Asset Management Plan

2021 - 2041

1 July 2021 to 30 June 2041

www.water.co.nz

Watercare
An Auckland Council Organisation

Contents

Section 1

Executive summary

What is the Asset Management Plan (AMP) and Funding Plan?

The AMP is Watercare's future-focused investment plan that will meet the water and wastewater needs of Auckland. This plan:

- Contributes to Auckland Council's Long-Term Plan (LTP) and infrastructure strategy
- Gives effect to Auckland Plan outcomes for the people of Auckland
- Directs how we will operate, maintain and renew existing water and wastewater assets
- Outlines how we will provide new assets to meet demand as Auckland grows
- Covers a 20-year period

The Funding Plan describes how Watercare will fund the AMP and its ongoing implementation.

- Outlines the sources of funds and how Watercare will use revenue and debt to pay for assets
- Determines the organisation's cash requirements, which informs our price path

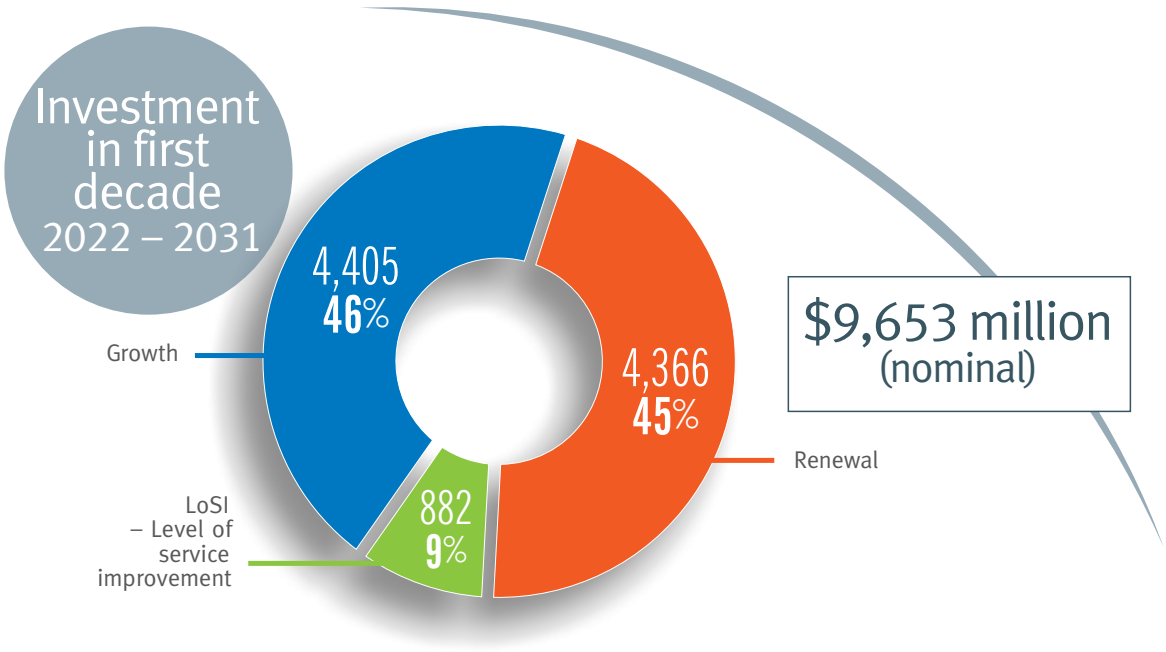
The purpose of our AMP

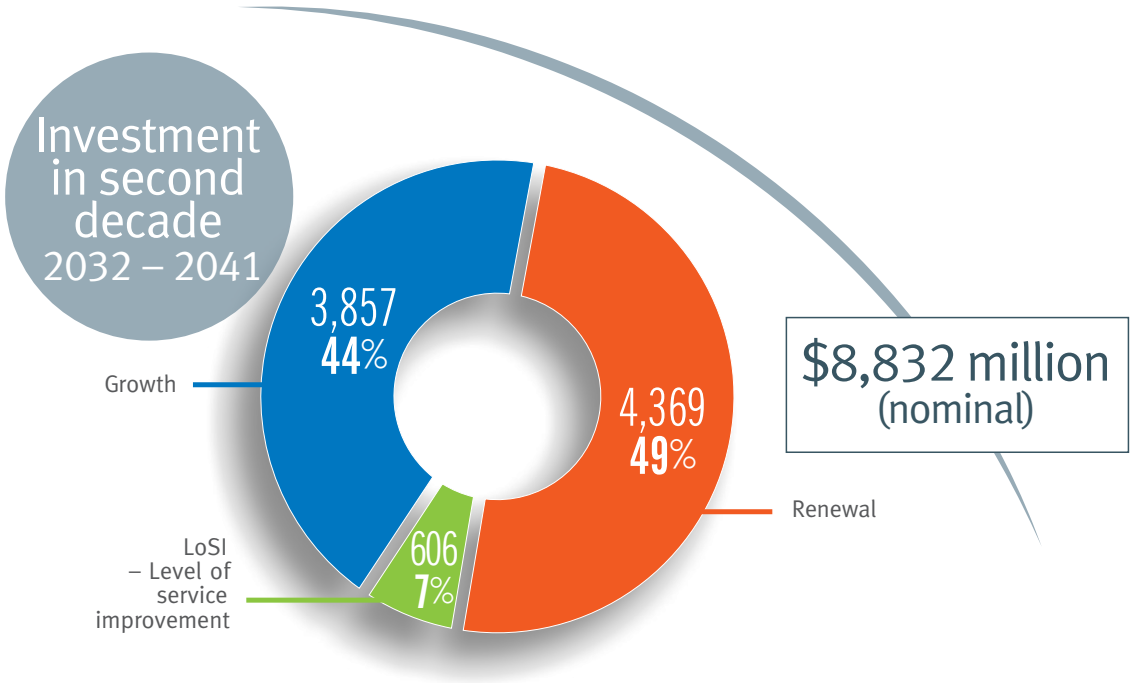
The AMP sets out programmes of works to enable beneficial outcomes for our customers across Auckland by:

- Catering for a growing Auckland
- Developing a resilient and diverse water system for tomorrow
- Protecting our environment
- Adapting to climate change impacts and reducing emissions
- Delivering value for money by running an efficient operation.

The AMP at a glance

Over the next 20 years, we will invest about $18.5 billion to build and maintain water and wastewater infrastructure for Aucklanders.





Catering for growth

Our customers will have safe, guaranteed services into the future as Auckland's population, business and industry continue to grow:

- Over the coming 20 years, Auckland's population is expected to grow by 29%, adding another 476,000 people to our current population of 1.7 million.
- During this time, we will invest $8.26 billion to provide additional water and wastewater capacity to meet this growth.

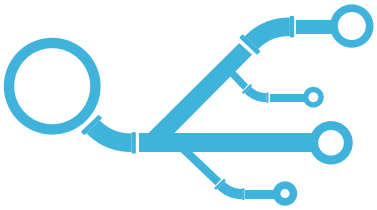
Catering for growth – water projects

Some of the strategic water projects we will deliver include:

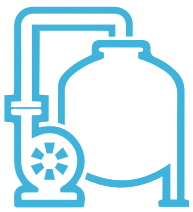
- Waikato A – the staged construction of a new water treatment plant (WTP) that will treat additional water from the Waikato River to cater for Auckland's water supply needs over the next 20 years

- Waikato 2 Watermain – a new watermain that will allow for growth and add resilience to the existing Waikato 1 watermain

- North Harbour 2 Watermain – to service growing communities in the west and north, provide redundancy and improve transmission capacity



- Boost pumping of the Ōrewa 1 and 2 watermains and a new Ōrewa 3 Watermain – to increase capacity to the north and meet forecast growth in the Silverdale, Dairy Flat and Wainui areas



- Encouraging efficient water use through an enhanced demand management programme and expansion of the smart metering programme.

Catering for growth – wastewater projects

Some of the strategic wastewater projects we will deliver include:

- Central Interceptor – the 14.7-kilometre-long wastewater tunnel will run underground from Grey Lynn to our Māngere Wastewater Treatment Plant (WWTP), provide additional conveyance capacity, reduce overflows and clean up local beaches and waterways

- The Northern Interceptor wastewater pipeline – this will divert flows currently treated by the Māngere WWTP, to the Rosedale Wastewater Treatment Plant, supporting growth in the north, west and southern regions of Auckland

- Māngere WWTP capacity upgrade – to support growth, optimise performance and reduce carbon emissions and waste

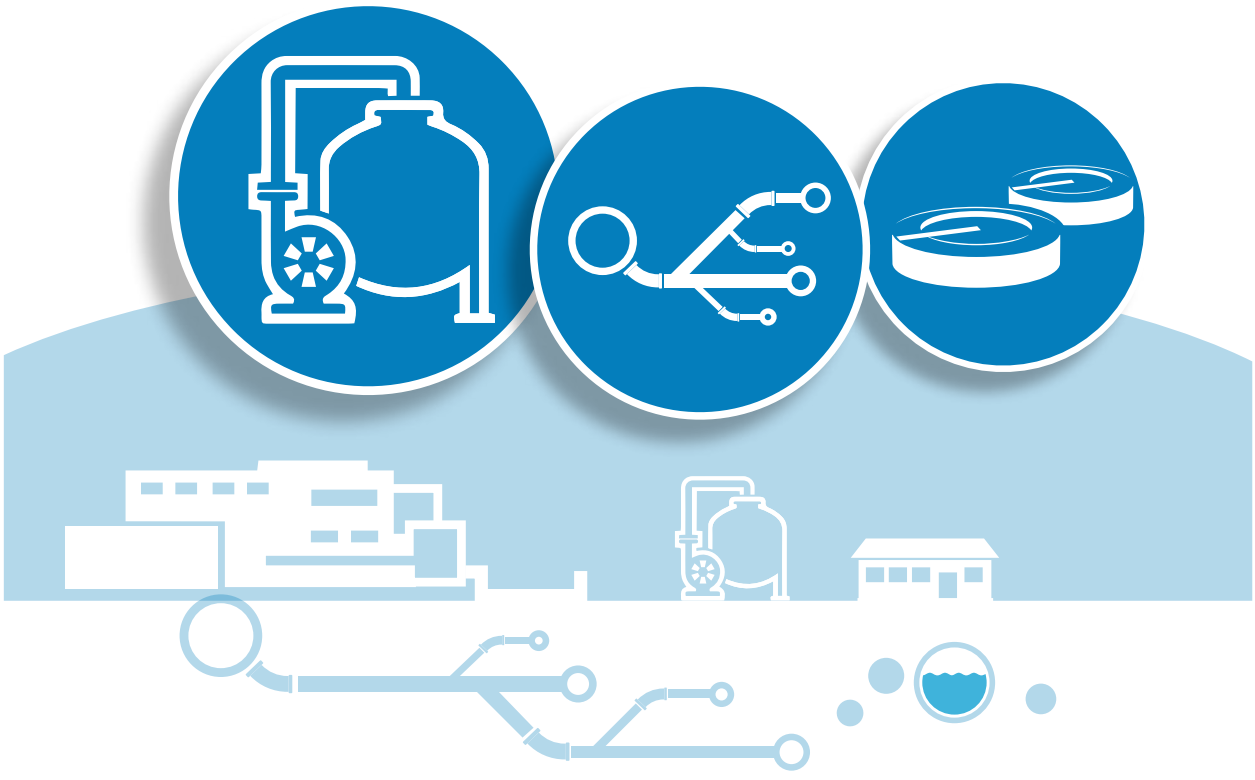
- Rosedale WWTP upgrade – to enable process optimisation, improve performance and reduce carbon emissions and waste.

Developing resilience for tomorrow

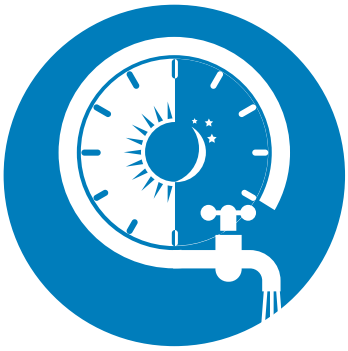
Our customers expect safe and reliable services every day. This means:

- Investing sufficiently so our water and wastewater networks can withstand disruptions and meet growth
- Operating with minimal impact on our customers and the environment
- Being resilient to changing conditions and climate change impacts

To build a resilient water and wastewater system, and ensure reliability of service, we will invest about $10.2 billion in renewing and upgrading critical assets over the next 20 years.



Developing a resilient water system



We will replace the ageing Huia WTP with a new 140 mega-litres per day (MLD) capacity plant to help meet peak demand and improve the system resilience.

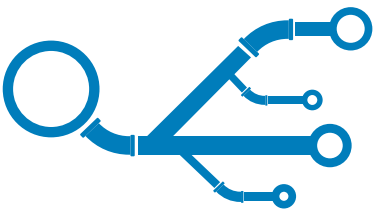
- ☑ We will build two additional reservoirs (2 x 25ML each) as part of the new Huia plant to increase storage and resilience for the region.

Our water renewals and level-of-service improvement programme ($4.58 billion) includes:

- ☑ Ōrewa 1 Watermain replacement
- ☑ Huia 1 and Nihotupu 1 watermains replacements
- ☑ Domain Reservoir replacement

- ☑ Khyber 3 Reservoir replacement
- ☑ Huia 2 Watermain replacement

- ☑ Hūnua 1 Watermain which will be replaced by the extension to Hūnua 4 Watermain



- ☑ Other local water network renewals
- ☑ Investing in projects to unlock water reuse as a source of future water supply.

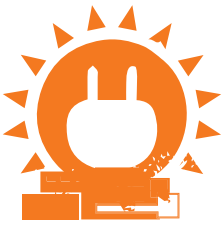
Developing a resilient wastewater system

Timely renewal and upgrade of our plants, pipelines and network will ensure service reliability for our customers and reduce overflows and blockages on the wastewater network.

Apart from the Central Interceptor and Northern Interceptor, resilience will be developed through our wastewater renewals and level-of-service improvement programme ($5.64 billion), which includes:

- Transmission network replacements
- Local network renewals

- Wellsford WWTP upgrades
- Sub-regional WWTP upgrades



- Rosedale WWTP upgrades
- Pukekohe WWTP upgrades
- Māngere WWTP upgrades

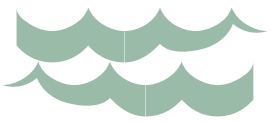
- Helensville WWTP upgrades.

Developing resilience to climate change impacts

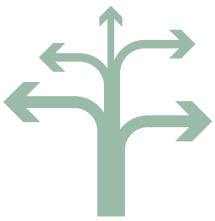
Our Climate Change Strategy sets out a direction for monitoring and understanding the impacts and risks to the provision of water and wastewater services in the future. It includes:

- Two ambitious targets for emissions reductions to align with keeping the global temperature increase within 1.5 degrees Celsius:
  - Net zero emissions by 2050
  - Reduce operational greenhouse gas emissions by 50% by the year 2030

- A work plan that consists of 14 portfolios across climate change adaptation and mitigation



- Climate change considerations integrated with the delivery of infrastructure projects through planning and impact assessments.



Climate change mitigation

A number of projects in the AMP will reduce emissions, carbon footprint and waste:

- Enhanced sludge processing at Māngere and Rosedale WWTPs to reduce biosolids generation

- Co-generation engine replacements at Māngere WWTP to remove the need for natural gas

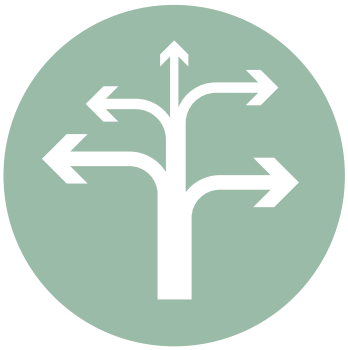
- Process upgrades and modifications to primary and secondary processes to reduce energy requirements at Māngere WWTP

- Improved aeration control and a second co-generation engine at Rosedale WWTP to reduce energy requirements

- Ongoing introduction of electric vehicles to our fleet

- A targeted reduction of ‘built carbon’ by 40% in new infrastructure.

Long-term climate adaptation



Additional infrastructure will be delivered using dynamic adaptive planning, which is a tool used to manage uncertainties.
This tool:

- ☑ Creates multiple long-term pathways, considering a range of pathway triggers
- ☑ Enables short-term commitment without locking in long-term decisions that might not be optimal.

Protecting our environment

Our customers place considerable value on clean harbours and waterways and expect us to act as guardians of the environment.

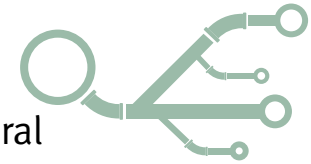
Over the next 20 years, we will invest $10.9 billion in our wastewater system and assets to:

- Improve treatment processes
- Discharge high-quality wastewater
- Reduce wet-weather overflows
- Build resilience and improve the quality of beaches and waterways
- Cater for Auckland's growth.

Programmes to protect our environment

- The 14.7km Central Interceptor Wastewater Tunnel will run underground from Grey Lynn to our Māngere WWTP and will reduce overflows and help clean up local beaches and waterways.

- The Western Isthmus Water Quality Improvement Programme, a 10-year programme of works, will improve the water quality in urban streams, and ultimately our harbours. It is jointly funded by Watercare and Auckland Council's Healthy Waters.



- Our largest WWTP at Māngere, will go through several improvements:
  - A thermal hydrolysis plant to enhance the pre-treatment of wastewater sludge for improved digester performance and production of more biogas and improved quality of biosolids. This will reduce emissions, waste and optimise asset life-cycle cost
  - Peak-flow treatment upgrades to handle additional wet-weather flows
  - Solids stream upgrades.

- Our second-largest WWTP, at Rosedale, has a range of planned improvements as well, in addition to process optimisation. These include:
  - A thermal hydrolysis plant to enhance the pre-treatment of anaerobic digestion to improve biosolids quality, reduce carbon emissions and waste, and optimise asset life-cycle cost
  - Construction of new treatment processes, including primary sedimentation tanks, biological treatment reactors, clarifiers and a separate pond discharger.

Delivering Māori outcomes

In 2020, Auckland Council approved **Kia Ora Tāmaki Makaurau**, a framework for the council group to place the aspirations of Māori in Tāmaki Makaurau at the heart of council business.

This framework identifies 10 strategic priorities:

- Māori business tourism and employment
- Marae development
- Te reo Māori
- Kaitiakitanga (guardianship)
- Māori housing and papakāinga (communal land)
- Realising rangatahi (youth) potential
- Māori identity and culture
- Tamariki (children) and whānau (family) well-being
- Effective Māori participation
- An empowered organisation.

Delivering Māori outcomes

Broadly, Watercare's service outcomes advance all the above strategic priorities, by providing essential lifeline services to all the communities of Auckland, protecting public health and enabling the economy to flourish.

More specifically, our programmes and projects directly impact the five priorities (Māori business, identity and culture, kaitiakitanga, effective Māori participation and empowered organisation) outlined below:

- One of our biggest programmes in this area is in the supply chain function. Our board has recently approved a programme with specific targets, to award five per cent of annual contract expenditure to Māori businesses, either directly through Watercare or indirectly through our partner organisations, by 2025. This programme will actively advance **Māori business, identity and culture**.

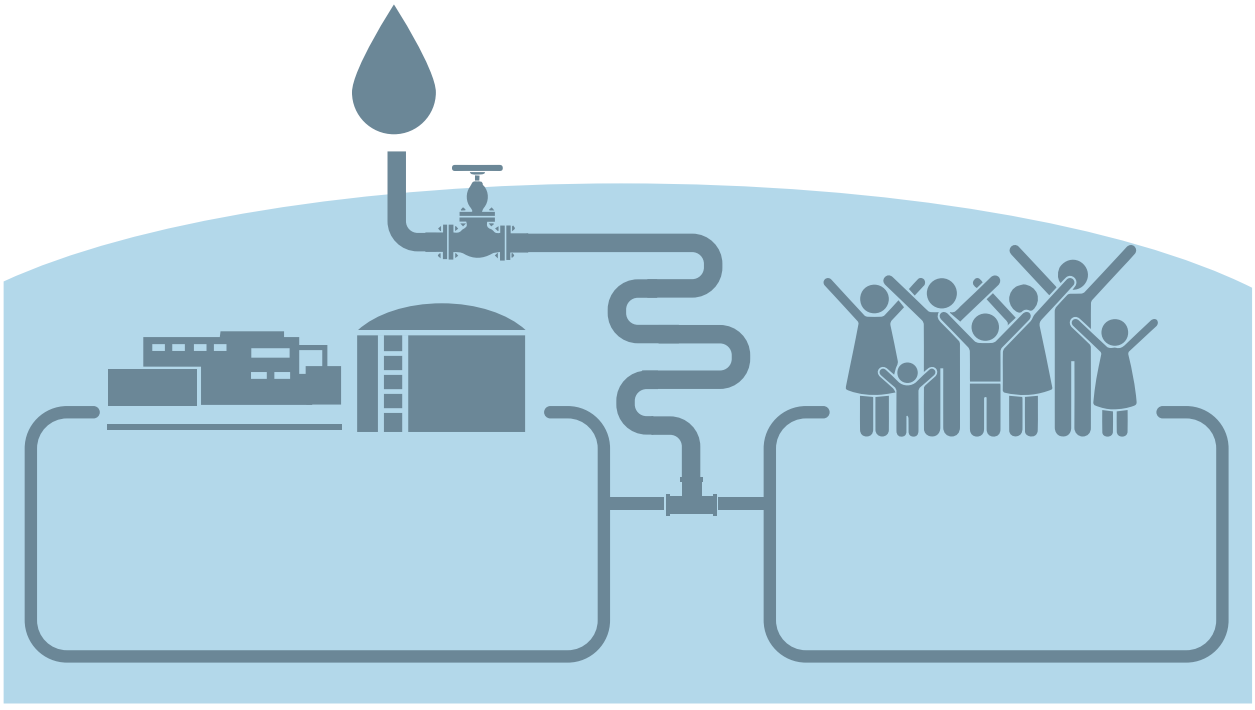
- We work closely with the Mana Whenua Kaitiaki Forum for all our projects across the region, engaging with appropriate iwi for projects within their rohe (area). This includes water take, treated wastewater discharge, network improvement and options assessments. We include value discussions around Te Ao Maori in our project assessment criteria. This enables the advancement of **kaitiakitanga and effective Māori participation**.

- We offer our employees many opportunities to learn, understand and apply **Māori tikanga** (culture), **values and te reo** (language) through free courses from Te Wānanga o Aotearoa, in-house programmes and marae visits. Our waiata (choral) group participates in all site blessings and milestones relating to our projects.

  These initiatives help build an empowered organisation that understands and appreciates the Māori worldview.

Delivering value for money

- Investing for today and tomorrow
- Cost-efficient operations
- Large programme of capital works each year
- Usage-based charging
- Structured pricing and funding so costs can be shared equitably between generations
- Investing in proactive asset maintenance to reduce operating expenditure
- Encouraging innovation, new thinking and collaboration through the ‘Enterprise Model’, our integrated way of delivering infrastructure

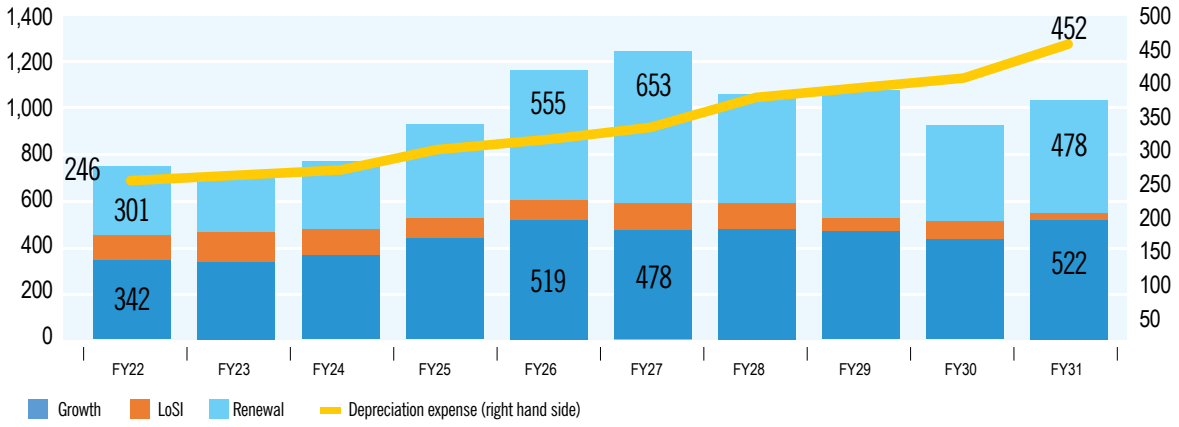


Funding and pricing

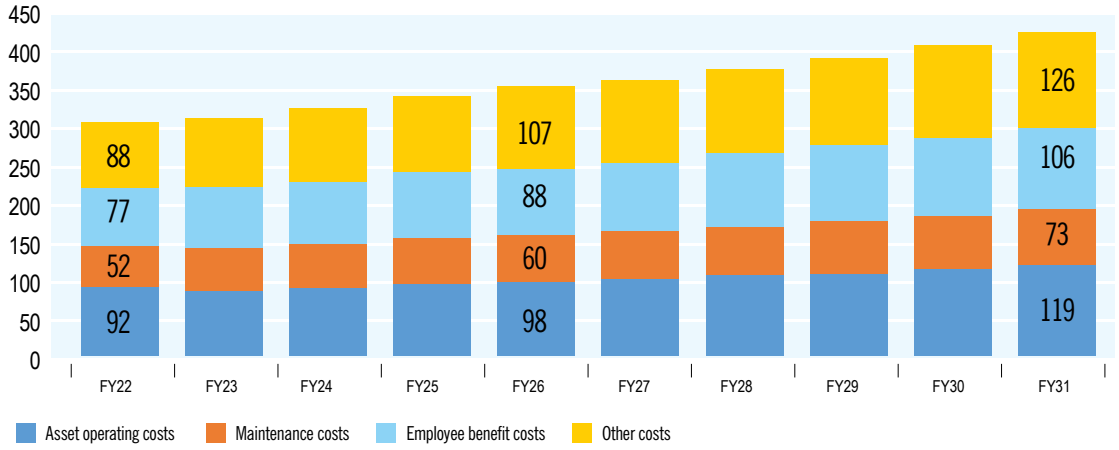
- We fund our operations and infrastructure using money from water and wastewater service charges, Infrastructure Growth Charges and borrowings.
- Currently, the average Auckland household spends $89.01 a month on average (less than 1% of their monthly income).
- Financing constraints from Auckland Council limit the amount of money Watercare can borrow to invest in renewing and developing Auckland water infrastructure.
- Shortfalls in borrowing need to be financed through revenue from increases in customer pricing. Watercare has announced price increases over the next few years to fund this shortfall.
- With a 7% rise in July 2021, households will pay on average around $6.25 more a month.
- Prices increase by 7% again in July 2022 followed by 9.5% increases from 2023 to 2029. Current modelling indicates that from 2030 annual price increases required will be in the range of 3.0% to 3.5%.

Our capital expenditure and operating expenditure forecast – 10 years

Capex and depreciation ($m nominal)

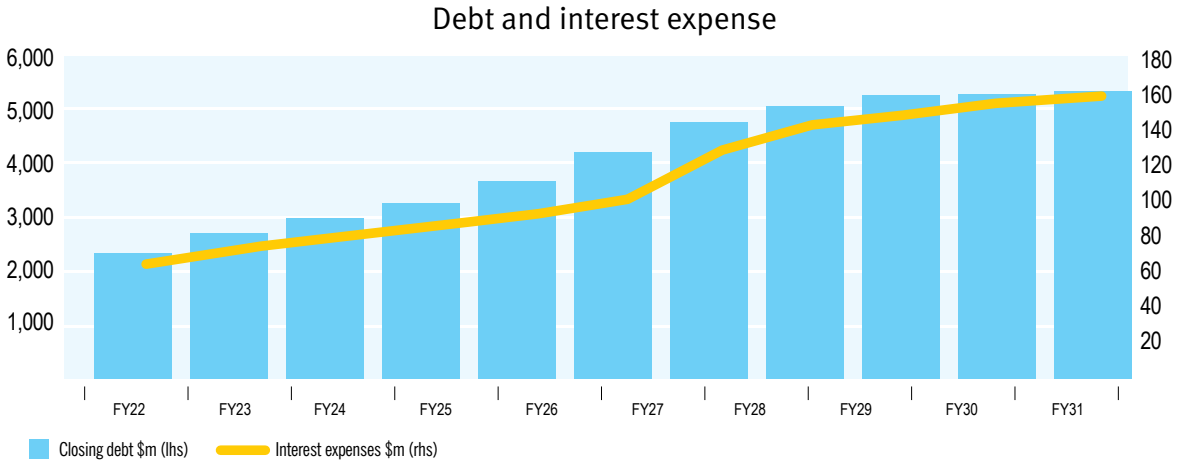


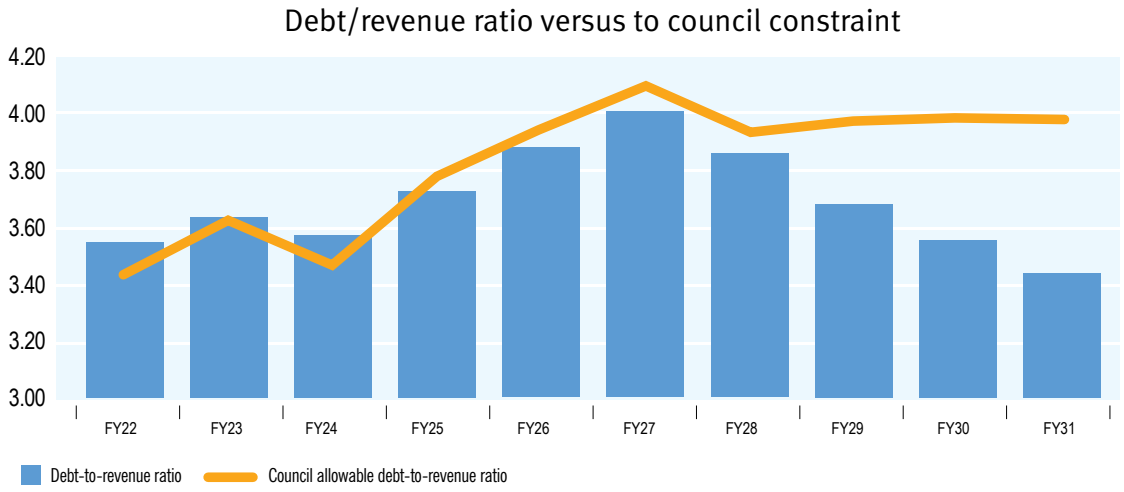
Operating expenditure ($m)



- For the 10 years 2022 to 2031 the AMP capital programme has increased from $5.3billion to $9.7billion (nominal) when comparing the 2018 LTP to the 2021 LTP.
- As our assets increase in value (coupled with three-yearly asset revaluations), depreciation expense increases significantly.
- Annual increases in operating expenses will be in line with projected inflation.

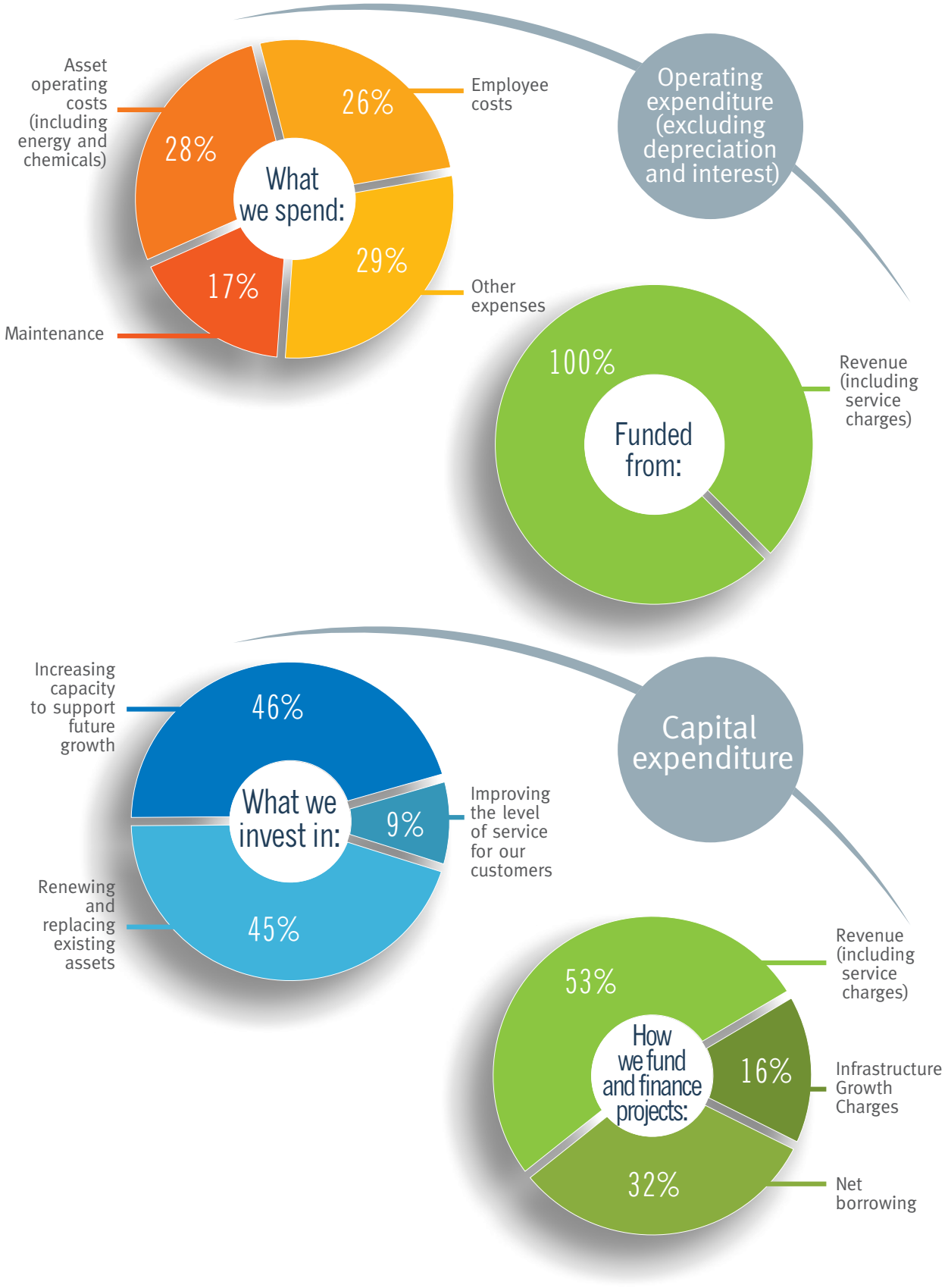
Our debt forecast – 10 years





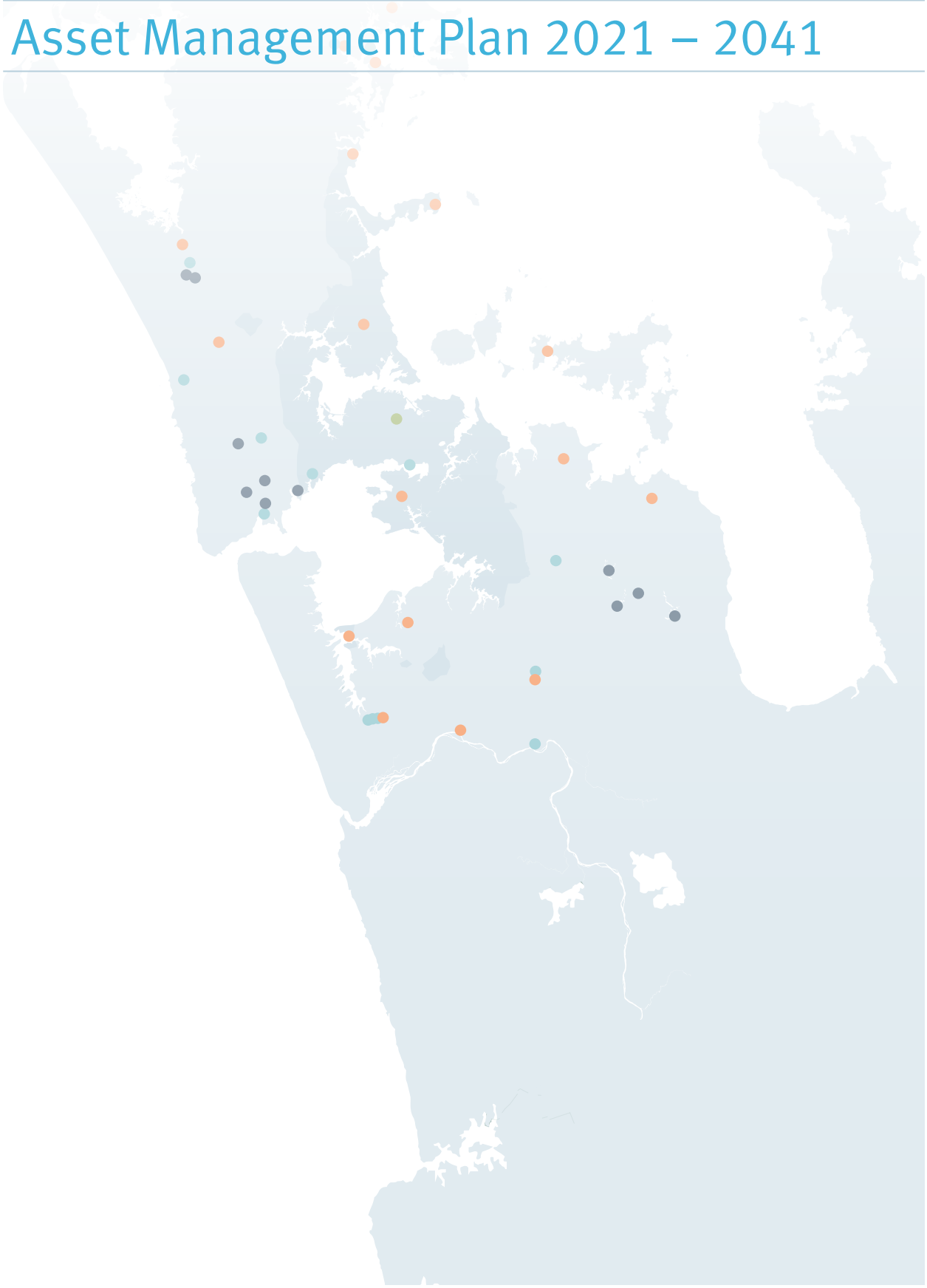
- More efficient financing would allow Watercare to better match the duration of financing against asset life. We do this as much as possible, while working within the constraints of Auckland Council's financing arrangements.
- Through the period 2022 to 2029 Watercare's investment programme will require debt funding that will take the business close to our Auckland Council debt constraint.
- If more debt could be accessed, prices could be held at lower levels than forecast.
- Debt increases from $2.3billion to $5.4billion by 2031. Interest expenses will increase with debt.

Our cash-flow forecast for 10 years



Section 2

Asset Management Plan 2021 – 2041



1. Introduction

Watercare Services is a lifeline utility providing water and wastewater services to 1.7 million people in Auckland. Our services are vital for life, keep people safe and help communities to flourish.

We supply reliable, high-quality drinking water to homes and businesses in the Auckland region and collect, treat and discharge their wastewater in environmentally responsible ways.

We manage water and wastewater assets with a gross replacement value of $15.9 billion and plan and build infrastructure to ensure we support growth today and into the future.

We are a council-controlled organisation (CCO), owned by Auckland Council. Our activities and programmes are funded through customer charges and borrowing. We are required by law to be a cost-efficient service provider and we do not pay a dividend to our shareholder, (Auckland Council).

Our value creation model

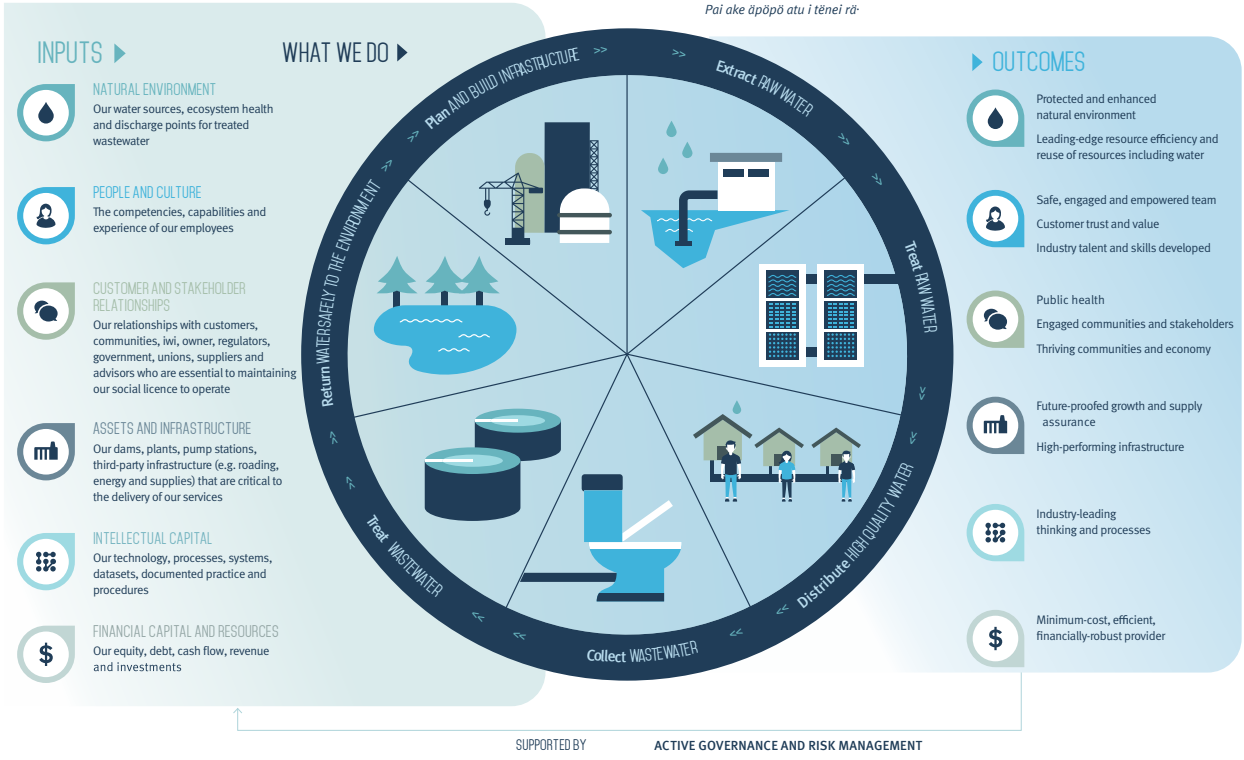
Our vision

Trusted by our communities for exceptional performance every day.

Better tomorrow than we are today.
Pai ake āpōpō atu i tēnei rā·

Our mission

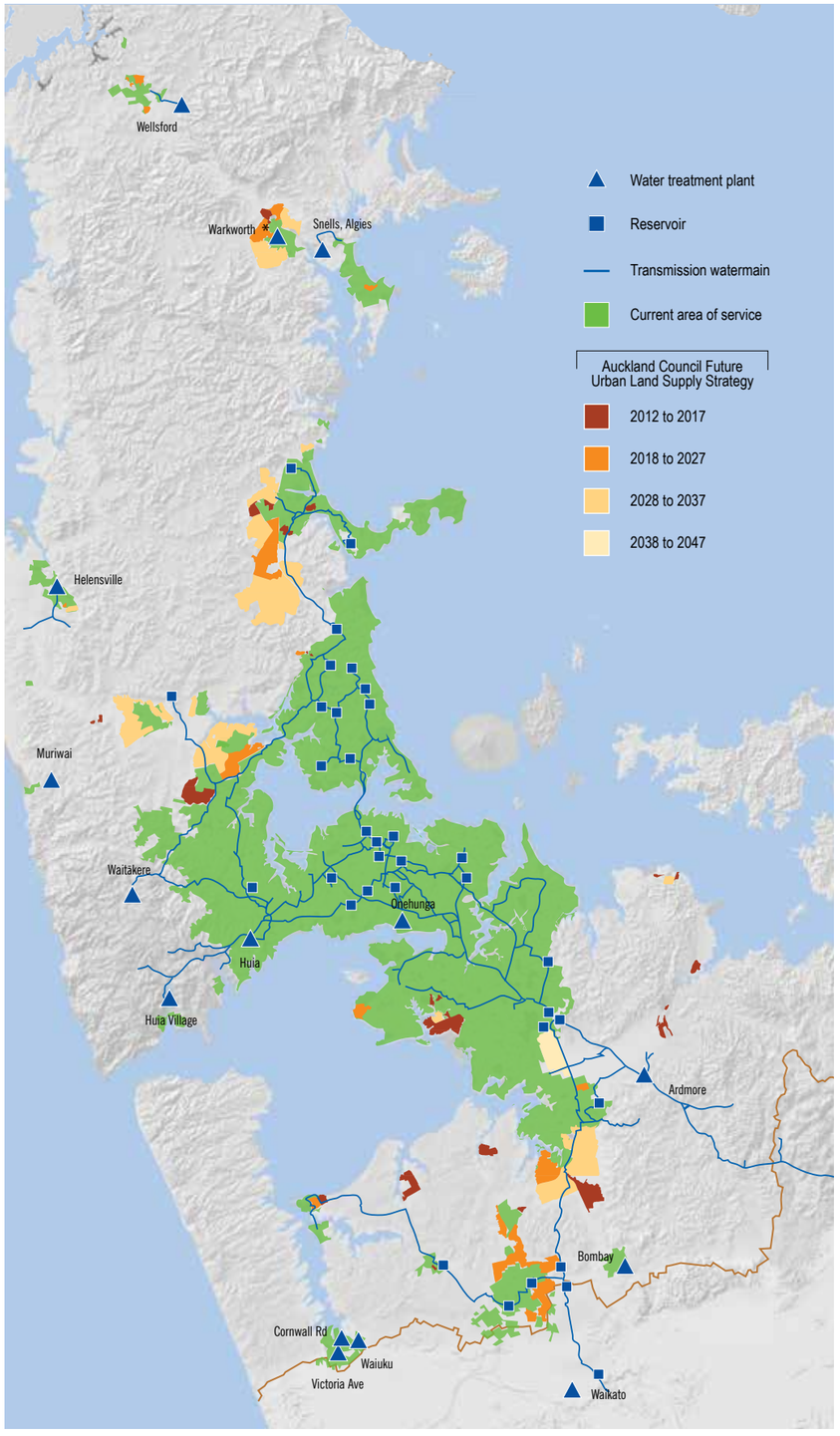
Reliable, safe and efficient water and wastewater services.



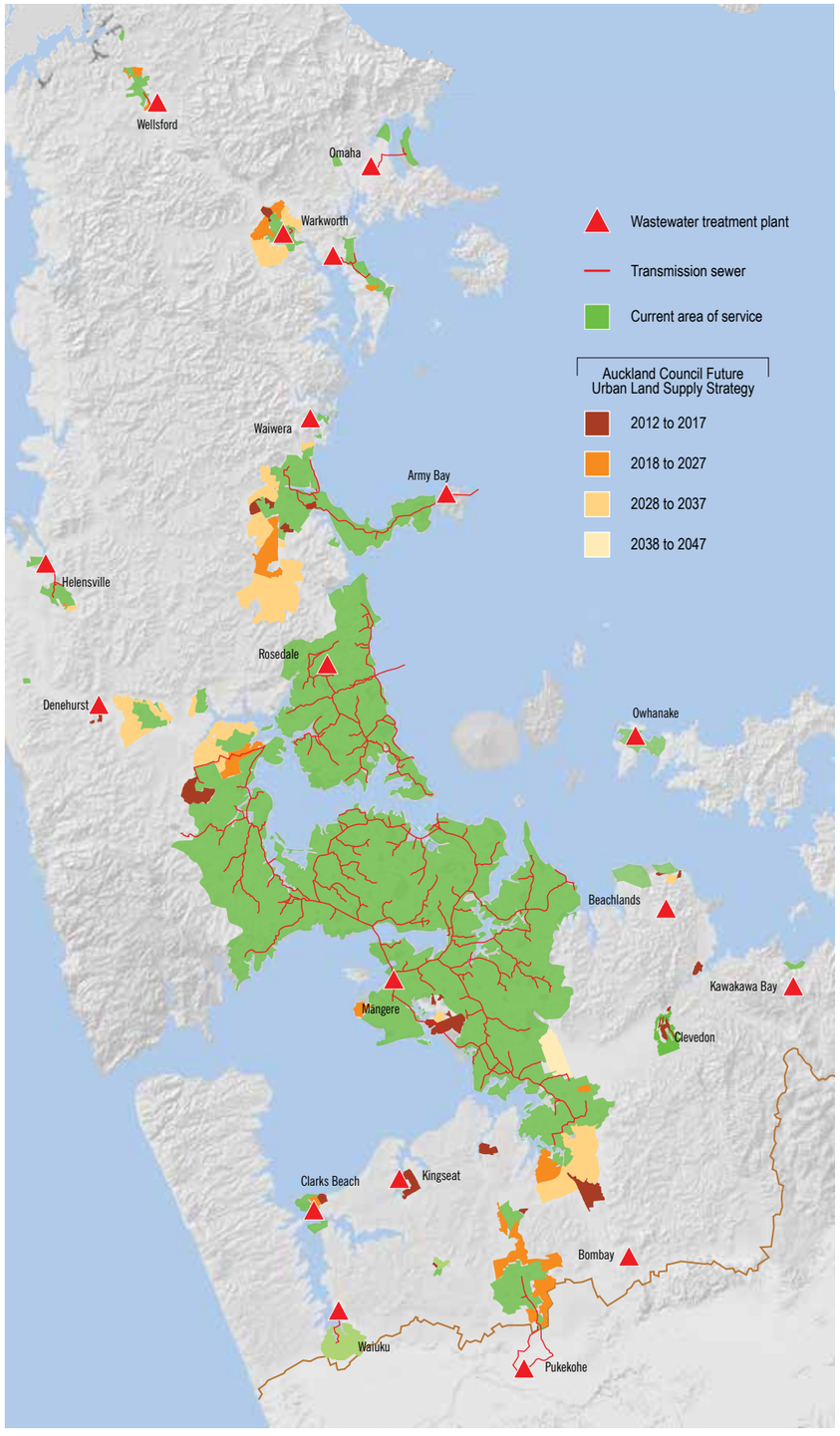
Our legislative and governance framework, along with our stakeholder engagement model, is outlined on our website.

Our areas of service

Water area of service



Wastewater area of service



The maps show the areas that are currently serviced by our water and wastewater transmission network assets. They also show areas where Auckland Council's Future Urban Land Supply Strategy is expecting growth to occur. These centres of forecast population growth in the north, west and south of the region will require new water and wastewater infrastructure capacity to service them.

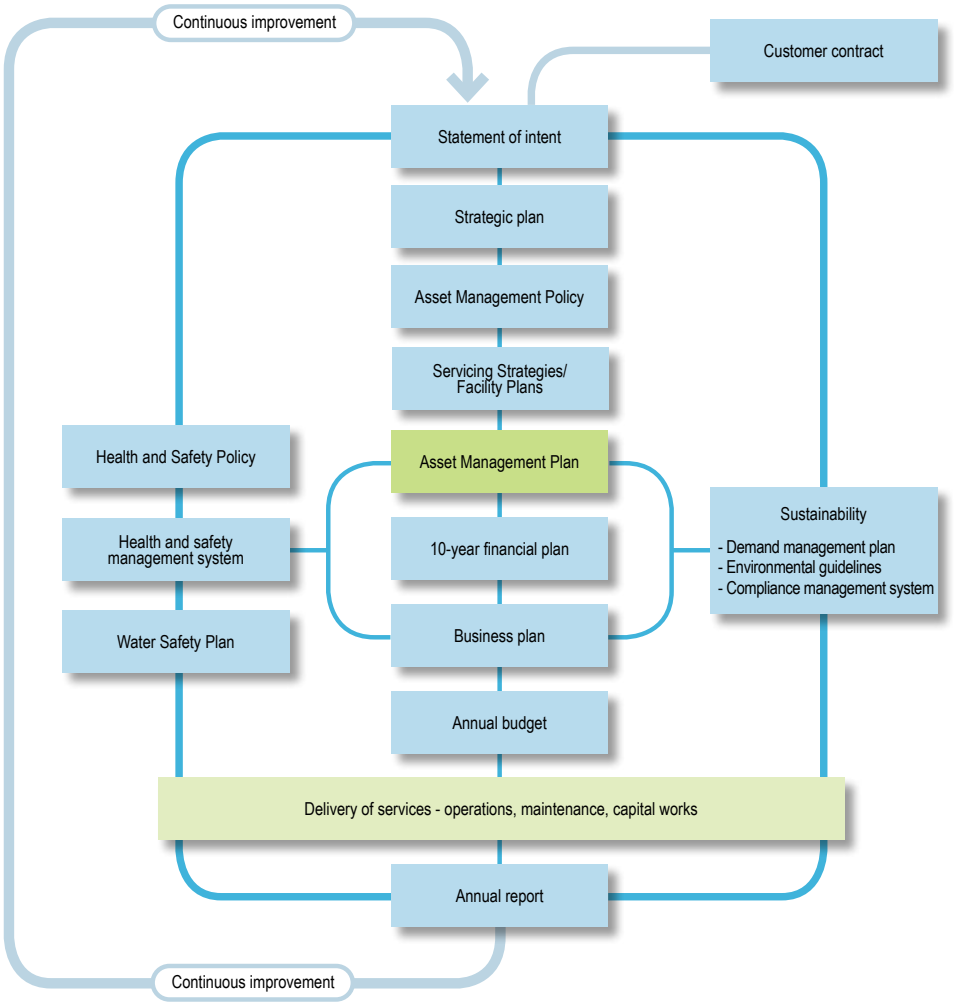
We also provide water and wastewater treatment services for Tūākau and Pōkeno in the Waikato, so these areas are included in this plan as appropriate. However, it excludes the Papakura network operated under contract by Veolia Water. Veolia Water does not own the assets but they do carry out the asset management planning functions for our assets in their area under the contract.

For areas outside Watercare's area of service, private supply is mainly through rain tanks for water and septic tanks for wastewater.

AMP and our strategic framework

Watercare's AMP (including our Funding Plan) is a future-focused planning document that outlines how we will operate, maintain and renew existing water and wastewater assets and provide new assets to meet demand as Auckland grows. It has a 20-year horizon and contributes to Auckland Council's Long-Term Plan (LTP). The AMP and the Funding Plan will be of interest to our shareholder, infrastructure partners, suppliers and other stakeholders from local government.

This AMP covers the period from 1 July 2021 to 30 June 2041.



There are a number of key inputs that inform the AMP:

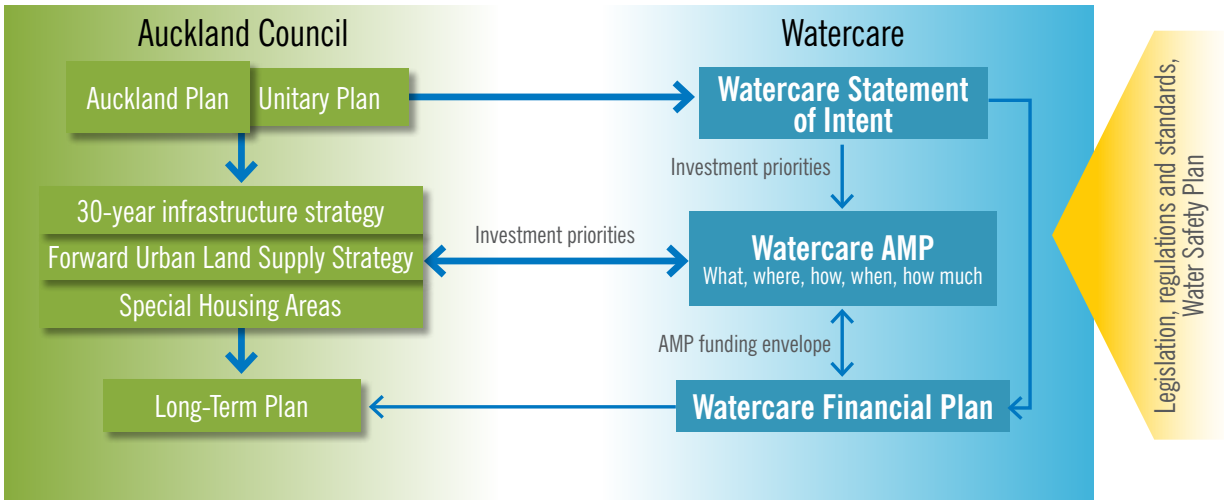
- Customer insights
- Water Safety Plan
- Region-wide Servicing Strategies for the identified growth/development areas
- Facility Plans
- Watercare's 2017 Wastewater Network Strategies (WWNS), which are prepared in compliance with the Auckland-wide Wastewater Network Discharge Consent (NDC) granted on 17 June 2014. It addresses the network performance and network improvement programme specific to each of the Strategic Management Areas (SMAs):

Wellsford	Waiwera	Māngere	Waiuku
Omaha	Helensville	Oneroa	Pukekohe
Warkworth	Hibiscus Coast	Beachlands	
Snells/Algies	Rosedale	Clarks Beach	

- Climate Change and Adaptation Strategy.

The AMP and the Funding Plan document is aligned with Auckland Council's strategic plans and is an important part of the Auckland Council's planning framework, as illustrated below:

Alignment of the Watercare AMP with the Auckland Plan



Delivering value for customers

Our vision is to be trusted by customers and communities for exceptional services. We understand that our customers trust us when we have regular, open and transparent engagement on issues that matter to them, when we consistently deliver on their expectations and when they have confidence that we are well prepared for the needs of future generations. We actively engage with our partners and customers with a view to improve our service on a day-to-day basis. We consult extensively with customers and communities ahead of our infrastructure and construction projects, to inform and engage with them and to ensure they understand how those projects will benefit them and what they can expect during the construction phase. We are committed to increasing our proactive engagement with customers and communities on what a resilient water supply means for them in the future and how we can fulfil those expectations. Over the next year, we will be partnering with the University of Auckland to engage with a cross-section of Aucklanders on future investment decisions. Broadly speaking, our customers expect us to deliver safe and reliable water supply and wastewater services seamlessly. When something does go wrong, they expect us to be responsive and accountable.

In addition to our service commitment, our customers expect us to think and plan for the future – building a water system which will enable our city to flourish for many years to come.

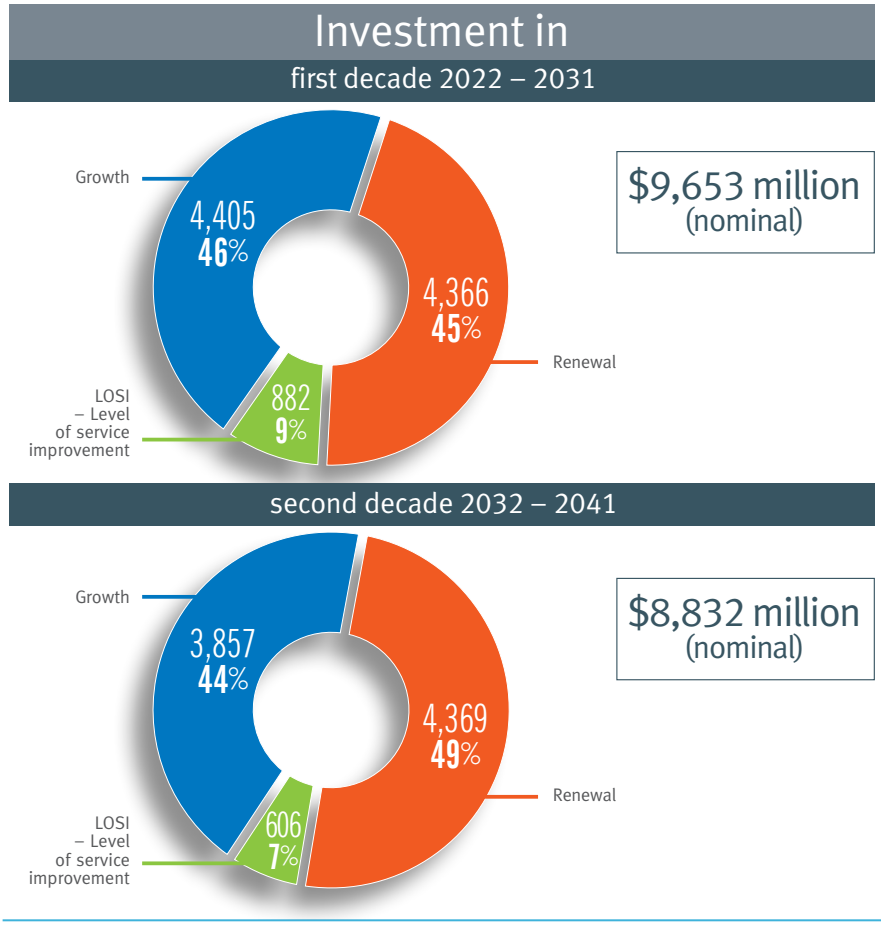
Our customers also expect us to provide leadership on matters relating to the water cycle and water use, and expect us to operate sustainably and mitigate any impacts our activities might have on the environment.

Closely related to sustainability is climate change, which impacts how we interact with the environment and how we operate, plan and build for a future which will see more impacts from a changing climate.

Lastly, customers expect us to provide value for money in our services, and manage a financially stable business. We undertake a large capital programme of works each year, to maintain our services and meet customer expectations. Our assets provide benefits over long periods of time, and we arrange our funding and financing so that these costs are shared equitably between generations. We are always looking for ways to become more efficient and minimise the costs associated with our work, through innovation and new technology.

How this AMP delivers benefits for our customers and communities

Over the next 20 years, we will invest about $18.5 billion to build and maintain water and wastewater infrastructure for a growing Auckland and develop a resilient water system that can serve today and tomorrow's generations effectively.



Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Catering for a growing Auckland

While Auckland's ever-growing population is a concern for many, our customers and communities will be guaranteed safe and reliable services into the future as the region continues to grow. Over the coming 20 years, Auckland's population is expected to grow 29%, adding another 476,000 people to our current population of 1.7 million. During this time, we plan to invest $8.26 billion to provide capacity for population growth and the accompanying increased need for our water and wastewater services.

Some of our key projects to cater for growth include:

Water

- Waikato A – the staged construction of a new water treatment plant that will treat additional water from the Waikato River to cater for Auckland's water supply needs over the next 20 years
- Waikato 2 Watermain – a new watermain that will allow for growth and add resilience to the existing Waikato 1 Watermain
- North Harbour 2 Watermain – to provide an alternative way to service customers in the west and north, as well as provide redundancy and improved transmission capacity
- Boost pumping of the Ōrewa 1 and 2 Watermains and a new Ōrewa 3 Watermain – to increase capacity to the north and meet forecast growth in the Silverdale, Dairy Flat and Wainui areas.

Wastewater

- Central Interceptor – the 14.7km-long Central Interceptor wastewater tunnel to run underground from Grey Lynn to our Māngere Wastewater Treatment Plant (WWTP) and, when complete, will reduce overflows and help clean up local waterways
- Northern Interceptor – a wastewater pipeline to help divert flows from the upper portion of the Western Interceptor catchment (currently serviced by the Māngere WWTP) to the Rosedale WWTP, balancing capacity across our treatment plants
- Māngere WWTP capacity upgrade
- Rosedale WWTP upgrade.

Developing a resilient water system for tomorrow

Our customers expect safe and reliable services 24/7. This means being resilient to changing conditions and investing sufficiently so our water and wastewater networks can withstand emergencies and droughts and operate normally with minimal impact on our customers and the environment.

The resilience of our water and wastewater networks has been, and will continue to be, challenged by climate change impacts. To manage these effects, and ensure reliability of service, over the next 20 years we will invest about $10.2 billion in renewing and upgrading critical assets, including:

- The replacement of the ageing Huia Water Treatment Plant (WTP) with a new 140MLD-capacity plant to help meet peak demand and improve the system's resilience. Two additional reservoirs (2 x 25ML each) are proposed as part of this replacement project and will increase storage for the region.

- The renewal and replacement of existing distribution systems, including watermains, wastewater mains and pump stations which are detailed below.

Water renewals and level-of-service improvement programme ($4.58 billion) include:

- Ōrewa 1 Watermain replacement
- Huia 1 and Nihotupu 1 watermains replacements
- Domain Reservoir replacement
- Khyber 3 Reservoir replacement
- Huia 2 Watermain replacement
- Hūnua 1 Watermain which will be replaced by the extension to Hūnua 4 Watermain
- Local water network renewals.

Wastewater renewals and level-of-service improvement programme ($5.64 billion) include:

- Transmission network replacements
- Local network renewals
- Wellsford WWTP renewals
- Sub-regional WWTP renewals
- Rosedale WWTP renewals
- Pukekohe WWTP renewals
- Māngere WWTP renewals
- Helensville WWTP renewals.

Protecting our environment

We know our customers and communities place a great deal of value on clean harbours and waterways and expect us to act as guardians of the environment.

Our activities are intrinsically linked to the health of the natural environment. Auckland's water sources must have sufficient volume and reliability to provide water for the region, and they must be protected from overuse. For the wastewater system, receiving environments must have the capacity to accept treated wastewater discharges without adverse effects, and overflows from the network must be minimised.

We fulfil our environmental responsibilities through a regulatory framework. Meeting our legal and regulatory obligations is a baseline requirement for our organisation. Our assets are subject to a large number of consent conditions, and we work to comply with these conditions at all times.

Beyond compliance with consent conditions, we also further improve the quality of the receiving environment through riparian restoration programmes, flora and fauna protection, and the use of advanced treatment processes to discharge high-quality treated wastewater.

Integrating environmental considerations into everything we do is key to our role as a trusted iwi partner and community organisation.

Over the next 20 years, we plan to invest $10.9 billion in our wastewater system and assets to improve treatment processes, reduce wet-weather overflows and build resilience so that the wastewater we discharge into the environment is of a high quality and will ultimately improve the water quality of the waterways.

- The 14.7km Central Interceptor Wastewater Tunnel will run underground from Grey Lynn to our Māngere WWTP and, when complete, will reduce overflows and help clean up local waterways.
- The Western Isthmus Water Quality Improvement Programme, a 10-year programme of works, will improve the water quality in urban streams, and ultimately our harbours. It is jointly funded by Watercare and Auckland Council's Healthy Waters.
- Our largest WWTP, at Māngere, will go through several improvements:
    - A thermal hydrolysis plant to enhance pre-treatment of wastewater sludge for improved digester performance and production of more biogas, and better-quality biosolids. This will reduce the plant's carbon footprint and waste as well as optimise asset life-cycle cost
    - Peak flow treatment upgrades to handle additional wet-weather volumes following the completion of the Central Interceptor wastewater tunnel
    - Commencement of the Māngere Wastewater Treatment Plant discharge consent renewal process ahead of its expiry in 2032
    - Solids stream upgrades.
- Our second-largest wastewater treatment plant, at Rosedale, also has a range of planned improvements as well. In addition to process optimisation and improvements, the programme of works and investment planned for the Rosedale WWTP include:
    - A thermal hydrolysis plant to enhance pre-treatment of anaerobic digestion to improve biosolids to class A quality, reduce carbon footprint and waste, and optimise asset life-cycle cost
    - Construction of new treatment processes, which includes primary sedimentation tanks, biological treatment reactors, clarifiers and a separate pond discharging unit.
    - The consent renewal process for the Rosedale WWTP.

Providing value for money

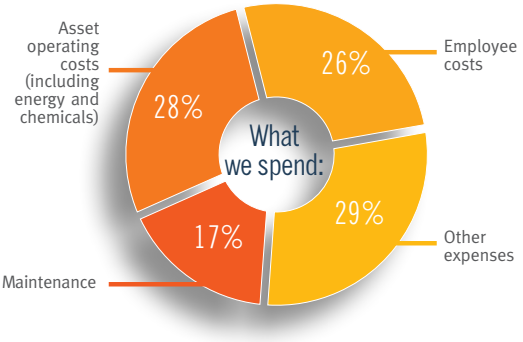
Water is a universal resource, essential for thriving communities and cities. As a public-sector company delivering lifeline services for the Auckland region, we take our financial responsibilities very seriously.

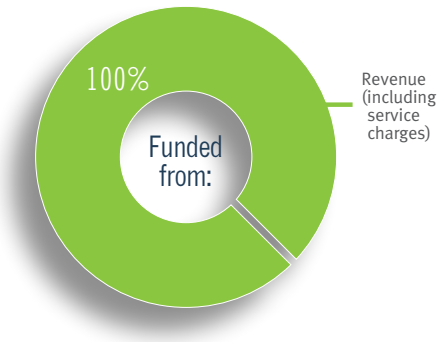
We are mandated by legislation to be a cost-efficient service provider, focussing on the efficient operation and maintenance of our assets. While keeping costs low is one part of our fiscal obligations, we must also make sure that we invest in providing safe and reliable services – not just today but for decades to come.

We undertake a large capital programme of works each year to maintain our services and meet customer expectations. Our assets are built to service communities over long periods of time, and we plan and arrange our funding and pricing so that these costs are shared equitably by generations throughout that period. These concepts are described fully in the Funding Plan section of this document.

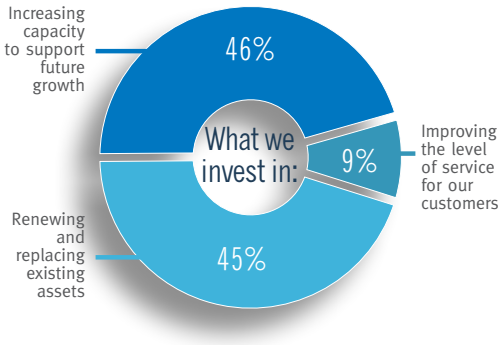
Our cash flow (10-YEAR FORECAST FROM 1 JULY 2021)

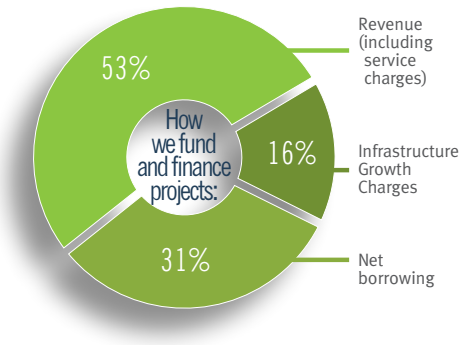
Operating expenditure (excluding depreciation and interest)





Capital expenditure





Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Delivering Māori outcomes

In 2020, Auckland Council approved **Kia Ora Tāmaki Makaurau**, a framework for the council group to place the aspirations of Māori in Tāmaki Makaurau at the heart of council business. This framework identifies 10 strategic priorities for the group to advance Māori identity and well-being. These 10 priorities are:

- Māori business tourism and employment
- Marae development
- Te reo Māori
- Kaitiakitanga (guardianship)
- Māori housing and papakāinga (communal land)
- Realising rangatahi (youth) potential
- Māori identity and culture
- Tamariki and whānau (children and family) well-being
- Effective Māori participation
- An empowered organisation.

Broadly, Watercare's service outcomes advance all the above strategic priorities, by providing essential lifeline services to all the communities of Auckland, protecting public health and enabling the economy to flourish.

More specifically, our programmes and projects directly impact the five priorities (Māori business, identity and culture, kaitiakitanga, effective Māori participation and empowered organisation) outlined below:

- One of our biggest programmes in this area is in the supply chain function. Our board has recently approved a programme with specific targets, to award five per cent of annual contract expenditure to Māori businesses, either directly through Watercare or indirectly through our partner organisations, by 2025. This programme will actively advance **Māori business, identity and culture.**
- We work closely with the Mana Whenua Kaitiaki Forum for all our projects across the region, engaging with appropriate iwi for projects within their rohe (rohe). This includes water take, treated wastewater discharge, network improvement and options assessments across the region. We include value discussions around Te Ao Māori in our project assessment criteria. This enables the advancement of **kaitiakitanga and effective Māori participation**.
- We offer our employees many opportunities to learn, understand and apply **Māori tikanga, values and te reo** through free courses from Te Wānanga o Aotearoa, in-house programmes and marae visits. Our waiata group participates in all site blessings and milestones relating to our projects. These initiatives help build an empowered organisation that understands and appreciates the Māori worldview.

2. Our asset management approach

We are committed to best-practice asset management across our business. Our aim is to align our asset management systems with the international standard ISO 55000:2018 – Asset Management System, and follow the guidelines of the *International Infrastructure Management Manual*.

Our Asset Management Policy outlines how we plan, design, construct, acquire, maintain, operate, rehabilitate and dispose of our assets. We keep in mind both present and future customers by considering the assets in a manner that:

- Protects the public health of the community and provides a defined level of service to our customers
- Takes an asset life-cycle approach
- Develops cost-effective management strategies for the long term, including optimising the cost of maintaining and operating our networks
- Manages risks associated with asset failure
- Uses physical resources sustainably and cares for the natural environment
- Continuously monitors and improves our asset performance and management practices.

Our high-level asset management objectives are as follows:

- To operate and maintain the water and wastewater systems in an efficient manner
- To ensure there is sufficient infrastructural capacity to meet growth in demand
- To meet regulatory requirements and levels of service
- To replace assets as they reach the end of their economic lives
- To respond and adapt to climate change.

Our service standards

We manage and maintain assets to ensure we continue our levels of service for customers. These service standards are specified below.

Water supply pressure	Minimum normal service target: 200 kilopascals (kPa)
Water supply flow rate	Minimum normal service target: 25 litres per minute*
Water quality	Maintain Ministry of Health/Manatū Hauora drinking water standard
Restoring water shutdowns	96% restored within 5 hours
Enquiries and complaints	Respond to enquiries within 3 working days of receipt. Respond to complaints within 10 working days of receipt.

** Based on 15mm residential water meter*

Asset management principles

The principles applied to the management of the water and wastewater systems and their associated strategies are as follows:

- We engage with our customers, partners and stakeholder to understand their needs and expectations.
- We are required to manage water and wastewater operations efficiently to keep costs to customers, collectively, at a minimum while maintaining effective management and maintenance of the long-term integrity of our assets.
- We are required by legislation to give effect to Auckland Council's plans and strategies as set out in the Auckland Plan and associated documents.
- We will plan and seek resource consents to operate and construct plant and transmission assets, and stage construction to match demand.

- A risk-based philosophy will be applied for the replacement or rehabilitation of critical water and wastewater assets and provision of new assets to service growth.
- Non-critical assets will be utilised until they no longer provide the expected levels of service to the customer, at which time they will be replaced. This will not preclude a planned approach to ensure assets are replaced before they fail as asset criticality changes over time.

Water-specific principles

- To help us provide safe and secure supply of drinking water to our customers, we develop and implement site-specific water safety plans that comply with legislative requirements.
- The current drought security standard is that the metropolitan water supply dams will be operated to a 1:100-year event (with a 15% residual storage at the end of the drought event), with additional water sources planned to meet the medium growth forecast.
- Future water sources will be secured with sufficient lead time to enable the delivery of water which meets the Drinking Water Standards New Zealand 2005 (Revised 2018) (Ministry of Health, 2018), before the average and/or peak demand exceeds the available supply.
- Follow international guidance protocols to develop a water resources strategy that identifies water supply solutions and delivery systems which have sufficient resilience to service the water requirements of Tāmaki Makaurau/ Auckland over a 35-year period.
- Provide water supply solutions which recognise and balance the cultural, environmental, carbon, social and financial impacts at both local and regional levels and take into account of the potential effects of climate change.
- Water treatment plant expansions will be implemented to meet peak demand in conjunction with regional treated-water storage.
- Metropolitan water treatment plant resilience will be managed to enable an outage of a single water treatment plant, excluding the Ardmore WTP, without a reduction in water supply.
- Water demand management will be implemented to achieve the average day consumption should the Ardmore plant be limited to the minimum production of 140MLD. Further restrictions will be implemented if the Ardmore plant is out of service and contingency reservoir storage cannot be maintained.
- To achieve resilience, we will maintain an average minimum of 24-hour treated water reservoir storage.
- In conjunction with water treatment and treated water reservoir storage capacity, the overall water transmission system will provide, wherever possible, redundancy against a transmission asset failure.
- The system will be designed to maximise the use of gravity supply of drinking water. Where distribution system capacity and capability can be enhanced to meet customer demand without compromising drinking water quality, boost pumping will be implemented to maximise the use of existing assets.

Wastewater-specific principles

- Wastewater treatment plant capacity will be augmented to match growth in demand and to maintain compliance with the facilities' discharge consents.
- Augmentation of the wastewater transmission and local networks will be carried out prior to the peak dry-weather flow exceeding the capacity of the network and in accordance with discharge consent conditions.
- We must recognise that the network discharge consent sets the performance standard for the wastewater network and the investment required.
- We will not permit cross-connections from the stormwater system to the separated wastewater network.
- The wastewater system is for the conveyance of wastewater only; therefore, as much as practical, stormwater and groundwater will be diverted from the system.
- An inflow and infiltration (I&I) reduction programme will be progressed and enhanced to maximise the use of existing assets.

- As the transmission system reaches capacity, we will augment the interceptors[1] by truncating the catchment or diverting flow to an adjacent interceptor.
- High-risk rising mains[2] and inverted siphons[3] will be duplicated to provide redundancy.
- Wastewater treatment plants will be regarded as 'resource recovery plants'. This means that, where possible and practicable, energy, biosolids and other resources will be beneficially reused.

Delivering our capital infrastructure

Our integrated model of delivering the majority of our infrastructure will leverage the size and scale of the AMP to deliver benefits in three areas – sustainability, cost and safety (40:20:20).

Our targets are:

- **Reduce** carbon in construction or **'built carbon' by 40%** across Watercare by 2024
- **Reduce** the **cost** to deliver our infrastructure programme by **20%** by 2024
- **Reduce** the number of **injuries** recorded during construction by **20%** year-on-year.

These targets will encourage innovation and new thinking from across the business and increased collaboration with external service providers. Some of the tactics that will support delivery of 40:20:20 targets include standard product designs, an integrated programme delivery mechanism, and challenging our standards and ways of delivery.

The high rate of growth in Auckland, along with the need to renew ageing assets, makes these challenging targets to achieve.

1 An **interceptor** is a component of a wastewater network. It is a pipe network that receives flow from trunk wastewater pipes and sometimes stormwater run-off and directs it to the wastewater treatment plant. It is among the larger pipes of a wastewater network and is categorised as a transmission asset.

2 A **rising main** is a type of wastewater pipe through which wastewater is pumped from a pump station, typically from a lower ground level to a higher ground level, to join with the main wastewater network.

3 **Inverted siphons** allow wastewater pipes to pass under obstructions such as rivers. Unlike the main wastewater pipe, the siphon pipes flow under pressure and must have flow velocities greater than 0.9 metres per second to keep any solid material suspended so it can continue to be conveyed to a wastewater treatment plant for collection and disposal.

3. Our risk management process

Risk management is an integral part of managing infrastructure assets through their life cycle to ensure that we minimise service disruptions and their impact on our customers and the environment.

Watercare takes an enterprise-wide approach to managing risks and opportunities through a formal enterprise risk management framework and by supporting processes which align with AS/NZS ISO 31000:2018 (Risk Management – Principles and Guidelines).

The continued application of risk management processes ensures that we identify the risks to achieving our business objectives. Risks are analysed, prioritised for treatment, and then appropriate risk mitigation measures are applied.

Risk Management Policy

Watercare maintains a Risk Management Policy, the aim of which is to direct the risk management function. The policy focuses on the management of those risks that are material to the achievement of our organisation's principal objectives.

This framework defines the management policies, procedures and practices to be applied to the risk management tasks of identifying, analysing, evaluating, treating and continuing to monitor risk to provide enterprise-level information.

Where Watercare is required to comply with specific legislative requirements that prescribe additional risk assessment components, We will incorporate these into our risk assessment programme.

As part of our risk management framework, we have established a Risk and Resilience Steering Committee, which meets quarterly to monitor emerging risk and risk mitigation actions and strategies. The committee comprises the chief executive, senior management team and the head of risk and resilience.

Regular monitoring, review and reporting of risks is an important component of the Watercare Risk Management Framework, as it ensures new risks and changes to existing risks are identified and managed, and that risk mitigation plans are developed and implemented. Business processes are in place to ensure that the priority a project takes in the AMP is aligned with the level of risk being managed (along with a measure of the relative importance of each).

Significant risks are monitored by the board at least quarterly, or as required. In addition, external reviews are carried out to ensure we meet and exceed good-practice measures in risk management.

Our enterprise risks reflect the interdependencies that we are faced with in delivering our services.

Emergency management and contingency planning

In providing our water and wastewater services, we use an incident escalation system to manage emergency incidents. This system defines roles, responsibilities and processes for response. It is documented in our incident management plan, which aligns with a number of other plans, including:

- Our Water Safety Plan
- Our risk management framework
- Our pandemic response plan
- Our drought response plan
- Our business continuity plan
- Auckland Council's crisis management plan
- Our water contamination communication plans.

For the management of wider-scale incidents, we are also a participant in the Auckland Lifelines Group (ALG). The ALG is made up of all the essential utilities in the Auckland region which work together to improve the resilience of Auckland's infrastructure to major hazards such as volcanic eruptions or earthquakes. Working with the ALG improves our understanding of the risks to the water and wastewater assets and services during major natural incidents. The ALG also works alongside Civil Defence and Emergency Management (CDEM) during emergencies to restore essential services. Lifeline procedures are included in our incident management plan.

At an operational level, we also have contingency plans to manage planned or emergency events as well as issues with specific critical assets. These plans are key components of our water safety framework and include:

- Water safety plans for each WTP
- Water safety plan for our distribution network
- A drought response plan
- Shutdown procedures for bulk water mains

- Site-specific incident response and contingency plans
- Site-specific business continuity plans that set out procedures we must follow in order to maintain service levels and minimise disruption to our customers.

Risk evaluation

Within our risk management framework, risks are evaluated using a semi-quantitative model that explicitly considers the likelihood of various adverse consequences occurring.

Consequences are scored according to the impact that the risk may have on the achievement of the following objectives:

- Providing for the health and safety of staff, customers and the public
- Delivering safe and secure supply of drinking water for consumers, protecting public health
- Achieving environmental compliance and minimising third-party damage
- Effective management of systems, assets, project performance and service delivery
- Minimising financial losses
- Maintaining our professional reputation.

The likelihood of adverse consequences is also scored based on a number of contributory factors. These include the asset's location, the operating environment, assessment of the asset's condition and the forecast remaining life of the asset.

Our risk management framework assesses each risk across these four classifications. Each risk is categorised according to the magnitude of the risk score and the magnitude of the potential consequences.

All high and very high risks are defined as enterprise risks. Very low, low and medium asset risks may be considered tolerable if risk reduction is impractical or if the cost of treatment exceeds the improvement gained. Very low risks are considered to be of minor significance, with the asset generally being run to failure before being replaced.

The process of evaluating risks involves considering the scope and effectiveness of existing risk control measures in terms of prevention, protection and recovery. Where further risk reduction is warranted, new business projects are identified, investigated and defined for inclusion in the AMP.

The nature of many of Watercare's infrastructure projects means that time for implementation is significant with detailed studies required before the project can be fully developed and delivered. As a result, major projects can take three to five years to approve, develop and implement. Some strategic projects may take even longer.

Combined with the forecast timeframe for the risk to reach an unacceptable level, these are key factors guiding the positioning of projects within the AMP.

The enterprise risks are reported to the board on a quarterly basis. An overview of these risk areas is outlined below:

Enterprise risk description	Potential consequence	Integrated reporting capitals showing dominant capital	Key controls and mitigation strategies
Health and Safety (H&S) – Operational Hazards Watercare's work involves significant operational hazards, which include: Confined Spaces, Working at Height, Trenching and Excavations, Working Alone, Working near/on Bodies of Water	Workers may be exposed to serious harm	o Financial o Natural o **Human** o Social and Relationships	o Clear standards for work involving significant operational hazards o Training of staff to industry standards o Using qualified, well-trained contractors o Ongoing monitoring of relevant lead and lag H&S indicators
Health and Safety – Process Safety A catastrophic failure of a major Watercare plant such as an explosion, fire or chemical leak which carries significant H&S risk	Workers, the public or the environment may be exposed to serious harm	o Manufactured o Financial o Natural o Human o **Social and Relationships**	o Plant design, operation and containment systems to address this risk o Regular plant condition assessments and specific regulation-driven compliance reviews undertaken

Enterprise risk description	Potential consequence	Integrated reporting capitals showing dominant capital	Key controls and mitigation strategies
Insufficient Treated Water Supply to Meet Demand The risk could arise from: Protracted drought conditions, the loss of a major storage dam or the loss of water treatment capacity which could arise from climate change (including extreme-weather events)	Inability to supply sufficient treated water to meet Auckland's demand	o Manufactured o Financial o Natural o Human o **Social and Relationships**	o Water Safety Plan o Risk mitigation is inherent in the design of the water systems, from source to treatment o Integrated source management model for water abstraction o Geographically separated dams o Drought response plan
Failure to Treat Wastewater to the Required Standard and Convey Wastewater Flows This includes the impact of stormwater overflows in wet-weather events and longer-term climate change	Environmental impacts or failure to meet consent conditions that impact stakeholders	o Financial o **Natural** o Human o Social and Relationships	o Wastewater treatment plant upgrades o Asset management renewal and upgrade programmes o Transmission and network upgrades to convey required stormwater and wastewater flows o Network upgrades to address capacity constraints
Major Water Quality Event The quality of treated water supplied is compromised	Compliance with Drinking Water Standards of New Zealand (DWSNZ) and/or public health is adversely impacted	o Manufactured o Financial o Natural o **Human** o Social and Relationships	o Water Safety Plan o Operation within well-established water treatment protocols following Ministry of Health/DWSNZ requirements o Disinfection and testing of all water prior to entering supply o Chlorine levels are maintained in the distribution system o Water safety and contamination notification in place o Staff training and competencies framework o Quarterly compliance reviews by the Drinking Water Assessors
Cybersecurity for Business and Control Systems Malicious acts compromising Supervisory Control and data Aquisition (SCADA) control systems, noting the cyber-threat environment continues to grow globally and in New Zealand	Corporate network and/or operating control systems are compromised, impacting operations	o Manufactured o Financial o Natural o Human o Social and Relationships o **Intellectual**	o Comprehensive cybersecurity policies in place o Regular staff training and awareness o Deployment of specialist cybersecurity to reduce overall risk o Independent experts used to advise on an enhanced cybersecurity roadmap and tools
Failure to Meet Developer Service Commitments Poor processes, engagement and slow delivery of Watercare's AMP	Failure to meet developer service commitments	o Manufactured o **Financial** o Natural o Human o Social and Relationships	o Proactive developer relationship engagement o Digital Strategy – enable online connection service o Consenting service level agreement with council o Improving transparency and working closely with developers on delivery of growth-related capital projects

Enterprise risk description	Potential consequence	Integrated reporting capitals showing dominant capital	Key controls and mitigation strategies
Availability of Trained Staff, Contractors and Suppliers Failure to attract and retain sufficient direct or supporting skilled and qualified resources	Watercare employees, contractors, suppliers and consultants not resourced to deliver Watercare's objectives	o Manufactured o **Financial** o Natural o Human o Social and Relationships o Intellectual	o Staff training and competencies framework o Operational succession planning o Ensure sufficient numbers of skilled and qualified resources are available o Market resources are identified and retained to support business deliverables
Major Project Cost Overrun Actual cost of delivery is higher than anticipated	The funding requirement is outside the AMP forecast	o Manufactured o **Financial** o Human o Social and Relationships o Intellectual	o Procurement strategies to minimise capital and whole-of-life costs on new assets o Monitoring of each project's costs and delivery time

Note: In addition to the enterprise risks, Watercare has a project risk framework to address risks associated with delivery of specific projects.

Risks evaluated by asset group

We try to identify the likely cause of asset-related events that might have an adverse impact on the provision of services to our customers. The following table provides an example of, but is not limited to, the factors we look for.

Asset group	Risks evaluated
Water system	
Water sources	• Structural failure of embankment, valve tower and cut-off wall • Failure of control valves, pipework and power supply • Contamination to groundwater source • Land instability
Raw water transmission	• Structural failure of aqueducts, tunnels, portals and raw water mains • Land instability
Water treatment plants	• Structural failure and land instability • Failure of dosing systems, clarification, filtration, disinfection or power supply
Water pump stations	• Structural failure and land instability • Failure of pumps, valves, pipework, power supply, motors, drives and controls
Water reservoirs	• Structural failure and land instability • Failure of control valves, pipework and power supply

Asset group	Risks evaluated
Wastewater system	
Wastewater treatment plants	• Structural failure and land instability • Failure of screens, primary tanks, reactor-clarifiers, filters, ultraviolet plant, discharge pumps, digesters and centrifuge dewatering • Failure of outfall
Wastewater pump stations	• Structural failure and land instability • Failure of overflow, odour control, pumps, valves, pipework, ventilation, power supply, motors, drives and controls
Wastewater pipes	• Failure of rising mains, exposed pipes (including pipe bridges), grit chambers, gravity pipes, overflows, manholes, chambers, valves/penstocks, ventilation/ odour, and mechanical issues

Risk mitigation

Efficient and effective risk mitigation does not necessarily eliminate the potential for adverse consequences. Risk mitigation is delivered through the combined application of a number of different forms of risk control, including risk minimisation, risk transfer, operational initiatives and engineered infrastructure solutions.

Wherever possible, and economically feasible, engineered infrastructure solutions are put in place to minimise or mitigate risks. This is particularly important in areas of Auckland with ageing infrastructure and growing demand.

In situations where the risk cannot be avoided, we carry out operational initiatives including:

- Asset condition assessment programmes
- Authorisation and monitoring of third-party works
- Inspection regimes
- Modelling of emergency network management and failure scenarios
- Capture, retention and distribution of incident and engineering knowledge
- Development and exercising of emergency management and contingency/continuity response plans.

These initiatives are aimed at providing us with the information to forewarn and prepare us to handle any unavoidable risk event effectively.

Contractual agreements and insurance cover are used as well, where it is appropriate and cost effective to transfer responsibilities for the control of risks and liabilities.

4. The AMP development process

Factors shaping the AMP

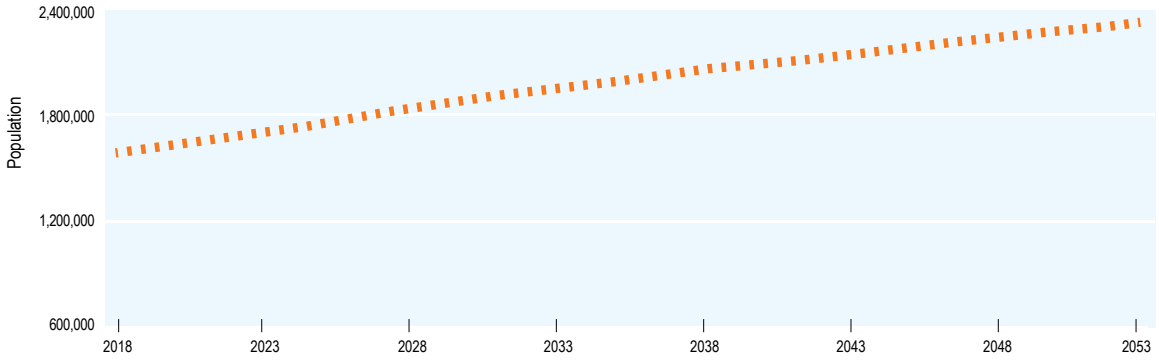
Delivering beneficial outcomes for customers is the foundation of our AMP. These outcomes include supply and service assurance, catering for growth, compliance and resilience against climate change impacts. The factors below have influenced when, where, what and how much we will invest.

4.1. Growth

Regional growth in population, industry and commerce has a direct impact on our ability to provide reliable services and protect public health and the environment.

Over the coming 20 years, Auckland's population is expected to grow by 29%, adding another 476,000 people to our current population of 1.7 million (Auckland Council's medium growth scenario i11v6, September 2020).

Auckland metropolitan serviced population forecast – 30 years



Growth on this scale is significant and optimal planning for growth requires certainty around how much expansion there will be and where it will take place so that infrastructure can be built on time and in the right location to meet desired service levels.

The National Policy Statement (NPS) for Urban Development Capacity (August 2020) sets clear expectations around council planning for growth and the provision of capacity to allow for additional housing. It advocates using the most recent Statistics New Zealand population projections, where the medium projection is considered the most suitable for assessing future population changes.

Accordingly, we have used medium growth population projections to size, stage and plan the timing of infrastructure requirements for the region. We will constantly review and adjust for changes to population growth trends.

If, over time, population projections are higher than estimated, projects will be brought forward and accelerated. If population projections are lower than estimated, projects would be deferred until the need arises. Consequently, changes in the timing of projects may impact on cost estimates and the Funding Plan.

We develop our bulk infrastructure in line with the Auckland Council Future Urban Land Supply Strategy (FULSS) in terms of location and timing. Any land development which is not aligned with the location or timing of our bulk infrastructure is likely to increase the inefficiencies in provision of infrastructure.

For example, early land development ahead of Watercare's network roll-out puts pressure on the timing of bulk investment and requires decisions on upsizing or bringing forward projects ahead of planned funding provisions.

Ideally, efficient infrastructure development occurs when land develops concentrically from the existing networks to optimise the value of investment. If developers wish to build ahead of planned infrastructure they will be required to pay for connecting their infrastructure to our existing networks.

An important consideration when planning for growth is demand management. Water is a finite resource and growth of population and industry has a direct impact on demand. Our water and wastewater networks are not built for unconstrained demand, so effective demand management and networks management will be vital for a resilient water system in the future.

We will continue our network initiatives which involve developing our oversight of water flows from source to tap so that we can proactively reduce water loss in our network. Our customer initiatives involve growing customer awareness of water use and potential rainwater and reuse opportunities where drinking water is not necessary, such as watering the garden or washing the car. We will continue to work with our commercial partners to improve their productivity per litre of water used, and our partner schools and organisations as we communicate the value of water conservation.

4.2. Resilience

With the expectation of reliable services 24/7, we must be resilient to changing conditions. In practical terms, this means analysing critical facilities and assets and minimising both the number of service interruptions and the effects on our customers during those interruptions. This starts right from the raw water sources, and progresses through the raw water network, water treatment facilities and treated-water networks, into the wastewater network and treatment facilities and on to the receiving environments.

The resilience of our water and wastewater networks has been, and will continue to be, challenged by climate change impacts. Over the last five years, Auckland has experienced extremes in weather, ranging from storm events with record rainfall to severe droughts depleting our water storage.

For example, the prolonged drought in 2020 has resulted in a huge deficit in rainfall and depletion of the water stored in the main supply dams servicing the region. This necessitated an emergency investment of $224 million to augment water supply and improve network performance. Demand was managed through voluntary savings as well as the imposition of Stage 1 restrictions on outdoor water use.

The frequency of these extreme-weather events is expected to increase in the future so it is important to diversify our sources of water to increase resilience. While still conceptual, we have been investigating two alternative options for new water sources in the long term: the reuse of purified recycled water and the desalination of seawater for potable use. (Read more about this on page 58).

For wastewater, there are several projects that will enable us to strengthen the resilience of the wastewater network, including treatment process upgrades and new wastewater conveyance systems. The Central Interceptor Wastewater Tunnel and the first phase of Northern Interceptor Wastewater Pipeline are two such projects; while these two projects will provide capacity for growth, they will also contribute to the overall resilience of the network by reducing overflows during wet-weather events.

4.3. Compliance with regulatory requirements

Our activities are intrinsically linked to, and directly dependent upon, the health of the natural environment. Water sources must have sufficient volume and reliability to provide water for Auckland, and they must be protected from overuse. For the wastewater system there are two main considerations: receiving environments must have the capacity to tolerate treated wastewater discharges without adverse effects, and overflows from the network must be minimised.

We fulfil our environmental responsibilities through a regulatory framework. Meeting our legal and regulatory obligations are baseline requirements for our business. Our assets are subject to a large number of consent conditions, and we work to comply with these conditions at all times.

Beyond compliance with consent conditions, we also work to improve the quality of the receiving environment. Integrating environmental considerations into everything we do is key to our role as a trusted iwi partner and community organisation.

As Auckland's lifeline service, we have resource consents associated with:

- Water abstraction from various sources for the purposes of potable water supply
- Discharges from our water and wastewater treatment plants
- Discharges from our water and wastewater networks
- Our infrastructure construction activities.

Legislation governs where and how water and wastewater services are delivered, and how the water and wastewater networks are managed, to ensure that public health and the environment are both protected.

Overall, our water supply complies with the requirements of the current Drinking Water Standards New Zealand and Health Act. From 1 July 2021, the Water Services Regulator Act 2020 will take effect. This means the principal regulators of our water quality will include the Ministry of Health/Manatū Hauora and Taumata Arowai (the Water Services Regulator).

In preparation for this, our focus has shifted beyond compliance with DWENZ to water safety planning, and a commitment to drinking-water quality management. Water safety planning strengthens the focus on preventive measures across the whole drinking-water supply system, promotes a multi-barrier approach to managing risks, and supports continuous improvement to guide day-to-day activities now and into the future.

Under the revised regulatory framework, Watercare will undertake annual internal audits of water safety plans (WSP) to:

- Ensure we follow the prescribed practices and procedures in our WSP for the treatment and management of water services operations. This is to be further validated by external audits carried out at any time by the regulator(s).

- Gather evidence to support Watercare's operations and compliance. Where there is non-compliance, we will specify the reasons for this and the impact on ensuring safe and secure drinking water.
- Confirm stated improvements are being actioned and potential new risks have been identified.

We have established a dedicated team to actively progress these recommendations.

4.4. Pricing of services

We are mandated by legislation to be a cost-efficient service provider, allowing for the efficient operation and maintenance of our assets. While keeping costs low is one part of our fiscal obligations, we must also ensure that we invest in providing safe and reliable services, not just today but for decades to come.

We undertake a large capital programme of works each year to maintain our services and meet customer expectations. Our assets are built to service communities over long periods of time, and we plan and arrange our funding and pricing so that these costs are shared equitably during that period. We are committed to ensuring that the cost of growth is borne by those creating the growth.

Before the COVID-19 pandemic, we developed a comprehensive AMP that identified the need to invest $10.44 billion over the next 10 years to accelerate projects that would further reduce leaks in our network, improve beach water quality, cater for population growth and make us more resilient to climate change.

We pay for projects in three ways: using money collected from our existing customers through monthly bills, Infrastructure Growth Charges (IGCs) collected from new customers and from borrowings.

We are financially constrained because our ability to borrow is linked to the Auckland Council group, which operates under the local government framework. The group's revenue has been significantly reduced because of COVID-19, which has reduced the amount of financing available to us. This has prompted us to review our original AMP.

Our revised plan has reduced our 10-year expenditure by around $800 million to $9.65 billion but requires us to increase our prices to continue to deliver the outcomes expected of us. This means the average household will pay around $1.50 more per week from 1 July this year, based on a 7% increase in service charges for residential and commercial customers. IGCs will also increase by 12%.

This amended AMP will see projects that are underway continue, such as the Central Interceptor and Northern Interceptor developments. However, some projects are likely to be postponed for a few years; these include the replacement of the Huia WTP and the next Rosedale WWTP upgrade.

By doing this, we are pushing the investment peak into the three-year period between 2025 and 2027, whereas we had hoped to spend more heavily over the first three years to boost service performance and realise the benefits sooner.

We are working collaboratively with Auckland Council and government to find a way to remove our financial constraints, ahead of the water industry reform.

4.5. Climate change

Climate change is one of the largest challenges that we face as a business and as a country. As New Zealand has experienced over the last few years, the frequency of extreme-weather events is increasing.

In 2019 we launched our first **Climate Change Strategy**, which set out a direction for monitoring and understanding the impacts we are already seeing today while taking action to reduce the risk to provision of water and wastewater services in the future.

This strategy establishes two ambitious targets for emissions reductions from our operations which align with keeping the global temperature increase within 1.5 degrees Celsius:

- Net zero emissions by 2050
- Reduce operational greenhouse gas emissions by 45% by 2030.

It also comprises a work plan that consists of 14 portfolios across both adaptation and mitigation.

There are climate change risks that could impact our water and wastewater services:

Delivering drinking water: Catchment land instability, water scarcity, deteriorating raw water quality, on-site flooding, power/access road failures to plants, increasing pipe breakages, impacts on assets due to sea-level rise, dramatic changes in demand for water services with increasing peak demands, potential 'stranded assets' following land-use changes, and sea-level rise.

Treating wastewater: Decreased effectiveness of oxidation ponds, increasing probability of wastewater bypasses, on-site flooding, impacts on critical third-party services, changes to assimilative capacities, increased instances of consent non-compliances, submerged outfalls, migratory bird impacts, greater corrosion/odour issues, an increased number of overflows, increased pumping costs, increased saltwater intrusion, and flotation of assets due to increases in the water table.

Incorporating climate change considerations

Climate change considerations are also woven into the way we deliver infrastructure projects. As our projects undergo individual planning assessments, where there are vulnerabilities to a changing climate these will be taken into consideration through the design and construction process. This will provide greater granularity of the likelihood and impact of climate change under different climate projections to enable us to decide which planning response is most appropriate.

The most visible challenge of climate change is rising sea levels, which have the potential, especially when coupled with storm surges, to impact low-lying communities. Watercare has a number of water and wastewater plants and networks in such areas. Reviewing the potential impacts of sea-level rise in localised areas is already undertaken when we plan for the upgrade of new assets.

For example, we know that Watercare's current largest facility, the Māngere WWTP, is situated at near sea-level in the Manukau Harbour. We have established a specific consideration of this challenge in the 30-year planning horizon, indicating the future risk; however, more work will be required to monitor and understand the actual sea-level rise to define exactly what the response will entail.

Long-term climate adaptation

Watercare's Climate Change Strategy recognises that the decisions we make today in the planning, design and location of infrastructure will impact the future service levels and operability of the network. The infrastructure that will be delivered through this AMP will last for many decades; therefore, we need to use the best knowledge available today to ensure that it is resilient to climate change impacts.

We are using a technique called 'dynamic adaptive planning' to support our planning approach to long-term climate adaptation. A series of long-term pathways have been proposed that provide various adaptation-related options mapped out with climate- and growth-related trigger points to support the direction we might take today while keeping options open for the future. The deep uncertainties associated with climate change make the adaptive pathways approach highly applicable.

If, for example, the rate of sea-level rise is faster than anticipated, any associated management or design actions within the long-term pathways can be initiated earlier than originally planned and be continuously reviewed at various 'trigger' times. This approach provides flexibility and reduces surprises that can occur if planning processes and outcomes are locked in using more traditional planning methods.

The planning responses to areas that are susceptible to the impacts of climate change-related sea-level rises are typically as follows:

- Retreat – This involves no effort to protect the asset or the land. In the most extreme cases, entire areas may be abandoned or not developed.
- Accommodate – This option involves elevating buildings and implementing operational as well as emergency evacuation procedures. The asset will continue to be used, though there will be potential impacts.
- Protect – This involves erecting hard structures, as well as soft solutions such as dunes and vegetation, to protect assets and communities from the impacts of extreme events.

Within this AMP, the primary planning approaches are likely to be 'accommodate' and 'protect'. However, ongoing monitoring and awareness of climate issues will be undertaken.

Climate change mitigation

Watercare's AMP includes a number of infrastructure upgrades that are designed to meet wastewater processing outcomes as well as having positive impacts on electricity consumption, natural gas and biosolids production.

Some of these projects include:

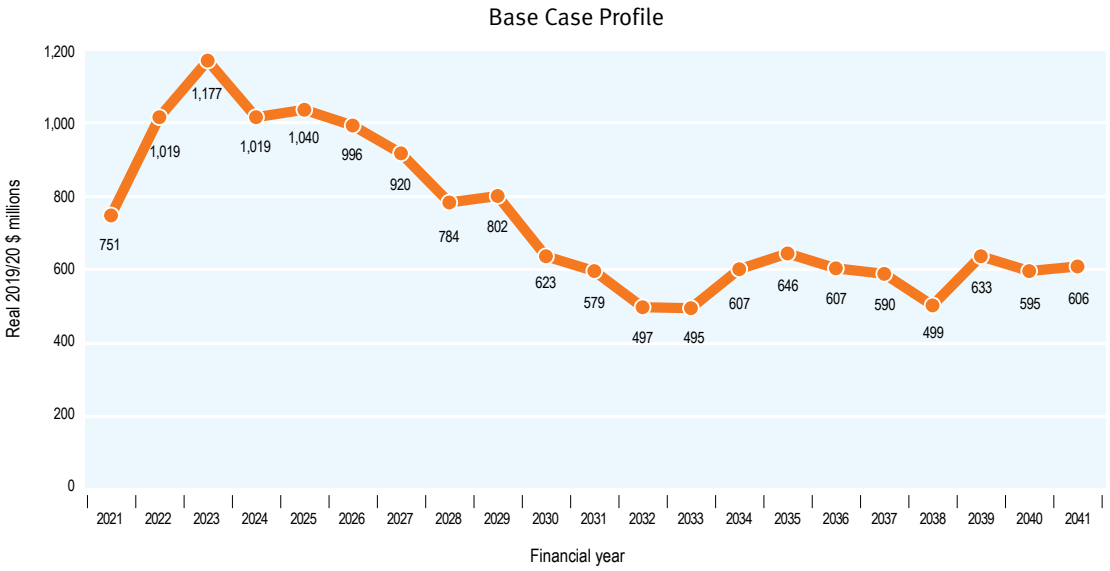
- Enhanced sludge processing at Māngere and Rosedale WWTPs to reduce biosolids generation
- Co-generation engine replacements at Māngere WWTP to remove the need for natural gas
- Process upgrades, including co-digestion and modifications to primary and secondary processes, to reduce energy requirements at Māngere WWTP
- Improved aeration control and a second co-generation engine at Rosedale WWTP to reduce energy requirements.

The base case for investment

In late 2019 Watercare embarked on the development of a revised AMP to support the Long-Term Plan 2021 to 2031 (LTP). This approach was different from previous AMP processes and was aimed at determining the true size of the capital investment required to plan for a 20-year period, without the consideration of debt limits and constraints.

The process for generating the AMP capital investment profile was iterative and challenged across the business. It was reviewed by the Capital Oversight Panel (executive team) and progressively challenged by the Asset Management Capex Committee (AMCC Board Committee). Following the recommendation of the AMCC, this was approved by the board as the preferred investment profile for Watercare. This profile is the base case investment programme and is summarised in the graph below. Values are in Real 2019/20 $ millions. Throughout this AMP, we use real $ to show the changing programme of work without the influence of inflation.

Base case capital investment profile



The peak in investment, from 2022 to 2025, was a function of concurrent projects, such as:

- The Central Interceptor
- Huia WTP and associated raw- and treated-water network renewal
- The revised asset replacement strategy for linear local assets (pipes)
- Delivery of the Western Isthmus programme
- Extension of the Waikato WTP to provide a resilient additional water supply for growth
- North Harbour No.2 Watermain
- Preparation for the Māngere WWTP upgrades to meet the expected 2032 consent requirements
- Meeting the growth projections for the north-east (Warkworth, Snells/Algies and Wellsford)
- Continuation of the Rosedale WWTP upgrades.

External influences that impact pricing and the capital programme

There have been two significant events during the 2020 calendar year that have influenced the direction of the capital programme. These are COVID-19 and the Auckland region's drought.

COVID-19

The impacts of COVID-19 have resulted in substantial loss of revenue to the Auckland Council group, forecast to exceed $1billion over the next three years. Combined with this, sister entities within the council group have reassessed their investment requirements.

These factors impact Auckland Council's ability to access debt and pass on that debt as an inter-company loan to Watercare.

Our only other source of funding is from customer charges. This means that when Watercare needs to build new infrastructure, where funds are not available from inter-company borrowing, we must either increase prices or defer the investment. Where investment is deferred, risk to the supply of services increases, as does maintenance costs and future capex requirements.

These factors are fully discussed in the Funding Plan section of this document.

Auckland region's drought

During the 2020 calendar year, Auckland experienced continuing drought. In response, Watercare has brought forward investment for future water supply and treatment, costing $209million in the financial year to June 2021. This has resulted in forecast debt at the start of the LTP period being $209million higher than previously planned.

The risks associated with the recommended pricing scenario

Ultimately, the Watercare board needs to determine a path that balances investment with debt restrictions, customer price impacts as well as the risk associated with the failure of critical assets or being unable to supply the infrastructure to support Auckland's rapid growth.

This process has resulted in the affordable AMP investment profile. The two AMP profiles are compared in the table below.

Real 2019/20 $ millions	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Base case (preferred)	1019	1177	1019	1040	996	920	784	802	623	579	8960
Affordable profile (recommended)	720	671	704	822	999	1044	863	849	703	758	8132
Variance	-299	-506	-315	-218	3	124	79	47	80	179	-827

Note: Totals will not add exactly due to rounding

Over the 10-year period, the overall investment is $827 million lower in the recommended versus preferred scenario. However, of particular note is the profile in the first four years where $1,338 million of capex has been deferred.

The implications of this reduction is that there are some key projects which will need to be deferred. These are:

- A portion of planned network renewals
- Huia WTP replacement and associated raw- and treated-watermain renewals including the North Harbour 2 Watermain
- The commencement of some of the Western Isthmus projects will be postponed but the overall programme will be completed on time.
- Warkworth and Wellsford growth, aligned with Auckland Council group's priority areas
- Warkworth/Snells Beach, Waiuku/Clarks Beach, and Wellsford WWTP
- Aspects of the Waikato A WTP project will be delayed
- Rosedale WWTP upgrades.

As we move forward and gain a better understanding of how the 'post-COVID' environment affects us, we will also monitor our programmes closely and take any opportunity to deliver all or part of key programmes through staging and/or reprioritisation of projects.

Despite the fact that we are faced with deferring key projects, we will be able to continue delivery on the following:

- Committed and in-flight projects: $1,167 million (real $) in FY22 to FY24, 56% of the base case capital programme
- The Central Interceptor: this is 34% of the capital programme in FY22 to FY24
- Approximately 50% of the base case planned network renewals
- Redhills/Whenuapai Housing Infrasstructure Fund (HIF) programme will continue
- 80% of the planned base case growth investment for the first five years
- Smart metering and new connection installations continue
- Planned control system and major electrical renewals and upgrades
- The second Waikato River intake structure delivered to programme
- Water quality projects.

Prioritisation of AMP projects

Watercare has a large capital expenditure programme, prioritised to address business risks. As a result of the significant constraints on funding, particularly over the short term, we are improving our prioritisation framework. The improvements will make the prioritisation more transparent, objective and repeatable. This last point will become critical in light of the water reforms, leading us towards external regulation from both an environmental and economic perspective.

The framework ranks our projects and programmes according to the consequences of a failure, identifying which projects and programmes can be addressed in any given year based on funding constraints. Currently projects and programmes that address level 4 and 5 consequences are included in our prioritised list. A number of level 3 consequence projects are included as well. We have also included some of those projects and programmes that are identified as 'business as usual' and always require funding allowances year-on-year. The prioritisation process is ongoing and is constantly being refined as required by business need.

Concurrently, we are also undertaking a programme optimisation process. Our Enterprise Model team will look broadly across our capital programme, to identify potential efficiency, cost and carbon savings to the prioritised baseline through more refined segmentation of the programme. These two processes are influenced by each other, requiring constant adjustment to maintain currency to realise both prioritisation and optimisation benefits.

WICS and options to address rating agency constraints on level of debt

During 2020, Watercare engaged the Water Industry Commission for Scotland (WICS) to undertake an independent review of our performance. WICS's report found that Watercare was the clear leader in performance in the New Zealand water sector. However, when benchmarked against world-leading water services providers, there are greater gains to be made, contingent on our ability to invest more in renewals, resilience and technology to lower costs.

The review found Watercare had achieved much in its first 10 years with the delivery of reliable services and a comprehensive capital works programme while charging its customers $100 million less per year than was forecast by previous councils.

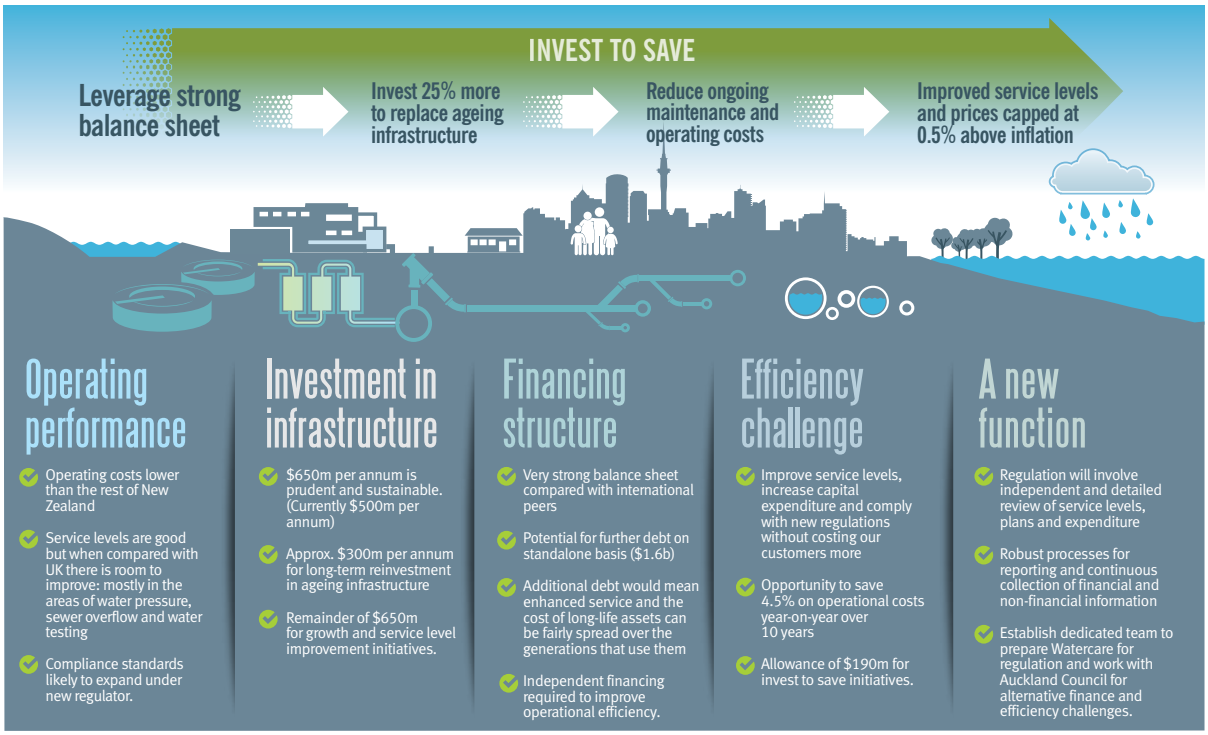
Watercare's unit costs compare very favourably with providers in other parts of New Zealand. Other metropolitan areas report unit operating costs that are 50% to 100% higher than ours.

However, these unit costs were still higher than those of leading UK providers that had been able to undertake a much higher level of investment through greater access to borrowing.

The WICS analysis recommended that Watercare:

- Looks to increase its level of capital expenditure by around 50%
- Seeks to improve its operating expenditure efficiency by 4.5% a year in real terms
- Achieves these outcomes with economically efficient pricing for customers along with a need to address its current constraining financing structure.

Draft determination from Water Industry Commission for Scotland (WICS) for Watercare Services



Addressing rating agencies view of Watercare's debt

Enabling rating agencies to treat Watercare debt as if we were a stand-alone water utility would allow us to invest more in both asset renewal and resilience as well as to develop initiatives to drive further operating cost efficiencies.

Work has been underway with both council and government agencies to identify ways to achieve this outcome for the benefit of our customers. The current options available are:

- An interim Crown indemnity of Watercare debt until the national Three Waters Reform process establishes new delivery models for water services. This would enable immediate relief to increase the investment programme without substantial increases in customer prices.
- Waiting for the Three Waters Reform process to be completed which may be two to three years away. It is critical that this process provides for economically efficient borrowing structures to ensure prices to customers and the level of investment can be managed.

Assessment of the viability of these options is currently in progress, so no assumptions have been made to include the outcome of these workstreams in our price path financing.

We feel the recommended pricing scenario of 7% for two years followed by a 9.5% increase gives the right balance between our legal obligations to keep costs to our customers at minimum levels while maintaining the long-term integrity of our assets.

5. Water Asset Strategy

Our Water Asset Strategy outlines the significant programmes required to meet Auckland's future growth. These programmes include source augmentation, water treatment upgrades and water transmission initiatives. They have been grouped by geographic area and first and second decades.

This infrastructure programme will be supplemented by demand management initiatives which are outlined in the Auckland Water Strategy (AWS) 2021 – 2050. The AWS highlights a pathway to reduce Aucklanders' use of drinking water by around 20% over the next 30 years to create a city more resilient to the impacts of drought and climate change.

Auckland Water Strategy

Auckland is expected to grow to 1.9 million people by 2031; 2.1 million by 2041 and 2.3 million by 2051.

As Auckland grows, its demand for water grows as well.

Currently, the gross per capita water consumption, which includes both residential and non-residential, is around 268 litres per person per day (Litres per day or L/p/d). We are implementing demand management initiatives to reduce this to 253L/p/d by 2025 and further programmes to bring down consumption to 225L/p/d by 2051. In April 2021, Auckland Council and Watercare jointly committed to adopting the next set of targets designed to reduce Aucklanders' use of drinking water by 20% by 2051.

This move is a significant step forward in the demand management aspect of council's water strategy, which aims to protect and enhance te mauri o te wai/the life-supporting capacity of water, to create a future of water security for Tāmaki Makaurau/Auckland.

One of the key principles used to develop the long-term water usage targets was ensuring we did not use water pricing as a lever to reduce customer demand. Instead, the aim is to educate people and create a more efficient and smarter system that allows for new technologies over time, leading to behaviour change in our customers.

Technology is a key component of the council group's water demand management strategy for us. Key technology initiatives include installing smart meters in all homes by 2034, and investing in a smart, efficient network monitoring system to keep leakage less than 13% of water volume treated.

Other measures that the council group will adopt as part of the AWS include:

- Increasing water efficiency education to change behaviour
- Requiring new homes to be water efficient
- Requiring new homes with stormwater tanks to be plumbed in for internal and external non-potable use by 2025.

Demand management is designed to operate in tandem with infrastructure investment, including securing alternative drinking-water sources for the long term.

Prior to the 2020 drought, we supplied water to 1.7 million Aucklanders, providing an average of 440 million litres of high-quality drinking water each day.

Auckland's metropolitan water supply network provides water to around 98% of Auckland's regional population, while the remaining population is served by smaller self-contained supply systems in the north and south.

The metropolitan network has a diverse range of water sources which feed into an integrated distribution system. These sources include:

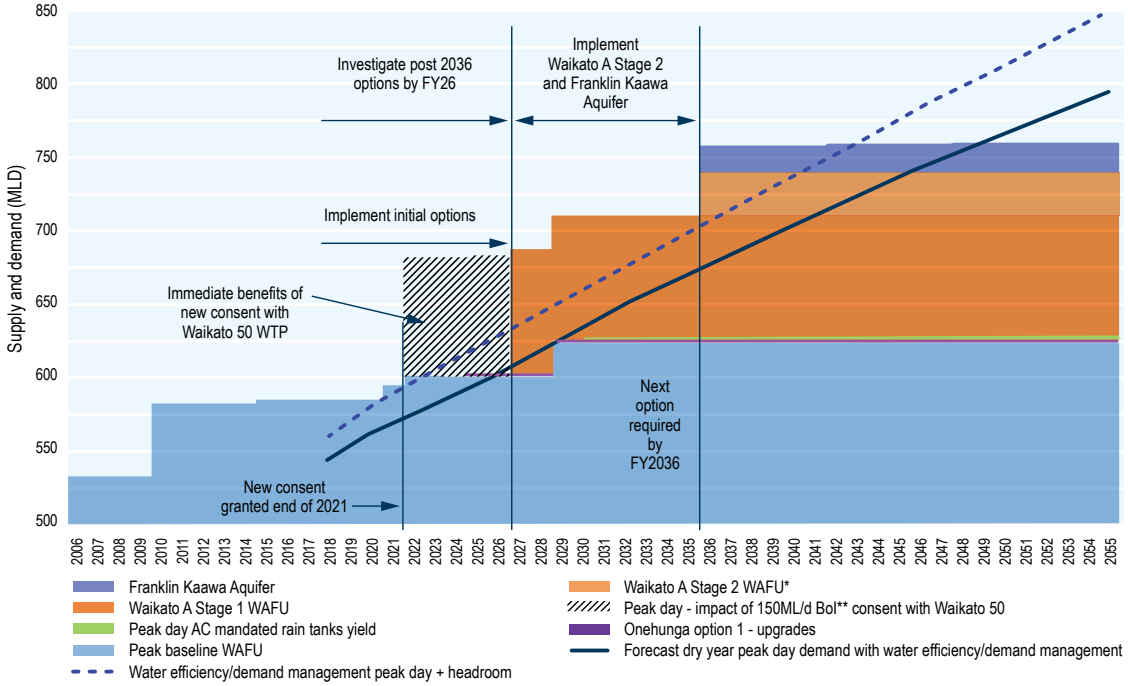
- Water storage lakes at high elevation in the Waitākere and Hūnua ranges, providing gravity supply into the system
- Underground aquifers in Onehunga and Pukekohe
- The Waikato River.

This diversity provides increased resilience against drought and other interruptions to supply.

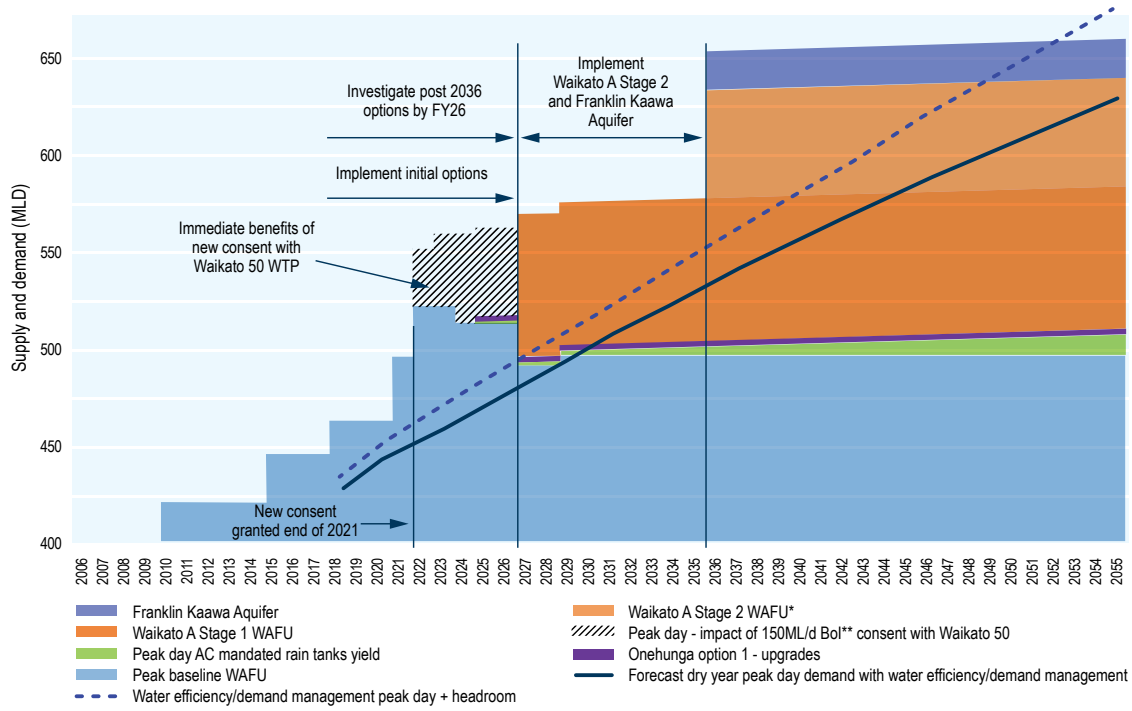
To add to this diversity of sources, Watercare has commenced investigation into the reuse of purified recycled water and desalination as sources of potable water. These are covered under "Water sources beyond 2041", further on in this section.

The graph below shows our planned augmentation of existing water sources as well as potential new sources over the next 30 years.

Preferred option, supply demand balance (peak)



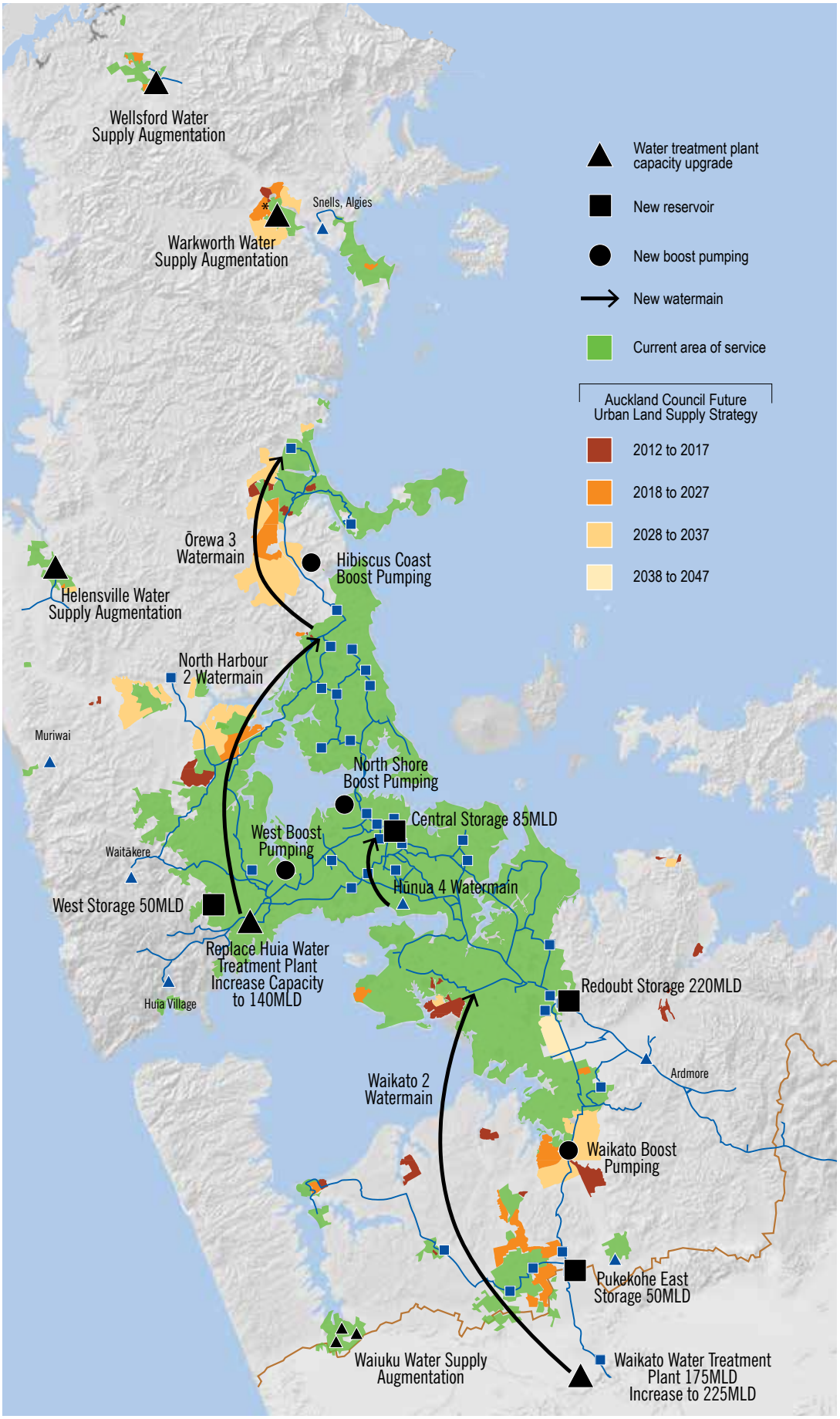
Preferred option, supply demand (annual drought)



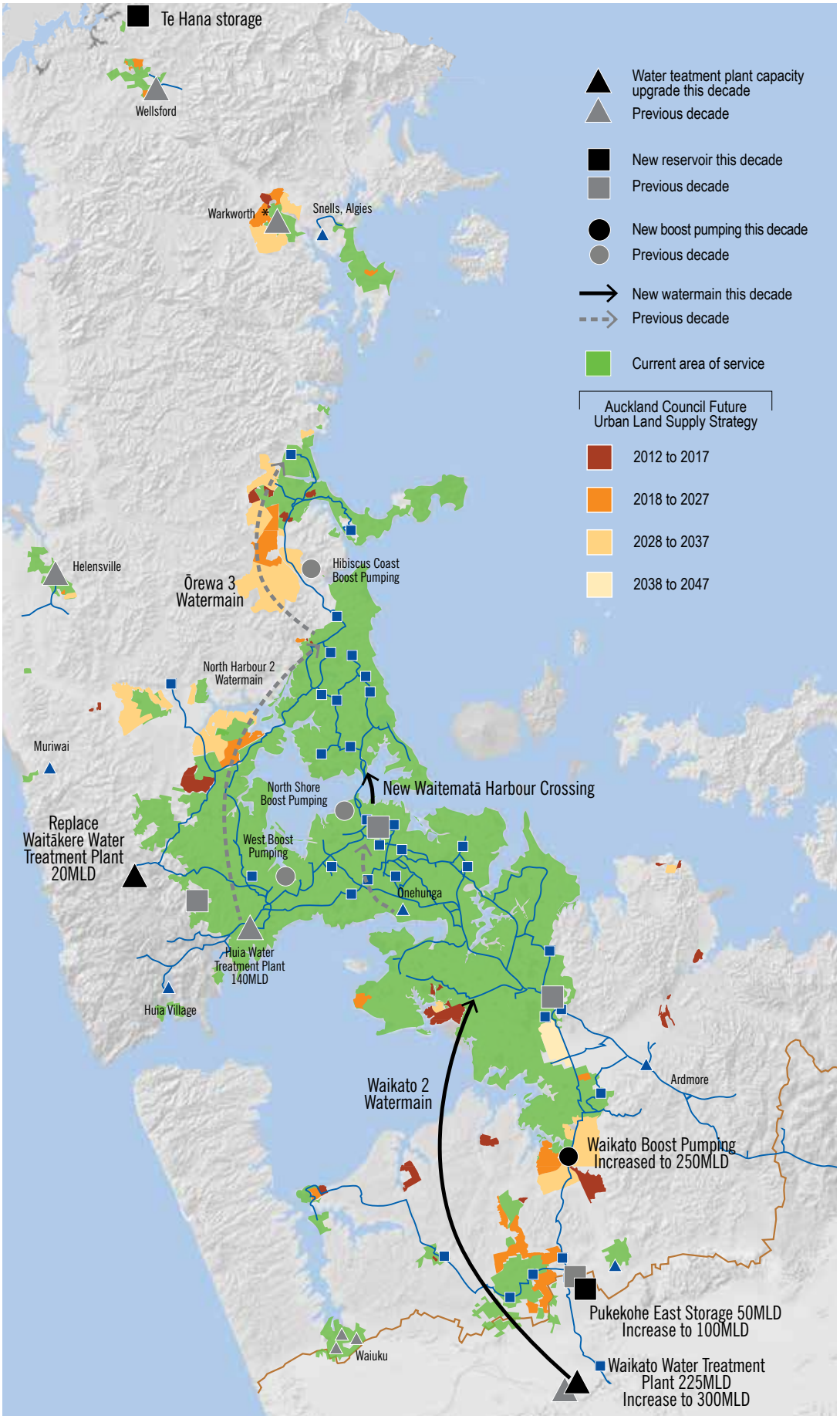
* **WAFU** - Water available for use

** **BoI** - Board of inquiry

Strategic water programmes 2022 – 2031



Strategic water programmes 2032 – 2041



Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Metropolitan water supply network improvements

South

2021 – 2031	2031 – 2041
The majority of Auckland's annual water supply needs have historically been met by the rainfall-dependent dams in south and west Auckland. We take climate change impacts into consideration while planning for the future and these impacts are projected to include more frequent dry periods and extended droughts. Therefore, the Waikato River is the preferred source to meet additional water needs during the next 30 years. A consent application has been lodged for an additional take of 150MLD and our case will be heard by a Board of Inquiry (BoI) during 2021. This proposes that 75MLD of treatment capacity will be built in the first decade with an additional 75MLD of treatment capacity added in the second decade. A treatment plant with a capacity of 50MLD is currently in construction and due to be in service during the winter of 2021. The plant will reduce the impact of the prolonged drought on the Auckland region in the summer of 2022. This will be followed by a solution to bring treatment capacity up to 75MLD. Pumping extra water in the existing Waikato 1 Watermain will increase the volume of water to the Redoubt Road reservoirs, while a new treated water reservoir (50ML) at Redoubt Road will increase strategic storage to provide a buffer for peak demands.	An increase in the Waikato River take by a further 75MLD (up to a maximum of 150MLD in accordance with the recent application) is required to maintain Watercare's security of supply standard. The current drought security standard is that the metropolitan water supply dams will be operated to a 1:100-year event (with a 15% residual storage at the end of the drought event), with additional water sources planned to meet the medium growth demand. A new, 75MLD water treatment plant to treat this additional volume will be required, along with the construction of the Waikato 2 Watermain and associated reservoirs. This watermain will allow for growth and provide resilience to the existing Waikato 1 Watermain, protecting our ability to use this source. The building of additional treated water reservoirs at Runciman Road (50ML) and Redoubt Road (50ML) will provide further strategic storage to buffer peak demands. Watercare will continue to explore the reuse of purified recycled water and/or desalination as alternatives to manage increased demand.

North-West

2021 – 2031	2031 – 2041
The ageing Huia WTP will be replaced with a new 140MLD-capacity plant to help meet peak demand and improve the current system resilience. Two additional reservoirs (2 x 25ML each) associated with the new Huia plant will be essential to increase the treated-water storage for West Auckland. Extra pumping to take water from the south to the west will be required to provide redundancy against a Huia plant outage. The North Harbour 1 Watermain is currently our only transmission watermain conveying water from the west to the north across the Greenhithe Bridge. The North Harbour 2 Watermain will be an alternative way to service customers in the west and north, as well as provide redundancy and improved transmission capacity.	The replacement of the ageing Waitākere WTP is scheduled for completion during this period. Additional treated-water storage (25ML) will assist in meeting peak demand periods and improve the system resilience in the western region.

Central

2021 – 2031	2031 – 2041
The completion of the Hūnua 4 Watermain to the Khyber reservoirs will improve our ability to move water from the southern region to the central region, while providing additional resilience for the Hūnua 3 Watermain. Reinstatement of the Khyber 2 Reservoir (12.5ML) will increase the strategic storage within the central region and help to buffer peak demand.	A planned upgrade of the Ponsonby reservoirs (13ML) will provide additional resilience to the central business district's (CBD) supply zone.

North Shore

2021 – 2031	2031 – 2041
Devonport 2 Watermain will be replaced. Planned boost-pumping of the existing North Shore watermains across the Auckland Harbour Bridge will improve the conveyance of water to the North Shore until the new Waitematā Harbour crossing is available.	A new harbour crossing for transmission watermains, leveraging on the planned New Zealand Transport Agency (NZTA) Waitematā Harbour crossing, will improve the conveyance of water from the central region to North Shore and provide resilience to the existing North Shore watermains on the Auckland Harbour Bridge.

Hibiscus Coast

Increased boost-pumping of the Ōrewa 1 and 2 watermains will allow for shorter-term growth in the Silverdale, Dairy Flat and Wainui areas. A new Ōrewa 3 Watermain will increase transmission capacity to the north and meet forecast growth.

Non-metropolitan supply network improvements

Warkworth

In 2018, a new groundwater source was consented to supply 4.3MLD of water and thereafter connected to a new WTP at Sanderson Road. Further water source augmentation is likely to be required within the next 30 years to meet the long-term population growth projections.

Wellsford

Wellsford is currently supplied from the Hoteo River. A new groundwater source has been identified but yet to be consented. A new WTP will be designed and delivered on a new site adjacent to the source, beginning in the first decade but likely to extend into the second.

Additional reservoirs for Te Hana and Wellsford will be required in the second decade for security of supply and to cater for expected growth.

Snells/Algies

Snells/Algies is supplied from a groundwater source at present. Further water source augmentation is likely to be required within the next 30 years to meet the long-term population growth projections.

Helensville, Muriwai, Waiuku and Bombay

Source augmentation to service these communities will require further investigation.

Helensville is currently supplied from surface water (Mangakura Dam) and a spring (Sandhills). The consent expires in 2026, and will be renewed in line with growth expectations. A new source is likely to be required late in the first decade to match growth.

At present, Waiuku is supplied from a groundwater source via three WTPs. A new water take consent has recently been granted, covering all three bores. We have investigated the water demand in Waiuku and have implemented a leak reduction scheme to make the best use of the current supply sources. Design of a new treatment solution will be completed in the first decade to meet growth requirements.

The Muriwai water take consent has been renewed, allowing for minimal demand increases in the area, as projected.

The Bombay water take consent expires in 2027. We will be renewing this consent in accordance with statutory timeframes, taking into account any expected growth in the area.

Clevedon is not currently serviced by Watercare. A scheme to take water from Ardmore is currently being devised. The funding costs are being distributed in accordance with the infrastructure funding agreement with the developers. The project costs will be reimbursed through development interest in the Clevedon community.

Water sources beyond 2041

As we plan for the future, there are two options for new water sources that will become increasingly significant.

Reuse of purified recycled water for potable use

Reusing purified recycled water (or highly treated wastewater) will enable the use of a finite resource effectively. It will also guarantee a reliable source of potable water as Auckland continues to grow.

A report we commissioned in November 2020 *(Source Options Assessment for the Metropolitan Supply – Purified Recycled Water Scheme Concept Report"– Beca)* considers two concept schemes:

1. **Indirect potable reuse:**
    - Treated wastewater from Rosedale WWTP is treated by an advanced water treatment plant (AWTP) on site.
    - This purified recycled water is suitable for drinking.
    - The purified recycled water is pumped to a new seasonal storage dam at Campbell Road .
    - A new 150MLD WTP at Campbell Road treats the reservoir water and is pumped to a new treated-water reservoir at Schnapper Rock.

2. **Direct potable reuse:**
    - Treated wastewater from either the Rosedale or Māngere WWTP is treated by an advanced water treatment plant (AWTP) on site.
    - This purified recycled water is suitable for drinking.
    - The purified recycled water is pumped directly to the treated-water network.
    - New pipeline from Rosedale to Schnapper Rock, with new 25ML treated-water storage at Rosedale.
    - New pipeline from Māngere to Hūnua 4 Watermain, with new 50ML treated-water storage at Māngere.

Desalination

The source options report also investigated desalination as a source of potable water.

The report summarises the concept design of a desalination scheme based at Rosedale WWTP from an intake in the sea, treatment at a desalination facility and transmission of the treated water to connect into the wider Auckland transmission system.

The concept desalination scheme is described below:

- New intake pipeline (approximately 2m in diameter) extending from an intake located about

three to four kilometres offshore to a desalination plant located at the Rosedale WWTP site. The precise location and route of this pipeline has not yet been determined.

- The seawater is treated at a desalination plant at the Rosedale WWTP site.
- Brine from the reverse osmosis (RO) process would be discharged through the existing ocean outfall from Rosedale WWTP.
- Treated water from the desalination plant would be pumped to new treated-water storage at Schnapper Rock.

The current drinking water standards and other statutory provisions do not support a utilisation of purified recycled water or desalination as a potable source. Changes to legislation and standards would be necessary, along with public education, to support the adoption of these options. In the interim, we are building a 1MLD pilot AWTP at Māngere WWTP to trial reuse of purified recycled water. This water will be used for the construction of the Central Interceptor and will provide valuable operational experience for these facilities.

Watercare will continue to utilise demand management as a tool to maximise the utilisation of existing and future water sources and will work closely with Auckland Council to meet the water security needs of Tāmaki Makaurau/Auckland.

6. Wastewater Asset Strategy

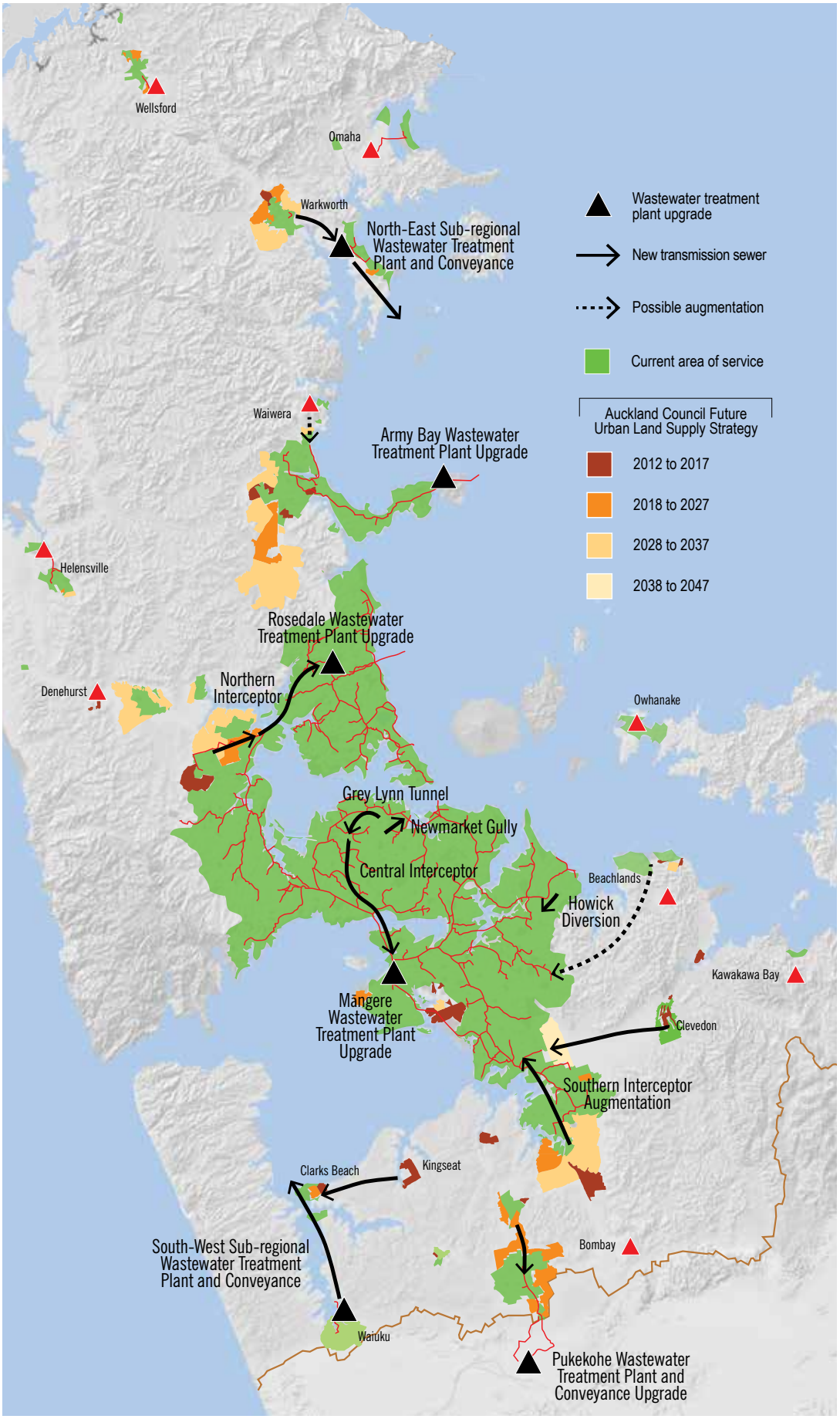
One of our key asset management principles is to optimise the use of existing assets. An important consideration when it comes to effective use of the wastewater network is stormwater. Stormwater is managed and overseen by Auckland Council and, therefore, is outside the mandate of Watercare.

Stormwater and groundwater entering the wastewater network reduces the hydraulic capacity (the ability to maintain or pass a given flow rate) that could be used to service growth and to provide better levels of service to existing customers. The overall principle guiding our wastewater planning is that the wastewater system is for the conveyance of wastewater only; therefore, as much as practically possible, stormwater and groundwater will be removed from the system through sewer separation and inflow and infiltration programmes.

The Wastewater Asset Strategy[4] over the next few pages outlines our significant programmes required to meet Auckland's future growth. These initiatives include regional and sub-regional connectivity, wastewater treatment and transmission upgrades. They have been grouped by wastewater catchment area and first and second decades.

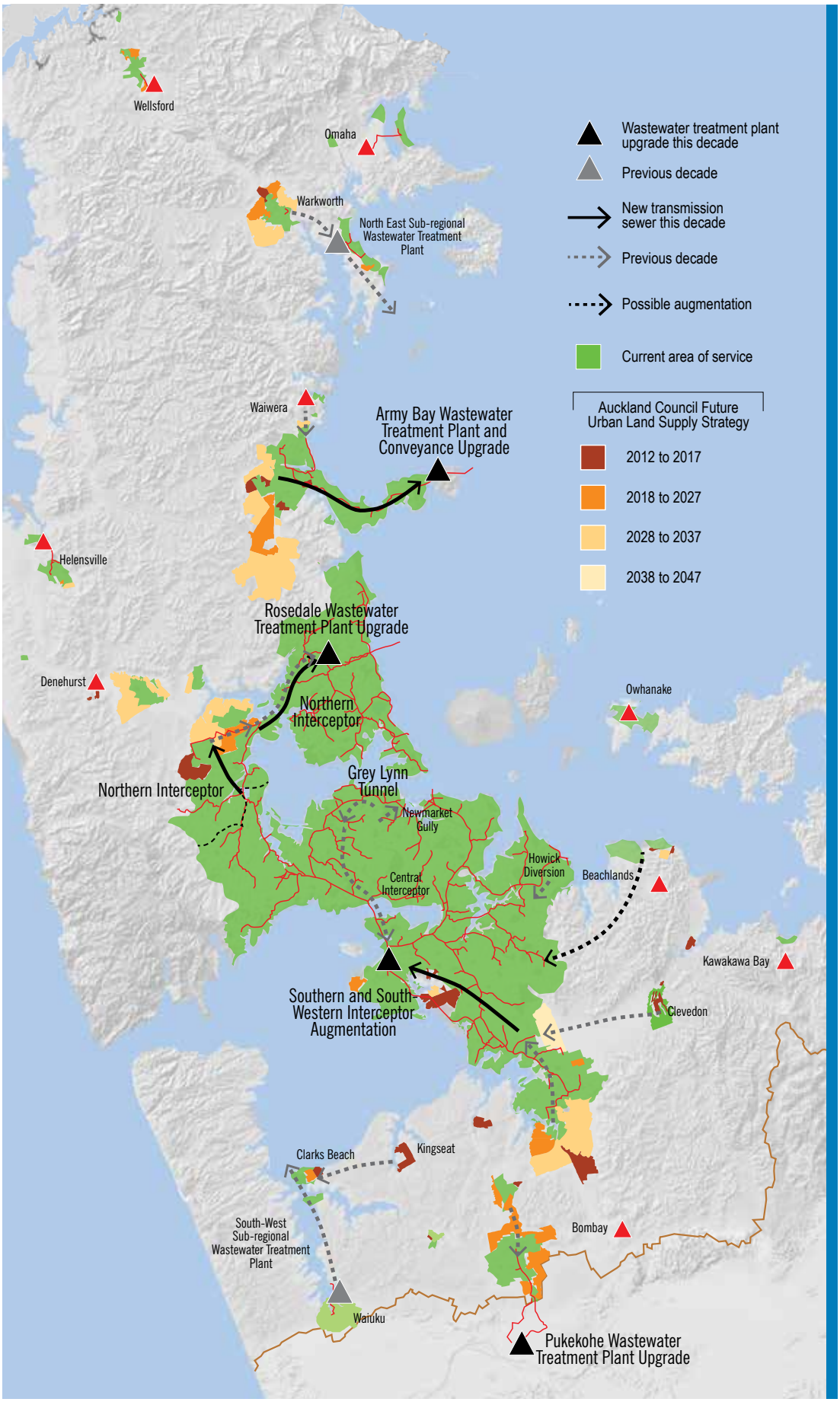
4 The Wastewater Asset Strategy, prepared in 2018 to achieve the outcomes of the Auckland Regional Network Discharge Consent (NDC), is still current. The NDC is renewed every six years. The next revision will be in 2023. Wastewater planning assumptions and statistics outlined in this AMP remain unchanged.

Strategic wastewater programmes 2022 – 2031



Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Strategic wastewater programmes 2032 – 2041



Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Māngere Wastewater Treatment Plant

The Māngere WWTP treats and disposes of wastewater from approximately three-quarters of Auckland's population (1.275 million people). In the recent drier years, these flows have been around a daily average of 330,000 cubic metres per day (m^3/d).

The treatment plant has a current discharge consent that includes the following limits:

- Maximum daily inflow and discharge volume of 1,209,600m^3/d
- Instantaneous maximum discharge flow rate of 25 cubic metres per second (m^3/s)
- Annual daily average inflow volume of 390,000m^3/d.

Using the current gross per capita production of around 290 L/p/d and the average daily inflow limit, this equates to a population capacity of approximately 1.34 million people.

Our Māngere discharge consent is valid until 2032. Under the medium growth scenario, a consent renewal is currently likely to be driven by population pressures rather than consent expiry date, as the plant will reach its estimated consented average discharge before the consent expires.

The existing available capacity to service population growth is significantly affected by rainfall. Wetter years typically increase the average daily discharge volume, while drier years typically reduce it. To allow for growth in metropolitan Auckland as the population increases, wastewater flows will be diverted via the new Northern Interceptor Wastewater Pipeline to utilise the spare discharge capacity at the Rosedale WWTP. Over the period of the AMP, wastewater flows of around 160,000 people will be diverted from the Māngere catchment to the Rosedale plant. At the same time, hydraulic processes at the Māngere plant will be upgraded to continue meeting the discharge requirements of the consent.

We are collaborating with the National Institute of Water and Atmospheric Research (NIWA) to develop a hydrodynamic model for the Manukau Harbour. This model takes into account nutrient and contaminant loads from all sources and enables us to analyse how our treated wastewater discharges affect the harbour and how the harbour environment will respond to future changes. A working group comprising Auckland Council and mana whenua representatives oversees the project, and we aim to have all the outputs from the model available for access by the public in due course.

2021 – 2031	2031 – 2041
In addition to plant renewals, process optimisation and improvements, our programme of works and investment planned for the Māngere WWTP includes: • A thermal hydrolysis plant to enhance pre-treatment of wastewater sludge for improved digester performance and production of more biogas and better-quality biosolids. This will reduce the plant's carbon footprint and waste, and optimise asset life-cycle cost • Peak-flow treatment upgrades to handle additional wet-weather volumes following the completion of the Central Interceptor Wastewater Tunnel • Commencement of the Māngere WWTP discharge consent renewal process ahead of its expiry in 2032.	The second decade will include: • Further solids stream upgrades • Additional wet-weather treatment facilities if required.

Māngere catchment

The Māngere catchment currently extends from Redhills to Whenuapai in the north-west, Howick in the east and Drury in the south. The older parts of this catchment are serviced by a combined wastewater and stormwater network. About three per cent of our customers are on a combined system. This leads to frequent occurrences of wet-weather overflows.

Wet-weather overflows are caused by heavy rain and are a mixture of stormwater (rainwater run-off from roofs and roads) and wastewater. In heavy rain, the stormwater that drains from the average roof is equivalent to the wastewater flows from more than 40 households.

Our Central Interceptor (CI) Wastewater Tunnel is a vital infrastructure project for Auckland. The CI is a 14.7-kilometre tunnel and is part of our wider wastewater strategy to protect and enhance the natural environment. It will increase the capacity of our wastewater system to deal with population growth, help protect our environment from overflows and ensure Aucklanders can enjoy clean and healthy beaches for generations to come.

The CI will carry wastewater – currently being conveyed by the Western Interceptor, Ōrākei Main Sewer and the Eastern Interceptor – to the Māngere WWTP.

This will not only create capacity in the Ōrākei Main Sewer but also free up capacity in the downstream Eastern Interceptor and allow for growth in central and south Auckland which are serviced by the Howick, Tāmaki East and Southern interceptors.

To make the best use of the conveyance capacity which the CI will provide, we are working with Auckland Council's Healthy Waters to develop a 10-year programme of works to improve the water quality in Auckland's Western Isthmus urban waterways, streams and harbours.

The Western Isthmus Water Quality Improvement Programme uses the enabling works of the CI to implement a combination of wastewater and stormwater options in each catchment to reduce the volume and frequency of overflows from the combined and wastewater networks. This will primarily involve removing as much stormwater from the wastewater network as possible. In addition to the $1.3 billion in capital works we are funding and undertaking in this area over the next 10 years, Auckland Council has allowed $300 million during this period for their share of the separation works, to reduce overflows to the environment. This is to be funded through Auckland Council's water quality targeted rate. The programme will be extended to cover the Eastern Isthmus with an investment contribution of $300 million from Watercare. Auckland Council will have to contribute a similar amount as part of the Healthy Waters funding requirements.

We are anticipating significant growth in the south of the region, in line with council's FULSS. The southern area has also been identified by Auckland Council and central government as a potential area to build houses quickly.

The Hingaia Peninsula and Drury West will be serviced by the Hingaia Pump Station, which is connected to the Southern Interceptor. Augmentation of the Southern/South-Western Interceptor, with additional capacity from Bremner Road via Hingaia to Manurewa, will be timed to service growth. In addition, we will be investigating the potential to integrate purified treated wastewater reuse to provide greater resilience in the water and wastewater networks.

Tamaki Regeneration Company (TRC) and Kāinga Ora

There is considerable intensification occurring in our eastern and central-city catchments. The Tamaki Regeneration Company (TRC) and Kāinga Ora are significantly increasing dwellings in the Tāmaki, Glen Innes and Panmure areas in the east, and Mt Roskill, Owairaka and Oranga more centrally. They are targeting at least a three-fold increase in dwelling numbers while they maintain the existing social housing stock in the area and provide additional housing for rent and private sale.

Watercare is working with TRC/Kāinga Ora, especially around the wastewater capacity, to manage any adverse effects of the redevelopment on our network and the environment. In particular, we are looking at replacing old wastewater pipes that connect each house to our network, as the wastewater flows from this area are highly influenced by wet weather. Where the public wastewater pipes are under capacity, even after reductions in wet-weather flows, we are working with TRC/Kāinga Ora to undertake necessary upgrades.

2021 – 2031

- The construction of the Central Interceptor started in 2019. The project is scheduled for completion by 2027.
- A stormwater/wastewater separation programme within the Western Isthmus catchments will be implemented to reduce wet-weather overflows to the environment.
- A stormwater/wastewater separation programme within the Eastern Isthmus catchments will be put in place to reduce wet-weather overflows to the environment. This will commence during this decade and be completed in the second decade.
- As part of the Southern Interceptor augmentation, the Hingaia Pump Station and initial network upgrades will be constructed. A new pump station at Bremner Road, to allow Drury West servicing, is currently underway. This will allow continued growth in the southern areas of the region.

Additional programmes to resolve residual capacity issues will be identified and carried out during this period, including:

- Howick diversion to provide for growth and mitigate wet-weather overflows
- Ōtara catchment upgrades to mitigate wet-weather overflows
- Newmarket Gully to mitigate the impact of overflows.

2031 – 2041

The programmes outlined below will continue into the second decade:

- Further augmentation to the Southern Interceptor, including an upgrade of the Bremner Road Pump Station and duplication of the pump station's rising mains
- Further Ōtara and Newmarket network upgrades
- Eastern Isthmus catchment improvements to reduce combined sewer overflows to the environment, set to be completed in the second decade

Additional programmes to resolve residual capacity issues will be identified and carried out during the period.

Rosedale Wastewater Treatment Plant

The Rosedale WWTP treats and disposes of wastewater from approximately 15% of Auckland's population, currently estimated to be 251,000 people. The plant discharges, on average, around 68,000m^3/d of highly treated wastewater through an outfall pipe into the Hauraki Gulf (off Mairangi Bay).

Based on the existing consent limits, we expect that the outfall pipe has capacity to treat the wastewater flows of around 578,000 people.

The discharge consent is valid until 2030. As growth occurs across the region and flows are diverted from the Māngere WWTP catchment to the Rosedale plant, treatment processes and hydraulic capacity at the plant will be upgraded to maximise the use of the existing outfall pipe.

2021 – 2031	2031 – 2041
In addition to process optimisation and improvements, the programme of works and investment planned for the Rosedale WWTP include: • A thermal hydrolysis plant to enhance pre-treatment of anaerobic digestion to improve biosolids to class A quality, reduce carbon footprint and waste, and optimise asset life-cycle cost • Construction of new treatment processes, which includes primary sedimentation tanks, biological treatment reactors, clarifiers and a separate pond discharging system • Start of the consent renewal process for the Rosedale WWTP • Investigation of reuse options.	• Further upgrades to the plant to provide additional capacity for growth and diversion of flows from Māngere • Improvements to meet new discharge consent requirements.

Rosedale catchment

The Rosedale catchment covers the area from Albany across to Long Bay in the north to Chatswood across to Devonport in the south and is served by a fully-separated wastewater network. Currently some parts of this catchment experience wet-weather overflows so there is a significant programme of works to address this issue.

As part of the North Shore trunk sewer and pump station upgrade programme, the following work is planned or underway to resolve overflows at the locations identified above:

- Wairau Pump Station and rising main upgrade
- Sidmouth Pump Station and rising main upgrades, including the East Coast Bays Branch Sewer upgrade
- Fred Thomas Drive Pump Station and rising main upgrades
- Alma Road Pump Station diversion
- Northcote Sewer upgrades
- Chelsea Pump Station upgrades
- Shoal Bay inflow and infiltration investigation.

The Northern Interceptor Wastewater Pipeline will be built to divert flows from the upper portion of the Western Interceptor catchment to the Rosedale WTP. The first phase of the Northern Interceptor will take flows from the existing Hobsonville Pump Station to Rosedale by 2022. The second phase, from Westgate to Hobsonville Pump Station, will enable growth in Whenuapai and Redhills, and is being advanced as part of the Government's Housing Infrastructure Fund. Further boost-pumping and extensions to the Northern Interceptor will be phased to accommodate growth, and the Concourse storage tank flow will be diverted from the Western Interceptor to the Northern Interceptor, currently programmed for 2036. We will build a second Hobsonville Pump Station and duplicate the rising main from Hobsonville to Rosedale, timed to start in 2036.

2021 – 2031	2031 – 2041
• The Northern Interceptor from Westgate through to Rosedale will be completed. • The North Shore trunk sewer and pump station upgrade programme will continue in the Wairau Valley, Castor Bay, Stanley Point and Birkdale wastewater catchments. • An interim pump station will be constructed to service the first stages of the Redhills special housing area (SHA) development. • A new transmission pump station will be constructed on Brighams Creek Road and be connected to the phase 2 Northern Interceptor network to service growth in Whenuapai, Redhills, Kumeu, Huapai and Riverhead.	• Further phases for the Northern Interceptor programme will be completed. • Network upgrades will be identified and completed as required across the decade. • Investigation of reuse will be undertaken.

Army Bay Wastewater Treatment Plant

The Army Bay Wastewater Treatment Plant treats and disposes of wastewater from around three per cent of Auckland's population, servicing communities from Ōrewa, Silverdale, Wainui and extending east to Whangaparāoa Peninsula. The population is currently estimated to be 49,300 people. The plant discharges around 12,000m^3/d of treated wastewater off the Whangaparāoa Peninsula (Tiritiri Matangi Channel).

The recent replacement of the treatment plant's outfall pipe has increased flow capacity to around 1000L/s. Wet-weather flows can now be treated and discharged without causing bottlenecks in the network.

The treatment plant has an existing discharge consent that limits the maximum daily discharge to 32,147m^3/d. Allowing for high wet-weather flows, this equates to the flows of approximately 60,000 people.

Treatment plant and process upgrades will be timed to accommodate growth based on the limits of the recently granted discharge consent.

Army Bay catchment

The Army Bay catchment is serviced by the Army Bay WWTP.

Significant future growth areas in this region include Wainui South and Silverdale West. Residential land in Wainui is programmed for immediate development. The structural plan for this area was adopted in 2020, with development expected in the first decade of our AMP period. These developments will be enabled by staged upgrades across our wastewater network.

Pukekohe Wastewater Treatment Plant

The Pukekohe WWTP treats and disposes of wastewater from approximately two per cent of Auckland's population, currently estimated to be 33,800 people. The plant currently discharges, on average, around 10,000m^3/d of highly treated wastewater into a tributary of the Waikato River. The plant's catchment also includes the north Waikato towns of Tūākau and Pōkeno, including a large industrial customer base in Pōkeno discharging trade waste.

We will be carrying out treatment process upgrades to expand the plant's capacity to an equivalent population of around 60,000 people, which will be completed by the end of 2021. Further expansion will occur in the second 10-year period, timed with growth in the connected communities.

Pukekohe and north Waikato catchments

The Pukekohe catchment is serviced by a dedicated 'wastewater-only' network; the recent upgrades to the Pukekohe Trunk Sewer and Pukekohe Pump Station have helped to maintain compliance, even during wet weather.

There is significant growth projected for this catchment, within the future urban zoned land. A plan change is currently underway, amending the Unitary Plan in accordance with the structural plan adopted in 2019. There is also substantial expansion predicted in both Tūākau and Pōkeno, with a considerable number of trade-waste discharging industries in both of these townships.

We will continue to plan staged upgrades to keep up with growth within this catchment.

Warkworth and Snells/Algies wastewater treatment plants

The Warkworth and Snells/Algies WWTPs together treat and dispose of wastewater from approximately 0.6% of Auckland's population, currently estimated to be 8,500 people. By 2040 this population is expected to grow to 35,000 people. The following programme is underway to service the projected growth.

The North-East Sub-regional WWTP is in design at present. The basic concept includes wastewater being pumped from Warkworth to the new plant, which will be located adjacent to the existing Snells/Algies plant. The scheme includes a new larger-diameter outfall pipe to the inner channel of the Hauraki Gulf, off Martins Bay. The sub-regional plant will have staged capacity upgrades, from an initial 18,000 people equivalent to an ultimate capacity of around 35,000 people. Our existing Warkworth and Snells/Algies plants will be decommissioned as part of the project works.

Warkworth, Snells Beach and Algies Bay catchments

The Warkworth and Snells Beach catchments are separate 'wastewater-only' systems with only one pump station and one network engineered outflow point (EOP) that exceeds the NDC target.

There is significant growth proposed in the Warkworth catchment, within the future urban zoned land. This land is located at both the northern and southern edges of the catchment. A plan change is currently underway, amending the Unitary Plan in accordance with the structural plan adopted in 2019. In view of the high growth expectations, a network model will be built to enable network solutions to be developed.

Programmes to resolve capacity issues will be identified and carried out as required during the AMP period.

Waiuku, Clarks Beach and Kingseat wastewater treatment plants

At present the Waiuku, Clarks Beach and Kingseat WWTPs serve these respective communities. These plants together treat and dispose of wastewater from approximately 0.7% of Auckland's population, currently estimated to be 10,800 people. Although these plants are broadly effective now, the steadily growing population will soon bring them to capacity.

A resource consent application for a South-West Sub-regional WWTP has been granted, enabling Waiuku, Clarks Beach and Kingseat to be serviced by a new WWTP, to be located at Clarks Beach. The scheme is in design at present and includes wastewater being pumped from Kingseat and Waiuku to an upgraded plant at Clarks Beach that will discharge a high-quality of treated wastewater. The existing plants will be decommissioned as part of the project works.

Waiuku, Clarks Beach and Kingseat catchments

The Waiuku and Clarks Beach catchments are serviced by dedicated 'wastewater-only' networks that are fully compliant even during wet weather.

The wastewater networks have some capacity to accommodate growth but will require planning studies to optimise the use of the individual networks.

Waiwera, Beachlands/Maraetai and Clevedon

The Waiwera and Beachlands/Maraetai areas are currently serviced by local WWTPs.

The Waiwera wastewater network will be diverted to connect with the Hatfields Beach and the Army Bay catchments. The treatment plant will be partially decommissioned as part of this project.

Our Beachlands plant currently has capacity for 10,000 people. If development exceeds this capacity, a consent variation will be required to increase the discharge allowance. The consent expires in 2025 regardless, and will need to be renewed. Further process expansion and upgrade would then enable the plant to service around 14,000 people. Between 2021 and 2041, growth expectations for the area are within the estimated tolerances of the plant. However, if growth is allowed to exceed current forecasts, upgrades will be scheduled and undertaken as required, including the possibility of connecting the community back to metropolitan Auckland.

Clevedon is not currently serviced by Watercare. A scheme to convey wastewater back to Takanini is currently being devised. The funding costs are being distributed in accordance with the infrastructure funding agreement with the developers. The project costs will be reimbursed through development interest in the Clevedon community.

7. Asset renewal strategy

As infrastructural assets age, we normally see a decline in their performance, sometimes to the point of asset failure. Asset failures can cause service interruptions and may pose a risk to public health and safety. We have developed asset replacement and rehabilitation programmes to monitor the condition and performance of critical assets in order to estimate the end of their useful economic lives. Asset renewal decisions for these assets are based on a risk assessment of the likelihood and consequence of failure, taking into account the asset's age and life expectancy, condition, performance, system resilience and criticality.

Renewal of treatment plant assets are undertaken based on the observed performance of the assets in operation and as a result of regular inspections.

For local network assets which are currently subject to a 'run-to-failure' philosophy, a probable failure rate is applied based on the diameter, pipe material and expected life. The statistical modelling of local network asset replacements will continue to be refined as further fault analysis and condition assessments are undertaken.

Over the time of this plan, we will move towards a proactive rather than reactive approach to renewal of our local network assets, with a proportionate increase in investment in this area to ensure a positive customer experience is maintained. Proactive renewal has significant benefits, by reducing leakage in water pipes and decreasing infiltration into wastewater pipes, preserving water volumes as well as network and treatment capacity for customers.

As part of the findings in the WICS report, it was noted that Watercare assumed a higher useful life than some international industry-leading water companies and that access to efficient funding could potentially lead to more proactive renewal of assets, resulting in lower operating costs and more efficient delivery of services.

Investment in asset renewals and level-of-service improvement

Over the next 20 years, $10.2 billion (or 45% of our total AMP investment) will be spent on renewing and upgrading existing assets across our network.

Water renewals and level-of-service improvement programme ($4.58 billion) include:

- Ōrewa 1 Watermain replacement
- Huia 1 and Nihotupu 1 watermains replacements
- Domain Reservoir replacement
- Khyber 3 Reservoir replacement
- Huia 2 watermain replacement
- Hūnua 1 Watermain, which will be replaced by the extension to Hūnua 4 Watermain
- Local water network renewals
- Other programmes – renewing and replacing critical assets near the end of their useful lives and non-critical assets that have failed.

Wastewater renewals and leve- of-service improvement programme ($5.64 billion) include:

- Transmission network replacements
- Local network renewals
- Wellsford WWTP renewals
- Sub-regional WWTP renewals
- Rosedale WWTP renewals

- Pukekohe WWTP renewals
- Māngere WWTP renewals
- Helensville WWTP renewals
- Other programmes renewing and replacing critical assets near the end of their useful lives and reactive renewal of non-critical assets.

Critical facilities and assets

Our critical facilities and assets are those which cannot be allowed to fail because the consequences of a failure are too high. Criteria to identify which facilities and assets are critical include:

- Health and safety risk
- Number, type and duration of customers affected
- Environmental consequence of the asset failure
- Regulatory, resource consent and drinking water quality compliance
- Size and location of the asset
- Complexity of repair and outage duration.

We have adopted the following approach to the renewal of assets:

- Renewal programmes are developed for critical assets
- Non-critical assets are replaced on failure.

Plant assets

Plant assets include water source assets, treatment plants, transmission pump stations and reservoirs. These are generally accessible assets and have inspections and planned maintenance programmes. The plants have dual process streams to provide redundancy and resilience, where feasible. Mechanical and electrical assets in these facilities have duty and stand-by provision to reduce the criticality of individual assets. Renewal of plant assets are planned based on the observed performance of the assets in operation and as a result of regular inspections.

Transmission pipeline assets

The transmission assets convey substantial quantities of water or wastewater across the region. The failure of these assets can have a significant impact on a large number of customers, the environment or on public health and safety. All transmission assets are classed as critical assets. They are assessed and scheduled for renewal based on age, condition, performance and risk of failure, on an individual basis.

Local network assets

The local network assets generally comprise smaller-diameter pipes. The impact of these assets failing is typically much lower than a transmission asset failure, due to the limited number of customers affected and reduced environmental or public health and safety impact. Water networks are inherently less vulnerable because of the advantages afforded by cross-connections. Most network assets are considered to be non-critical and are allowed to fail a number of times before they are replaced. The consequence of failures is managed via the maintenance contracts' response key performance indicators (KPIs).

A subset of network assets is regarded as critical based on their location and the type of customers serviced. We treat these assets in the same way as our transmission assets.

This AMP introduces a proactive renewals programme for local pipe assets based on age and condition of the asset. The intention of the programme is to improve customer service and reduce whole-of-life costs.

Condition assessments are carried out when local network pipes are exposed as part of a repair or during operational routines, like carrying out a closed circuit television (CCTV) inspection due to a wastewater pipe blockage, or as part of a request to build over the asset.

Pipe asset age profiles

Pipes make up more than 64% of the gross replacement value of our infrastructure assets. It is important that we have a renewal strategy which addresses the uncertainty surrounding these underground assets.

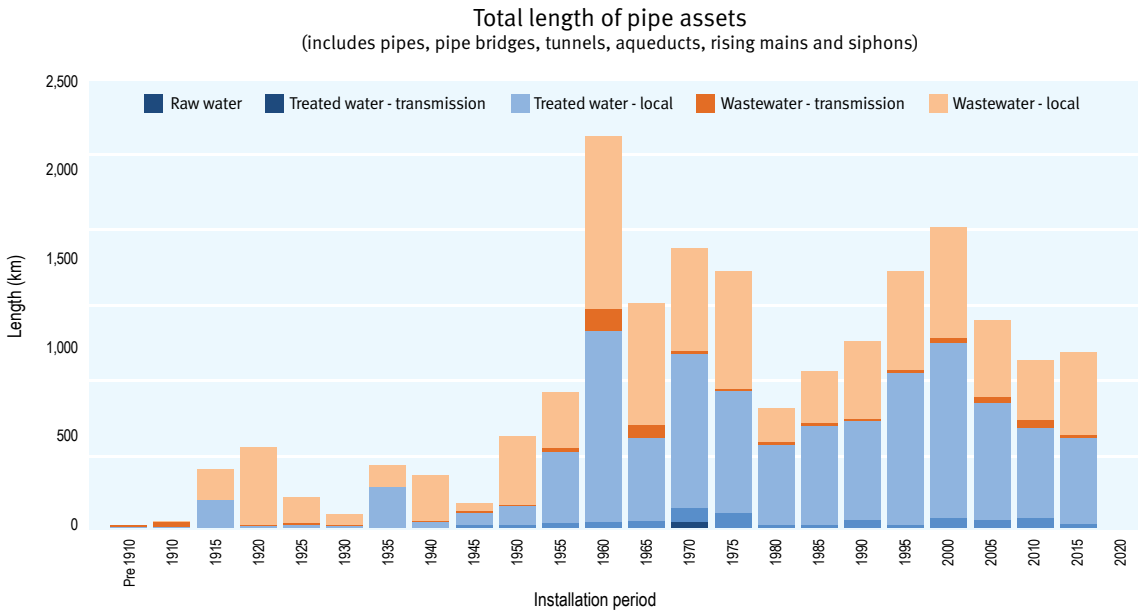
The charts below provide an overview of the age class distribution of our pipe assets as at 30 June 2020.

Major development occurred in the 1960s due to the construction of the trunk interceptor system to take wastewater to the new Māngere WWTP and following the opening of the Auckland Harbour Bridge and development of the North Shore area. This can be seen in the age and cost profiles shown below.

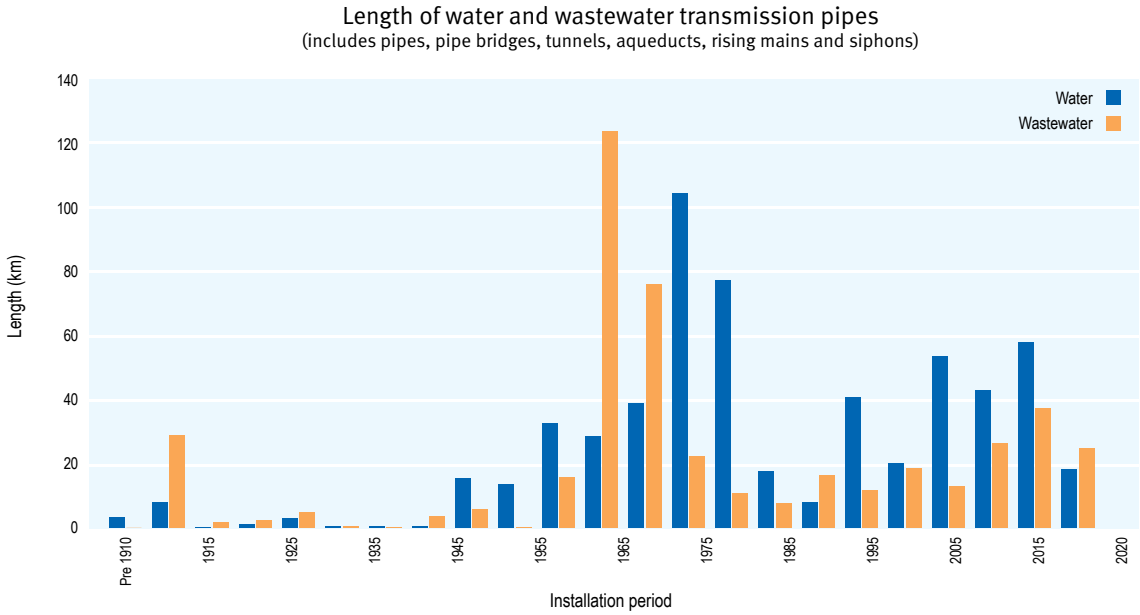
The weighted average age (by length) of transmission water pipes is 36 years and that of local water network pipes is 37 years.

The average age (by length) for both wastewater transmission and local network pipes is 46 years.

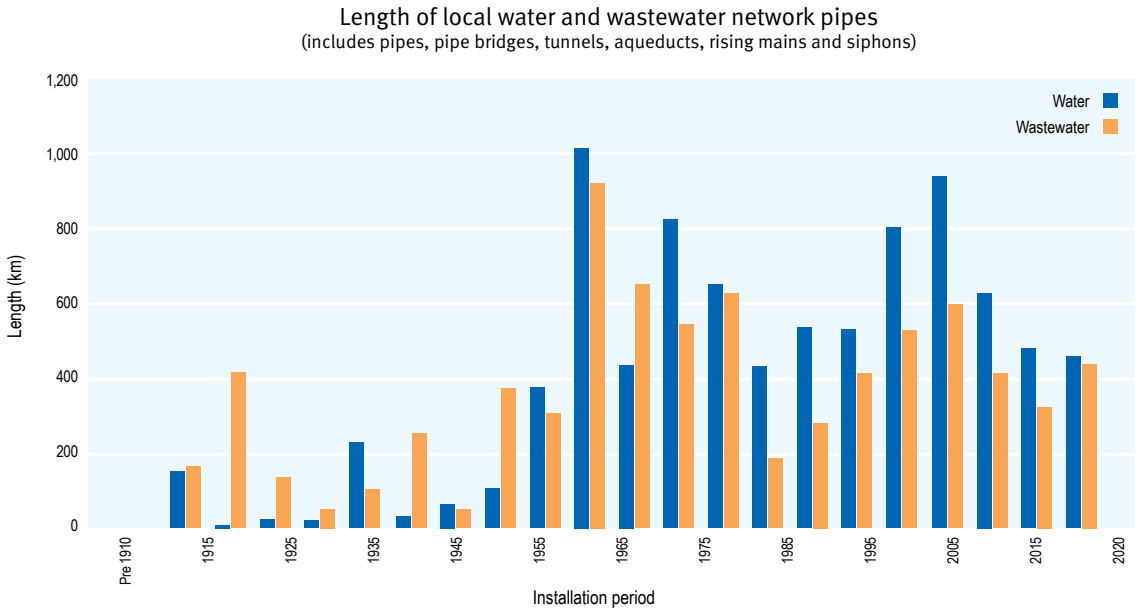
All Watercare's pipe assets



Water and wastewater transmission pipes



Water and wastewater network pipes



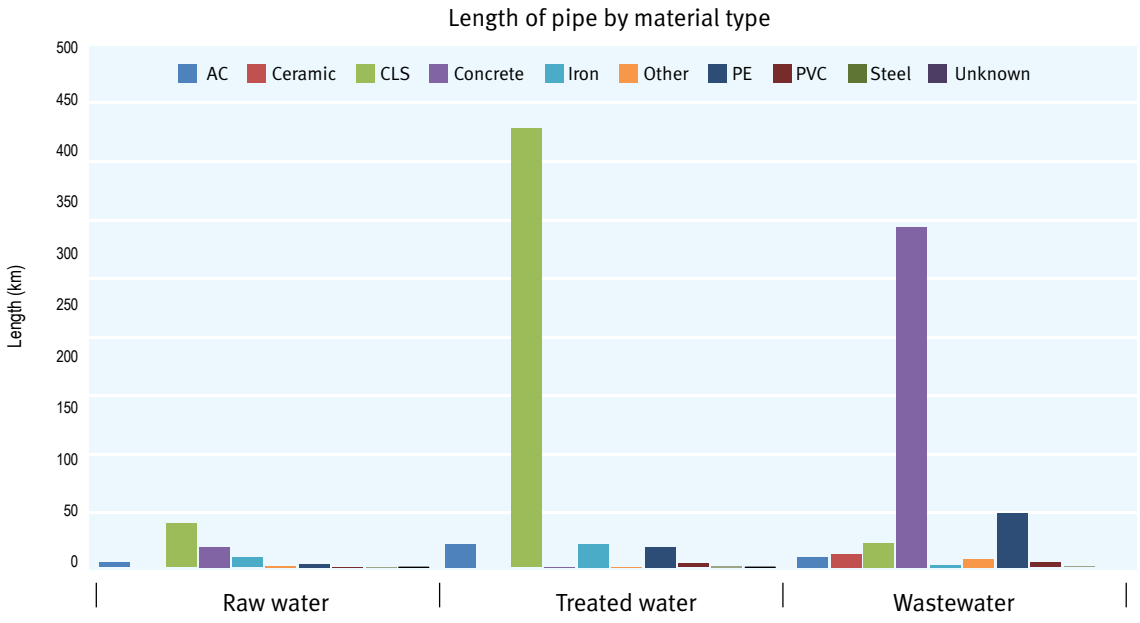
Pipe materials

Pipe material has a bearing on the pipe performance and renewal timeframe.

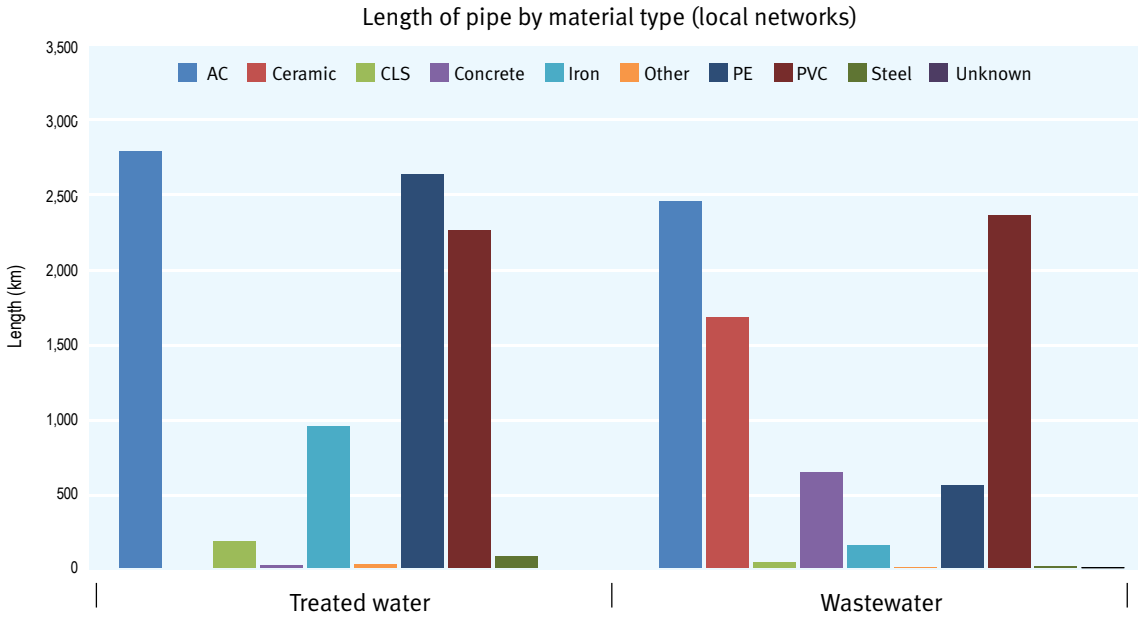
The graph below shows that the materials most commonly used for water and wastewater transmission are concrete lined steel (CLS) and concrete respectively. In recent times the use of large-diameter polyethylene (PE) pipes for bulk transmission is increasing.

In contrast, as shown, local network water distribution pipes have been constructed using cast iron (iron) followed by asbestos cement (AC) as preferred materials. The first local wastewater networks used ceramic pipes, which have stood the test of time. Many of these still exist today. AC became the preferred material for small-diameter wastewater pipes in the 1950s to the 1960s. These pipes are reaching the end of their useful life and will be replaced with modern materials. PE and polyvinyl chloride (PVC) pipes are being used more now.

Length of pipe by material type for bulk transmission



Pipe length by material type for local networks



8. Operations and maintenance strategies

Enterprise Asset Management (EAM)

Watercare has an EAM which forms part of part of our efficiency and productivity focus. This system improves asset operation and maintenance efficiency. It integrates asset maintenance plans, operational intelligence and work-order management.

With improved asset data, access to better analytics and improved processes to manage work, EAM reduces the manual effort to plan and manage maintenance work.

Water supply pressure, flow and water source levels monitoring

This includes remote and manual monitoring of bulk meters and flow meters for billing, network analysis and modelling, operations and leak detection. Pump stations, reservoirs and treatment plants are alarm-monitored for low/high pressure and water levels, faults, power failures and water quality deterioration. The system enables remote control of pumps based on reservoir levels. Rainfall stations, dam-level recorders and in-stream weirs record water levels for use in dam safety surveillance, consent compliance reporting, headworks operation and drought security analysis.

Water supply interruption management

During unplanned outages, customers are supplied with bottled water or water from our 'Oasis' trailers or water tankers. Where possible, customers are notified in advance of planned water supply shutdowns.

Water source management

Watercare has an Integrated Source Management model (ISMM) to optimise source allocation. We operate our water sources to ensure compliance with consent conditions (regarding allowable volumes of water takes), to optimise the use of energy by minimising pumping and water treatment costs and maximising hydro-generation potential, and to provide volumes within the capacity limitations of the treatment plants, pipelines and pump stations.

We operate our water sources in accordance with our Water Safety Plans. The Water Services Bill will require water suppliers to have source-water risk management plans once it becomes the Water Services Act.

We also manage our water sources to minimise the effects our operations have on the environment.

In addition, we manage our dams according to their characteristics. The Hūnua dams are of a large-capacity type, with relatively small catchments. They fill slowly but sustain use for longer. The Waitākere dams are the opposite, with small capacities and large catchments, filling quickly but unable to sustain prolonged use. We actively manage the dams to make the best use of these characteristics.

Pressure management

Pressure management across our water supply zones ensures that our water networks work within minimum and maximum water pressures to protect the network and reduce leakage. Pressure management initiatives will be further considered as part of our demand management and leak reduction programmes.

Water quality management

Watercare's Water Safety Plans have been developed to manage our drinking-water supply system to ensure provision of safe and secure drinking-water through commitment to drinking-water quality management. Watercare adheres to the six principles of drinking-water safety. These are:

- Embrace a high standard of care
- Protect source water
- Maintain multiple barriers against contamination
- Change precedes contamination
- Suppliers must own the safety of drinking water
- Apply a preventive risk management approach.

To deliver on these principles, our water supply system is collaboratively operated and managed by a variety of teams within the Operations group to ensure understanding, implementation, maintenance and continuous improvement of the drinking-water quality management system.

The water quality parameters include both online instrument readings and the results of laboratory analyses. We carry out compliance and operational sampling and analyses throughout the region, in accordance with the DWSNZ and our Water Safety Plan. Reactive water quality tests and flushing are carried out in response to customer water quality complaints. Routine flushing is undertaken in areas where we know repeat problems are likely to occur.

Backflow prevention

All our commercial and industrial customers must have a certified backflow prevention device installed at the boundary of the property, to prevent contaminants entering the public network from private connections. In addition, some residential connections (e.g. those with rainwater tanks or irrigation meters) have backflow devices fitted as these carry a higher risk. We undertake a monitoring, testing and enforcement role for these devices, to meet the requirements of the DWSNZ, the Health Act's Section 69ZZZ and the new Water Services Bill.

Leak detection and management

Active leak detection is carried out through handheld acoustic monitoring of pipelines across 6000 kilometres of the network each year. This enables us to find and fix a substantial number of underground leaks that are invisible to the public.

The monitoring of over 60 district metering areas (DMAs) across the city informs Watercare which regions have the highest levels of leakage. These are then targeted for active leak detection. The creation of an additional 5 DMAs is currently underway with a further 5 in design. The intention is that these areas will also be pressure-managed, which will further reduce background leakage and the number of breaks within each zone.

Water leaks are a primary cause of non-revenue water or water losses. The management of non-revenue water volumes is a key focus for Watercare, as significant water loss would require us to invest in new water supply capacity earlier than otherwise would be necessary.

Water meter management

Commercial water meters are monitored (some remotely) and replaced proactively, based on consumption and age. Residential water meters are replaced when they fail or when they reach 20 years of use, which is when they start to rapidly decline in accuracy. About 30,000 of these meters are proactively replaced every year to ensure they keep pace with the rate of failure.

An additional smart meter roll-out has been approved across the top 100 commercial customers and schools in the region. This will provide the benefit of greater visibility of leaks and usage patterns across these larger users. Smart meters will also be rolled out to all residential customers by 2034.

Wastewater flow monitoring and control

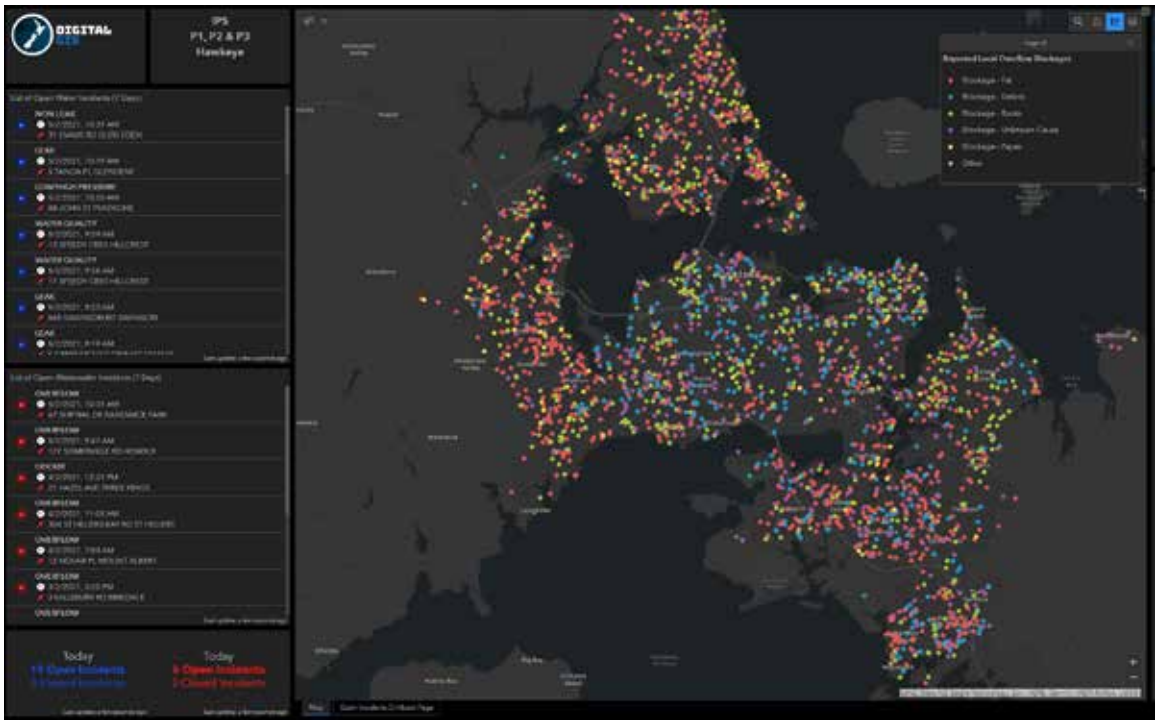
Our wastewater pump stations are continuously monitored for pump run-times, flows, wet-well levels, storage operation and overflow activation. Monitoring allows for pumping rates to be adjusted according to downstream conditions and enables us to use the storage to minimise issues. It also allows us to respond quickly to potential overflow incidents and to facilitate clean-up if needed.

Wastewater overflow management

Overflows are caused by stormwater and groundwater entering our wastewater pipes, therefore reducing their capacity for wastewater. Blockages (caused by fat build-up or root intrusion) or collapses, or breaks in the pipes from third-party damage cause overflows also. We use a number of methods to avoid and minimise overflows, including I&I detection and education campaigns, regular pipe flushing, enzymes to reduce fat accumulation, strict trade-waste management and monitoring, network enhancements and investigation of repeated blockages.

We are able to monitor open water and wastewater incidents and where overflows have occurred and what their causes are. The screenshot below shows, on the left, the number of open incidents. In the centre, we can see the reported overflows over time (from the time this system was implemented) and their cause. Drilling down on a dot takes you to individual events. Armed with this information, we are better able to target remedial programmes and customer communications.

Location of overflows and their causes



Inflow and infiltration (I&I) control

Auckland has sewer networks in some of the earliest established suburbs on the isthmus where a single pipe network transfers both stormwater and wastewater. This is known as the combined network. Today this represents about 3 per cent by number of properties serviced by Watercare. The combined network was built in the early 1900s, in accordance with accepted practice at the time, and remains in service today.

While the combined network has the advantage of requiring only one pipe to convey both stormwater and wastewater, it has a limited capacity to convey storm flows and therefore was designed to regularly overflow during rainfall events. To ensure that these overflows occur in a controlled manner, rather than occurring in private homes or on private properties, dedicated engineered overflow structures were constructed at points along the network so that, during rainfall events, the excess flow could be safely discharged to the local receiving environment and prevent surface flooding.

The remainder of the Watercare wastewater system is designed to modern standards and separates wastewater flows from stormwater flows by providing separate pipe networks. However, we design for low levels of stormwater or groundwater infiltration into the wastewater pipe system as pipe networks age and deteriorate. The additional stormwater can increase flows to an extent where the capacity of the network is no longer sufficient. This can result in excess flows which need to be discharged to the environment during significant rain events to prevent back-up of wastewater in the system and overflows in houses and on private property. Such discharges normally occur at specially constructed engineered overflow points (EOPs) which are designed to overflow in a controlled way into a receiving environment, although they can also discharge unintentionally e.g. from a manhole, to either public or private property.

During wet-weather periods, a sewer network may receive higher levels of inflow into the system through the following mechanisms:

Inflow, which is the direct entry of stormwater into private drains (private drains are private pipes that convey wastewater from buildings to the public wastewater system), either through a downpipe from the roof connected to a gully trap, or a low gully trap that allows water from the hard stand to flow into it.

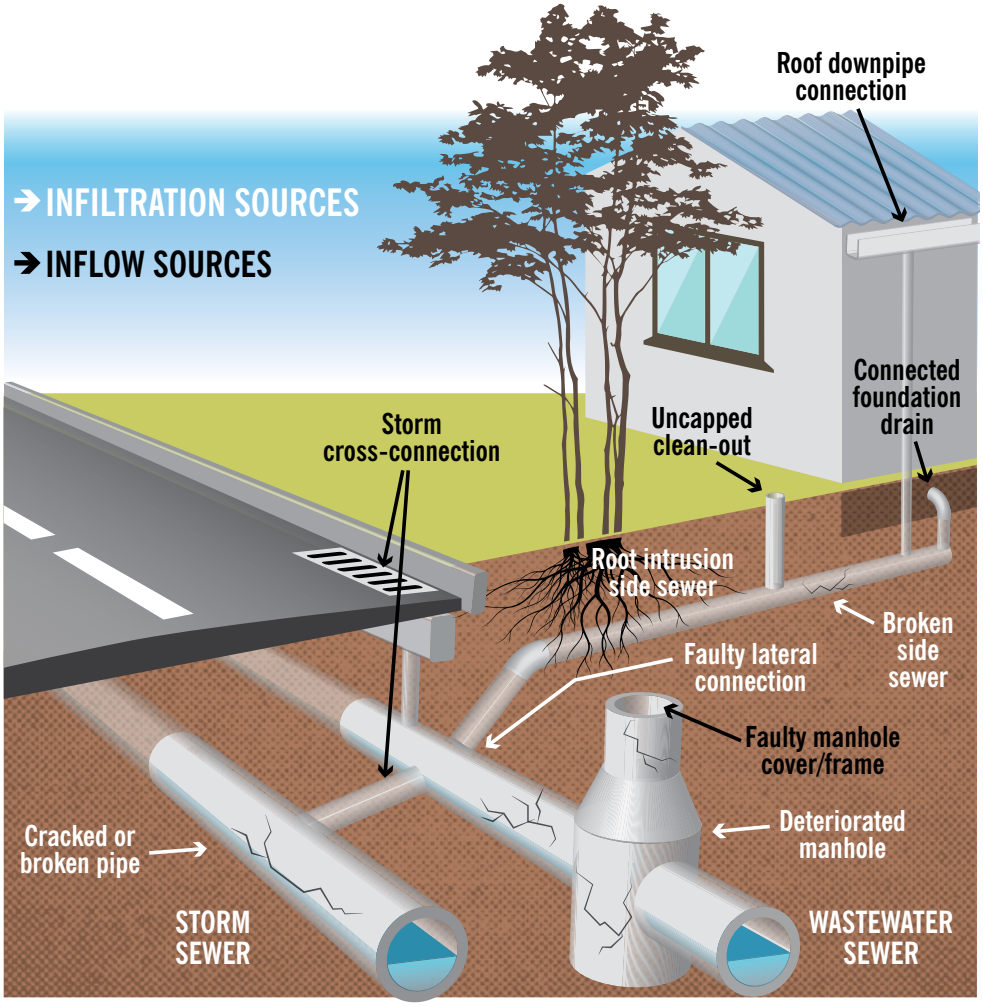
Infiltration refers to the water (groundwater) that enters the wastewater pipe system through cracks, joints, broken or poorly constructed pipes. This occurs in both public and private wastewater pipes.

The extent of I&I usually depends on the location and age of the pipes, the pipe material used and the ground conditions.

Experience within Auckland has shown that between 50% and 60% of I&I comes from private drains (also known as 'laterals'), and that correcting these defects is necessary to achieve a reduction in wet-weather flows through the implementation of an I&I programme.

The diagram below shows the sources of I&I.

Sources of inflow and infiltration



For separate sewer networks, a dedicated network improvements and I&I team has been set up to proactively remove stormwater and improve network performance.

The reactive I&I programme targets wet-weather overflows which cause operational issues that need to be addressed urgently. It targets illegal stormwater connections to the wastewater network and low-lying gully trap, i.e. sources of direct inflow which are able to be rapidly and inexpensively identified and remedied.

The planned I&I programme follows a more detailed catchment investigation and analysis, and involves the identification of all private defects (both above-ground and private drains) and also a full investigation and rehabilitation of the public network and manholes.

For I&I control through the removal of stormwater run-off in combined sewer networks, we are building on our foundation programmes of work. These include the Central Interceptor and Newmarket Gully projects, which will provide additional wastewater transmission capacity to alleviate the high-frequency combined sewer overflow (CSO) discharges. A complementary programme of work called the Western Isthmus Water Quality Improvement Programme (WIWQIP) has been implemented as a joint initiative by Watercare and Auckland Council's Healthy Waters and we are jointly developing catchment-specific improvement programmes to:

- Provide new stormwater enhancements to enable separation and local catchment augmentation
- Alleviate uncontrolled discharges into local catchments
- Optimise the benefits of the wastewater transmission solutions to meet growth needs
- Achieve discharge consent targets.

Maintenance activities

Asset group	Maintenance activities	Standards and specifications
Planned maintenance		
Water networks	Meter testing	Manufacturer's specifications
	Valve and hydrant inspections	Operated to identify maintenance needs
	Pump station and reservoir inspections	Bulk network – based on reliability-centre maintenance (RCM)programme logged in asset management system Local networks – routine pump/electrical testing into manufacturer's specifications
	Pipe and structural condition surveys	Planned programmes
Wastewater networks	Sewer cleaning and siphon flushing	Planned programmes
	Pipeline CCTV inspections	Planned programmes
	Inflow and infiltration testing	Flow model calibration Planned programmes for inspections of properties
	Critical asset inspections (pipe bridges, suspended sewers, control valves, outfalls, siphons)	Planned inspection programmes
All pump stations and treatment plants	Planned preventative maintenance programmes	Bulk network – RCM-based programme logged into the asset management system Local networks – routine inspections/ cleaning
	Pump overhauls and electrical testing	Manufacturer's specifications
	Safety inspections of lifting beams and backflow preventers	Manufacturer's specifications
Unplanned maintenance		
Water network asset	Repair broken mains/pipes	Reactive maintenance is carried out in accordance with the key KPIs set within the maintenance contracts
	Repair/replace broken/under-reading meters	
	Repair/replace leaking valves and hydrants	
	Flushing in response to water quality complaints or identified problems	
Wastewater network assets	Repair broken pipes and blockages	
Treatment plants/reservoirs/ pump stations	Repair plant/equipment failures	Manufacturer's specifications

Condition and performance assessment

Condition assessment practices have been developed to assist with renewals planning. These are described below:

Asset group	Condition assessment practices
Water system	
Water supply dams	• Annual investigation and inspection of each dam to report on its safety performance • Five-yearly independent dam safety assurance audit to evaluate dam condition • Routine monitoring and assessment to ensure dam condition is maintained
Water treatment plants	• Visual inspections • Detailed, scheduled condition inspections
Treated water reservoirs	• Visual inspections trigger in-depth condition assessments, such as structural assessments
Water pump stations	• Regular routine inspections (in conjunction with maintenance work) • Vibration monitoring, thermography and leak detection testing to determine likely failure of bearings in motors and pump units • Monitoring of motor insulation to ensure integrity and detect evidence of potential early failure • Testing of pump station efficiency, in terms of actual pump rate compared to design pump rate • Annual inspection of all lifting beams and gantry cranes to check the integrity of the fixing bolts, supports, wire ropes and chains to comply with statutory requirements
Water transmission pipes	• Pipe sample analysis (pipe samples are cut when the pipe is exposed during maintenance or repairs) • Condition grade assessment when maintenance or repairs are undertaken • Analysis of pipe performance (breaks/leaks) to interpret condition • Use of condition assessment technology (called JD7) for pressurised watermains while in service
Water network pipes	• Spot inspection and condition grade assessment as part of pipe repair works • Analysis of pipe performance (breaks/leaks) to interpret condition
Valves and hydrants	• Tested (operated) and maintained at varying intervals • Fire and Emergency NZ hydrant inspections
Wastewater system	
Wastewater treatment plants	• Visual inspections • Detailed, scheduled condition inspections
Wastewater pump stations	• Regular routine inspections (in conjunction with maintenance work such as wet-well washing to remove fat build-up) • Vibration monitoring, thermography and leak detection testing to determine likely failure of bearings in motors and pump units • Monitoring of motor insulation to ensure integrity and detect evidence of potential early failure • Testing of pump station efficiency, in terms of actual pump rate compared to design pump rate • Annual inspection of all lifting beams and gantry cranes to check the integrity of the fixing bolts, supports, wire ropes and chains to comply with statutory requirements
Wastewater transmission pipes	• Scheduled inspections • Pipe sample analysis (pipe samples are cut when the pipe is exposed during maintenance or repairs) • Condition grade assessment when maintenance or repairs are undertaken • Analysis of pipe performance (breaks/leaks) to interpret condition • Specialist pipe bridge and rising main inspections • CCTV, sonar, laser profiling and walk-through inspections
Wastewater network pipes	• Spot inspection and condition grade assessment as part of pipe repair • Analysis of pipe performance (breaks/blockages) to interpret condition • Pipe bridge inspections • CCTV inspections

Asset groups by operation and standards

Asset group	Operational activities	Standards and specifications
Water sources and treatment plants	Water abstraction rates monitored through telemetry	Resource consent conditions
	Water quality monitoring	• DWSNZ • Watercare's Water Safety Plans
	Process monitoring to allow optimisation of processes and cost minimisation	• Critical control points (CCPs) • Functional descriptions
	Treatment plant operation	Standard operating procedures
Water networks	Reducing non-revenue water • Leak detection • Theft management • Minimum night-flow analysis • Create smaller district metering areas • Meter replacement programme • Pressure management	
	Water quality monitoring	• DWSNZ • Water Safety Plan
	Flushing	In accordance with flushing programmes and operating manuals
	Backflow prevention auditing	• AS2845.1:2010 • Water New Zealand Backflow Group – Backflow Code of Practice for Water Suppliers • Health Act 1956, Section 69ZZZ
Wastewater treatment plants	Receiving environment monitoring	Resource consent conditions
	Resource consent conditions	Monitoring of wastewater discharge
	Discharge monitoring	Resource consent conditions
	Process monitoring to allow optimisation of processes and cost minimisation	
	Treatment plant operation	Standard operating procedures
Wastewater networks	Overflow monitoring (via telemetry) of pump stations and designated manholes	Resource consent conditions
	Response to and clean up of wastewater overflows	Agreed levels of service
	Reducing wastewater overflows from illegal connections	Inflow and infiltration investigation
	Trade-waste monitoring	Inspections at trade-waste customer properties
	Modelling to ensure overflow minimisation	Resource consent conditions

Summary of assets managed

As at 30 June 2020

	Unit	Transmission	Local	ALL
Water Assets				
Water supply dams	No.	11	-	**11**
Groundwater sources	No.	14	-	**14**
River abstraction	No.	3	-	**3**
Raw water aqueducts	No.	13	-	**13**
Raw water tunnels	No.	23	-	**23**
Raw water pump stations	No.	18	-	**18**
Raw watermains (pipe length in km)	km	83	-	**83**
Water treatment plants	No.	16	-	**16**
Treated watermains (pipe length in km)	km	507	8,922	**9,428**
Treated water pump stations	No.	25	52	**77**
Water reservoirs	No.	56	31	**87**
Valves	No.	6,815	97,256	**104,071**
Hydrants	No.	–	53,127	**53,127**
Meters	No.	–	450,636	**450,636**
Wastewater Assets				
Sewer mains (pipes) (pipe length in km)	km	455	7,872	**8,327**
Manholes	No.	3,671	166,556	**170,227**
Wastewater treatment plants	No.	18	-	**18**
Wastewater pumping station	No.	68	460	**528**
Wastewater storage tanks	No.	3	5	**8**

NOTE: The following are new sources and treatment plants brought into service as part of the drought response. These are additional to the table above.

- Hays Creek Dam (included in the table above) was brought back into service, along with a new 12MLD treatment plant
- Pukekohe water supply augmented by the reinstatement of two bores along with a new 5MLD treatment plant
- Waikato 50MLD WTP.

Approximate gross replacement cost of key infrastructure asset classes

As at December 2020 ($ millions)

	Transmission	Local	All
Water Assets			
Water supply dams	559		**559**
Groundwater sources			
River abstraction			
Raw water aqueducts	358		**358**
Raw water tunnels			
Raw watermains			
Raw water pump stations	8		**8**
Water treatment plants	497		**497**
Treated watermains	1,630	3,229	**4,859**
Treated water pump stations		60	**60**
Water reservoirs		399	**399**
Valves	17	192	**209**
Hydrants		143	**143**
Meters	11	199	**210**
Total water assets			**6,377**
Wastewater Assets			
Sewer mains	2,191	4,106	**6,297**
Manholes	98	1,516	**1,614**
Wastewater treatment plants	1,196		**1,196**
Wastewater pumping stations	414		**414**
Wastewater storage tanks			
Total wastewater assets			**9,521**

Note: Pipe assets make up 70% of total asset value.

9. Shared services and technology programmes

In the AMP, we categorise assets and activities into those that support water services and those that support wastewater services. There are also assets and activities that support both water and wastewater areas of the business. These are called shared services and include capital investment in services such as information systems, control systems, energy systems, general plant and equipment, and motor vehicles.

In this AMP, we have earmarked $155 million (nominal) in the first decade and $336 million (nominal) in the second decade, for investment in shared services.

Information systems and control systems are essential for the efficient and effective running of our business. Continuing innovation in the area of digital technology can drive productivity and efficient operations. As an example, our Enterprise Asset Management (EAM) system forms part of the productivity focus. This system improves asset operation and maintenance efficiency. It integrates asset maintenance plans, operational intelligence and work order management. With improved asset data, access to better analytics and better processes to manage work, EAM will reduce the manual effort to plan and manage maintenance work.

Another example of innovation is the Nerve Centre. Introduced in April 2021, this facility is our way of bringing together operational information, insights and various teams to help us be more responsive and deliver better customer outcomes.

We continuously monitor the industry in New Zealand and overseas to identify emerging technologies and systems that would enable us to improve the way we deliver services, operate more efficiently and engage more effectively with our customers.

10. AMP investment breakdown

Our Revenue and Financing Policy is built upon principles which are consistent with those adopted by Auckland Council. These can be found in our Funding Plan (Waikato A WTP expansion) along with our funding strategies and price path calculation methodology. Our major strategic projects and programmes and our capital and operating expenditure expectations are highlighted here.

Strategic projects and programmes

The following tables show the forecast capital expenditure for the water and wastewater strategic programmes discussed in the earlier sections.

Water strategic programmes - $ millions (nominal)

Water – strategic programme	Financial years 2021 – 2031	Financial years 2031 – 2041
North of Albany • Wellsford water supply • Warkworth water supply • Helensville water supply • Hibiscus Coast boost pumping • Ōrewa 3 Watermain • Ōrewa 1 Watermain replacement	325	9
North Shore • North Shore boost pumping • New harbour crossing	6	199
North-West • Huia WTP • Nihotupu raw watermain replacement • Woodlands Park Reservoir • North Harbour 2 Watermain • West boost pumping • North West storage • Waitākere water supply • Huia 1 and Nihotupu 1 watermains replacement	952	161
Central • Hūnua 4 Epsom to Khyber Pass • Khyber 2 Reservoir reinstatement • Ponsonby reservoirs upgrade • Domain Reservoir replacement • Khyber 3 Reservoir replacement • Other programmes	87	67

Water – strategic programme	Financial years 2021 – 2031	Financial years 2031 – 2041
Southern • Waikato boost pumping • Pukekohe East Reservoir at Runciman Road • Pukekohe water supply • Redoubt Road Reservoir complex expansion • Waiuku water supply • Waikato A WTP expansion to 250MLD • Waikato 2 Watermain • Waikato A WTP to 325MLD	607	556
Other water programmes		
Growth • TRC and Kāinga Ora programme • Additional water sources • New transmission watermains • Other programmes increasing capacity to support growth	487	613
Renewals • Local water network renewals • Huia 2 Watermain replacement • Hūnua 1 Watermain replacement (H4) • Other programmes – renewing and replacing critical assets near the end of their useful lives and non-critical assets that have failed	1,610	1,731
Level-of-service improvements • Improving the level of service to our customers	40	62
Total	4,114	3,398

Wastewater strategic programmes – $ millions (nominal)

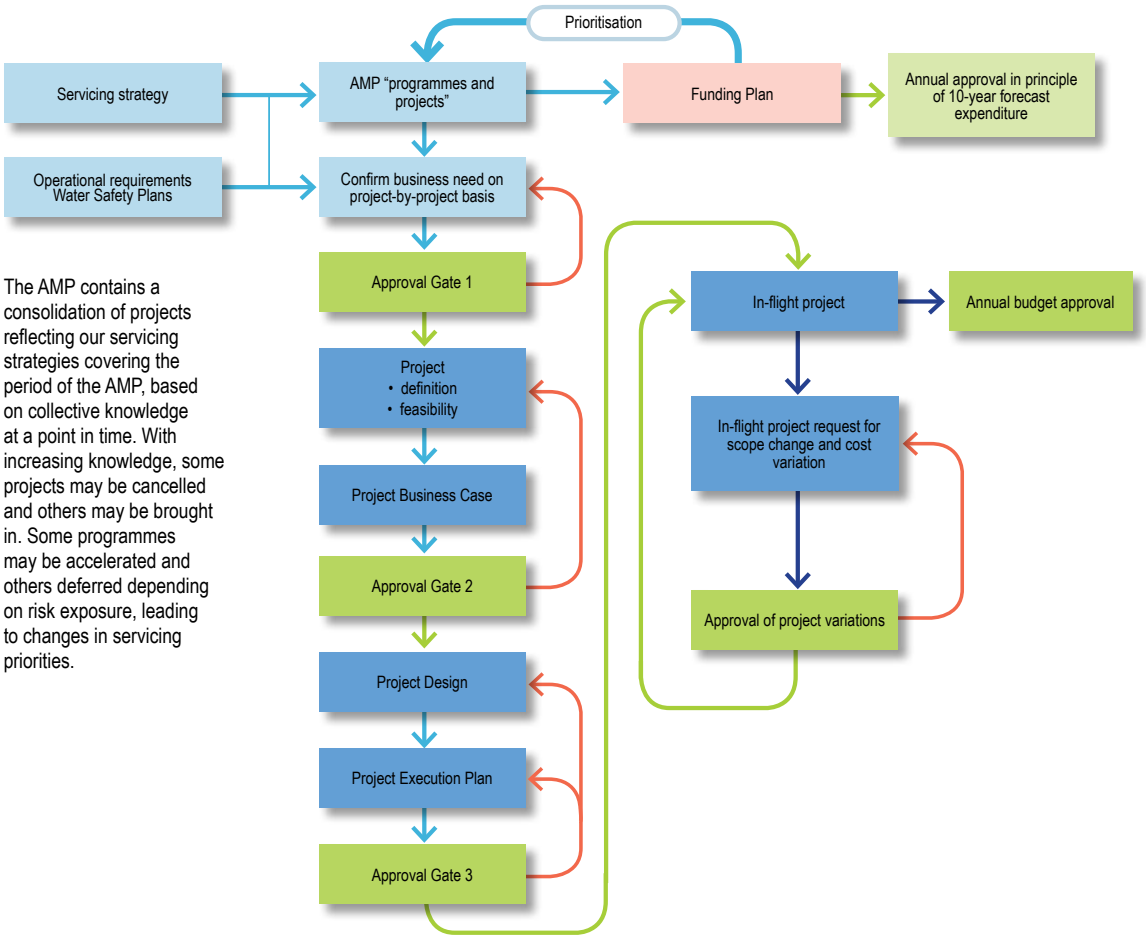
Wastewater – strategic programme	Financial years 2021 – 2031	Financial years 2031 – 2041
Treatment plants and catchments		
Māngere **Treatment plant** • Māngere WWTP capacity upgrades • Other programmes	494	980
Catchments • Central Interceptor • Southern Interceptor augmentation • Howick diversion • Ōtara network upgrades • Newmarket Gully • Eastern Isthmus programme	1,841	478
Rosedale **Treatment plant** • Treatment upgrades • Other programmes	377	87
Catchments • Northern Interceptor • North Shore trunk sewer and pump station upgrades • Other programmes	359	694
Army Bay **Treatment plant** • Treatment plant upgrades	69	148
Catchment • Provision for growth	300	177
Pukekohe **Treatment plant** • Treatment upgrades	116	171
Catchment • Pukekohe trunk sewer upgrades	111	52
Warkworth and Snells/Algies **Treatment plants** • North-East Sub-regional Plant and conveyance	232	126
Catchments • Network upgrades	87	14
Clarks Beach and Waiuku **Treatment plant** • South-West Sub-regional Plant and conveyance	216	23

Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Wastewater – strategic programme	Financial years 2021 – 2031	Financial years 2031 – 2041
Other wastewater programmes		
Growth • TRC and Kāinga Ora programme • Other programmes increasing capacity to support growth	414	877
Renewals • Other programmes renewing and replacing critical assets near the end of their useful lives and non-critical assets that have failed	681	1,264
Level-of-service improvements • Improving the level of service to our customers	153	149
Total	5,450	5,240

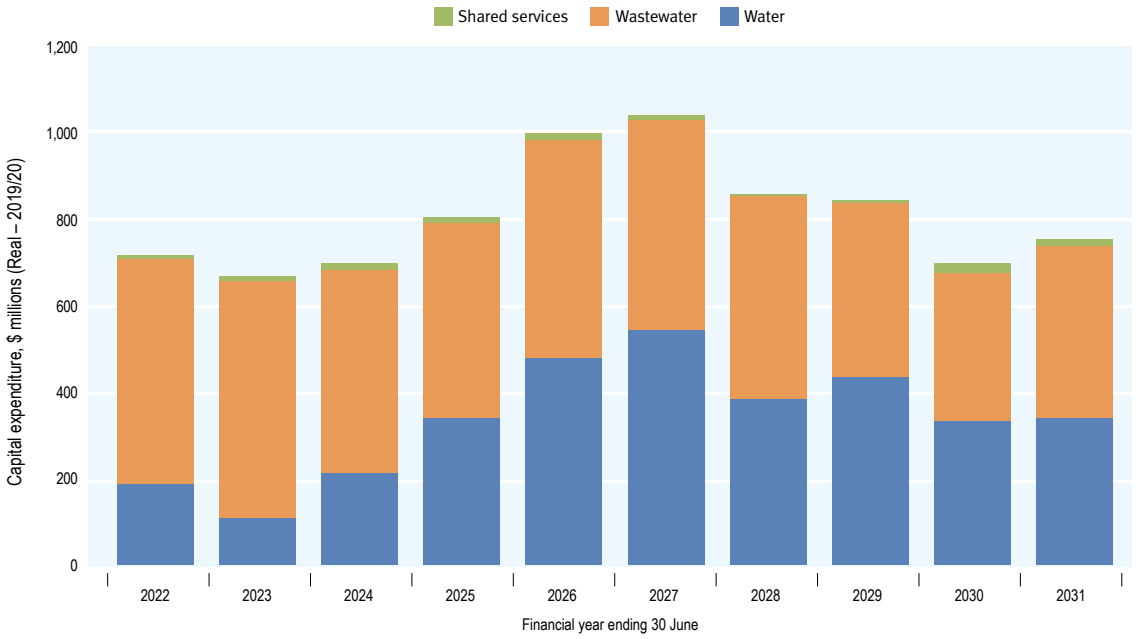
It is important to recognise that the presence of a programme or project within the AMP does not mean automatic approval to proceed. The capital projects approval process is set out in our project management framework. There are a number of approval gates providing extra levels of governance and oversight. This capital expenditure approval is reflected in the flow chart below with approval gates shown by the green boxes.

Capital expenditure approval process



The AMP contains a consolidation of projects reflecting our servicing strategies covering the period of the AMP, based on collective knowledge at a point in time. With increasing knowledge, some projects may be cancelled and others may be brought in. Some programmes may be accelerated and others deferred depending on risk exposure, leading to changes in servicing priorities.

Forecast capital expenditure by business area 2021 – 2031 $ millions (Real – 2019/20 base)



The following tables provide further details of our proposed capital investment.

In the AMP we categorise assets and activities into those that support water services and those that support wastewater services. There are also assets and activities that support both water and wastewater areas of the business. These are categorised as shared services and include capital investment in services such as information systems, electrical and control systems, energy, general plant and equipment and motor vehicles.

Watercare's capital expenditure forecast summary – $ millions (Real – 2019/20 base)

Business Area	Contributing Driver	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WATER	Growth	77.5	40.6	104.7	166.3	207.1	177.9	159.9	154.0	149.4	177.9	1,415.1	839.2	2,254.3
	Renewal	108.3	65.3	97.3	175.2	262.1	362.5	224.4	281.0	185.2	162.7	1,924.0	1,186.7	3,110.7
	LoSI	3.4	3.9	11.5	14.7	9.2	5.0	0.3	0.2	0.2	0.2	48.6	21.7	70.3
Water Total		**189.1**	**109.8**	**213.4**	**356.2**	**478.4**	**545.4**	**384.6**	**435.2**	**334.8**	**340.8**	**3,387.8**	**2,047.6**	**5,435.3**
WASTEWATER	Growth	252.8	279.8	231.4	225.8	239.7	222.2	234.0	212.6	186.3	206.7	2,291.4	1,512.8	3,804.2
	Renewal	173.2	160.1	157.7	171.5	205.4	175.9	148.2	147.7	123.1	175.0	1,637.8	1,294.7	2,932.6
	LoSI	94.1	111.6	83.1	55.9	63.6	89.3	89.6	46.4	33.81	18.5	685.9	323.0	1,008.9
WASTEWATER Total		**520.2**	**551.5**	**472.2**	**453.3**	**508.6**	**487.4**	**471.8**	**406.8**	**343.1**	**400.2**	**4,615.1**	**3,130.6**	**7,745.7**
SHARED SERVICES	Growth	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	2.6	3.8	6.4
	Renewal	9.0	8.9	17.9	10.1	10.1	9.1	4.6	5.0	7.2	15.0	96.9	182.0	279.0
	LoSI	1.7	-	0.0	1.8	1.7	1.6	1.8	1.9	17.1	1.9	29.6	19.2	48.8
SHARED SERVICES Total		**11.0**	**9.1**	**18.2**	**12.2**	**12.0**	**10.9**	**6.6**	**7.2**	**24.7**	**17.3**	**129.1**	**205.1**	**334.2**
Grand Total		**720.3**	**670.4**	**703.8**	**821.6**	**999.0**	**1,043.7**	**863.0**	**849.2**	**702.6**	**758.3**	**8,132.0**	**5,383.2**	**13,515.2**

Watercare's capital expenditure forecast summary – $ millions (nominal)

Business Area	Contributing Driver	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WATER	Growth	80.2	43.3	114.9	188.3	240.5	212.2	196.0	195.2	195.8	241.1	1,707.5	1,361.2	3,068.8
	Renewal	112.2	69.6	106.8	198.3	304.5	432.4	275.2	356.3	242.8	220.5	2,318.5	1,928.9	4,247.5
	LoSI	3.5	4.2	12.6	16.6	10.6	6.0	0.4	0.2	0.3	0.3	54.8	36.5	91.3
Water Total		**195.9**	**117.0**	**234.4**	**403.2**	**555.6**	**650.6**	**471.6**	**551.7**	**438.8**	**461.9**	**4,080.9**	**3,326.7**	**7,407.5**
WASTEWATER	Growth	261.9	298.3	254.1	255.7	278.4	265.1	286.9	269.6	244.2	280.0	2,694.2	2,489.9	5,184.1
	Renewal	179.5	170.7	173.1	194.2	238.6	209.8	181.7	187.3	161.3	237.2	1,933.3	2,141.3	4,074.6
	LoSI	97.5	119.0	91.2	63.3	73.8	106.5	109.9	58.9	44.3	25.1	789.5	538.1	1,327.6
WASTEWATER Total		**538.9**	**587.9**	**518.5**	**513.2**	**590.8**	**581.4**	**578.5**	**515.7**	**449.8**	**542.3**	**5,417.0**	**5,169.3**	**10,586.3**
SHARED SERVICES	Growth	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.5	0.5	3.1	6.3	9.4
	Renewal	9.3	9.5	179.7	11.4	11.7	10.9	5.6	6.3	9.5	20.3	114.3	298.6	412.8
	LoSI	1.8	-	0.0	2.1	1.9	1.9	2.2	2.4	22.4	2.6	37.4	31.5	68.8
SHARED SERVICES Total		**11.4**	**9.7**	**20.0**	**13.8**	**13.9**	**13.0**	**8.1**	**9.1**	**32.4**	**23.4**	**154.7**	**336.3**	**491.1**
Grand Total		**746.2**	**714.7**	**772.8**	**930.1**	**1160.4**	**1,245.0**	**1,058.2**	**1,076.6**	**921.0**	**1,027.6**	**9,652.6**	**8,832.2**	**18,484.9**

Water supply capital expenditure forecast – $ millions (Real – 2019/20 base)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WATER	Water sources	15.8	0.2	4.9	6.4	47.2	14.9	1.9	5.2	1.5	1.5	99.5	40.5	140.0
	Raw water network	-	-	-	2.7	4.0	74.8	-	-	-	8.2	89.7	102.9	192.7
	Water treatment	24.7	8.3	78.2	125.2	121.0	109.0	90.0	70.9	22.2	5.5	654.8	278.6	933.4
	Treated-water networks	129.6	101.3	122.6	202.0	303.2	344.9	292.5	358.9	309.0	323.6	2,487.7	1,613.0	4,100.7
	Control systems	3.4	-	3.2	0.3	0.4	0.7	-	-	-	-	8.0	1.4	9.4
	Electrical systems	15.7	-	4.5	19.5	2.5	1.1	0.2	0.2	2.1	2.1	47.9	11.1	59.0
Water Total		**189.1**	**109.8**	**213.4**	**356.2**	**478.4**	**545.4**	**384.6**	**435.2**	**334.8**	**340.8**	**3,387.8**	**2,047.6**	**5,435.3**

Water supply capital expenditure forecast – $ millions (nominal)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WATER	Water sources	16.4	0.2	5.4	7.2	54.9	17.8	2.3	6.6	2.0	2.0	114.7	72.2	186.9
	Raw water network	-	-	-	3.0	4.7	89.3	-	-	-	11.1	108.1	146.6	254.7
	Water treatment	25.6	8.8	85.9	141.7	140.5	130.0	110.4	89.9	29.0	7.4	769.2	463.0	1,232.2
	Treated-water networks	134.3	108.0	134.7	228.7	352.1	411.4	358.7	455.1	405.0	438.5	3,026.5	2,624.0	5,650.5
	Control systems	3.5	-	3.5	0.4	0.5	0.8	-	-	-	-	8.7	2.6	11.3
	Electrical systems	16.3	-	4.9	22.1	2.9	1.3	0.2	0.3	2.8	2.8	53.6	18.3	71.9
Water Total		**195.9**	**117.0**	**234.4**	**403.2**	**555.6**	**650.6**	**471.6**	**551.7**	**438.8**	**461.9**	**4,080.9**	**3,326.7**	**7,407.5**

Wastewater capital expenditure forecast – $ millions (Real – 2019/20 base)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WASTEWATER	Wastewater networks	391.2	413.3	315.8	284.1	384.0	327.6	249.0	241.6	230.3	279.1	3,116.1	2,099.6	5,215.7
	Wastewater treatment	126.1	135.7	149.5	160.3	116.2	157.7	220.4	162.8	112.4	120.7	1,461.8	1,011.8	2,473.6
	Trade waste	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.5	1.9	3.3
	Control systems	1.4	-	1.3	1.6	3.1	0.7	-	-	-	-	8.2	3.3	11.5
	Electrical systems	1.4	2.5	5.3	7.1	5.2	1.2	2.2	2.2	0.2	0.2	27.6	14.0	41.6
WASTEWATER Total		**520.2**	**551.5**	**472.2**	**453.3**	**508.6**	**487.4**	**471.8**	**406.8**	**343.1**	**400.2**	**4,615.1**	**3,130.6**	**7,745.7**

Wastewater capital expenditure forecast – $ millions (nominal)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
WASTEWATER	Wastewater networks	405.2	440.6	346.7	321.6	446.0	390.8	305.4	306.3	301.9	378.2	3,642.9	3,423.1	7,066.0
	Wastewater treatment	130.7	144.7	164.2	181.4	134.9	188.1	270.2	206.4	147.4	163.6	1,731.6	1,714.5	3,446.1
	Trade waste	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	1.8	3.1	4.8
	Control systems	1.5	-	1.5	1.9	3.6	0.8	-	-	-	-	9.2	6.0	15.2
	Electrical systems	1.5	2.7	5.9	8.1	6.0	1.4	2.7	2.8	0.3	0.3	31.5	22.6	54.1
WASTEWATER Total		**538.9**	**587.9**	**518.5**	**513.2**	**590.8**	**581.4**	**578.5**	**515.7**	**449.8**	**542.3**	**5,417.0**	**5,169.3**	**10,586.3**

Shared services capital expenditure forecast – $ millions (Real – 2019/20 base)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
SHARED SERVICES	Shared services maintenance	1.2	0.8	1.2	1.1	1.0	1.0	1.1	1.7	1.9	1.9	12.9	19.2	32.1
	Shared services laboratory	1.7	-	-	1.8	1.6	1.5	1.7	1.8	17.0	1.8	28.8	18.2	47.0
	Shared services Information Services	-	-	1.3	-	-	0.3	0.7	0.6	0.7	1.1	4.7	54.3	59.0
	Shared services corporate	2.6	1.8	2.4	2.2	2.2	2.1	2.4	2.3	4.3	4.2	26.5	27.0	53.5
	Control systems	5.3	6.5	13.0	6.7	6.7	5.6	0.3	0.3	0.3	7.7	52.4	81.3	133.7
	Electrical systems	0.2	-	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	3.7	5.1	8.9
SHARED SERVICES Total		**11.0**	**9.1**	**18.2**	**12.2**	**12.0**	**10.9**	**6.6**	**7.2**	**24.7**	**17.3**	**129.1**	**205.1**	**334.2**

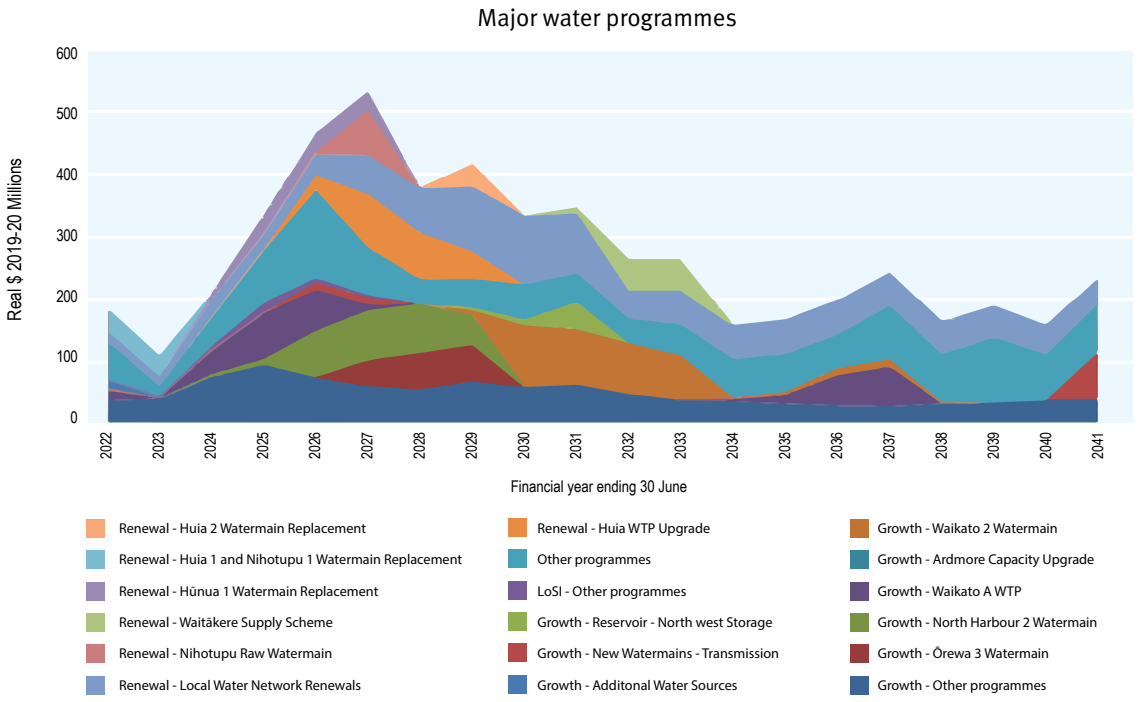
Shared services capital expenditure forecast – $ millions (nominal)

Business Area	Operational Area	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total 2022-2031	Total 2032-2041	20-year Total
SHARED SERVICES	Shared services maintenance	1.2	0.8	1.4	1.2	1.2	1.2	1.3	2.1	2.5	2.6	15.6	31.3	47.0
	Shared services laboratory	1.8	-	-	2.0	1.8	1.8	2.1	2.3	22.3	2.4	36.4	29.8	66.2
	Shared services Information Services	-	-	1.5	-	-	0.3	0.8	0.8	0.9	1.5	5.9	88.7	94.6
	Shared services corporate	2.7	2.0	2.7	2.5	2.5	2.5	2.9	2.9	5.6	5.7	32.0	44.1	76.2
	Control systems	5.5	6.59	14.3	7.5	7.8	6.6	0.4	0.4	0.4	10.4	60.3	133.9	194.2
	Electrical systems	0.2	-	0.2	0.6	0.6	0.5	0.6	0.6	0.7	0.7	4.5	8.4	13.0
SHARED SERVICES Total		**11.4**	**9.7**	**20.0**	**13.8**	**13.9**	**13.0**	**8.1**	**9.1**	**32.4**	**23.4**	**154.7**	**336.3**	**491.1**

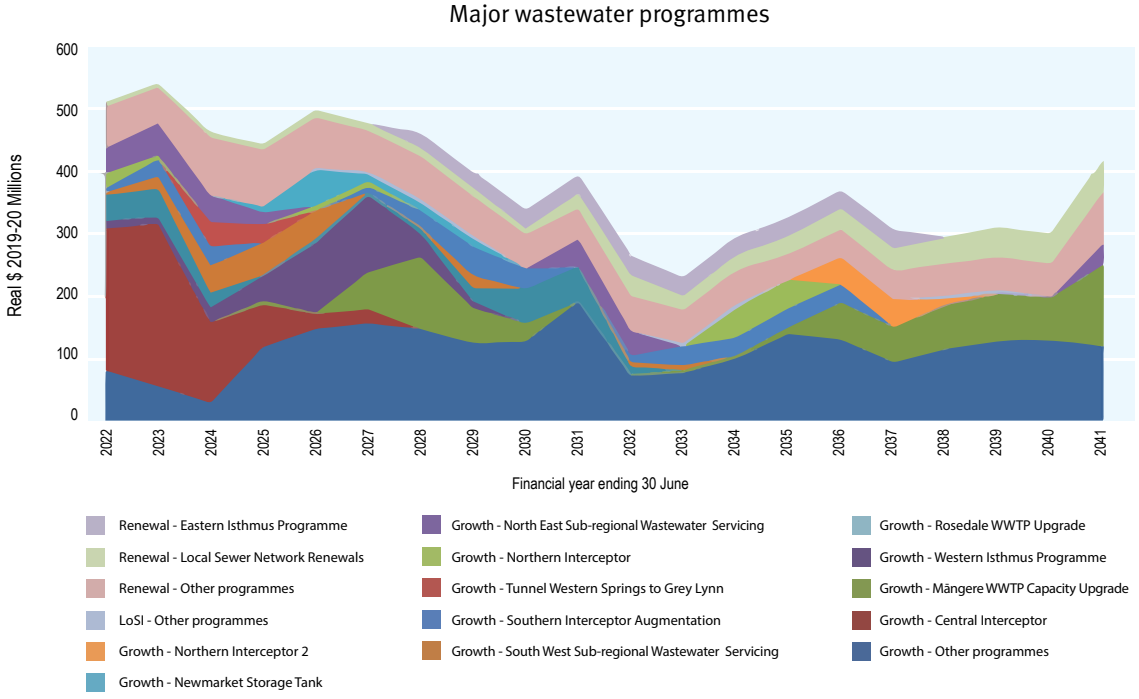
The following graphs provide a 20-year view of ongoing investment in water and wastewater infrastructure. Depending on the impacts of climate change on rainfall patterns in the next few years, it is possible that investment in alternative water supply infrastructure may be required earlier than expected despite demand management measures. Current technology indicates that this could add a further $1 billion to the 20-year profile for water infrastructure.

The graphs are presented in real dollar terms (base 2019/20) to represent changes in programme scope rather than inflationary trends. The scales in tboth graphs have been kept the same to indicate relative investment in the water and wastewater infrastructure over time.

Major investment in water infrastructure over the next 20 years



Major investment in wastewater infrastructure over the next 20 years



Note: All mentions of forecast expenditure are stated in nominal (inflated) dollars unless otherwise specified.

Section 3

Funding Plan

1. Introduction

This Funding Plan demonstrates how Watercare intends to fund and finance our business activities over the 10-year period of the LTP. Funding is the term given to sources of revenue (fees and charges) from which expenditure (including debt repayment) will ultimately be paid. Financing is the term given to the sourcing of debt.

Watercare is the Auckland water organisation as defined under the Local Government (Auckland Council) Act 2009 (LGACA). It is a council-controlled organisation (CCO), wholly owned by Auckland Council, providing water supply and wastewater services to around 1.7 million people in the Auckland region. Auckland is growing fast, and over the next 30 years, the population we serve is forecast to grow by another 700,000 people. There will be increased demand on our water and wastewater networks, requiring the construction of new bulk and local infrastructure.

All long-term debt is sourced through Auckland Council's centralised treasury function. We do not receive any funding from Auckland Council or the Government, other than for arm's-length charges for the services we provide, nor do we pay a dividend to Auckland Council. All the money we receive from customers is allocated to operating, maintaining and expanding our infrastructure. Any shortfall is financed through borrowing.

This Funding Plan describes:

- The sources of funds – where the money we spend comes from (revenue and borrowing)
- The application of funds – what the money going out is spent on (expenditure and debt repayment)
- What categories of money going out are funded and financed by which categories of money coming in (revenue and financing framework).

The LGACA sets out how Watercare must manage our operations.

In short, we:

- Must balance the need to incur and recover the costs of providing our services with the need to minimise charges for those services and to maintain the long-term integrity of our assets
- Pass on to our customers any surplus or productivity gains in the form of reduced water and wastewater tariffs
- Are prohibited from paying a dividend to council
- Must support and give effect to the relevant aspects of Auckland Council's plans.

Our focus is, and always will be, to run our operations cost-effectively and deliver value for money through our services. The financial challenge is to fund operating expenditure and expensive, long-life infrastructure while also maintaining service affordability for our customers.

Expenditure incurred by Watercare includes:

- Capital expenditure (to obtain, replace or improve long-life assets such as plant, equipment, pipes and buildings)
- Operating expenditure (incurred in carrying out normal day-to-day activities such as maintenance, energy, wages and rent)
- Interest on borrowing
- Repayment of debt

We need to ensure these costs are covered by a combination of revenue (funding) and borrowing (financing). This requires establishing a revenue price path which strikes a balance between revenue and borrowing, to ensure that revenue from customers will be sufficient, and also fairly distributed between present and future generations.

Revenue received by Watercare includes:

- Retail and wholesale service charges for water supply and wastewater services
- Infrastructure Growth Charges (IGCs)
- User charges such as new meters and service connections, meter relocations, wastewater audits, trade-waste monitoring, laboratory services and administration fees
- Subvention income from the transfer of tax losses to the Auckland Council tax group.

2. Funding Plan preparation

The preparation of this Funding Plan is guided by legislation, pricing principles and prudent consideration of financial ratios and shareholder plans.

2.1. Legislation

Watercare has to comply with the LGACA. In particular, Watercare must:

- Under Section 57 (S57),
  - Manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to its customers (collectively) at the minimum level, consistent with the effective conduct of its undertakings and the maintenance of the long-term integrity of its assets
  - Not pay any dividend or distribute any surplus in any way, directly or indirectly, to any owner or shareholder
- Under Section 58 (S58),
  - Give effect to the relevant aspects of the LTP (but does not authorise non-compliance with Section 57).

Watercare is unable to levy property rates and is prohibited under the LGACA from charging development contributions. Charges for services are made to our customers under a customer contract. By using our water and/or wastewater services or by remaining connected to our networks, customers are deemed to have accepted the terms and conditions of that contract.

Currently, water utilities in New Zealand are not subject to price regulation, unlike some other utilities (e.g. electricity lines companies and telecommunications). While we have discretion as to the contractual charges we set for our services, and the methodology used to set these charges, we consult with our customers when making significant changes to our charges, as required by Section 57 of the LGACA.

2.2. Pricing principles

The following are the pricing principles that Watercare follows. Often these principles need to be balanced between each other. Sometimes external factors constrain the ability to apply them. In spite of that, Watercare endeavours to apply them as consistently as possible when making decisions.

Council borrowing constraints are a good example of this, where in a perfect world we would use debt to apply the inter-generational equity principle. However, council borrowing constraints dictate our maximum debt, forcing Watercare to pay back borrowings faster than the principle would require.

We continue to look for funding mechanisms that would remove this constraint.

Inter-generational equity

Both current and future customers will benefit from investment in long-lived growth assets. The concept of inter-generational equity is for a fair balance to be struck between current and future customers paying for that investment. This means that costs are not unduly deferred to future generations, nor incurred too early by the current generation.

The principle of inter-generational equity suggests that growth-related assets with a long life span should initially be financed by borrowings. In that way, debt incurred is repaid over a long period. The spread of benefits is reflected in a distribution of cost to users over time. This avoids today's users paying for the entire cost of an asset in the year that it is acquired or built.

The inter-generational equity principle, however, needs to be balanced by consideration of other relevant pricing principles adopted by Watercare.

Other pricing principles include:

Alignment of costs with benefits

Where a service benefits a particular person or group, or where a particular person or group has caused the cost to be incurred, the corresponding person or group should pay the cost of that service as far as practicable.

Affordability for users

We are legally required to manage our business efficiently in order to keep costs to customers collectively at minimum levels. This means we must balance the need to incur and recover the costs of providing our services with the need to minimise charges for those services.

Horizontal equity

Customers across Auckland should pay similar amounts for the same service; this is achieved by the standardisation of charging frameworks across the region as much as is reasonably possible.

Minimising change

Customers across Auckland should expect a stable and signalled price path to ensure annual cost increases are manageable.

2.3. Financial ratios and measures

In addition to considering the pricing principles outlined above, the revenue price path needs to ensure key prudential financial ratios and measures are maintained within acceptable bands. This is in order to keep future debt at levels that will not stifle capacity to meet our Section 57 obligations.

Key financial ratios and measures include:

- Funds from operations ratio (the net of cash revenue and expenses divided by gross interest cost)
- Gearing
- Debt-to-revenue ratio.

These ratios and measures are explained in Appendix 1.

2.4. Statement of intent

We are responsible for establishing a statement of intent (SOI), which sets targets and other measures by which our performance can be judged in relation to our objectives.

Every year, we consult with our shareholder, Auckland Council, to develop an SOI covering the next three-year period. The SOI represents Watercare's public and legislative expression of accountability to our shareholder. It identifies the relationship between our activities and the delivery of those outcomes sought by the Governing Body of Auckland Council and those specified within the Auckland Plan. Local boards, the Independent Māori Statutory Board and the general public are invited to comment on the final draft, before it is adopted by the board.

3. Application of funds – areas that we spend money on

We are forecasting around $3.6 billion in operating expenditure and $9.7 billion of capital expenditure over the 10-year LTP period. We expect to pay $1.6 billion of interest cost and collect around $11.8 billion worth of revenue (excluding vested asset revenue) over the same time period. Debt is forecast to increase by $3.0 billion. Our Funding Plan financials are included in the council's LTP, which was publicly consulted on in early 2021.

3.1. Operating expenditure

Operating expenditure (opex), excluding depreciation and interest, is the sum required to maintain, operate and deliver the services we provide. Opex is split separately into water and wastewater activities. For each activity, opex is further split into employee-related costs, maintenance costs, asset operating costs and other expenses.

Both activities include allocations of shared services expenditure. Shared services comprise servicing and consents, planning and design, project delivery, customer experience, supply chain, finance and business support, digital, people and capability, communications, and risk and assurance, among other services.

Forecast opex by year is shown under the financial projections section on page 107.

3.2. Capital expenditure

We prepare our AMP on a three-yearly cycle to inform Auckland Council's preparation of the LTP. The AMP is reviewed internally each year, which also allows us to adjust our works programme to reflect the council's revised growth forecasts and priorities over time and to achieve the following objectives:

- To provide the necessary water and wastewater infrastructure to meet growth in the region in accordance with council's plans
- To maximise the use of existing infrastructure assets
- To ensure that level-of-service requirements are met at the least overall cost to customers collectively.

Watercare plans and builds the capital programmes outlined in the AMP.

Forecast capex by year, as identified in the AMP, is shown under the financial projections section on page 106. This is described in both real (today's) and nominal (adjusted for inflation) dollars.

The capex programmes identified in our AMP are broadly categorised based on three strategic drivers:

- Growth
- Renewal
- Level of service.

Typically when we construct new assets, they address more than one driver. For example, if we are renewing a pipe because of its condition, we also consider the long-term requirements of the asset with respect to growth and levels of service before deciding how to proceed with the renewal. Most programmes/projects have multiple drivers. The AMP identifies the cost split for each AMP programme or project by strategic driver.

Growth capex

Growth capex is infrastructure investment undertaken to increase capacity to cater for increased population and demand.

Regional growth in population, industry and commerce has a direct impact on the demand for water and wastewater services. Auckland is anticipated to grow significantly, and as it does, the demand for water supply and wastewater services will increase.

To assess the growth component of a programme, there is a need to estimate a scenario of 'what would happen if there was no growth?'. The difference between the total programme cost and the 'no growth' scenario estimate is the growth component.

Renewal capex

Renewal capex is infrastructure investment required to renew and replace critical assets near the end of their useful lives and non-critical assets that have failed.

Asset replacement and rehabilitation programmes are in place to ensure existing levels of service are maintained. These are derived from asset age profiles and maintenance histories, as well as ongoing condition assessments and risk analysis. Capital works are prioritised according to the criticality of the asset and the probability and consequence of system failure.

Level-of-service capex

Level-of-service capex is infrastructure investment required to ensure Watercare complies with legislative and regulatory operating conditions, increases operational efficiency, and improves the quality of service we provide to the region.

Our customers expect safe, reliable service at a reasonable cost over time, and they expect us to protect our natural environment. Legislation governs where and how our water and wastewater services are delivered. From time to time, changing legislative or consenting requirements require us to adjust our operations. Legislation also prescribes how the water and wastewater networks are managed, to ensure that public health and the environment are protected.

Some level-of-service capex may be short-term in nature. Examples are information technology and software upgrades that increase operational efficiency. A distinction is made between short-term and long-term level-of-service capex for determining how these are funded and financed.

3.3. Finance costs

Finance costs consist of interest and other costs that are incurred in connection with the borrowing of funds. Interest costs are paid to Auckland Council for monies borrowed and interest is recognised as interest expenses. Interest relating to infrastructural growth projects which are not yet complete is capitalised to the project and amortised through depreciation after the asset is operational.

3.4. Repayment of debt

In any particular period, Watercare will be raising new debt to finance a level of growth capex. In the same period, we will also be generating fees and charges to repay debt that was raised in earlier periods. In practice, however, these two cash flows will be netted.

We aim to set our revenue price path at a level to enable debt incurred by a generation to be fully repaid over a period of about one generation. A generation is taken to be the average period between when children are born and when they begin to have children of their own (assumed as 25 years). On average, each generation repays a generation's worth of debt. Because of the spread of ages among the population, there is always more than one generation paying water charges at any one time. However, as long as debt (taken at any point of time) is fully repaid over the period of about one generation, then, on average, each generation has repaid a generation's worth of debt.

Watercare's infrastructure programme in the initial years is significant and causes the business to operate close to its borrowing constraint. Debt repayment will be sitting at 25 years in 2027 and Watercare will be close to its maximum council group debt allowance. In subsequent years, Watercare will start paying down debt due largely to the price increases in the years immediately prior, which were required at that time to offset the borrowing constraints.

4. Sources of funds – where does the money we spend come from?

Funding is the term given to sources of revenue (fees and charges) from which expenditure (including debt repayment) will ultimately be paid. Financing is the term given to the sourcing of debt. Funding sources must therefore be identified to support opex as well as financing arrangements (debt repayment). If funding is insufficient to meet expenditure, the difference will need to be financed by new borrowing.

Watercare's income is sourced directly from our customers and we therefore need to ensure our overall customer charges are sufficient to fund our expenditure and debt repayment.

4.1. Revenue

- Forecast revenue assumptions are shown in the financial projections section on page 105.

Watercare's revenue comes mainly from the following sources:

Water and wastewater charges

- Water revenue is from water supplied, charged volumetrically per kilolitre[5], measured by water meter per customer. Generally, customers pay the same volumetric rate ($1.706 per cubic metre including GST for 2021/22), regardless of the volume used. Those customers who use our service less frequently, e.g. Town to Tank customers or those who use our tanker filling stations, pay a higher tariff, reflecting their low volumetric usage and our need to recover other fixed costs related to this service.
- Wastewater revenue is a combination of a fixed charge and a volumetric charge based on a percentage of the water used. The majority of domestic customers who have metered water pay a standard fixed charge and a volumetric charge based on 78.5%[6] of their water use. Wastewater services for non-domestic customers are charged on four different price tariffs, which allow customers to choose a combination of fixed and variable rates (refer to www.watercare.co.nz to see current prices). This is a result of significant consultation undertaken with our customers between 2012 and 2014.

Infrastructure Growth Charges

An Infrastructure Growth Charge (IGC) is applied to all new water and wastewater network connections, additional residential units at an existing connection and where a non-domestic customer increases water usage at their property by 220 kilolitres or more per year (refer to www.watercare.co.nz to see current IGC rates).

Growth from new property developments, or increased demand from existing connections, creates a requirement for us to provide, or to have provided, new or additional assets or assets of increased capacity. The IGC means that a share of the necessary growth cost is recovered from those who create the extra demand, rather than from all our customers.

IGCs are explained in more detail on pages 102 and 103.

User charges

A range of user charges covers items or services such as new meters and service connections, meter relocations, wastewater audits, trade-waste monitoring, and administration fees. These are charged directly to customers who request the service (refer to www.watercare.co.nz to see current prices).

Watercare Laboratory Services, a division of Watercare, is one of the largest water, wastewater and environmental laboratories in New Zealand, operating out of Auckland, Wellington, Queenstown and Invercargill. It offers a comprehensive variety of sample collection services, laboratory testing and air-quality monitoring services across New Zealand. As well as providing water and wastewater testing for Watercare, its customers also include councils, government agencies and private companies. Revenue generated by Watercare Laboratory Services also comes under "user charges".

Subvention income

Watercare has a loss offset and subvention arrangement with the Auckland Council tax group, a related party. Failure to offset our tax losses to related entities generating taxable profits would require profitable entities to make tax payments to Inland Revenue. This economic inefficiency is addressed by enabling the Auckland Council tax group to access our tax losses by way of tax loss offset and subvention payments to Watercare. The consideration we receive for tax losses is regularly reviewed by the board to ensure it represents a reasonable return to ensuring we continue to meet our obligations under Section 57 of the LGACA.

5 1 kilolitre = 1,000 litres = 1 cubic metre = 1 m^3

6 Apartments are charged 95% of their water volume as wastewater on the basis they have less outdoor water usage.

4.2. Borrowing

Forecast debt assumptions are shown on page 106.

Current and future customers collectively benefit from investment in long-lived growth assets. The concept of inter-generational equity is that growth-related assets with long life spans should initially be financed by debt. That way, a fair balance can be struck between current and future customers paying for that investment. Debt incurred by a generation is repaid by that generation over a long period. This means that costs are not unduly deferred to future generations, nor burdened too heavily on the current generation.

Watercare is required to operate under the debt levels specified by Auckland Council. This requirement on Watercare can cause inefficiencies in our funding structure and sometimes challenges the principle of inter-generational equity discussed above. Any requirement Watercare has, to fund infrastructure in excess of the available debt headroom, can only be met through a water tariff increase, even when it would be more efficient to fund the infrastructure with debt and align repayment over the actual period of customer benefit.

All new long-term debt is sourced from Auckland Council as this is currently the lowest-cost source of debt for Watercare. Watercare and Auckland Council entered into a service level agreement for the provision of treasury services post 30 June 2018 and an inter-company loan agreement for existing loans at 30 June 2018. All existing loans become one loan with a fixed maturity of 30 June 2022. The key objective of the centralised treasury function is to achieve cost savings and efficiencies across the council group and access to funding at cheaper interest rates for Watercare. We remain responsible for ensuring the company is adequately and sustainably financed on prudent terms. We do not receive any funding from Auckland Council or the Government, other than the Housing Infrastructure Fund and arm's-length charges for services we provide.

5. Funding infrastructure for growth

Investment in growth infrastructure is undertaken to increase capacity for increased population and demand. As already noted, most capex programmes/projects can be categorised broadly into three strategic drivers: growth, renewal and level of service. New assets we construct may include elements of all three drivers. For example, if we are replacing a pipe in poor condition, its replacement will meet existing capacity (renewal); it may be larger in size (for growth) or be of a superior design or material (level-of-service improvement). To assess the growth component of a programme, there is a need to estimate a scenario of 'what would happen if there was no growth?'. The difference between the total cost and the 'no growth' scenario estimate is the growth component.

Watercare distinguishes between local network and bulk infrastructure assets, as follows:

- Local network infrastructure generally refers to the part of water and wastewater systems that customers connect to. It covers all infrastructure that is not bulk infrastructure.
- Bulk infrastructure generally refers to treatment facilities (water and wastewater treatment plants) and larger transmission pipes and associated infrastructure that the local network infrastructure connects to.

The area serviced by bulk infrastructure is extended over time by Watercare, to meet growth in accordance with Auckland Council's Future Urban Land Supply Strategy (FULSS). The FULSS identifies a programme to sequence the urbanisation of future urban land, over 30 years, through the ongoing supply of greenfields land for development. This land is predominantly rural, not previously identified for urbanisation, so may require new bulk infrastructure to be provided.

Funding sources for local network and bulk infrastructure investment for growth are different.

a. Funding for local network infrastructure investment

Generally, property developers will fund growth of the local network, sufficient to meet the water and wastewater demand from their development. Watercare funds the capital investment to renew or improve the level of service of existing local infrastructure. We will fund some growth investment in local network infrastructure where it is associated with renewal or level-of-service improvement of existing assets, mainly in brownfields areas.

A developer of greenfields land will obtain the required consents and will build and pay for earthworks, roading and utilities such as electricity, telecommunications, water and wastewater to service the new development. We require the developer to construct and fund the internal water and wastewater infrastructure on their land to our specifications. The developer is also required to fund any connecting infrastructure, between their internal network and our existing local network infrastructure. They may be required to fund upgrades (if any) to the local network infrastructure as well, where capacity is inadequate for their development.

Where required by consent conditions, the ownership of developer-funded infrastructure is vested to Watercare on completion of construction. After that, we take the responsibility to operate and maintain the assets to continue to provide services in perpetuity.

To this point, developers have not contributed towards investment in bulk growth infrastructure; this is made through payment of IGCs at the time properties connect to our networks.

b. Funding for bulk infrastructure investment

Watercare generally plans and pays all the cost of capital investment for bulk infrastructure, including for growth. We recover the cost of bulk growth infrastructure through IGCs. However, in some circumstances (particularly when the need for bulk investment does not align with our plan) it is appropriate for us to reach agreements with a developer (or developers) to share the cost of bulk growth infrastructure with us.

c. Infrastructure Growth Charges

An Infrastructure Growth Charge (IGC) is applied to all new water and wastewater network connections, for additional residential units at an existing connection, and where a non-domestic customer increases water usage at their property by 220 kilolitres or more per year. For domestic customer connections, one IGC is applicable per residential unit. However, where the floor area of the residential unit (includes apartments) is less than 65m^2, two-thirds of the standard IGC rate will apply.

The IGC is charged at the time an approval for a connection is made. The IGC is not to be confused with a connection fee, which covers the direct cost of connecting privately-owned pipes to the local water network through a water meter.

A new property development or an increase in non-domestic demand creates a requirement for us to provide, or to have provided, new or additional assets or assets of increased capacity. The IGC means that a share of the necessary upgrade cost is recovered from those who create the extra demand, rather than from all our existing customers.

The IGC rate a customer is billed varies depending on whether the capital investment is on the Auckland metropolitan water and wastewater networks or on the smaller, stand-alone non-metropolitan (generally rural) networks. In some areas, there may only be a water or a wastewater service, or a combination of metropolitan and non-metropolitan elements. In those cases, a hybrid IGC rate applies. However, most of our IGC revenue comes from connections to the metropolitan networks.

The metropolitan rate applies for connections made to:

- Our large, contiguous water supply network
- Any of our four major wastewater treatment plants for Auckland: Māngere, Rosedale, Army Bay and Pukekohe.

i. The method for calculating the metropolitan IGC rate

We use the term 'development unit equivalent' (DUE)[7] to mean a new connection, or unit of increased non-domestic use, that attracts an IGC at the full rate.

We have chosen to standardise water and wastewater tariffs across the region and we've taken the same approach for IGCs in the metropolitan area. This makes the method of calculation simpler, with a single IGC rate being more predictable for developers and customers.

The cost of bulk growth infrastructure to be recovered from each DUE equates to the cost of bulk growth infrastructure over a period divided by the number of DUEs over the same period. We use a period of 15 years (4 past + 1 current + 10 forecast). This is deliberately an averaging approach, considering that Watercare has an ongoing growth investment need.

Cost of growth per DUE = cost of bulk growth infrastructure ÷ number of DUES (over 15 years)

However, we endeavour to recover the cost of growth per DUE, from those who connect, in two ways:

- By an IGC at the time of connection
- Through future water and wastewater service charges over time, for the portion representing depreciation and interest recovered.

The depreciation and interest recovered from each DUE over time (in today's dollars) ensures that the new customer is not charged twice for the same asset over its life. This places new customers on an equal footing with existing customers, with both groups contributing equally to the recovery of operating costs, depreciation, interest and debt repayment through a common standard tariff.

Currently, the metropolitan IGC rate is recovering close to 85% of what it should be. The reason for this is that the initial level of IGC was set around the average amount of development contributions collected by former councils prior to the amalgamation of Auckland's local government on 1 November 2010. Watercare is consciously moving to increase the IGC recovery rate in line with the Productivity Commission's recommendation, so Auckland's growth is not being subsidised by customers with existing connections. The move to full recovery of ICGs requires a higher level of price increase for IGC compared to water and wastewater charges in the early years.

d. Housing Infrastructure Fund (HIF)

In July 2016 the Government announced the creation of a HIF. The aim of this fund was to provide financing capacity for local councils to deliver the infrastructure needed to support their area's growth.

Auckland Council submitted an application to this fund in March 2017 and was notified in July 2017 that $300 million of investment was supported in principle. It is estimated that the HIF investment will unlock around 6200 dwellings in the North-West area.

Through the HIF, Watercare has received an interest-free loan from Auckland Council for $125million to support development at Redhill's and Whenuapai. Repayment is forecast to be made over 2025 to 2033, to correspond with the anticipated build rate of the new dwellings.

e. Infrastructure funding and Financing Act

Watercare is investigating with council, opportunities to utilise the Financing Act to fund projects servicing growth in Auckland.

7 A development unit equivalent (DUE) is the equivalency factor between the full IGC rate and the IGC rate applying to the development unit. For example, a development unit which is a residential unit less than 65m² and charged two-thirds the IGC rate is taken to be two-thirds of a DUE. Every 220 kilolitres of water used by a non-domestic connection is a DUE.

6. Revenue and financing framework

Revenue projections and price paths over the LTP period are set at a level so that, generally:

- Annual price increases are stable over time.
- Prices are kept as affordable[8], within debt and risk constraints, and we appropriately balance the recovery of costs between current and future customers.
- The benefit to be derived from Watercare's tax losses is balanced between making them available to the Auckland Council group and retaining them for our own use when it is more economical to do so.
- Debt incurred by a generation is largely repaid by that generation.

These concepts are difficult to apply in practice because:

- Capital spends are uneven, and assets in place at any time may have excess capacity.
- Capex is paid for as incurred but under the inter-generational concept we will only be reimbursed for those assets (from revenue) as they are used.
- Auckland Council debt covenants cause inefficiencies in Watercare's debt structure, resulting in an artificially low debt ceiling and accelerated repayment.
- Many generations are present at any one time.

We attempt to set the price path at a level that is fair by optimising funding sources through a combination of:

- Service charges paid by current users
- IGCs paid by those who create demand
- Borrowing.

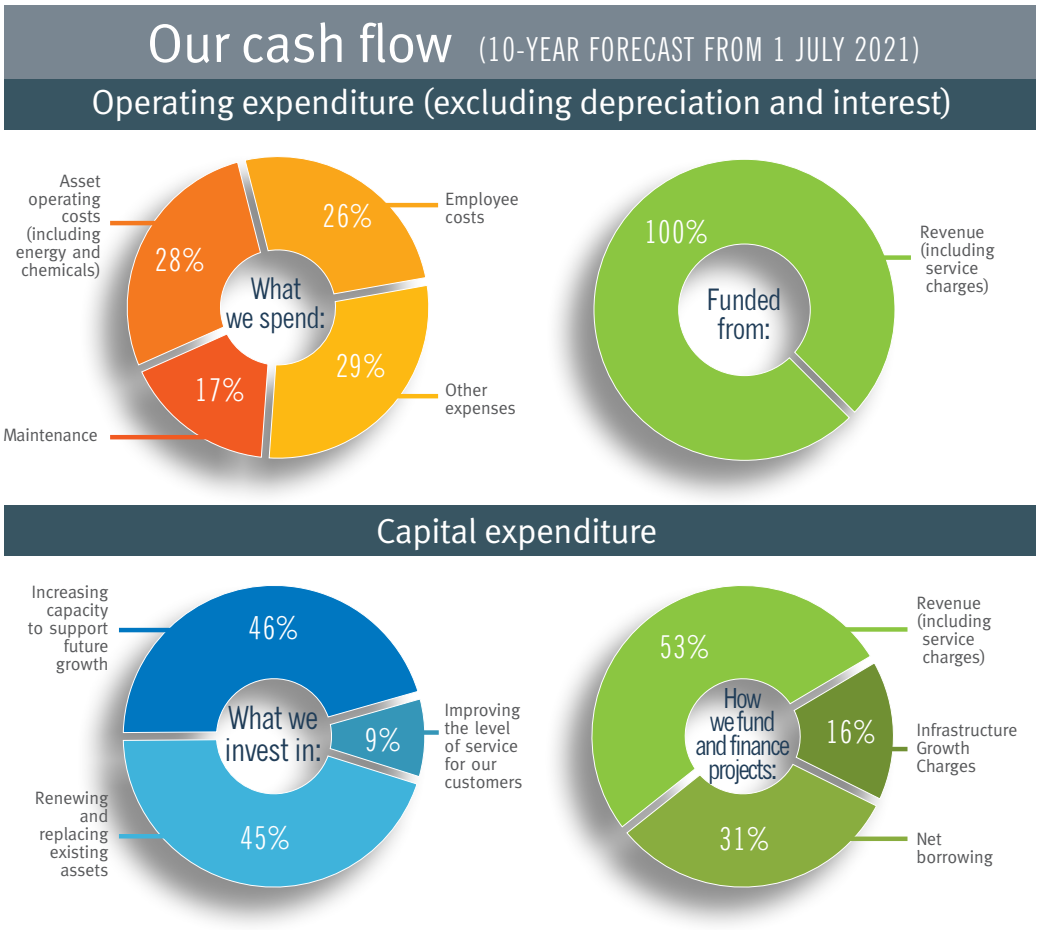
Watercare's revenue and financing framework identifies how those sources of funding are applied to opex, capex and repayment of debt.

Our funding and financing framework is designed to:

- Finance capex for growth and long-term level-of-service improvement with debt
- Fund annual finance costs and opex through operating revenue from water and wastewater service charges and other user charges (except IGCs)
- Fund the renewal and short-term level-of-service components of capex by recovering depreciation through water and wastewater service charges
- Fund partial repayment of debt related to bulk growth infrastructure by IGC revenue
- Fund the repayment of remaining debt over time through revenue, after paying all opex and capex for renewal and short-term level of service.

8 Watercare measures affordability by expressing the cost of water and wastewater services per household as a percentage of average household income. For the 2021 financial year, the percentage has been set at 0.895%.

7. Financial projections



7.1. Significant assumptions

All forecasts are exclusive of goods and services tax (GST).

7.1.1. Growth forecasts

Regional growth in population, industry and commerce has a direct impact on the demand for water and wastewater services, and new connections.

- Increased water demand translates into more water sold and higher volumes of wastewater discharged. This means greater revenue, but also increased operating costs. The increase in demand comes not only from people in their homes but also from increased economic activity.
- Water and wastewater revenue and opex are assumed to increase in line with water demand growth.
- All new homes and commercial premises need connections to our networks. This translates into investment in expanded infrastructure, but also revenue from IGCs.

Growth estimates are based on Auckland Council's medium growth scenario ART i11.6 dated September 2020. Our starting point is that water demand will increase in line with the rate of growth of the population connected to our networks.

Specific initiatives include reducing leakage in our network, smart metering, consumer education to encourage the efficient use of water, and developing tools to understand localised demand and its causes.

Forecast growth in annual per-day demand is shown in the following table:

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Population ($000)	1,692	1,716	1,741	1,765	1,791	1,820	1,849	1,878	1,903	1,930
Households ($000)	573	583	593	603	614	625	638	649	660	671
Retail growth demand	1.51%	1.56%	1.81%	1.19%	1.30%	1.27%	1.57%	1.00%	1.20%	1.17%

7.1.2. Cost adjustors

Estimates for inflation, or cost adjustors, are applied for each year of the 10-year LTP period. They are applied to estimates of future expenditure made in today's dollars (real dollars) to derive future-year expenditure with estimated inflation taken into account (nominal dollars). For the LTP, Watercare used cost adjustors provided by Auckland Council, which it reviewed against several financial institutions' projections. Our own investigation supported these rates.

The following cost adjustors have been applied to the long-term financial projections:

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Staff	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	3.0%	3.0%	3.0%
Other CPI	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	3.0%	3.0%	3.0%
Capital Goods PI	3.6%	2.9%	3.0%	3.1%	2.6%	2.7%	2.8%	3.4%	3.4%	3.4%
Operating Expenses $m	$ 308.91	$ 312.75	$ 326.28	$ 340.78	$ 353.30	$ 362.10	$ 376.38	$ 391.57	$ 407.57	$ 424.73

The cost adjustor is applied to opex. The capital goods price adjustor is applied to capex. The rates are different because the component parts of opex and capex are inherently varied. Opex includes costs such as labour, energy, chemicals, repairs and maintenance. Capex, on the other hand, can include costs such as pipes, machinery, control equipment, bespoke manufactured components, and construction costs.

The rate of inflation for these types of expenditure is different to the Consumer Price Index (CPI), commonly referred to as the rate of inflation affecting the goods that people buy day to day. CPI includes cost increases for such things as food and fridges. Inflation affecting Watercare's costs is more to do with items such as construction, concrete, pipes, equipment and bitumen; these are more accurately measured by other cost indices such as Producer Price Index (PPI) and Capital Goods Price Index (CGPI), which have generally been higher than CPI.

7.1.3. Capex – nominal and real expectations

In general, the capital investment planning process produces estimates for project costs and timing with varying degrees of precision. Uncertainty of estimates is implicit in forecasting capex programmes. Actual project costs can be more or less than initially estimated due to new technologies, materials, method of construction, processes and supply constraints.

In developing capex projections, Watercare has made a best estimate of the costs. We work with our contractors in partnership and we are all tasked with reducing the cost of developments through working together in an enterprise framework. Over time, we are endeavouring to reduce the cost of developments by 20%. These, where identified, are built into the project costs below.

Nominal capex describes the consolidated best estimate of the projects in the AMP after adjusting for the inflators described above.

Real capex describes the consolidated best estimate of the projects in the AMP in today's dollars.

Capital expenditure	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	Total
$ Nominal											
Growth	342	342	369	444	519	478	483	465	440	522	4,405
LoSI	103	123	104	82	86	114	112	61	67	28	882
Renewal	301	250	300	404	555	653	463	550	414	478	4,366
Total	**746**	**715**	**773**	**930**	**1,160**	**1,245**	**1,058**	**1,077**	**921**	**1,028**	**9,653**
$ Real											
Growth	331	321	336	392	447	400	394	367	336	385	3,709
LoSI	99	116	95	72	74	96	92	48	51	21	764
Renewal	291	234	273	357	478	548	377	434	316	353	3,659
Total	**720**	**670**	**704**	**822**	**999**	**1,044**	**863**	**849**	**703**	**758**	**8,132**

7.1.4. Asset revaluation

Asset revaluations for property, plant and equipment are carried out on a 'class of asset' basis at least every three years. The most recent valuation for all infrastructure assets was completed on 30 June 2018 by Beca Valuations Limited. This is due to be updated and will be completed by 30 June 2021. Given Watercare's business, the infrastructure assets are of a specialised nature, rarely traded in the marketplace. Therefore, fair value is assessed by the optimised depreciated replacement cost (ODRC) approach. The ODRC uses the assessment of replacement cost of an asset with a new or modern equivalent asset. It applies optimisation and depreciation to adjust for age, condition, performance and remaining useful life.

Revaluation of plant and equipment is forecast to occur every three years. Asset values are increased by the cumulative capital goods price adjustor over the relevant three-year period. Forecast depreciation is calculated on a straight-line basis on the ODRC over the assets' remaining useful lives.

7.1.5. Interest rate

All long-term debt is sourced from Auckland Council as this is currently the lowest-cost source of debt for Watercare. The following interest rate assumptions have been applied to the long-term financial projections:

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Average interest rate	4.2%	4.2%	4.2%	4.2%	4.0%	3.9%	3.9%	3.7%	3.7%	3.7%

As noted in the section 2.d above, $125 million of interest-free debt is projected to be received from Auckland Council during the LTP period under the Government's Housing Infrastructure Fund.

7.2. Operating expenditure forecasts

Watercare's opex forecast for the period 1 July 2021 to 30 June 2031 is presented in real dollars (excluding inflation) and nominal dollars (including inflation) in the following two tables.

Inflation is applied at the cost adjustor rate per year (refer to section 7.1.2 above). Baseline opex is assumed to increase in line with water demand growth. Approximately $4 million (real) is added progressively to baseline opex from 2018/19 through to 2024/25, to allow for increased operating costs on planned or new major infrastructure. These include the biological nutrient removal (BNR) addition at the Māngere WWTP, the Central Interceptor and the replacement Huia WTP.

The total forecast opex for the 2021 to 2031 period (excluding depreciation and interest) is estimated at $3.1 billion in real terms, or $3.6 billion in nominal dollars.

Opex is split into water and wastewater activities. Both activities include allocations of shared services expenditure in proportion to water and wastewater revenue.

Over the 2022 to 2031 period, opex for the water activity is forecast to be $1,646 million (46%), and for the wastewater activity, $1,959 million (54%) – in nominal dollars.

For each activity, opex is split into maintenance costs, asset operating costs (including energy and chemicals), employee-related costs (including labour), and other expenses.

Over the 202 to 2031 period, the percentage of total forecast expenditure in each category is as follows:

- Maintenance costs – 17%
- Asset operating costs – 28%
- Employee-related costs – 26%
- Other expenses – 29%.

Operational expenditure 1 July 2021 to 30 June 2031 – $ millions (real)

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	Total
Water											
Asset operating costs	31.1	28.5	29.2	29.8	29.9	30.4	30.9	31.2	31.5	31.9	304
Maintenance costs	25.2	25.6	26.2	26.5	26.8	27.1	27.6	27.9	28.2	28.5	269
Employee benefit costs	26.2	26.6	27.1	27.4	27.8	28.1	28.5	28.8	29.2	29.5	279
Other costs	51.8	53.6	55.6	57.3	60.0	57.8	59.7	60.3	60.5	61.2	578
	134.3	134.3	138.0	141.0	144.4	143.4	146.7	148.1	149.4	151.2	1,431
Wastewater											
Asset operating costs	57.4	53.2	54.3	57.0	57.1	58.2	59.1	59.7	60.4	61.1	577
Maintenance costs	24.9	25.5	26.0	26.5	26.9	27.2	27.7	27.9	28.3	28.6	270
Employee benefit costs	50.1	50.8	51.8	52.4	53.1	53.7	54.6	55.1	55.8	56.4	534
Other costs	30.2	30.7	31.2	31.6	32.0	32.4	32.9	33.2	33.6	34.0	322
	162.5	160.3	163.2	167.5	169.0	171.5	174.2	176.0	178.1	180.2	1,703
Watercare Services Limited Group											
Asset operating costs	88.5	81.7	83.5	86.8	86.9	88.5	89.9	90.8	91.9	93.0	882
Maintenance costs	50.1	51.1	52.1	53.0	53.7	54.4	55.2	55.8	56.5	57.1	539
Employee benefit costs	76.2	77.4	78.8	79.8	80.8	81.8	83.1	84.0	85.0	86.0	813
Other costs	82.0	84.3	86.8	88.9	92.0	90.2	92.6	93.5	94.2	95.3	900
	296.8	294.6	301.3	308.5	313.5	314.9	320.9	324.1	327.5	331.3	3,133

Operating expenditure 1 July 2021 to 30 June 2031 – $ millions (nominal)

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	Total
Water											
Asset operating costs	32.41	30.32	31.65	32.99	33.69	34.94	36.21	37.68	39.28	40.93	350
Maintenance costs	26.19	27.13	28.31	29.22	30.19	31.18	32.31	33.61	35.03	36.51	310
Employee benefit costs	26.31	27.26	28.31	29.22	30.19	31.18	32.31	33.61	35.04	36.51	310
Other costs	54.84	57.88	61.20	64.28	68.69	67.52	71.14	74.02	76.54	79.76	676
	139.75	142.59	149.47	155.70	162.75	164.82	171.96	178.92	185.88	193.71	1,646
Wastewater											
Asset operating costs	59.79	56.57	58.83	63.01	64.38	66.93	69.33	72.11	75.17	78.33	664
Maintenance costs	25.91	27.10	28.14	29.30	30.28	31.28	32.40	33.71	35.14	36.62	310
Employee benefit costs	50.30	52.11	54.11	55.85	57.71	59.61	61.76	64.25	66.97	69.79	592
Other costs	33.16	34.38	35.73	36.92	38.18	39.47	40.93	42.59	44.41	46.29	392
	169.16	170.16	176.81	185.08	190.54	197.28	204.41	212.66	221.69	231.03	1,959
Watercare Services Limited Group											
Asset operating costs	92.20	86.89	90.47	95.99	98.06	101.86	105.53	109.79	114.44	119.26	1,014
Maintenance costs	52.10	54.23	56.45	58.52	60.47	62.46	64.71	67.32	70.17	73.13	620
Employee benefit costs	76.62	79.37	82.42	85.07	87.90	90.79	94.07	97.86	102.01	106.30	902
Other costs	88.00	92.26	96.94	101.20	106.87	106.99	112.07	116.60	120.94	126.05	1,068
	308.91	312.75	326.28	340.78	353.30	362.10	376.38	391.57	407.57	424.73	3,604

7.3. Capital expenditure forecasts

Watercare's capex forecast in the AMP for the period 1 July 2021 to 30 June 2031 is presented in real dollars (excluding inflation) and nominal dollars (including inflation) in the following two tables.

Inflation is applied at the Capital Goods Price Index per year (refer to section 6.1.2 above).

The capex forecast for the 2022 to 2031 period is $8.1 billion (real) or $9.7 billion (nominal). This excludes capitalised interest.

The tables on pages 90 to 93 show capex for growth, renewal and level of service, split into water, wastewater and shared services.

Over the 2022 to 2031 period, capex in nominal dollars for the water activity is estimated at $4,081 million (42%); for the wastewater activity, $5,417 million (56%); and for shared services, $154 million (2%).

The AMP 2021 – 2041 provides an in-depth view of why and where our capex programmes are being undertaken in the Auckland region.

7.4. Revenue forecasts

Watercare's forecast revenue for the period 1 July 2022 to 30 June 2031 is shown in the following table:

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	Total
Bulk supply - wholesale	19	21	23	25	28	32	36	41	44	47	316
Bulk supply - retail	596	654	734	787	871	963	1,072	1,186	1,243	1,301	9,408
Laboratory Services revenue	8	8	8	8	9	9	9	10	10	11	90
Infrastructure Growth Charges	114	120	131	140	151	162	175	173	170	172	1,507
Subvention receipt	-	1	4	6	8	9	10	11	12	14	74
Other miscellaneous	25	26	27	28	29	30	31	32	34	35	299
Late payment penalty	2	2	3	3	3	3	4	4	4	5	33
Operating revenue	764	831	930	998	1,099	1,207	1,338	1,458	1,517	1,584	11,727
Vested assets revenue	69	71	74	77	79	82	85	88	92	96	812
Total revenue	833	903	1,004	1,074	1,178	1,289	1,422	1,546	1,609	1,679	12,539

7.4.1. Water and wastewater service charges

More revenue from water and wastewater service charges is required to meet the needs of renewing and developing Auckland's ageing water and wastewater infrastructure.

As outlined in Auckland Council's 10-year LTP, our projected price increases over the period are:

- For both water and wastewater, a price increase of 7% is planned for the 2022 and 2023 financial years.
- This increases to 9.5% per annum from 2024 to 2029 to meet Auckland's infrastructural needs while maintaining Auckland Council's debt covenants.
- Current modelling indicates that from 2030 annual price increases required will be in the range 3.0% to 3.5%.

Refer to www.watercare.co.nz to see current water and wastewater prices.

7.4.2. Infrastructure Growth Charges (IGCs)

Auckland is growing in every direction and pressure on increasing the capacity of Watercare's bulk assets is intense. In addition, the Productivity Commission has recommended that Watercare increase its IGC pricing at a higher rate than water and wastewater charges so that we move towards recovering 100% of the cost of growth assets through the collection of IGC, thereby reducing any cross-subsidisation between new and existing connection costs.

To implement the Productivity Commission's recommendation, we have increased IGCs by 12% for 2022 followed by an 8% increase from 2023 to 2028 (refer to www.watercare.co.nz to see current IGC rates). After that, we do not expect significant increases for the remainder of the LTP period.

7.4.3. Subvention receipts

Watercare allows the Auckland Council tax group to access our tax losses by way of tax loss offset and subvention payments to us. Actual amounts of tax loss offset and subvention payments are determined post balance date when the respective income tax calculations are completed by the parties. Under the agreement with council, subvention income of 45 cents per dollar of the tax impact of the losses sold is paid to us by the Auckland Council tax group.

The consideration we receive for tax losses represents a reasonable return to enable us to meet our obligations under Section 57 of the LGACA.

Forecasts for subvention receipts are based on Auckland Council's estimates of taxable profit available for offset within the Auckland Council tax group.

7.4.4. Other revenue

Other revenue includes Laboratory Services income and user charges such as new meters and service connections, meter relocations, wastewater audits, trade-waste monitoring, and administration fees. Other revenue growth is forecast to be in line with water demand growth and prices are estimated to increase at the same rate as the Cost Price Index (refer to section 7.1.2. above).

Refer to www.watercare.co.nz to see current prices for "Other Charges".

7.5. Debt

Watercare inherited the water and wastewater assets of the previous local network operators (LNOs) and councils as a result of the amalgamation of Auckland's local councils on 1 November 2010. It also took over the debts of the LNOs and a portion of the debt of the councils. Watercare's initial debt, as an integrated provider on 1 November 2010, was $1.236 billion.

Net debt was $1.953 billion at 30 June 2020 (refer to the Watercare 2020 Annual Report). It is forecast to increase to $5.355 billion by 30 June 2031.

	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Debt	2,705	3,018	3,314	3,711	4,260	4,830	5,150	5,358	5,386	5,442

Refer to Appendix 1 for commentary on applicable debt ratios and measures.

7.6. Asset values

The value of property, plant and equipment (PP&E) at 30 June 2020 was $10.5 billion (refer to the Watercare 2020 Annual Report). This value will increase each year through capex, capitalised interest and vested assets, and every three years by revaluation to the optimised depreciated replacement cost (refer to section 7.1.4 above), offset by depreciation and a small provision for asset write-off. The value of PP&E is forecast to be $21.2 billion by 30 June 2031.

Total assets as at 30 June 2020 were $10.8 billion and are forecast to increase to $23.8 billion by 30 June 2031.

APPENDIX

Financial ratios and performance measures

The final revenue price path needs to result in key prudential financial ratios and measures being kept within acceptable bands. This is in order to keep future debt at levels that will not stifle capacity to continue meeting our obligations under Section 57 of the LGACA. Watercare maintains appropriate financial thresholds in the following key areas which impact the level of future expenditures, fees and charges, and borrowings.

Funds-from-operations ratio

Funds from operations (FFO) broadly means the net amount of cash revenue and cash expenses. The FFO ratio is the FFO divided by gross interest cost. This measures our ability to generate sufficient cash to service debt. Our established price path modelling has been based on maintaining the FFO ratio at ≥ 3.0. Our planned average FFO over the 10-year LTP period is 4.95.

Gearing

A company's gearing is the relationship between its levels of debt and equity. High gearing will normally signify reduced financial flexibility and the need to alter levels of future expenditures, fees and charges, and borrowings to reduce gearing. Gearing is usually expressed as the ratio of debt to debt plus equity. We target a debt-to-debt-plus-equity ratio of no more than 28%.

Our forward debt projections reflect a prudent debt-to-debt-plus-equity percentage, trending to 42% at the end of 2031 from 34% for 30 June 2020. This increase in debt reflects our accelerated infrastructure spending on Auckland's water and wastewater networks. The average over the 10-year period is forecast to be 41%.

Debt-to-revenue ratio

Our shareholder, Auckland Council, reports its financial performance in relation to various prudential benchmarks. A key measure for council is its net debt as a percentage of total revenue. The sustainable management of debt presents a major challenge for council to make progress on new investment to meet the most pressing needs of Auckland. Its approach to managing this challenge is to maintain an AA credit rating from Standard & Poor's (or similar rating from an independent rating agency). Historically, to ensure that debt levels continue to remain prudent and sustainable, the council has set a prudential limit of group debt being less than 2.7 times group revenue. However, in response to the pandemic, Auckland Council has increased this limit to 2.9 times group revenue for the next five years. Watercare has worked closely with Auckland Council, sharing debt forecasts which sometimes exceed the council thresholds, to ensure that the level of debt can be accommodated within the Auckland Council group's overall debt-to-revenue target.

Watercare's debt-to-revenue ratio is predicted to increase from 2.6 at June 2020 to a maximum of 3.94 by 30 June 2027, thereafter trending downwards to be at 3.36 by 30 June 2031.

Glossary

ADWF	Average dry-weather flow
ALG	Auckland Lifelines Group
AMCC	Asset management capex committee
AMP	Asset Management Plan
AUP	Auckland Unitary Plan
AWTP	Advanced Water Treatment Plant
BNR	Biological nutrient removal
BOD	Biochemical Oxygen Demand
BoI	Board of Inquiry
BPO	Best practicable option
CCO	Council-controlled organisation
CCP	Critical control point
CDEM	Civil defence and emergency management
CGPI	Capital goods price index
CPI	Consumer price index
CSO	Combined sewer overflow
CCTV	Closed circuit television
DMA	District metering area
DUE	Development unit equivalent
DWSNZ	Drinking Water Standards for New Zealand
EAM	Enterprise Asset Management
EOP	Engineered overflow point
FULSS	Future Urban Land Supply Strategy
FFO ratio	Funds from operations to interest cover ratio
HIF	Housing Infrastructure Fund
IGC	Infrastructure Growth Charge
I&I	Inflow and infiltration
ISCA	Infrastructure Sustainability Council of Australia
ISSM	Integrated source management model
km	Kilometres
KPI	Key performance indicator
kWh	Kilowatt hours
LoSI	Level-of-service improvement
L/c/d	Litres per connection per day
L/p/d	Litres per person per day
L/s	Litres per second
LTP	Long-Term Plan
m²	Square metres
m³	Cubic metres
m³/d	Cubic metres per day
m³/s	Cubic metres per second
ML	Mega-litres or million litres
MLD	Mega-litres per day or million litres per day
mm	Millimetres
NDC	Network Discharge Consent
NIWA	National Institute of Water and Atmospheric Research
NZTA	New Zealand Transport Agency
ODRC	Optimised depreciated replacement cost
PDWF	Peak dry-weather flow
PE	Polyethylene
PPI	Producer price index
PVC	Polyvinyl chloride
PWWF	Peak wet-weather flow
RCM	Reliability-centred maintenance
RUB	Rural Urban Boundary
SCADA	Supervisory control and data acquisition
SHA	Special Housing Area
SMAs	Strategic management areas
SOI	Statement of intent
TRC	Tamaki Regeneration Company
WAFU	Water available for use
WISC	Water Industry Commission for Scotland
WSP	Water Safety Plan
WTP	Water Treatment Plant
WWNS	Wastewater network strategies
WIWQIP	Western Isthmus Water Quality Improvement Programme
WWTP	Wastewater Treatment Plant