# Auckland water efficiency strategy

## 2017 to 2020

Watercare
An Auckland Council Organisation

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# Foreword

More directly than for most organisations, the sustainability of Watercare's activities is dependent on the health of the natural environment.

While we are fortunate that water is not scarce in New Zealand like it is in some parts of the world, it is also a treasure to respect and manage wisely for the people of Auckland now and into the future. Over the next 35 years, the Auckland population that is serviced by the water system is expected to dramatically increase.

As a result, Watercare needs to invest in new water sources and infrastructure to meet demand. At the same time it will become even more important for Aucklanders to be mindful of water efficiency and minimising waste.
One of the United Nations' Sustainable Development Goals is to "ensure availability and sustainable management of water and sanitation for all". Watercare's 2017 water efficiency strategy – in which we encourage our customers and stakeholders to be efficient with their water use – is our collective contribution to a more sustainable Auckland.

The strategy outlines Watercare's plans – and the steps our customers can take – to reduce the pressure on Auckland's water supply. In line with our Asset Management Plan, our aim is to improve water efficiency over time, which will in turn help to delay investment in new water sources, treatment and network infrastructure.

I am pleased to introduce this important piece of work. I am confident that, together, our efforts to minimise water waste will gather momentum, and we will be successful in protecting and enhancing Auckland's water supply now and for future generations.

Raveen Jaduram
Watercare Chief Executive

# Executive summary

Over the next 35 years, the Auckland population serviced by the metropolitan water system is expected to increase by 800,000 from 1.41 million to 2.2 million, based on Auckland Council's medium growth projection. This will create significant additional demand for water – and that means investment will be needed for new water sources, water treatment capacity and networks. As the water and wastewater services supplier for Auckland, Watercare plans for this increasing need for water supply and lays out the required new water sources and infrastructure projects in the Asset Management Plan. At the same time, we work on reducing water demand through our water efficiency programme.

In 2008, Watercare collaborated with the former local councils of Auckland on the Three Waters Strategic Plan. This set a target to reduce Auckland's average rate of consumption[1] by 15 per cent by 2025 compared with 2004. This aimed at deferring the next water source required for Auckland by 10 years. To date, Auckland has succeeded in pushing out the next source by five years. The water efficiency gains planned from 2017 to 2025 will achieve the remaining five. Deferring the next water source puts less pressure on Auckland's waterways and saves $92 million of interest cost associated with avoided infrastructure. This is true environmental and social sustainability, contributing to a healthier natural environment and a more affordable Auckland.

Our water efficiency activities of the past three years were presented in the *2013–2016 Auckland Regional Water Demand Management Plan*. They included a combination of outreach programmes, volumetric charging for water and wastewater, metering and reducing losses from our network. We estimate that over the past three years, Auckland and Aucklanders have made water efficiency gains of approximately five million litres of water per day. This is a significant step and represents about one fifth of the total savings required by 2025.

To meet the target we need to go further. This water efficiency strategy enhances our existing programmes and identifies a number of new initiatives. The three years ahead represent a step change for water efficiency at Watercare. We enter a time of strong partnerships with the council, the community and organisations driven by resource efficiency. We also acknowledge the wider picture, such as the impact water use has on energy use and liveability in Auckland. Every dollar a household saves on water results in at least eight saved on energy if that water had required heating.[2] Water efficiency is very much in the interest of our customers and we want to acknowledge this with entirely new programmes such as showerhead retrofits and water efficiency schemes for new housing developments. We also want to lead by example and have worked on a strategy to reduce leakage in our network further than required by our regulatory target.

The programme for the next three years comprises four strategies and the key initiatives in the table.

[1] Or gross per capita consumption (PCC). This is the amount of water supplied divided by the number of people connected to the water network and includes residential and non-residential water consumption as well as leakage and bulk supply. It is different from residential per capita consumption, which is the average water use of Aucklanders in their homes.

[2] Source: *Be Waterwise for businesses and organisations*, available at www.watercare.co.nz

| Strategy | Key initiatives |
|---|---|
| 1. Municipal water efficiency programme | • **Watercare** will benchmark and reduce its internal water use and integrate water efficiency requirements as part of our contracts<br>• **Auckland Council** will work towards a 30 per cent reduction in water use by 2040 across all its facilities and work with Watercare to develop an optimised approach to irrigation of its parks, reserves and gardens<br>• **Panuku Development Auckland** will promote green buildings in its developments and measure water efficiency outcomes<br>• **Auckland Transport** will proactively monitor its water use across its facilities and projects, and utilise resources from Watercare to promote residential water efficiency programmes to its staff. |
| 2. Residential water efficiency programme | • The ***Be Waterwise*** **water efficiency brand and home show stand** will be enhanced. We will continue to support and promote the successful **water audit service in partnership with EcoMatters Environmental Trust**<br>• **A showerhead retrofit scheme** will be piloted and implemented, which will involve partnering with other organisations and addressing energy and water efficiency simultaneously<br>• More **information on rainwater harvesting and greywater recycling** will be developed<br>• **A water efficiency scheme for new builds** will be developed and implemented to promote water-efficient fixtures and fittings in new developments. |
| 3. Non-residential water efficiency programme | • **The Infrastructure Growth Charges** will be monitored to track increases in non-residential consumption<br>• A **key account customer** programme will be enhanced to work directly with our largest users<br>• Our **school programme** is to continue with a water efficiency message, a customised water efficiency service and benchmarking of school water usage to promote efficient use<br>• **Water efficiency in community sports clubs** will be addressed with the Project Litefoot Trust, creating the blueprint for water efficiency at Manukau Rugby Club. |
| 4. Network leakage reduction programme | • Establish **district meter areas** and actively manage pressure<br>• Maintain an active programme of **leak detection and repair**<br>• **Use technology** improvements to enhance the leak detection programme<br>• **Review current programmes and adopt a portfolio of key performance indicators (KPIs)** for best-practice leakage management<br>• **Install smart meters,** prioritising new subdivisions and communities not connected to the metropolitan network. |

# Water supply in Auckland

The water Aucklanders drink every day comes from dams in the Hunua and Waitākere ranges, an aquifer in Onehunga, and the Waikato River. The dams in the Hunua Ranges provide most of our water, currently meeting 60 per cent of Auckland's water needs.

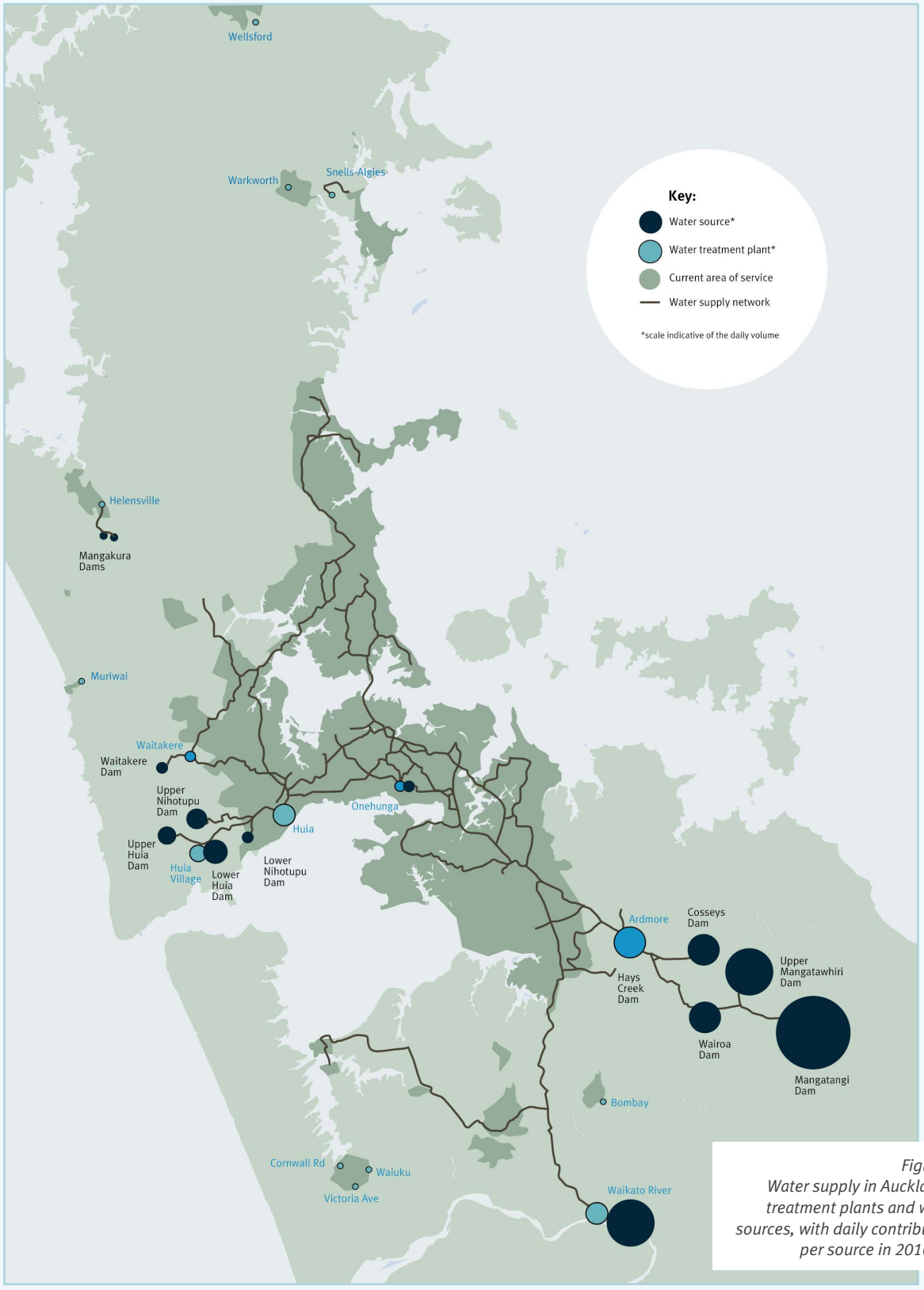



*Figure 1*
*Water supply in Auckland – treatment plants and water sources, with daily contribution per source in 2016/17.*

Fifteen water treatment plants supply drinking water to the Auckland region and each plant is designed to deal with the characteristics of the water it receives. Continuous monitoring is in place to meet the Ministry of Health's Drinking Water Standards for New Zealand and achieve an Aa grade in the public health grading process.

Because of the wide variety of sources that water comes from, a broad range of treatment processes needs to be used depending on the quality of the water. Water from dams in the Hunua and Waitākere ranges comes from catchment areas that largely comprise native bush and are protected from farming and industry. This means the water is of a high quality naturally and needs less complex treatment.

Water from the Hunua dams is treated at the Ardmore Water Treatment Plant, which uses conventional treatment processes – water conditioning, solids removal, sand filtration, fluoride addition, pH correction and disinfection.

In contrast, water from the Waikato River travels through a number of different environments on its journey to the water treatment plant at Tuakau and needs more treatment. The Waikato Water Treatment Plant uses additional processes including membrane ultra-filtration and activated carbon.

Once treated, water is sent around the region in an 8900 kilometre-long network of pipes. If all our water and wastewater pipes were placed end to end, they would reach Tokyo.

Almost all of the water that Watercare treats – over 98 per cent – feeds into the metropolitan network for Auckland and Waikato communities. This metropolitan network extends from Pokeno in the south to Waiwera in the north.

Some rural communities have a local source and are not connected to the metropolitan network. They are termed non-metropolitan areas. For example, people living in Waiuku receive water that is sourced from an aquifer and this water is treated and distributed via the town's local network.

Watercare Services Limited (Watercare) is the water and wastewater service provider for Auckland. We own and operate the water treatment plants and the distribution network. Everything we do is intrinsically linked to the natural environment. We are committed to playing a pivotal role in enhancing the natural environment and improving the quality of life for all Aucklanders.

Watercare is a council-controlled organisation (CCO), wholly owned by Auckland Council. We do not operate to make a profit and we are prohibited by law from paying a dividend to the council. We receive no funding from local or central government.

## Planning for growth

To calculate Auckland's water use, an average rate of consumption is multiplied by Auckland Council's population growth projections. This average rate is called gross per capita consumption (PCC).[3] It is expressed in litres per person per day but is not to be confused with how much water an Aucklander uses a day. The latter is called residential per capita consumption and currently stands at 160 litres per person per day (L/p/d). Gross PCC includes residential and non-residential consumption as well as leakage in the network and bulk supply, and currently stands at 272 L/p/d.

Growth investment, for water planning and construction, is based on PCC data. From these PCC calculations it is clear that, within the next decade, Auckland's current water sources will be insufficient to supply the region's growing population. An additional water source – plus treatment and transmission capability – will need to be brought on stream. After an exhaustive examination of over 80 options, Watercare has determined that the most viable solution for future-proofing Auckland's water supply is to duplicate the Waikato Water Treatment Plant and potentially install a second pipeline to draw additional water from the Waikato River.

[3] Gross per capita consumption (PCC) is the amount of water supplied divided by the number of people connected to the water network.
Gross PCC is influenced by many factors, in particular the balance between commercial and industrial demand and the number of people that live in Auckland. In other words, changes in gross PCC might have more to do with which industries choose to operate from Auckland, rather than water efficiency.
As a result, we believe targets based on volumetric water use could provide better water efficiency indicators. So while we continue to use PCC in this report, options for an alternate measure will be investigated.

If all of us in Auckland were to use less water in our households and businesses, the need for new infrastructure could be delayed. So while we plan for growth, Watercare is also strengthening its focus on reducing water demand.

## Deferring the need for the next water source

Back in 2004, Auckland's total water supply was 350 million litres per day (that equates to a gross PCC of 298 L/p/d). If water demand had continued at that rate, the new Waikato River[4] water source would have been needed in 2021. In 2008, Watercare, in collaboration with Auckland's former local councils, set a water efficiency target for the Auckland region – reduce the daily rate of consumption per person from 298 litres in 2004 to 253 litres in 2025. To date, Aucklanders have been successful in deferring the need for the next water source by five years.

Figure two shows how Auckland's population has increased over the past years, but the gross PCC has reduced.

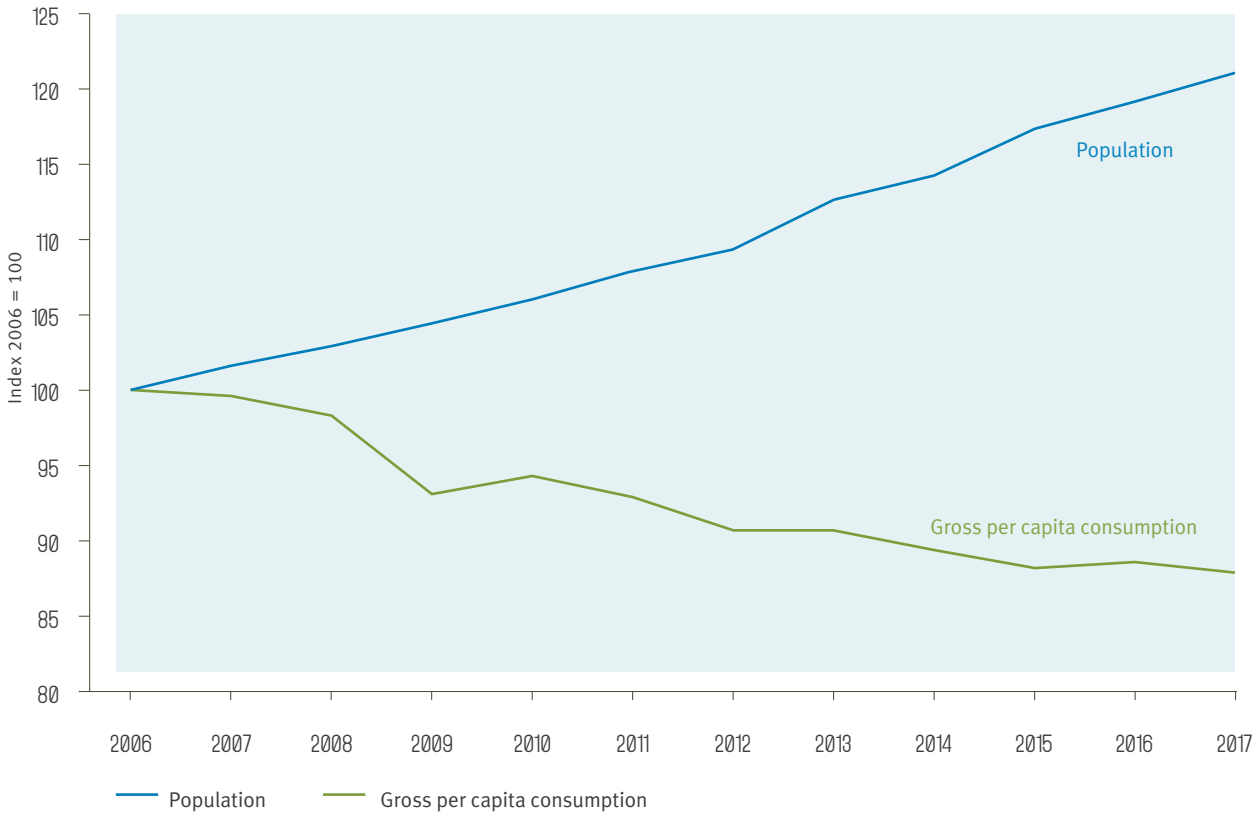



*Figure 2*
*Gross per capita consumption vs population growth from 2006 to 2017.*

[4] The new Waikato Water Treatment Plant is in Watercare's Asset Management Plan and the company is currently seeking resource consent to increase the water take from 150 to 350 million litres per day from the Waikato River.

Figure 3 shows that gross PCC has reduced significantly since the target was established in 2008. Over the past five years the reduction has been more modest and gross PCC has stabilised at between 270 and 280 L/p/d.

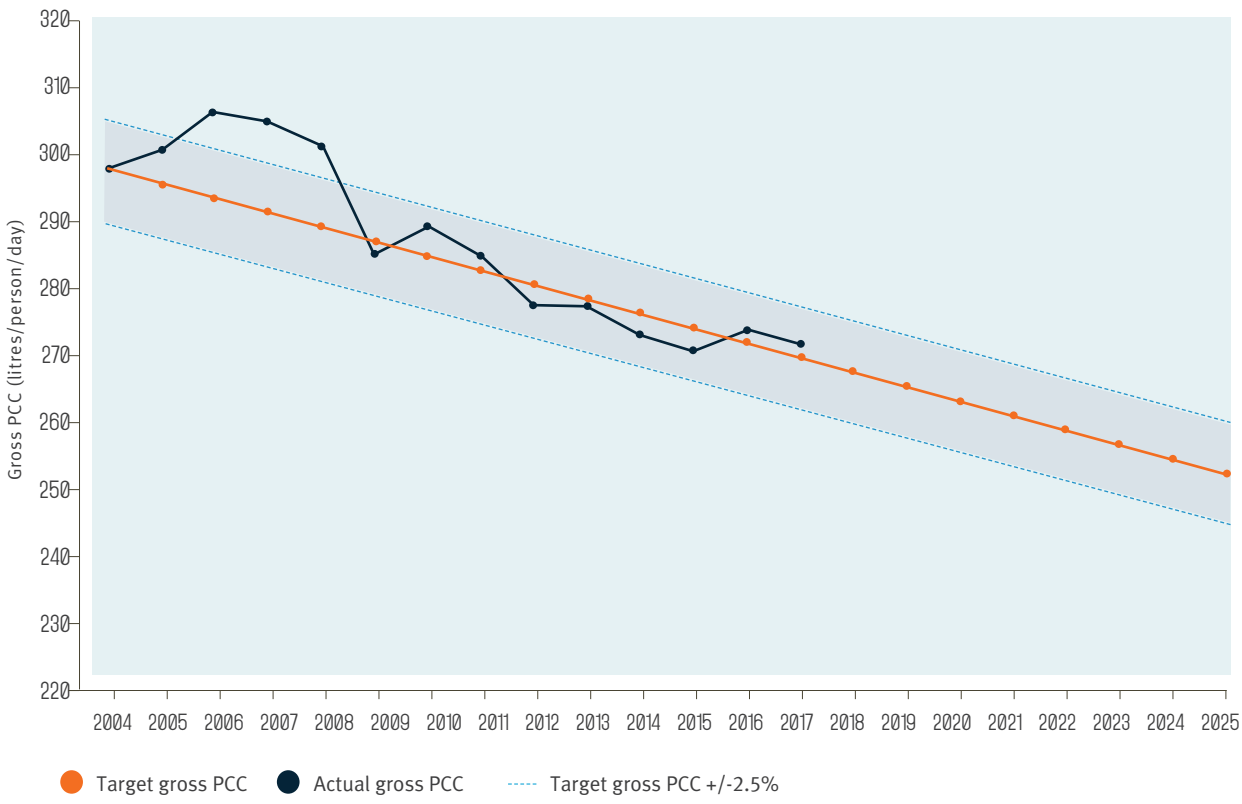



*Figure 3*
*Gross per capita consumption 2004 to 2025.*

The remaining water efficiency gains planned from 2017 to 2025 aim at deferring the next water source by another five years. In addition to putting less pressure on waterways, this equates to savings of $92 million in interest costs associated with not having to build new infrastructure for 10 years.

## Water efficiency – looking ahead

The way to push out the new Waikato Water Treatment Plant upgrade to 2031 is for all of us to be more efficient with the water we are using. Water efficiency is about reducing the amount of water waste or unnecessary use. Waste or unnecessary use could be from old appliances using a lot more water than newer ones, leaks in water pipes, behaviours such as watering a lawn while it is raining. For Aucklanders, being more water efficient leads to a more sustainable and affordable lifestyle. Since we charge for water and wastewater volumetrically, every reduction Aucklanders make to their water use leads to dollar savings for them.

Water use over the past three years has changed and these changes reflect evolutions of society and the impact of actions taken over this period, which were flagged in our *2013–2016 Auckland Regional Water Demand Management Plan*. Over the past three years, water efficiency in Auckland has led to approximately five million litres per day of the total savings required by 2025. Auckland's growth means that overall water use has not decreased. Recent trends suggest that both gross and residential PCC may be stabilising. Another step change is required to drive demand down to meet the water efficiency target, which we are implementing from 2017 onwards.

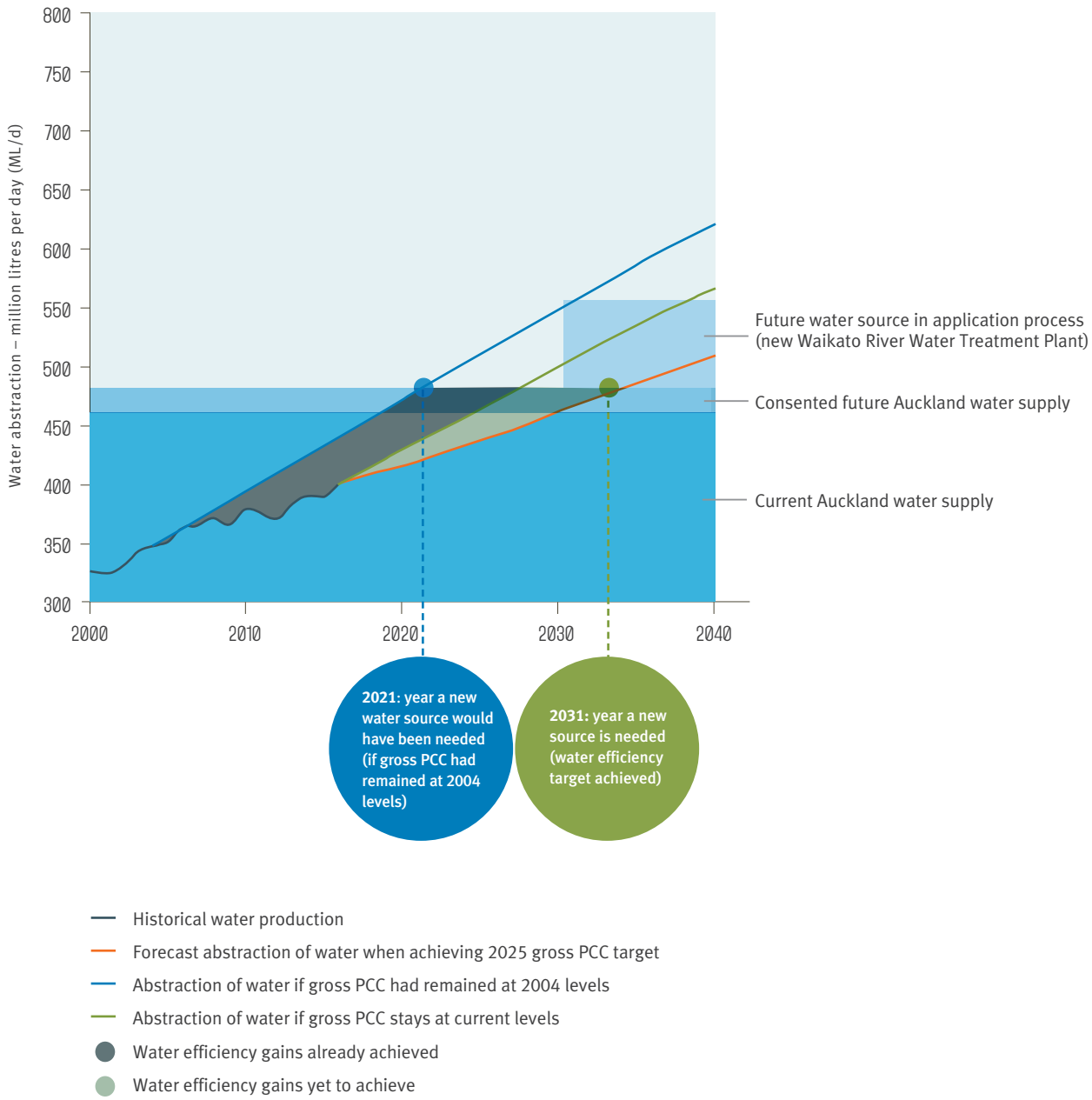



*Figure 4*
*Water supply vs demand in Auckland – the impact of water efficiency on the timing of new water sources.*

This document discusses our achievements to date and our proposed approach to achieve the water efficiency target. Beyond 2025 and the current water efficiency target, Watercare is investigating the potential of the next steps for water efficiency, such as considering the reuse of treated wastewater.

# Water use in Auckland

Watercare provides water to households, businesses and other organisations across Auckland. Over half of the water we supply (54 per cent) is used by residential households. The remainder is supplied to non-residential customers (25 per cent) and bulk agreements (five per cent). The bulk agreements are water provided to Veolia Water (which is in charge of the water network in Papakura) and the Waikato District Council, which uses the water to supply some of the growing communities in north Waikato. The final 16 per cent is identified as 'non-revenue water'. Non-revenue water is the difference between the water supplied to the network and the volume sold. There are a number of types of non-revenue water such as water used for fire-fighting, cleaning of water mains, burst water mains, illegal connections, meter under-reading and leakage in the network.

The percentage distribution between these categories has remained reasonably constant over the past five years. The breakdown for June 2015/16 is shown as Figure 5.

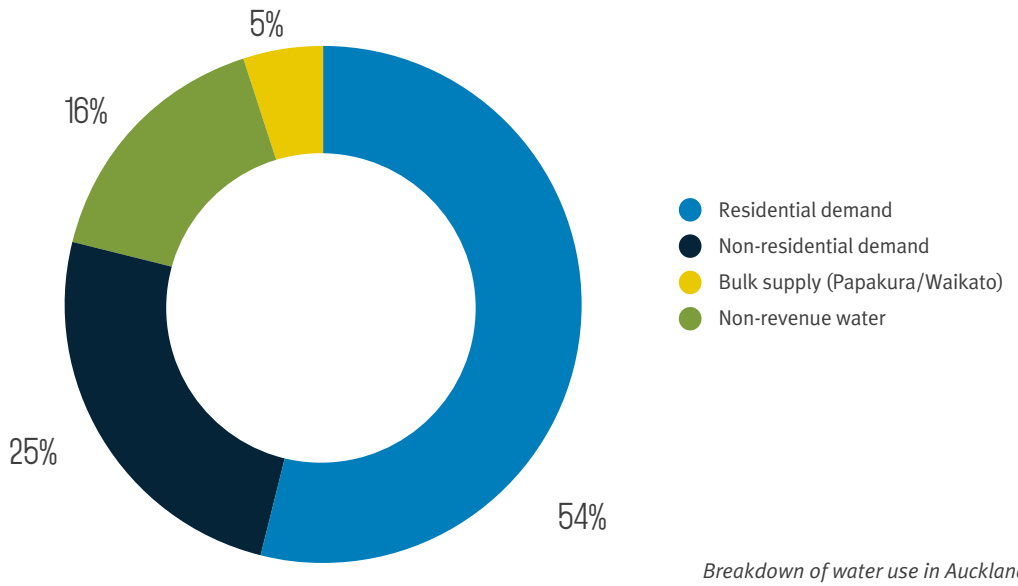



*Figure 5*
*Breakdown of water use in Auckland in 2015/16.*

### How we compare

Most major water utilities have developed plans and programmes to help their customers use water more efficiently. Sometimes this is to use resources more sustainably, or to respond to an extended drought (for example, the millennial drought in Australia).

Examples include:

- New York's approach to reduce overall demand by five per cent
- Sydney Water and Watercare both have a target to reduce gross PCC in comparison with a baseline level
- Water companies in England and Wales target reduction in water use per household over a five-year regulatory period.

Cities have a different mix of residential and non-residential water users, so overall water efficiency targets cannot be compared. Residential water use per person is more comparable and reflects the cultural attitude to water efficiency between different countries or locations.

All water connections in Auckland, unlike most parts of New Zealand, are metered. That means customers know how much water they use – it also provides Watercare with comprehensive water use data.

Figure 6 compares Auckland's residential PCC[5] with other fully metered utilities. Aucklanders have the lowest residential PCC in New Zealand, according to the 2016 Water New Zealand performance review.

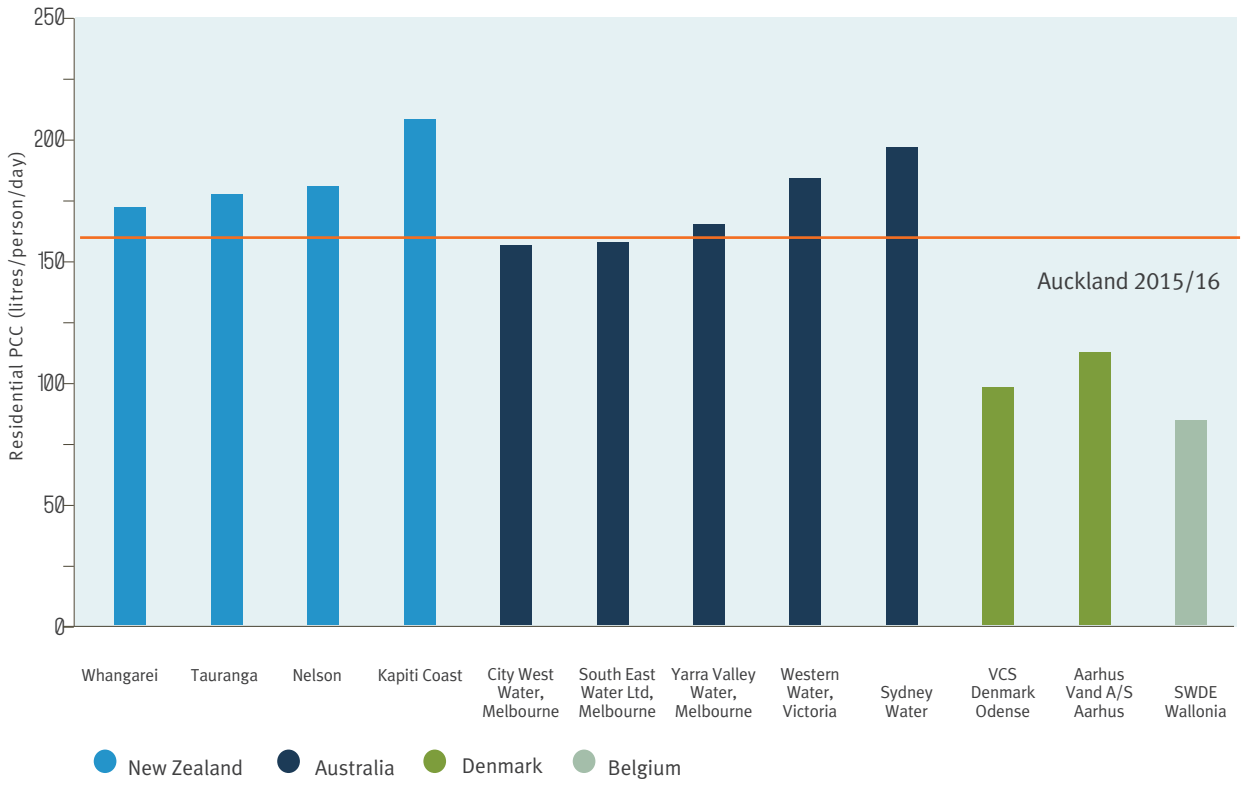



*Figure 6*
*Auckland residential PCC benchmarked against similar cities (medium and large, over 95 per cent of population metered).*[6]

Internationally, consumption compares well with similar Australian utilities but tends to be higher than cities in Europe. We believe this is a combination of a higher water efficiency awareness, denser housing and lower network pressure in some European cities. The UK has not been included in the graph as there is currently no data available from UK water utilities that are fully metered.

[5] Residential per capita consumption is the amount of water metered from household customers divided by the number of people connected to the water network.

[6] Data from 2013 to 2016, being the most recent available.

# Residential water use

Household use shows a reduction from approximately 167 L/p/d in 2012 to about 160 in 2014, 2015 and 2016. Variations in annual residential usage are impacted by water efficiency and by the weather over the summer. Water usage increases during a drier or hotter summer in comparison with a normal year.

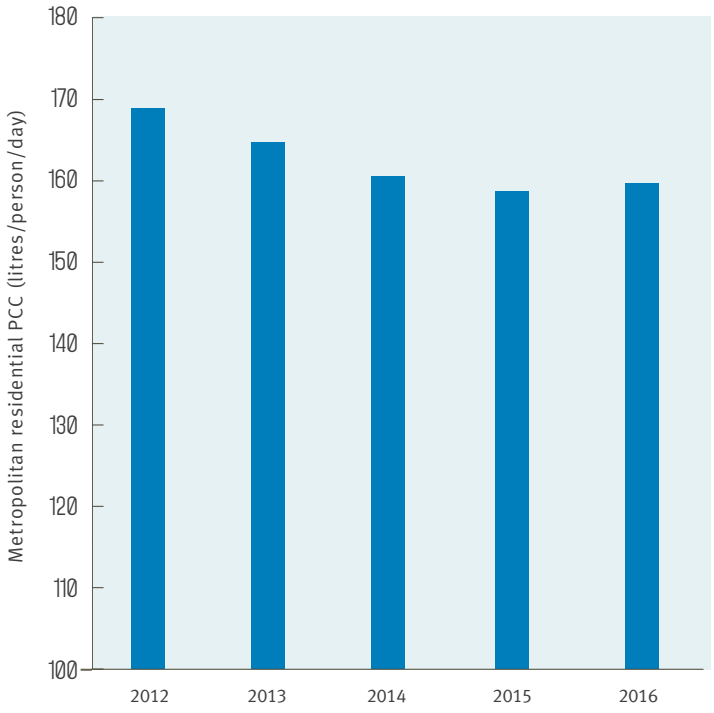



*Figure 7*
*Metropolitan residential per capita consumption between 2012 and 2016.*

In 2008, Watercare engaged BRANZ, an independent research organisation, to determine how water is typically used in 50 Auckland homes. BRANZ used high-resolution meters. A summary of the results is shown in Figure 8. This helps us to understand where water efficiency efforts could make the biggest difference.

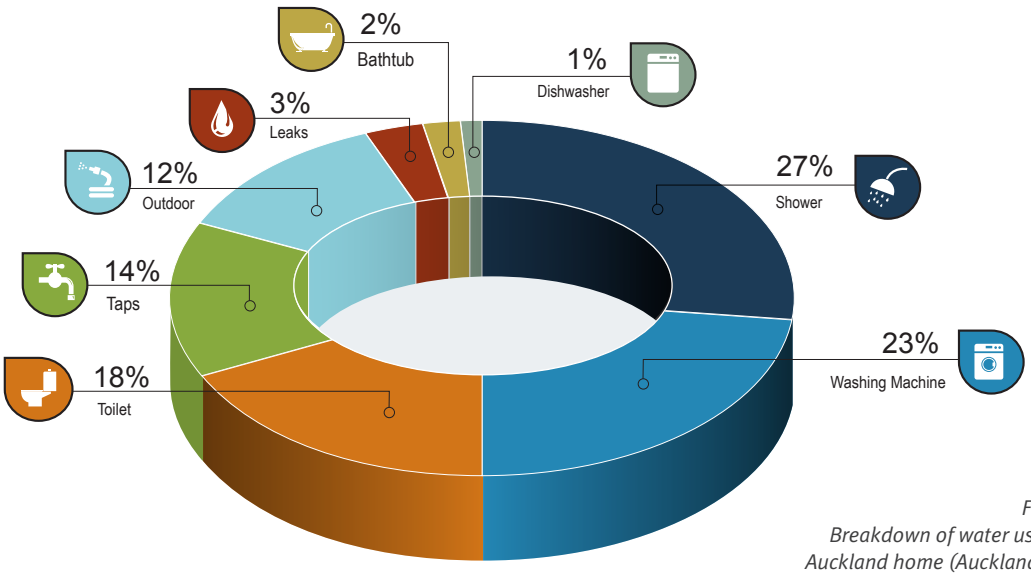



*Figure 8*
*Breakdown of water use in an Auckland home (Auckland water use study, BRANZ 2008).*

The largest use of water indoors is people showering, followed by washing machine use and toilet flushing. These are areas where water efficiency initiatives could have the greatest benefit. This water efficiency strategy focuses on approaches that could reduce water use in these areas, all year round.

In 2014, Watercare engaged BRANZ again to understand changes in water use since undertaking the 2008 study. A similar sample of households was targeted, this time using surveys and a prediction tool as opposed to high-resolution meters. Six years of billed water use was analysed to enable the seasonality of water use to be fully taken into account. The average billed water use per person showed a slight reduction of six per cent between 2008 and 2013 for the participating households.

## Non-residential water use

Non-residential water use accounts for approximately 25 per cent of water use in Auckland. The vast majority of our non-residential customers (approximately 85 per cent) use less than 2000 litres of water per day. A small number of large users in Auckland (less than 1.5 per cent) use more than 15,000 per day. There is a regional difference, with more of the large non-residential customers being located in central Auckland and Manukau.

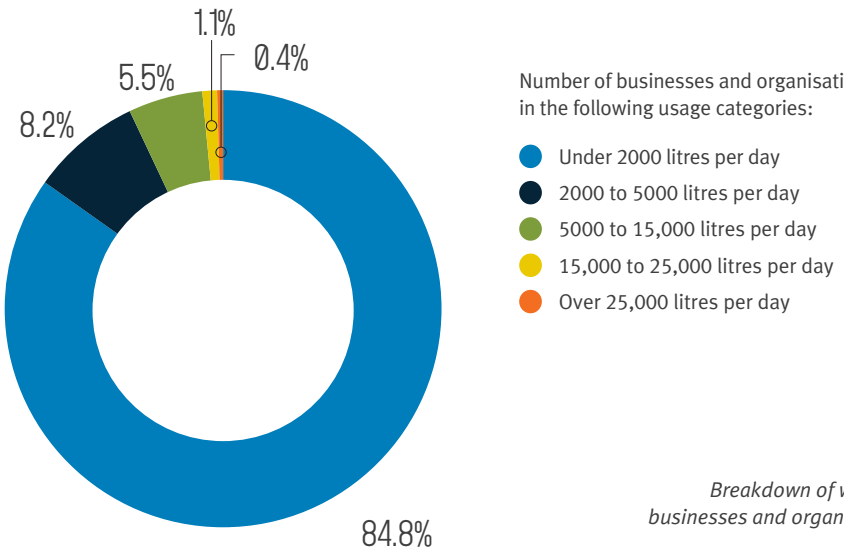



*Figure 9*
*Breakdown of water use across businesses and organisations in 2016.*

We can drill into the water usage of the 80 customers that use the most water – these are Watercare's key account customers. Collectively, this includes 3200 accounts (held by those 80 customers) and represents 42 per cent of annual non-residential water usage. (Note: Auckland Council organisations – some of Watercare's largest accounts – have developed water efficiency strategies that are presented in the next section of this document.)

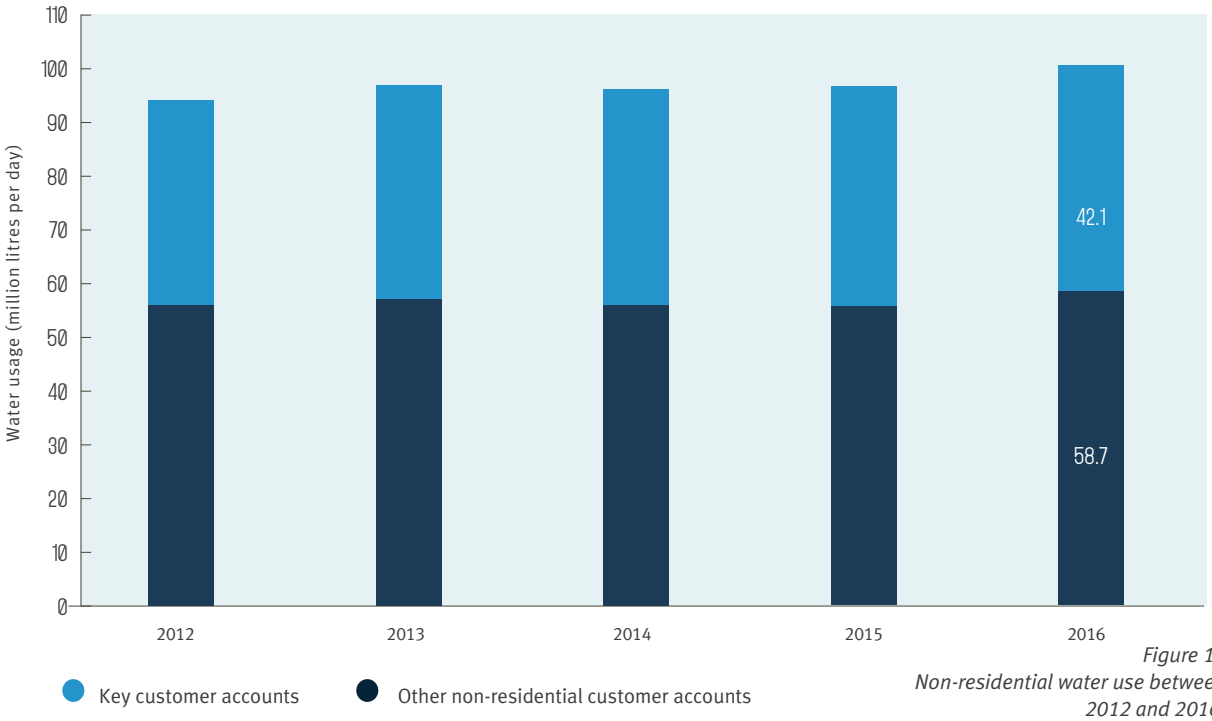



*Figure 10*
*Non-residential water use between 2012 and 2016.*

Currently, Watercare has 21 categories for non-residential customers.

Figure 11 shows the trends in total water use by customer category over the past five years. This excludes the 'commercial' category, a 'catch-all' category that represents approximately 65 per cent of non-residential accounts with low water usage.[7] Total water usage in most categories is trending upward, with notable exceptions being the industry category, which has decreased, and the beverage category, which has fluctuated from year to year. This aligns with the growth observed in Auckland over the same time period. It also shows that the categories use the most water overall are food manufacturing, industry, and beverage manufacturing, followed by the retail, education (schools with sports fields), and sports and recreation facilities categories.

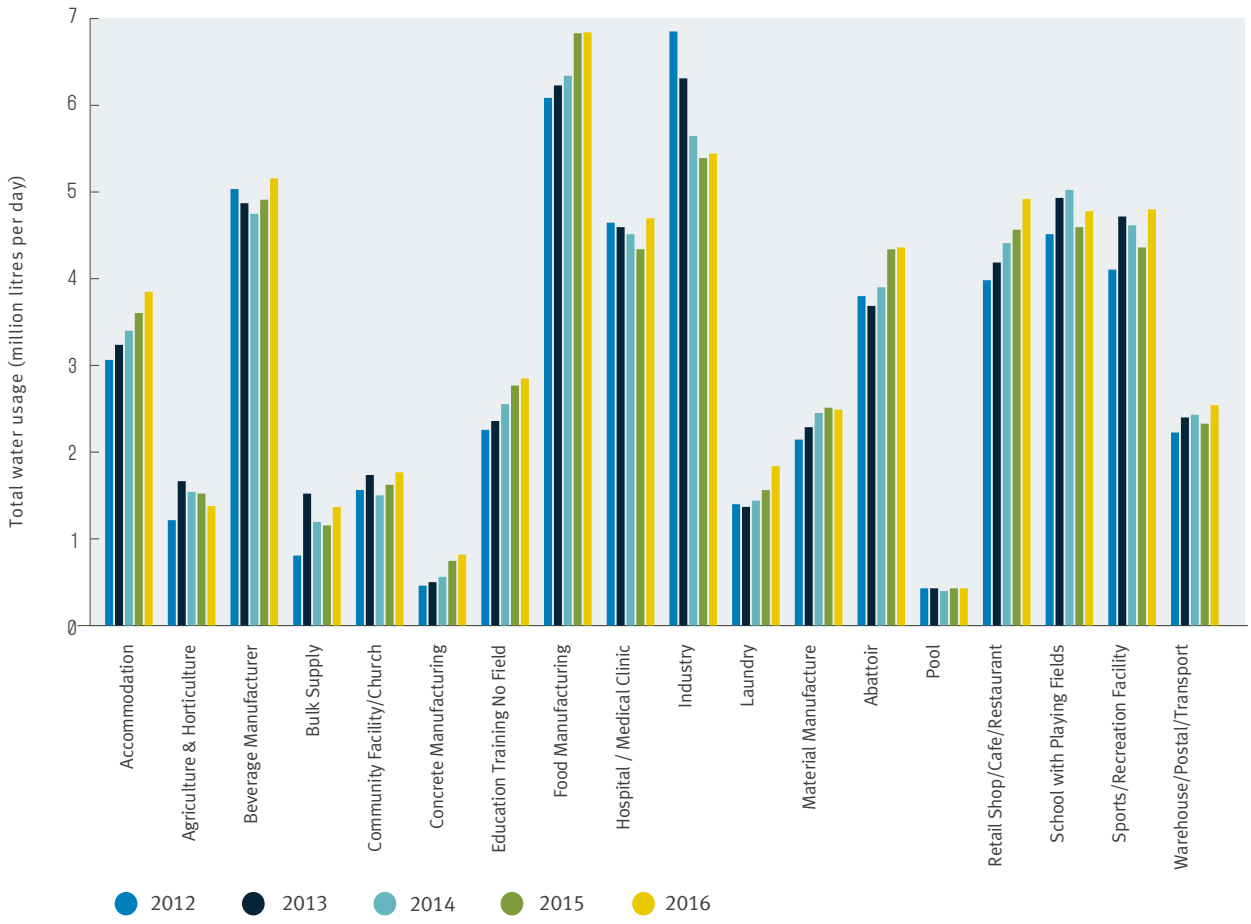



*Figure 11*
*Total annual water usage per non-residential account class 2012 to 2016 (excludes 'commercial' account class).*

We can contrast the figures above with the same figures representing a subset of accounts that have been active during a five-year period. This looks at the water efficiency in the category as opposed to its growth. Figure 12 shows average usage by the same accounts over five years. Looking at this information, we can see increases and decreases in water use within the same set of accounts.

Categories that show clear increases in water usage per account, most likely equating to increased production, are beverages, food manufacturing, industry, concrete manufacturing and material manufacturing. Categories with the most apparent decreases in water usage are agriculture/horticulture, and hospital/medical clinics.

[7] Categorisation will be revisited as part of Watercare's strategic transformation programme to allow a better breakdown of this 65 per cent of non-residential accounts.

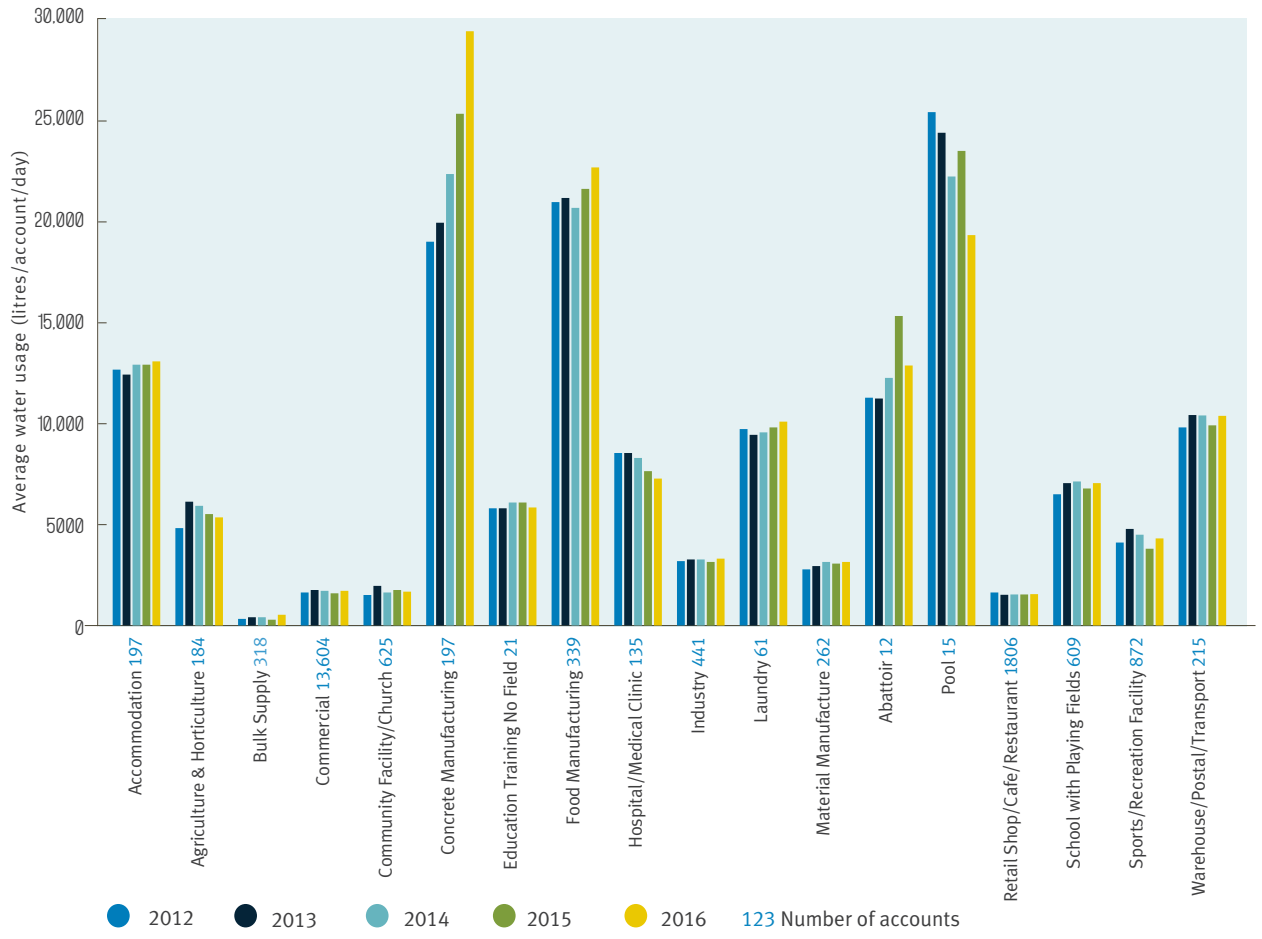



*Figure 12*
*Twenty-thousand continuous non-residential accounts – average annual water usage per account 2012 to 2016 (excludes 'beverage' account class).*[8]

[8] The nine continuous accounts of the beverage category are not represented on the graph given the extremely high usage per account, which would dwarf the other categories. Average usage in the continuous accounts of this category is around 220,000 litres per day.

# Auckland water efficiency targets

**Save 21 million litres per day by 2025**
**A reduction of 15 per cent[9]**


## Strategy one: Municipal water efficiency programme

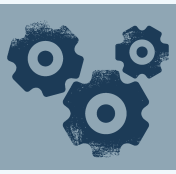
Target water efficiency gains by 2025 – one million litres per day

## Strategy two: Residential water efficiency programme

Target water efficiency gains by 2025 – three to five million litres per day

## Strategy three: Non-residential water efficiency programme

Target water efficiency gains by 2025 – three to seven million litres per day



## Strategy four: Reducing leakage in the water network

Target water efficiency gains by 2025 – eight to 14 million litres per day

[9] Watercare, in collaboration with Auckland's former councils, set a water efficiency target for the Auckland region – reduce the daily rate of consumption per person from 298 litres in 2004 to 253 litres in 2025. The objective of this 15 per cent reduction was to defer the need for the next water source for 10 years.

# Strategy one: Municipal water efficiency programme

## Target water efficiency gains by 2025 – one million litres per day

## Overview

Auckland Council and its family of council -controlled organisations (CCOs) – including Watercare, Panuku Development Auckland and Auckland Transport – are committed to achieving Auckland's vision of becoming the world's most liveable city.

Sustainability principles are at the core of this vision, which includes energy and resource efficiency. Auckland has joined other cities at the forefront of a global transformation to a sustainable, energy resilient, low carbon future. In 2015 Auckland was admitted to the C40 Cities Climate Leadership Group – a strategic global network of 90 leading cities working together to reduce greenhouse gas emissions and climate risks.

To encourage positive change, Auckland's council organisations are taking a leadership role by using water efficiently within their own facilities and operations.

This section sets out what Watercare and other CCOs are doing to reduce water use, and our plan for future improvements in water efficiency.

## Initiative one: Watercare's operations

Watercare's business is intrinsically linked to the natural environment and significantly impacts the communities in which it operates. Integrating sustainability into everything we do is key to our role as a trusted community partner.

In 2015, we adopted being 'Fully Sustainable' as one of our four strategic priorities. Minimising environmental impact is already core to our business operations. Moving to a position of leadership in environmental sustainability has boosted a number of forward-thinking programmes that have been in the works for a while. These include the ambitious target of achieving energy neutrality by 2025 at our two largest wastewater treatment plants, Mangere and Rosedale. This will reduce our energy use by 37 gigawatt hours every year and would be a world first for a plant the size of Mangere.

In the next three years we have plans to continue our progress towards being a fully sustainable organisation. In terms of water efficiency, we plan to:

- Measure our water use in construction and operation across the organisation and through our supply chain
- Benchmark our water use in our office buildings
- Review our design standards to make sure that new water and wastewater treatment plants are as efficient as possible in their use of water
- Review our contracts with our suppliers to make sure they are thinking of water efficiency when they design, build and operate our facilities.

### Treated wastewater reuse

Our wastewater treatment plants continue to reuse treated wastewater within the treatment processes and elsewhere on site. Treated wastewater is used for washdown, clarifiers, biofilter irrigation, as the carrier water for chemicals, and as cooling water for engines and heat exchangers.

At our two largest wastewater treatment plants, Mangere and Rosedale, the volumes of treated effluent that we reused for the year 2015/16 were:

- Mangere Wastewater Treatment Plant – 21.6 million litres per day
- Rosedale Wastewater Treatment Plant – 1.95 million litres per day.

This volume of water reused is the equivalent of the water consumption of over 150,000 Aucklanders.

At some Watercare sites, treated effluent is used to irrigate the surrounding land. This depends on the location and specific consent requirements.

Our resource consents include a requirement to consider other beneficial reuse options for wastewater, which is in line with our constant search for wastewater reuse opportunities. Where we are constructing new infrastructure we try to change our designs to make it easier to reuse wastewater in the future. For example, we could install treated wastewater pipes with outlets that would allow treated wastewater to be used in industrial processes for our non-residential customers in the future.

In Huapai, we have constructed a wastewater system to meet demands of forecast growth. While we wait for that growth to eventuate, the pipes must be flushed regularly to avoid septicity and odours. Instead of using drinking water for this flushing, we have switched to treated wastewater trucked a short distance from the Denehurst Wastewater Treatment Plant to Huapai.

### Case study – technology solutions

We are committed to adopting new technologies where they deliver efficient outcomes for us. One of our current initiatives is to test and prove how ozone treatment can be used in place of traditional chlorination when we are flushing our watermains. The ozone treatment process would result in reduced outage periods, a quicker service for connecting new supplies and lower operational water use. Other international water utilities use this process; for example Sydney Water.

We have submitted this more water-efficient process to the Ministry of Health for its approval and plan to update our Disinfection Code of Practice once the process has been tested, proven and signed off.

## Initiative two: Auckland Council community facilities

Auckland Council operates many facilities involving significant water use: leisure centres, sports fields, public facilities and buildings. The council is committed to achieving a net 30 per cent reduction in water use by 2030 for its facilities – that is, reduce water consumption by 1.5 million litres per day compared with its 2016/17 total use.

Prior to establishing this target, the council worked with Watercare to centralise all water and wastewater invoices into one utility management system to be able to compare usage and receive alerts in case of high water use. This system will now be updated to benchmark water consumption per asset class using a water usage index such as the number of kilolitres used per square metre per year. This information will then be made available to staff and contractors monthly to track performance.

The council has recently let new Auckland-wide facilities maintenance contracts that require contractors to meet water efficiency targets. The contracts include incentives and penalties to make sure that the targets are met. Irrigation contracts specify that moisture readings have to be taken throughout the year and maximum irrigation volumes are set.

Some examples of how contractors and the council may achieve the water efficiency targets range from small to large changes, including:

- Constructing AstroTurf or hybrid turf sports fields instead of grass pitches if relevant
- Replacing existing water fittings with new water-efficient devices
- Looking for and fixing leaks
- Switching to foaming soap, which could lead to a 15 per cent reduction in water use associated with hand washing.

The council is working with Watercare on the Auckland irrigation app. This will help its contractors achieve the targets it has set them. Watercare plans to make this app available to all its customers to help them use water efficiently in the garden.

## Initiative three: Auckland Council community initiatives

Auckland Council is committed to helping communities become more sustainable. It runs initiatives that are focused on making the homes we live in warmer, healthier and more energy efficient. Some of these programmes help minimise water use at home through practical changes.

Watercare works alongside the council to deliver initiatives that help Aucklanders to live in a more sustainable way. Over the next three years we intend to strengthen these ties.

We will work with the council low carbon living team to galvanise all Aucklanders to make changes to their daily lifestyle choices to achieve the council's target of reducing 40 per cent of Auckland's greenhouse gas emissions by 2040.

Services provided to the community by the council include:

**The Eco-Design Advisory Service:** Auckland Council eco-design advisors offer free, expert advice on a range of topics and are advocates for creating healthier buildings, improving households' use of energy, water and materials, minimising waste, and reducing environmental damage from building projects. An eco design advisor can come to a home, building site or office. Water-related advice includes information on WELS[10] rated fittings, rainwater collection tanks, low flow showerheads and greywater system setup.

**Healthy Rentals Programme:** Landlords in several Local Board areas around Auckland can transform their rental properties into healthy, energy efficient homes. The Local Board offers a free, independent healthy home assessment, plus potential assistance including low flow showerheads and flow restricting devices. The team educates tenants about taking shorter showers, fixing leaks and using a shower instead of a bath to reduce water use.

**Energy-Efficient Communities Project:** This is a collaborative project between Entrust, Auckland Council and Vector to help home-owners in Papakura and Takanini save on energy bills, create warmer, healthier homes, create awareness of energy efficiency and reduce peak load pressure on energy infrastructure. The project consists of:

- Home health checks
- Installation of renewable and efficient energy solutions
- Education within schools and community organisations.

Home-owners can be offered low flow showerheads and flow restricting devices, along with education about how to use water wisely.

[10] Water Efficiency Labelling Scheme.

The council is running the project as a pilot between March and December 2017. Following this pilot, the council will look at scaling and replicating the programme in other areas of Auckland.

**Retrofit your home scheme**: This scheme improves the quality of housing for Aucklanders by giving better access to home insulation, clean heating, rainwater tank installation and water-efficient devices.

Ratepayers can apply for up to $5000 (including GST) to make their home warmer, drier and more sustainable. This is paid back through their rates over nine years. This cost-neutral programme has been running for five years, retrofitting over 11,000 homes in Auckland.

## Initiative four: Panuku Development Auckland's water-efficient buildings

Panuku Development Auckland is investigating the ability to implement green building initiatives for all new developments they are working on, in a cost-effective way.

One of four major regeneration areas currently overseen by Panuku, Wynyard Quarter, is fast becoming a sought-after place by Aucklanders to work, live and socialise in. It is an exemplar project that has been developed on key sustainability principles and an overarching vision by Panuku to create a resilient place which minimises environmental impacts, conserves natural resources, is built sustainably and responds to climate change.

This vision was outlined in a set of sustainability standards for the Wynyard Quarter. These defined the need for high-performance buildings that were energy efficient, water efficient, used renewable energy and were close to sustainable transport modes. All buildings built or renovated within the Wynyard Quarter development are required to meet these sustainability standards.

Panuku uses a number of rating tools to ensure sustainable building design and construction in the Wynyard Quarter. These include Green Star, a tool by the New Zealand Green Building Council to support stakeholders in the property and construction sectors to design, construct and operate projects in a more sustainable, efficient and productive way. Water use is a specific category to which Green Star points can be assigned. Panuku also uses the Homestar tool, which rates the health, comfort, efficiency and sustainability of New Zealand's residential homes on a scale of one to 10.

Wynyard Central, a luxury apartment development located in the Wynyard Quarter, has set a high benchmark with all residences achieving a minimum seven Homestar rating. By comparison, a typical new home built to minimum Building Code requirements would rate around three or four on the Homestar scale. Wynyard Central became the first large-scale multi-unit residential development to achieve a Homestar Design rating for sustainability and energy efficiency.

As more and more commercial and residential buildings are tenanted, Panuku is able to monitor and track progress against its key sustainability targets. Panuku tracks sustainability data and makes it available through the online platform called the Wynyard Quarter Smart Website, www.wynyard-quarter.co.nz/wqsmart. The website analyses sustainability data from the precinct and presents this in an interactive and innovative way so people can see real-time information on building performance.

*Image 1*
*Lysaght Building, Wynyard Quarter.*

Water efficiency is an important part of this wider sustainability story at the Wynyard Quarter. All new buildings and refurbishments must have water-efficient fixtures and appliances. All new buildings need to be able to collect rainwater for reuse in toilet flushing, laundry and irrigation. Any landscaping or irrigation must be designed to have low water demand or use drip irrigation systems. Specific targets are set for residential and commercial developments in Wynyard Quarter, including volumes of use and also minimum WELS ratings for fixtures and fittings as outlined below:

| Residential | Non-residential |
|---|---|
| 120 litres/person/day | 350 litres/$m^2$/year |
| Fixtures and appliance rating minimums:<br>• 3-star WELS showerhead<br>• 4-star WELS toilet tapware<br>• 5-star WELS dishwasher and washing machine | Fixtures and appliance rating minimums:<br>• 3-star WELS showerhead<br>• 4-star WELS toilet tapware<br>• 5-star WELS dishwasher and washing machine<br>Waterless or very low water use urinals and water |

## Initiative five: Auckland Transport

In 2017, Auckland Transport will publish its Sustainability Policy. To help it decide where it can make the most difference to the environment and communities, Auckland Transport has just completed a study investigating its largest environmental impacts. This shows that water use does not have an impact as great as carbon emissions, energy use or the effect of roads and rail on streams and other waterways.

Auckland Transport has been improving its understanding of water use in its own buildings, including railway and bus stations. This information could be used to benchmark levels of water efficiency between locations, and with other offices and public facilities.

The construction of roads and railway lines is an area where Auckland Transport has not measured its water use yet. Water is used during construction for dust suppression and truck wheel washing. Auckland Transport is hoping to carry out an exercise to calculate the size of this 'water footprint'. This will follow on from the City Rail Link water footprint calculation.

### Case study – City Rail Link water footprint

For the City Rail Link (CRL) project, Auckland Transport applied the Infrastructure Sustainability Council of Australia (ISCA) tool to embed sustainability into the design and construction of the first two contract packages, Contract 1 Britomart Works (C1) and Contract 2 Albert Street tunnels and a stormwater diversion (C2). As part of this work the CRL team developed a water footprint for the predicted construction and operational water use. Based on efficiencies in the design, predicted water use at Britomart is expected to reduce by over 50 per cent with a further four megalitres of water use avoided during the construction phase for C1. With the Albert Street works, construction efficiencies for C2 result in a predicted 30 per cent reduction in water use, and efficiencies associated with the design are predicted to achieve 40 per cent reductions.

CRL has been awarded a 'Leading' Infrastructure Sustainability Design rating by ISCA, the highest possible achievement in the IS scheme for the design and construction for both C1 and C2.

The CRL is now delivered by City Rail Link Limited, a Crown Entity separate from Auckland Transport.

# Strategy two: Residential water efficiency programme

## Target water efficiency gains by 2025 – three to five million litres per day

More than half of the water we supply to Auckland is used in households. Connecting with Aucklanders and helping them to reduce their water use at home is at the heart of our water efficiency strategy.

Over the past three years, we have developed several ways to engage with households wanting to reduce water wastage with the *Be Waterwise* programme. This involves information on our website, water audits provided free of charge to households and meeting Aucklanders on our stand shared with the EcoMatters Environment Trust at home shows throughout the year. We have also increased our communication on residential water efficiency thanks to the *Tapped In* quarterly newsletter, which regularly features case studies and advice on the matter. These publications and subsequent articles in local newspapers have resulted in an increased number of customer calls enquiring about our water audit service.

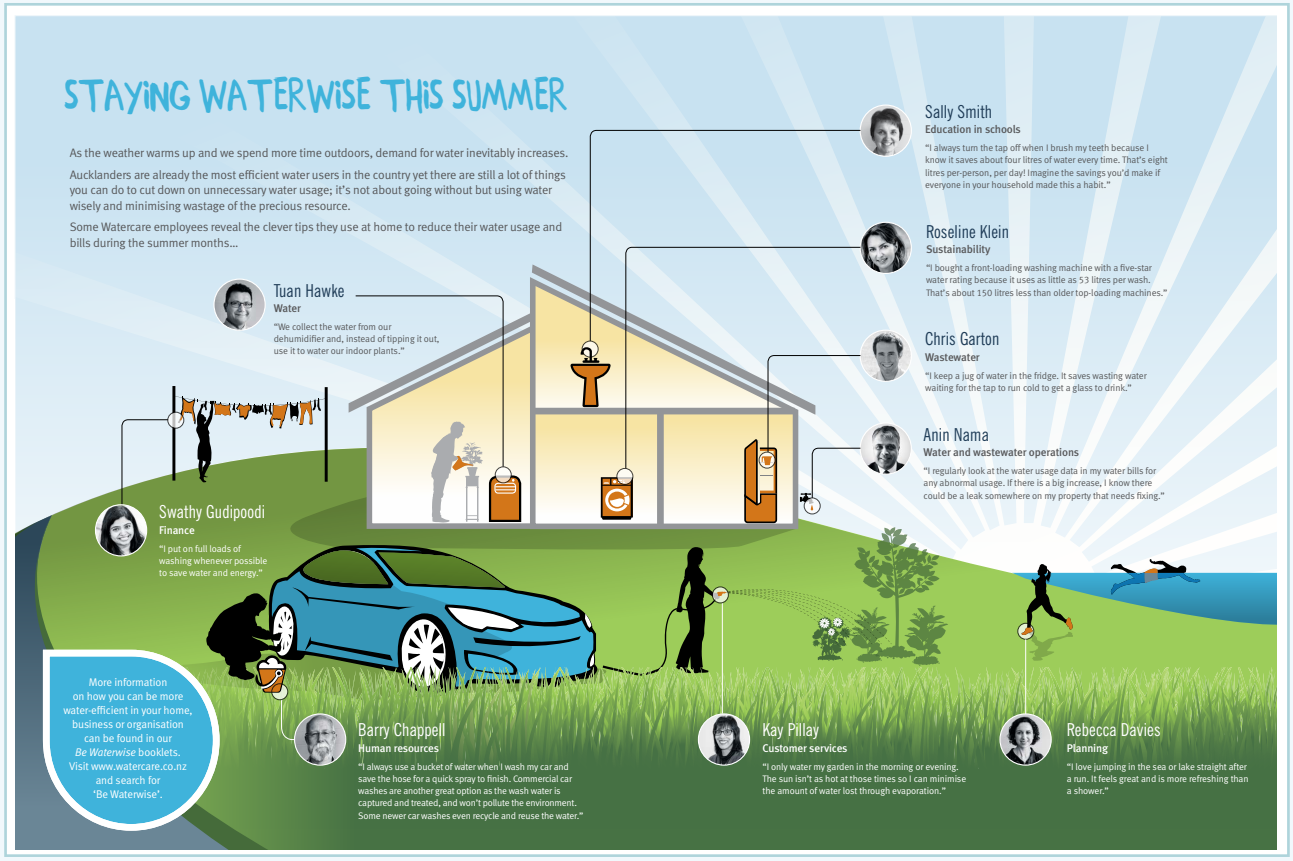
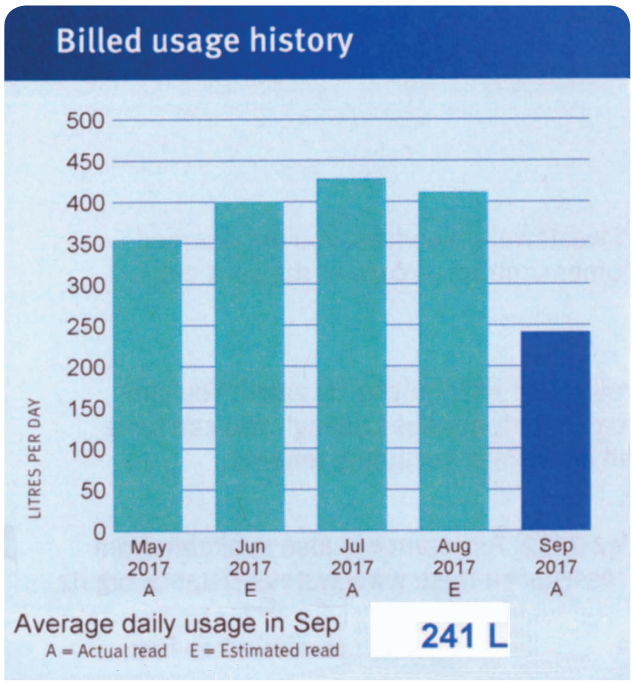



*Figure 13*
*Insert from 2015/16 summer edition of Tapped In, Watercare's customer newsletter.*

Beyond our *Be Waterwise* services – available free of charge to Aucklanders who are proactive about their water efficiency – we aim to engage all Aucklanders, sustainably minded or not. To do this, all water supplied by Watercare in the Auckland region is metered. Water is charged volumetrically at a rate of $1.48 per 1000 litres (GST inclusive, 2017/18 prices).

The water used in Auckland reduced significantly following the introduction of metering. Volumetric charging of water has been a key component of managing demand to date. As of July 2012, a unified residential wastewater tariff was put in place, including a volumetric component. This is best practice for sustainability. Volumetric charging allows customers to appreciate the value of water and wastewater services as well as spot leaks more easily. A reduction in use leads to customers making monetary savings across both the water and wastewater services. This is a clear financial incentive for water efficiency, whether the household cares about sustainability or not.

The bills Aucklanders receive from us also help them compare their usage month by month and understand how their usage compares with average household usage in Auckland.



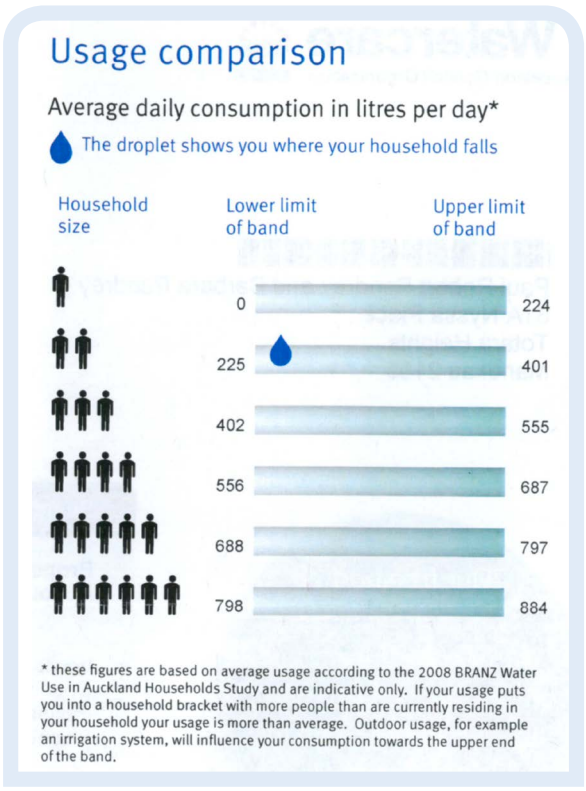




*Figure 14*
*Examples of information displayed on the water bill.*

Over the next three years, we will enhance these existing initiatives and will go further in our contribution to residential water efficiency through partnerships with other organisations, a showerhead retrofit programme and a scheme to promote water-efficient fittings and fixtures in new housing developments.

## Initiative one: *Be Waterwise*, the complete toolkit for household water efficiency

*Be Waterwise* is the branding Watercare created in 2013 when developing our new water efficiency offering to residential customers. The programme is made up of information material, ways to engage and tools available to Aucklanders.

Parts of the programme are delivered in partnership with EcoMatters Environment Trust. EcoMatters' mission is to connect people with the environment they live in. To do that, it offers a wide range of community-based environmental initiatives in Auckland including sustainable living programmes and projects in the areas of waste minimisation, permaculture, energy efficiency, air quality, water conservation, stream restoration, weed management, composting, and edible gardening. Watercare has had an ongoing partnership with EcoMatters for six years.

### Information – Be Waterwise for households

The *Be Waterwise* booklet outlines the benefits of being water efficient and the many ways that a household can save water. This booklet is available online on the Watercare website and also in hard copies, and is used to engage with Aucklanders at the events we attend. More than 2000 copies of this booklet have been distributed since its creation.


*Figure 15*
*Cover from the Be Waterwise for households booklet.*

## Out and about

Being present at events to meet Aucklanders face to face is a great way to have conversations with our customers. Staff are drawn from across Watercare to help ensure all teams know what is top of mind for Aucklanders. We stand side by side with the EcoMatters team to answer questions and provide information and water-saving devices to customers attending events such as the Auckland Home Show and Go Green Expo. Over the past three years we have attended 21 events and spoken face to face with more than 5700 customers.


*Image 2*
*EcoMatters and Watercare staff attending the Go Green Expo in Auckland.*

*Image 3*
*Watercare network engineer Maria Eliza explaining low-flow showerheads.*

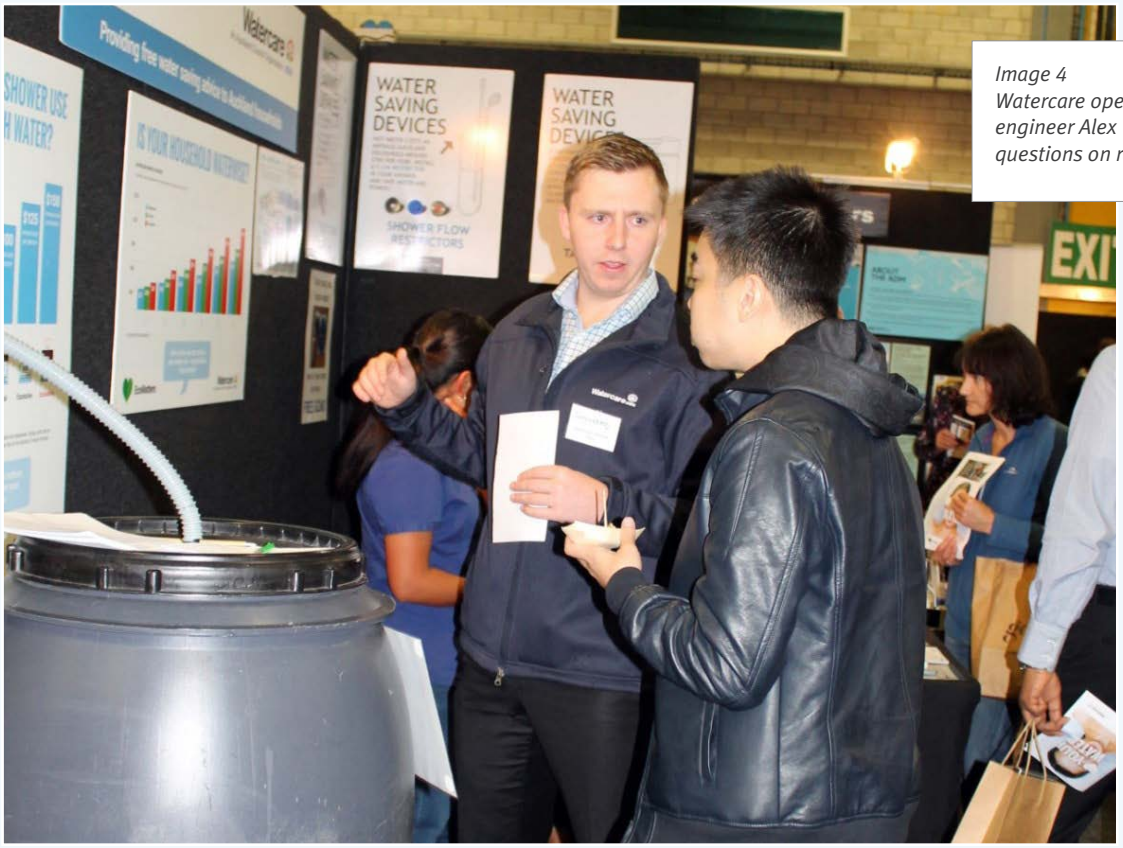



*Image 4*
*Watercare operations engineer Alex Walker answers questions on rainwater tanks.*

In the next three years, we will enhance the displays used at events to better engage and respond to questions received from customers.

### The Water Advice Line – water audits free of charge

A new water advice line was launched in 2013 to help households reduce their water use. Once they contact Watercare mentioning a higher-than-usual bill, households get the opportunity to have an audit of their water use done by EcoMatters, either over the phone or through a home visit. The information enables a tailored water-saving recommendations report to be shared with the household. It highlights the water and dollar savings achievable through behavioural changes, maintenance or changes in appliances. If desired, regular reports on the household's water usage over a 12-month period are provided to monitor progress and so assess the benefits of the programme.

These water audits have resulted in a total reduction in water use of about 15 per cent per household involved, with up to 45 per cent in some homes. In 2015/16, three hundred households used the service.

EcoMatters has been implementing process changes to help more households more cost effectively. Over the next three years, we want to promote this service more actively to Aucklanders who would not be aware of it.

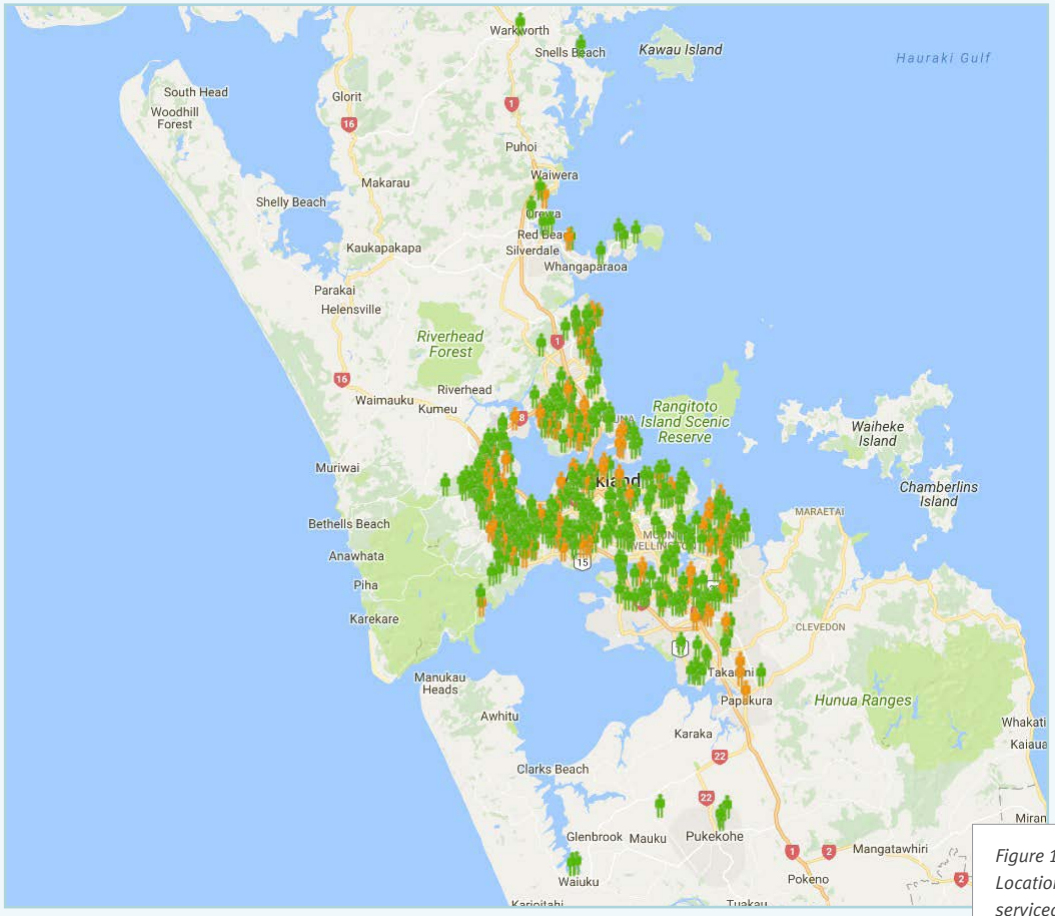



*Figure 16*
*Location of the households serviced by the Water Advice Line.*

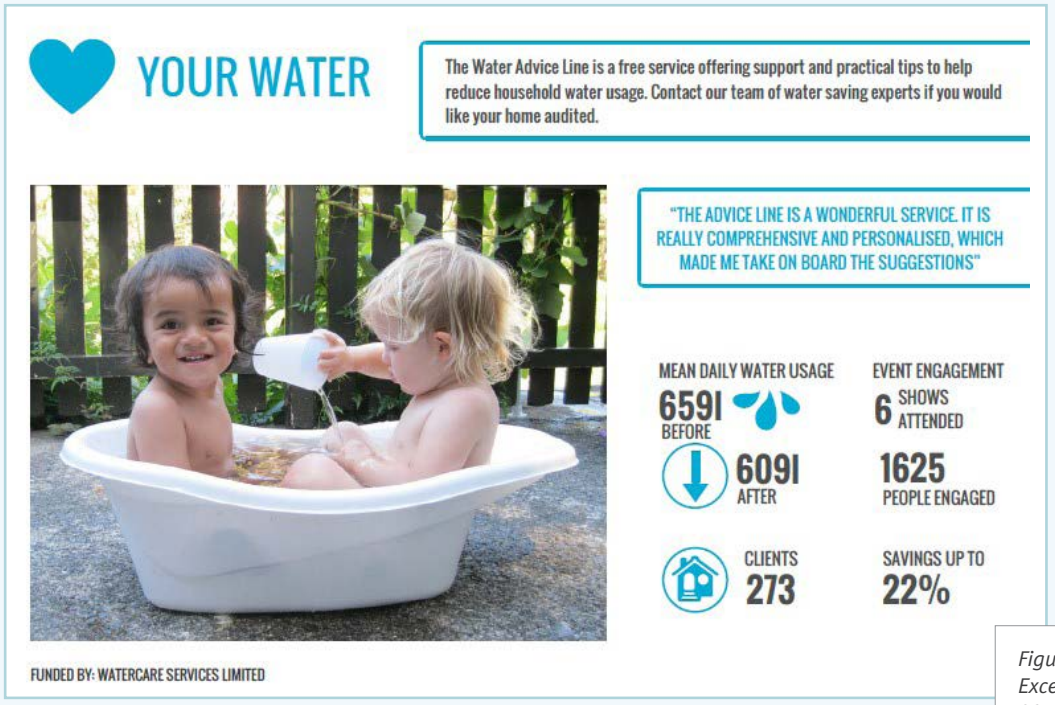



*Figure 17*
*Excerpt from EcoMatters 2015/16 annual report.*

## Case Study – Helping Shelley's family change its ways with water (source: *Tapped In* newsletter)

*Shelley, Anton and 18-month-old Ben are reducing their water use.*

WANT TO LEARN MORE ABOUT YOUR WATER USAGE?

Visit our website and search for 'Be Waterwise' or call us on 09 442 2222 to book in your free home water assessment.

# Helping households change their ways with water

A young family from Glen Eden is now well on their way to forming new water-use habits and lowering their monthly water bill thanks to our free waterwise advice line.

After looking at the data on their water bill, Shelley Scarlett says she was shocked to see her family's usage was higher than an average three-person household in Auckland. She got in touch with Watercare and we connected her with our waterwise advice line, delivered by EcoMatters Environment Trust.

Shelley shared her family's water-use habits with EcoMatters sustainability advisor Olivia Tukuogo, who then created a report tailored for the family.

The family already had an efficient showerhead and dual-flush toilets, so Olivia had to find other areas where savings could be made.

In the kitchen, she suggested installing a flow-restricting aerator to the mixer tap. That simple improvement immediately halved the flow rate.

Shelley had carried out a simple leak test prior to phoning EcoMatters and had picked up a 'slow leak' of 1.1 litres overnight. She also reported hearing the toilet refilling occasionally during the night. On hearing this, Olivia suggested they place a piece of toilet paper inside the back of the toilet bowl to determine whether the cistern was leaking into the pan – a common and easily-repaired problem usually caused by perished rubber seals.

Shelley says the paper became wet within minutes, confirming the source of the slow leak.

Outside, Olivia recommended mulching around shrubs and on non-edible garden beds in order to retain moisture, suppress weed growth and add nutrients to the soil. The family's thirsty large palm will appreciate this in the summer heat.

Shelley says the hardest change to make has been using the washing machine less frequently after learning that the average number of washing loads for a family of their size is four full loads a week.

"We were doing up to 10 because of our decision to use cloth nappies, so this has stuck with me and I'm very conscious now of how many loads we do. If I can stretch out another day between washes, I do!"

Shelley says the advice line is "a wonderful service. It is really comprehensive and personalised, which made me take on board the suggestions a lot more than if someone just generally told me to take shorter showers".

Her advice to other high-water using households is simple: "Awareness is key. You can't change your habits if you're not aware that there is a problem."

### Supporting households in hardship

This year, the Water Advice Line has been made available to the Water Utility Consumer Assistance Trust. This charitable trust receives funding from Watercare and provides financial support to Aucklanders who are struggling to manage their water and wastewater costs. Since water and wastewater are charged volumetrically in Auckland, this water efficiency support is a way for these households to reduce their cost of living.

### Promoting leak detection and fixing

A leak on a property can waste thousands of litres of water at considerable cost to the household. If a water bill unexpectedly increases but water use patterns have not changed, it could mean there is a leak at the property.

We offer a leak allowance in an effort to encourage the timely repair of leaks and water efficiency.

Allowances are given on a discretionary basis only. Aucklanders can apply for the allowance if they have received an unusually high water bill because of a water leak and would like to receive a partial credit. If the application is accepted, the allowance will appear as a credit on the next bill. It is the property owner's responsibility to remedy leaks and pay for the cost of any repairs as a result.

From May to November 2016 alone, more than 630,000 litres of leaks were fixed by Aucklanders on their properties.

We also have procedures in place to check meter readings for customers who identify sudden increases in water use. We will continue to proactively support our customers to reduce leakage in this way.

## Initiative two: Showerhead retrofit

Nearly one-third of the water we use at home is in the shower. Heating water is also a large proportion of a home energy bill. By reducing hot water use, households improve their water and energy efficiency. We plan to help customers who would most benefit to replace their existing showerhead with a modern low flow one.

Modern lowflow showerheads use about nine litres of water per minute[11] and can go as low as three or five litres per minute. This compares with an average shower flow rate of 13 litres per minute. This means households could save 40 per cent of the water they currently use in the shower. Modern and well-designed low flow showerheads provide an experience that is as good as, or better than, older high flow showers.

We have carried out some calculations to estimate how much money Aucklanders might save if they installed a low flow showerhead. For an average home, this could be about $37 per year on their water and wastewater charges. The saving on hot water heating is even more significant – more than $100 each year. In the past year, we did market research to identify all types of low flow showerheads available in New Zealand. We made this database available to interested parties and will use it in further projects.

Our work with EcoMatters will help us to identify the types of properties that would be eligible for a low flow showerhead. EcoMatters' sustainability advisors believe that 40 per cent of the homes they visit would benefit. We will work closely with EcoMatters and suppliers to confirm the types of properties that would be eligible and design a showerhead retrofit programme. In some cases other options may be more relevant and cost effective, such as flow restrictors to be inserted in the shower hose.

Putting in place a programme like this is new for Watercare. We plan to pilot different approaches so we can be sure of getting the best water savings outcomes. This could be a joint approach with energy retailers or the Energy Efficiency and Conservation Authority (EECA).

[11] Recommendation by the New Zealand Green Building Council.

### Case study – Watercare staff and managers lead by example

In November 2016, Watercare organised 'Energy week', a week of energy efficiency related activities for staff to engage in the topic and find out more about the energy efficiency vision of the organisation. We partnered with Methven and gave away 20 Satinjet water-efficient showerheads to staff taking part in a draw, with the option of nine or five litres per minute. Watercare's general managers chose to lead by example by retrofitting water-efficient showerheads in their own bathrooms. For each showerhead bought by a general manager, Methven donated one to Watercare for the retrofit of the gym's showers at Watercare House in Newmarket. This resulted in at least 18 per cent reduction in water use from the showers and received strong support from staff.

## Initiative three: Rainwater harvesting and greywater recycling

Of all water used in the home, 30 per cent is for outdoor use or toilet flushing. This water should be safe to use but does not need to be drinking water quality. It could be rainwater harvested onsite. Auckland benefits from regular rainfall most of the year and we are often asked for information about rainwater tanks. Where a public water supply is available, Auckland Council advises not to use rainwater for drinking water connections such as in kitchens and bathrooms.

Greywater is the wastewater from the bath, the shower, the bathroom sink and the washing machine. Recycling and reusing greywater onsite can significantly reduce the amount of freshwater used in homes. Greywater reuse systems work by collecting and treating a portion of the household's wastewater (for example, from sinks, showers and baths). This water is treated to a standard that is suitable for toilet flushing or irrigation in the home. The advantage of greywater systems is that there should always be water available, but the treatment system needs maintenance to make sure there is no public health risk.

Our customers ask us for technical design guidance and whether we provide a subsidy if rainwater tanks or greywater reuse systems are installed. The volumetric charging for water in Auckland is a financial incentive to install rainwater tanks and greywater reuse systems because reducing water use leads to a direct reduction in the Watercare bill customers receive.

Over the past three years we have delivered two projects that provide more answers to our customers about rainwater tanks.

### Information to customers – *Be Waterwise* and home shows

We included rainwater tanks and greywater reuse systems in our *Be Waterwise* for households booklet. The information we have provided gives advice about different-sized rainwater tanks for different types of water use and some of the practical considerations to take into account when installing a tank.

Greywater reuse systems are still rare in Auckland and a building consent is required. This is because there are safety issues when using this water, as harmful bacteria can build up if the system is not properly maintained by the household. In our booklet we suggest you get in touch with the eco design advisor team at Auckland Council for help with designing a greywater reuse system.

At the home shows and green shows we attend with EcoMatters, we always have a rain barrel on display and a free draw to give away two of them, including installation. This is a successful display triggering many entries at each event.

We aim to develop further our information on rainwater tanks since this is a very popular topic for Aucklanders.

### Rainwater tanks as a source of water for Auckland

In 2016, Watercare carried out a detailed study to understand the potential benefits of a wide-scale uptake of rainwater tanks for Auckland's water supply. The aim of this study was to investigate whether or not rainwater tanks could provide the additional water required to meet demand in 2050 (called 'deficit'), based on Watercare's two levels of service. These levels of service require us to provide water in a drought with a likelihood of occurring once in a century and to restrict water use no more than once every 20 years.

The work modelled a range of scenarios including the implementation of a programme installing large rainwater tanks on a widespread basis throughout Auckland. This work found that rainwater tanks can provide a significant contribution to household water supplies during a normal rainfall year, but during a drought this benefit reduces so other sources would still be required to meet demand.

Outputs demonstrated that the most favourable scenario would result in tanks supplying up to 16 per cent of the 2050 deficit at the drought level of service and 35 per cent at the peak level of service. The capital cost of implementing such a programme would be four times that of a source able to supply 100 per cent of the forecast demand at both levels of service. The aim of the study was to start quantifying the impact of rainwater tanks – water supply benefits being only one of the benefits they provide.

## Initiative four: Water efficiency scheme for new builds

Aucklanders each use about 160 litres of water per day in their homes. Currently, 54 per cent of the water supplied by Watercare is used by residential customers. With the strong forecast growth in housing, there is an opportunity to develop water-efficient housing that enables people to use less water.

Water usage in the home is influenced by a combination of the water efficiency of appliances and fixtures and individual behaviour. For some types of appliances (like washing machines), there is a large variation in water efficiency. Typically, consumer choice is influenced more by price than water efficiency. In addition, the volume of water used in households is affected by behaviour such as the length of showers and the number of loads of washing per week.

There are well-established programmes that provide consumers information on water efficiency. The New Zealand Water Efficiency Labelling Scheme (WELS) applies to six product classes: washing machines, dishwashers, toilets, showers, taps, and urinals. Each product label displays a star rating out of six – the more stars, the greater the water efficiency.

Another very useful tool is the Homestar programme. It was introduced by the New Zealand Green Building Council in 2010 to certify the health, efficiency and sustainability of homes. The certification includes water efficiency. The fourth version of Homestar was released in July 2017. The new guidelines have changed the way water efficiency is assessed, prioritising water-efficient appliances over alternative water supply (rainwater tanks) and requiring alternative supply to meet a specific share of the household's needs. With this change, the programme does lead to reliable reductions in water use all year round, including peak times. As a result, Watercare decided to support these changes by becoming a sponsor of Homestar 4 and intends to work in collaboration with the New Zealand Green Building Council.

To make the most significant changes to water efficiency in a home, aspects beyond the Homestar scope such as washing machines (one of the highest users of water in a home), leak management, behaviours or greywater recycling would need to be considered too.

Watercare will work with developers to encourage them to include water-efficient fixtures and fittings as part of new developments. Under a certification programme, new houses (or renovated houses) that meet the determined water efficiency criteria would receive a 'blue tick'[12] certification and be eligible for some form of incentive (to be defined). Developers will be able to use this certification to market their homes as being water efficient.

There are similar schemes for promoting water efficiency in other parts of the world. In Australia some states promote water efficiency by requiring fixtures and fittings linked to the WELS scheme. In the UK, the Building Regulations require a minimum standard of 125 litres per person per day (internal use).

[12] Working title

# Strategy three: Non-residential water efficiency programme

Target water efficiency gains by 2025 – three to seven million litres per day

## Overview

About 25 per cent of the water we supply is to non-residential customers. There is a huge range of non-residential customers, from small shops to large office blocks, hospitals and industrial and manufacturing companies. There is potential for improving water efficiency across the whole sector, but different approaches may be needed, depending on the type of business or organisation.

A section of our website is designed to help small and large businesses make changes to reduce water use. This includes guidance on gathering information, understanding the current level of water efficiency, identifying areas of improvement and then implementing a water efficiency programme. In the past three years, we have started to run water efficiency pilots with some of our largest water users or organisations committed to sustainability. In the next three years, we will build water efficiency services targeted to different segments of our non-residential customer base.

## Initiative one: Infrastructure growth charge review

The infrastructure growth charge (IGC) is a contribution towards the capital investment we have made in bulk infrastructure to provide services to either new or existing customers who increase their demand on our services.

The IGC means the cost of increasing the capacity of our bulk infrastructure is paid for by those who increase demand on the system now, rather than by other existing customers or future generations. Bulk infrastructure refers to treatment plants as well as large pump stations and transmission pipes.

Without the IGC, we would need to recover a greater proportion of our growth-related capital investment costs through our user charges. This means it would cost all customers a lot more for their water and wastewater services.

The IGC is applied whenever a property owner or developer adds extra demand on our networks. Typically, in the non-residential space this occurs when:

- a new non-residential property connects to our networks
- an existing non-residential property increases (or expects to increase) its water use.

The IGC is a one-off charge, unless the user intends to use more water or connect more dwellings to our network. For example, if a factory increases its water use beyond the level agreed when connecting to the Watercare network, it will need to pay an IGC to cover the increased demand the factory puts on our infrastructure (even if no new connection is needed).

In the past two years, we have started working with some of our non-residential customers who were largely exceeding their agreed water usage. Instead of charging them an additional IGC straight away, we have worked with them to see whether they could reduce their usage and avoid paying another IGC. It has proven to be an efficient incentive for water efficiency, with water use reducing by 80 per cent in some places. Examples include installing a water recycling process avoiding $1.2 million additional IGC at a manufacturing facility or operating a swimming pool's filtration and backwash system more efficiently to avoid a $640,000 payment.

## Case study – Water waste gets out of control

This medical supply manufacturer was using up to six times the volume of water agreed in 2014. This means they were putting a lot more pressure on the water infrastructure than initially anticipated, by requiring a lot more water than planned.

We contacted them to highlight the situation and offered our help to improve their water efficiency.

They identified a faulty valve and changed some of their processes, bringing their water use just underneath the IGC level for the first time in over a year.

We have acknowledged their effort and will not charge them the $500,000 of IGC they should have paid had they not become more efficient. Water efficiency is a journey and it sometimes takes time to make water efficiency a part of an organisation's DNA. We will continue to accompany them in this journey.

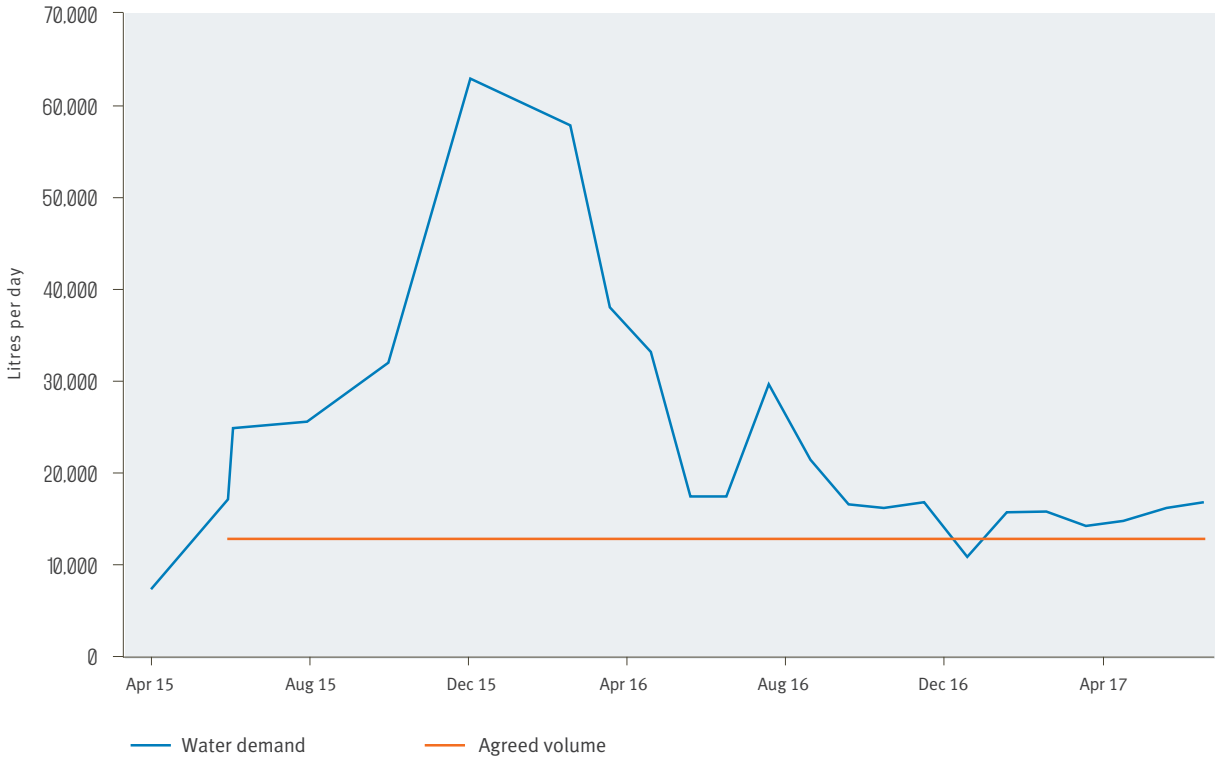



*Figure 18*
*Water use at a customer property vs infrastructure growth charge agreed usage.*

## Initiative two: Key account customer programme

We engage with many of our non-residential customers through our website and publications. We work on a one-to-one basis with our large customers to clearly demonstrate how to make water efficiency improvements. This includes analysing water use, checking for leaks and suggesting changes to processes to make savings.

On pages 14 and 15 presented how water is used by different non-residential sectors in Auckland. We identified some groups of customers who are increasing their water use: for example, accommodation providers (hotels and guest houses) have increased consumption every year over the past five years. We aim to work with companies in such industries to identify approaches they can take to reduce water use.

The programmes we will structure will include the following elements:

- **Baseline** – Analyse annual water consumption at a selection of the company's sites through Watercare's summary reports and the company's knowledge of their processes
- **Smart meters** – Install smart meters at these sites to enable detailed understanding of water use. Smart meters record water use data at a five- or 15-minute interval, creating a usage profile for each site.
- **Water management software** – Implement a water management software called One2five®. This is a process where Watercare facilitates a meeting with key members of the customer's team. We go through a series of questions to help the discussion on how to improve water efficiency. The software produces a rating on how the company is doing and prioritises five critical actions for water efficiency. The software can be run again after a year as a tool for continuous improvement.
- **Progress meetings** – Monitoring of the customer's water consumption for an agreed period of time, including regular progress meetings.

### Case study – Finding and fixing underground water leaks can generate huge savings

NZ Bakels manufactures and distributes a wide range of bakery ingredients to industrial bakeries and to the craft and food service sectors. The company has a manufacturing facility in Penrose, Auckland employing, 75 staff.

Typically, manufacturing and food processing industries consume the largest proportion of water among non-domestic customers. NZ Bakels' average water consumption was historically 86,000 litres per day, which the company considered normal for its business. However, periodically the water usage was disproportionately high despite no significant change in the operations. In the previous five years, the business had dealt with the issue of underground leaks four times, each time identifying and repairing the leaks individually. Watercare highlighted that there could be a structural issue with NZ Bakels' pipe.

When the same problem occurred again, the company hired a specialised service to detect and repair the leak. But this time, the company decided to replace the old underground watermain with an overhead stainless steel watermain.

When the connection was changed over to the newly installed watermain, the company immediately saw a 50 per cent saving in water consumption, which is a lot more than they expected. They realised then that old leaks had gone unnoticed for so long that they had become part of what the company thought was its baseline water use.

### Case study – How Unitec managed to reduce its water and wastewater costs by a third

Unitec Institute of Technology is the largest institute of technology in Auckland, with more than 23,000 students across three campuses in Mt Albert, Henderson and Albany. Energy and water performance audits of their facilities drove home the need for a formalised process where conservation targets were set and performance against these targets was measured. This process also made Unitec realise the need for a Water Management Plan, since water costs are a significant variable cost for Unitec.

Unitec formed a water efficiency working group, which brought together staff and students from the engineering and plumbing faculty and Watercare to understand Unitec's consumption and costs as well as industry best practices in water conservation. Watercare provided detailed reports on Unitec's water use and advice on initiatives for saving water such as wastewater audits, checking leaks and meters, choice of appliances, data logging to provide time-of-use data, greywater recycling and rainwater harvesting.

Unitec has adopted a two-pronged strategy. The facilities team changed the ground management strategy to xeriscaping (selecting plants that required little or no irrigation), focusing mainly on native species and mulching heavily with composted garden waste to reduce water loss over the summer months.

The other significant change was an upgrade to the plumbing infrastructure. The Unitec campus was formerly the old Carrington Hospital and the infrastructure is quite dated. The facilities team decided to upgrade leaky pipes strategically. Instead of patching over leaking sections, whole stretches of pipes were replaced to prevent leaks and ensure lower maintenance costs in the longer term.

Students who were pursuing certificates in plumbing conducted water audits of all Unitec kitchens, bathrooms and laboratories. In two weeks, students completed audits across all three campuses and spotted significant areas for improvement, including one urinal which was using an estimated $9000 worth of water a year. This also helped to underscore to students (future plumbers and drainlayers) the importance of factoring water conservation into their work.

### Housing NZ water efficiency programme

Housing New Zealand (HNZ) manages more than 27,000 properties in Auckland. The demand for water from HNZ properties is typically higher than other properties. We have developed a programme of work to detect leaks and reduce water use in HNZ's Auckland properties. This scheme began in 2012.

Water meters are read monthly and any homes with high water use or with a change to a previous month are identified. This information is provided to HNZ, which then investigates the property for leaks.

In the future we expect to extend this to the implementation of smart meters across all of HNZ's properties in Auckland. This should enable HNZ to quickly identify properties with leaks and where there is abnormally high water use.

## Initiative three: Working with schools

Watercare runs a successful education programme for primary and intermediate schools in Auckland. The programme currently focuses on water quality, wastewater and stormwater. We plan to add to this successful initiative to provide a greater focus on water efficiency, by:

- Including a water efficiency and sustainability focus as part of the existing programme
- Developing a wider benchmarking programme for all schools in the Auckland region.

The benchmarking programme will focus on enabling schools to develop their own water footprint, followed by tools to help reduce water use. This is expected to focus on:

- Reducing water wasted from toilets, urinals and taps
- Reducing losses from swimming pools
- Optimising irrigation of playing fields
- Identifying and reducing leaks.

This proactive approach to work with schools should reduce the water wasted and help to educate young people about water efficiency and sustainability.

*Image 5*
*Watercare education co-ordinator Sally Smith teaching Auckland school students about water.*

## Initiative four: Working with community sports clubs with Project Litefoot Trust

Project Litefoot is a charitable trust offering a free service that saves money for community sports clubs by helping them become more efficient with electricity, water and waste management. The programme is led by 10 of New Zealand's top sportspeople, including former All Black Conrad Smith, Olympic medallists Sarah Walker, Barbara Kendall, Caroline and Georgina Evers-Swindell and former Black Caps skipper Brendon McCullum. Since 2008, they have been making changes in their own lives to reduce environmental impact and since 2011 Litefoot has helped community sports clubs to follow the lead of these heroes.

Watercare has partnered with Litefoot to work on two community sports clubs to create the blueprint for water efficiency in sports clubs and show that grassroots sport and the environment are both winners when water efficiency is improved. Two clubs, the Te Atatu Football Club and the Manukau Rovers Rugby Club, have had a smart meter monitoring their consumption to help Litefoot understand the usage profile, the 'water story'. Following on from that, potential efficiency gains were identified.

Litefoot and Watercare then met potential partners and suppliers, which resulted in Laser Plumbing, Delabie, Mico, Caroma and Methven joining the initiative to create a best-practice model for water management. Major retrofits were made at the Manukau Rovers in June 2017. Our idea is that these clubs will become the blueprint for other clubs to aspire towards and build a business case for water efficiency in sports clubs.

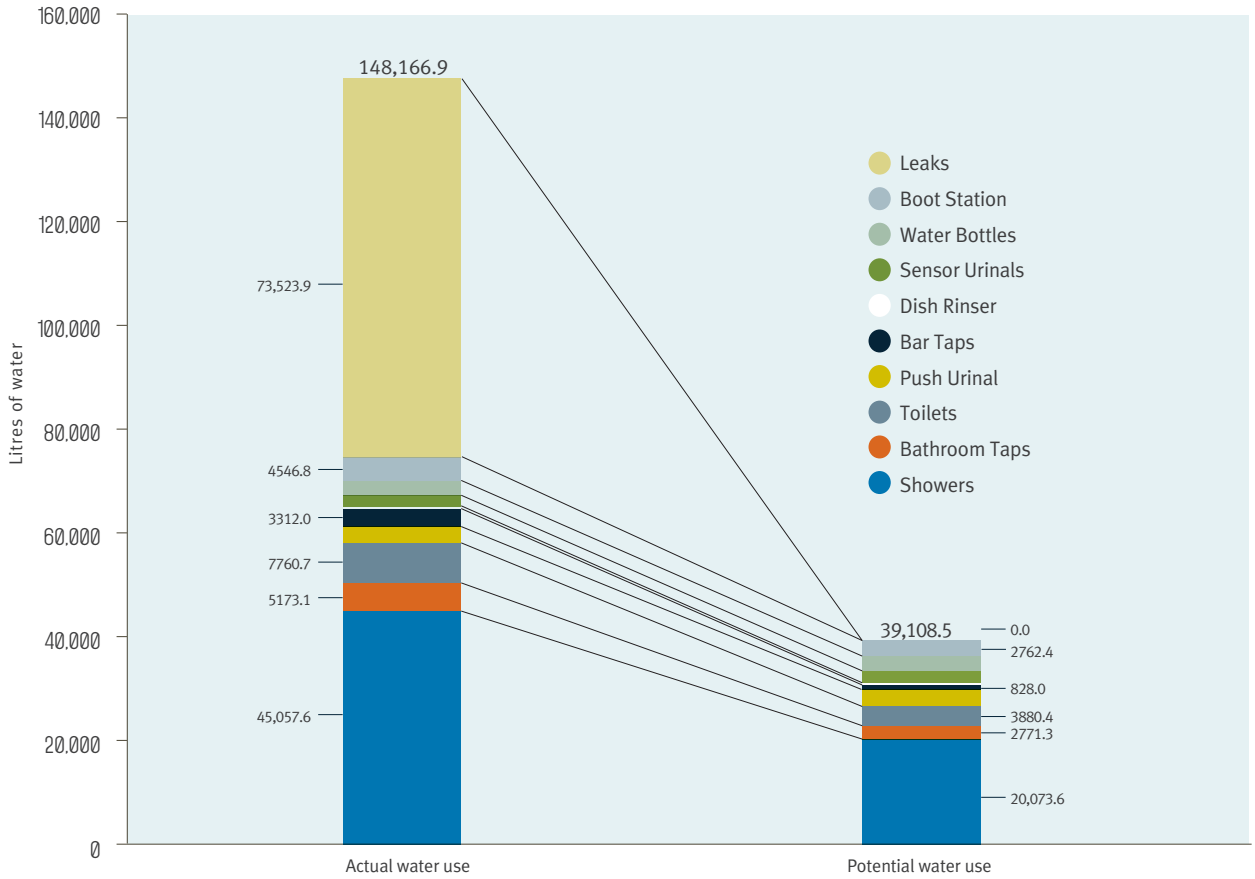



*Figure 19*
*Potential water efficiency improvements identified at a community sports club over a season.*


*Figure 20*
*Poster used at the Manukau Rovers Rugby Club to inform players about the upgrade, featuring Litefoot ambassador and former All Black Conrad Smith.*

# Strategy four: Reducing leakage in the water network

Target water efficiency gains by 2025 – eight to 14 million litres per day

## Overview

In 2017, Watercare established a 'non-revenue' water strategy. Non-revenue water is water that is supplied from our network but cannot be billed for some reason. There are a number of types of non-revenue water such as water used for firefighting, cleaning of watermains, burst watermains and illegal connections. However, one of the components is leakage from water pipes, or 'real losses'.

Reducing leakage in the water network will require significant investment in new approaches to monitor, identify and reduce losses across our network. Of the planned activities in our non-revenue water strategy, the following actions will directly reduce the volume of water lost from our networks:

- Establish district metering areas (DMAs) and pressure management
- Find and fix leaks more efficiently through an app for customers
- Find leaks through acoustic sounding
- Use smart meters.

Watercare's current target for real losses is that real losses should be less than or equal to 13 per cent of the water supplied, reducing to less than or equal to 12 per cent of the water supplied by 2040. However, international standards organisations and regulators have established that measuring leakage as a percentage of water supplied is of limited use.

Through the non-revenue water strategy, we are moving towards a portfolio of KPIs for leakage, to both drive continuous improvement and allow comparison with other water utilities. In addition to the regulatory percentage target, we will report real losses in terms of litres per connection per day (L/c/d). Our current performance is just over 126 L/c/d. Our target is to reduce this to 101 L/c/d by 2025, with real losses limited to a total of 50 million litres per day. This would lead to an overall reduction in non-revenue water of 10 million litres per day by 2025.

The portfolio of KPIs we are putting in place is as follows:

- Real losses as a percentage of water supplied – to be used for regulatory reporting only
- Real losses as L/c/d – to be used as Watercare's primary reporting tool
- Real losses in terms of the infrastructure leakage index – internal benchmarking, with the understanding that the benefits of this will only be clear when pressure management is in place
- The total volume of non-revenue water – an internal Watercare benchmark.

## Initiative one: Establishing district metered areas and pressure management

We are implementing some changes in our network to help us better manage the network, identify problems and improve customer service. The biggest change will be the introduction of district metered areas (DMAs). These network areas are made up of approximately 3000 to 5000 properties and are usually bounded by closed valves so they can be monitored and managed as separate areas. These areas are used in most countries around the world and they have been extensively proven to assist in reducing leakage in a water supply network.

We will be monitoring these new areas more regularly to identify any changes in usage that could be attributed to water losses. Leaks will then be found and fixed in the network to prevent further losses from occurring in the network.

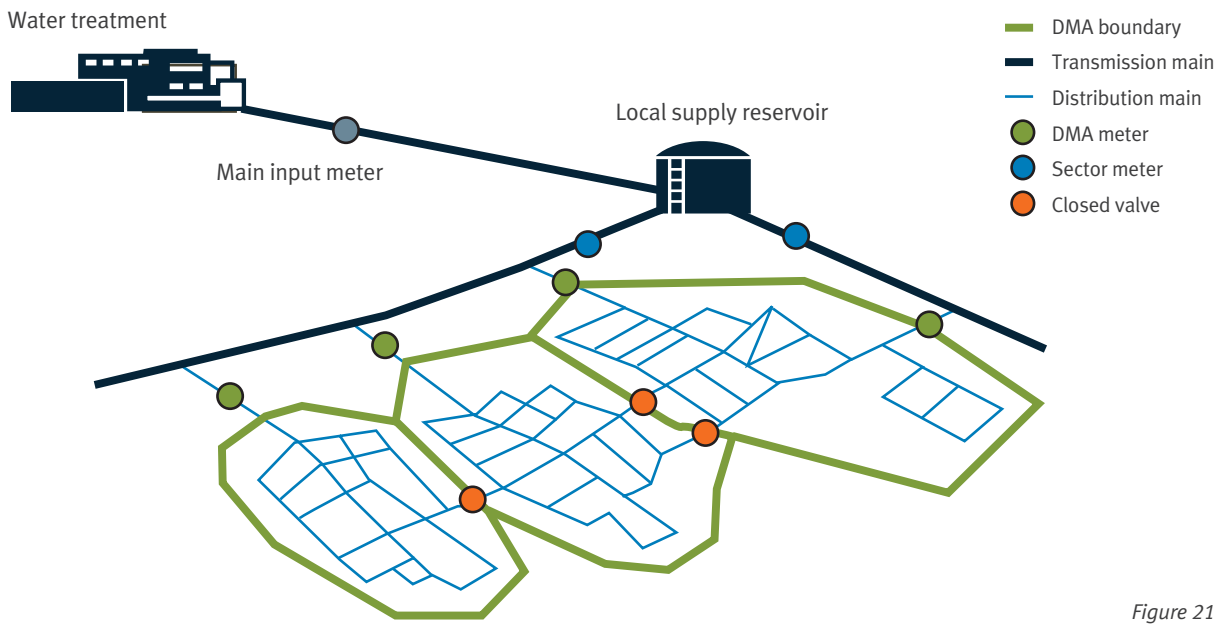



*Figure 21*
*District metering zones in a water supply network.*

Where average pressure in our network is much higher than it needs to be, we will consider if we can reduce the pressure without lowering the level of service we provide to our customers. This most commonly happens at the bottom of a steep hill, or near a reservoir. Reducing the system pressure requires careful planning and installation of pressure-reducing valves in our network.

The effect that pressure management has on leakage can be explained by likening our pipes to a garden hose with a hole in it. If the garden tap is turned up fully, the water coming out of the hole may cause a mini fountain. As the tap is turned down, the size of the fountain and the flow of water reduces. If the pipes in our network have any small cracks or holes in them, then reducing the average pressure in these areas will reduce the volume of water lost from the pipe.

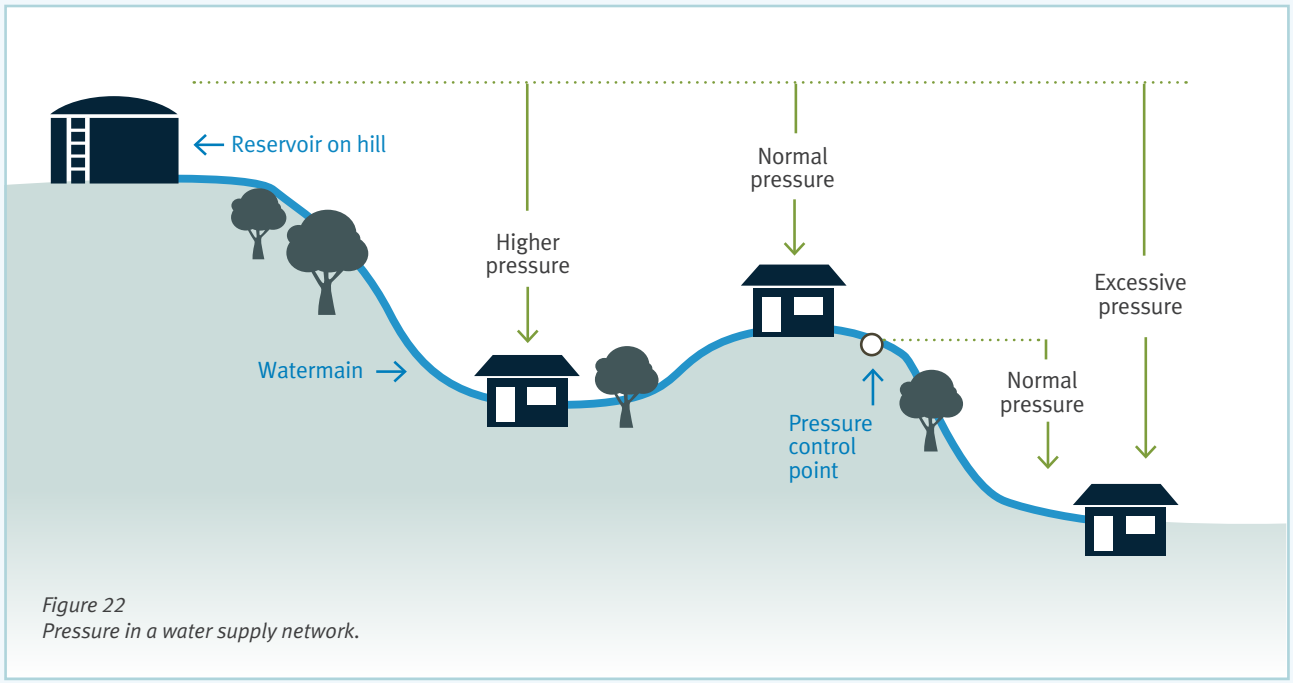



*Figure 22*
*Pressure in a water supply network.*

## Initiative two: Leak detection app

Due to the size of our network, it is impossible for our staff to check every road and street for any visible signs of leaks. That is why we strongly encourage our customers to report any suspected water leaks in our network so that we can come and fix them as soon as we can. To help make it easier to report leaks we will be launching a new leak reporting app. This will mean anyone can simply report a leak when they see it. We aim to reduce the time we take to repair the leaks reported to us, meaning less water will be lost from our pipes.

*Image 6*
*Example of a leak.*

## Initiative three: Acoustic sounding to find leaks

When water flows through a pipe it shouldn't make any noise. If there is an underground leak in the pipe, then the pipe will start to make a noise. This is generally a low-volume noise that will not be audible to anyone walking along a road. Historically, listening sticks were used to try and pinpoint where the leak was occurring. These devices have been improved and it is possible to use electronic acoustic leak detection to improve the accuracy of leak identification.


*Image 7*
*Watercare's maintenance services team detecting a leak at Auckland's North Shore Hospital.*

We will be targeting our acoustic leak detection activities to areas where we expect leaks to be highest. We will aim to cover 20 per cent of our network every year.

## Initiative four: Smart meters

Smart meters are electronic devices that record the water use at a property and automatically send that information back to us. They often also offer the option to provide the customer with information about their water use in a much more detailed way than the mechanical meters currently in place. This technology helps to quickly identify leaks on properties by analysing changes in day-to-day water use. Mechanical meters under 10 years old can be retrofitted with a data logger. Plugged to the existing mechanical meter, this device sends the same information as a smart meter.

Our plan is to install smart meters on all new homes in new subdivisions and across all of the communities that are not connected to the metropolitan network.

Recently we completed a smart metering trial in Waiuku. During this trial we installed 3305 data loggers onto the mechanical water meters. In the process, we also replaced 2149 mechanical water meters that were older than 10 years. All loggers record water use in 15-minute intervals and send the reads to our data storage house once a day. Our billing services team proactively calls Waiuku customers who we have identified as having a leak on their property based on the smart reads. This reduction in leakage from customer pipes, along with several leaks and illegal connections that were corrected, resulted in a 22 per cent reduction in the volume of water needed to supply Waiuku.

The full 10-year non-revenue water programme of work is included in the Appendix B.

# Appendices

# Appendix A: Water efficiency programme of work

| Strategy | | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|
| **1.** Council water efficiency programme | Watercare | • Measure our water use in construction and operation across our business and through our supply chain<br>• Benchmark water use in our operations<br>• Technical analysis to develop guidance about irrigation for sports and school applications | • Implement new design standards to make sure that new water and wastewater treatment plants are efficient in their use of water<br>• Develop and trial a web-based tool for Auckland Council and schools to help them irrigate efficiently | • Review our contracts with our suppliers to make sure that they are thinking of water efficiency when they design, build and operate our facilities<br>• Roll out the irrigation app |
| **2.** Residential water efficiency programme | Communications and other initiatives | • Continue to communicate with our customers directly via water bill, website and call centre<br>• Continue to work with and support organisations such as EcoMatters, including attending events<br>• Continue to proactively support reducing customer-side leakage | | |
| | | • Create a water efficiency page on the Watercare website, including mobile friendly platform<br>• Work with EcoMatters to identify types of properties that would be eligible for low flow showerheads<br>• Identify other organisations promoting sustainable lifestyles and identify how we can partner with them and integrate water-saving messages across different organisations | • Develop web-based platform to help customers audit water use in their homes<br>• Implement showerhead retrofit programme with EcoMatters and/or other partners<br>• Continue to leverage sustainability messaging from other organisations | |
| | Smart metering | • Specify smart metres for new developments and require developers to install them<br>• Set up our data management and finance systems for the collection of and billing from smart meter data | • Install smart meters to all of the communities that are not connected to the metropolitan network<br>• Review smart metering and data and use to find and fix leaks<br>• Measure benefits associated with smart meters | |
| | Blue Tick | • Determine how the 'Blue Tick' scheme will be applied<br>• Confirm the details of the Blue Tick scheme<br>• Engage with developers to promote the scheme | • Work with developers to achieve accreditation<br>• Monitor water use in 'Blue Tick' developments | |

# Appendix A: Water efficiency programme of work *continued*

| Strategy | | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|
| | Housing New Zealand (HNZ) | • Install smart meters in HNZ Auckland properties | • Use information from smart meters in HNZ Auckland properties to repair leaks and implement/advise on sustainable water use | |
| **3.** Non-residential water efficiency programme | Infrastructure Growth Charges (IGCs) | • Identify scale of growth in commercial demand and where additional IGC charges are equitable | • Negotiate IGCs and water reduction measures with our applicable customers | |
| | Schools | • Develop our existing primary and intermediate school programme by including a water efficiency and sustainability focus as part of the existing programme<br>• Developing a benchmarking programme for all schools in the Auckland region | • Review benchmarking and promote successful practices<br>• Implement water-efficient irrigation using the web-based tool | |
| **4.** Reducing leakage | District metered areas (DMAs) | • Develop a plan to separate the network into DMAs<br>• Identify DMAs that would be most suitable for pressure management as part of the DMA design<br>• Commence pressure management trial in a high-pressure area<br>• Implement DMAs as part of new developments | | |
| | Losses | • Continue with current find and fix method<br>• Investigate repair times and identify any potential efficiencies<br>• Continue with current acoustic leak detection<br>• Develop specification and investigate tools for new leak/fault reporting application/ mobile platform<br>• Investigate where new technology can reduce the cost of loss management | | • Utilise DMA monitoring information to find and fix leaks in specific DMAs<br>• Develop active acoustic leak detection programme to cover a percentage of the network per year<br>• Implement leak/fault report reporting application |

# Appendix B: 10-year non-revenue water programme of work

| | | | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| Metering | Supply Meters | Review current activities and processes | Determine how to install meters at Huia and Ardmore WTP to measure water into supply as per the forward capital programme<br>Review other sources that require metering and prioritise implementation | Install meters at Huia and Ardmore WTP and carry out any additional works to enable this | Confirm maintenance and renewal plans for all meters into supply |
| | Transmission Meters | | Identify any locations that require additional metering in the transmission network using the existing BSPs and water into supply meters.<br>Develop installation plan of new meters if required. | Begin installation of new meters if required.<br>Develop maintenance/renewal plan for transmission and bulk water meters<br>Implement maintenance/renewal plan for transmission and bulk water meters | |
| | Bulk Water Meters | | Continue with programme to replace all mechanical meters with Magflo meters | | |
| | Customer Meters | | Continue with proactive meter renewals programme replacing up to 20,000 meters per year.<br>Continue with reactive meter renewal programme which replaces up to 6,000 meter per year. | Review total number of meters that need to be replaced each year to maintain a smooth meter replacement program. | |
| | Smart Meters | | Develop supply contracts for smart meters and develop software tools to manage data.<br>Transition Waiuku smart meter data to in house system<br>Identify plan for installation of smart meters within new sub-divisions and non-metropolitan supplies | Begin installation of smart meters.<br>Review data processes and implement improvements<br>Review expected savings from the smart meter programme. | Complete smart metering of 75% of non-metropolitan supplies. |
| | DMA Meters | | Renew/maintain any existing DMA meters (Waitakere) | | |
| | Meter Readings | | Review processes for how meter readings (all types of meters) are verified | | Develop action plan for verifying meter reading if required |
| Network Management | Mains | | | | Review mains renewal plans and update if required |
| | Establish DMAs and Manage Pressure | | Develop a plan to separate the network into DMAs.<br>Identify DMAs that would be suitable for pressure management as part of the DMA design<br>Develop DMA development plan<br>Commence with presssure management trial in Panmure area<br>Implement DMAs as part of new developments | Implement DMAs across 20% of the network<br>Identify DMAs that could be candidates for pressure reduction and implement pressure management | |
| | Investigate Theft | | Review and improve process for new connections for developments<br>On site surveys of areas to confirm the number of customer meters is correct<br>Identify other potential locations for theft, e.g. tanker filling points, fire hydrants etc | | Identify potential fire mains that should be investigated further or metered directly<br>Review outcomes of onsite surveys and potential areas of theft and develop mitigation plan |
| | Active NRW Control: Find and Fix | | Continue with current find and fix method<br>Investigate repair times and identify any potential efficiencies | | Utilise DMA monitoring information to find and fix leakages in specific DMAs. |
| | Active NRW Control: Acoustic Leak Detection | | Continue with current acoustic leak detection | | Develop active acoustic leak detection program to cover a certain percentage of the network per year |
| | Active NRW Control: Customer Leakage | | Maintain existing customer leakage identification procedures | | |
| | Active NRW Control: Storage Structures | | Develop a targeted plan for investigating losses from storage structures<br>Investigate losses from at least five structures in the first year | Continue with investigating and minimising losses from storage structures with an aim to check each structure every 5 years for leakage. | |
| Reporting | Water Balance and Programme of Works | | Develop a better understanding of the water balance and uncertainties<br>Apply the results of the WSAA NRW studies to learn from the programme of works followed in Australia | Calculate the water balance annually<br>Re-evaluate WTP and raw water losses<br>Investigate tools to assist in automatically calculating the water balance<br>Collect data to calculate the ELL | |
| | DMA Monitoring | | | Investigate tools for monitoring DMA performance e.g. Wateroutlook, Netbase, SCADAWatch | Implement a DMA performance monitoring tool.<br>Actively monitor the new DMAs (nightlines, AZNP, AZP) |
| Customer | Helpline | | Investigate costs for a dedicated fault reporting phone number that is also free from mobiles to encourage the public to report faults. | Implement dedicated fault phone line and publicise this in conjunction with the customer engagement program<br>Provide a reference for reporting to the customer and record | |
| | Fault Reporting Application | | Develop specifications for a fault reporting application. Should include a feedback loop and linked to the time to repair faults. | Investigate 'off the shelf' or 'custom' fault reporting applications and decide on a way forward | Begin development / implementation of fault reporting application |
| | Customer Engagement | | | Update website and customer bills with the new dedicated fault reporting phone line | Review information available to customers and revise to correspond with roll out of fault report application |
| Technology | | | Review Viscenti trail in Auckland CBD and determine suitability to extend this to other areas | Implement smart technologies to enhance NRW performance within the network. | Review new and emerging leakage technology and asses applicability to Watercare |
| Staff Engagement | | | Publicise the NRW strategy internally and outline how Watercare staff play a key role in reducing NRW | Report internally on progress and changes in NRW | Report internally on progress and changes in NRW. Publish the results to raise visibility |

# Appendix B: 10-year non-revenue water programme of work *continued*

| | | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 |
|---|---|---|---|---|---|---|---|
| Metering | Supply Meters | Continue with meter renewals and maintenance plans. | | | Continue with meter renewals and maintenance plans. | | |
| | Transmission Meters | Continue with meter renewals and maintenance plans. | | | Continue with meter renewals and maintenance plans. | | |
| | Bulk Water Meters | | | | | | |
| | Customer Meters | Targeted renewal for customer meters | | | Targeted renewal for customer meters | | |
| | Smart Meters | Complete smart metering of all non-metropolitan supplies. | Continue smart metering of new sub-divisions. | | Continue smart metering of new sub-divisions. | | |
| | DMA Meters | Renew/maintain any existing DMA meters | | | Renew/maintain any existing DMA meters | | |
| | Meter Readings | | | | | | |
| Network Management | Mains | Implement mains renewals plan | | | Continue with mains renewals plan | | |
| | Establish DMAs and Manage Pressure | Implement DMAs across a further 20% of the network Identify DMAs that could be candidates for pressure reduction and implement pressure management | | | Implement DMAs across a further 20% of the network Identify DMAs that could be candidates for pressure reduction and implement pressure management | | |
| | Investigate Theft | Install meters on fire mains if required Implement water theft reduction programme | | | Install meters on fire mains if required Implement water theft reduction programme | | |
| Active NRW Control | Find and Fix | Utilise DMA monitoring information to find and fix leakages in specific DMAs. | | | Utilise DMA monitoring information to find and fix leakages in specific DMAs. | | |
| | Acoustic Leak Detection | Implement active acoustic leak detection program | | | Continue with active acoustic leak detection program | | |
| | Customer Leakage | Review customer rebate process for customer side | | | | | |
| | Storage Structures | Continue with investigating and minimising losses from storage structures with an aim to check each structure every 5 years for leakage. | | | Continue with investigating and minimising losses from storage structures with an aim to check each structure every 5 years for leakage. | | |
| Reporting | Water Balance and Programme of Works | Calculate the water balance annually Calculate the Economic Level of Leakage Set NRW and real losses targets | | | Calculate the water balance annually Update the Economic Level of Leakage Review NRW and losses performance against the targets | | |
| | DMA Monitoring | Actively monitor the new DMAs (nightlines, AZNP, AZP) | | | Actively monitor the new DMAs (nightlines, AZNP, AZP) | | |
| Customer | Helpline | | | | | | |
| | Fault Reporting Application | | | | | | |
| | Customer Engagement | Launch revised customer engagement program | | | | | |
| Technology | | Review new and emerging leakage technology and asses applicability to Watercare | | | Review new and emerging leakage technology and asses applicability to Watercare | | |
| Staff Engagement | | Report internally on progress and changes in NRW. Publish the results to raise visibility | | | Report internally on progress and changes in NRW. Publish the results to raise visibility | | |

Review NRW Programme of Works and effect of the measures undertaken

Review NRW Programme of Works and effect of the measures undertaken

Review NRW Programme of Works and effect of the measures undertaken