Wai Tāmaki ki te Hiku

Draft Initial Asset Management Plan

2024 - 2035

Te Tari Taiwhenua
Internal Affairs

WS WATER SERVICES REFORM PROGRAMME

Acknowledgement

This report was prepared in collaboration with:

Contributing Councils	Working Group Members	Consultants
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Note on Process

This draft initial asset management plan has been developed for the Wai Tāmaki ki Te Hiku water services entity by the Department of Internal Affairs in collaboration with local authorities and provides a basis for initial engagement with stakeholders and partners. Feedback will be sourced from the Commerce Commission, councils, mana whenua and other crown agencies to determine if the investment plans are prudent, efficient and in the long-term interest of our customers and communities.

The draft plan covers the full content that would normally be expected in an asset management plan. An updated draft for adoption as a final initial asset management plan will incorporate feedback as well as any updated information under development to refine and finalise the investment profile. It is anticipated this will be available in early 2024.

The Department of Internal Affairs extends our gratitude to the Auckland and Northland Councils for their valuable contributions and inputs, which have been instrumental in shaping this comprehensive document.

Wai Tāmaki ki Te Hiku

Initial Asset Management Plan 2024 – 2035

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Current revision	Prepared by	Date
Draft Initial Asset Management Plan	AECOM	11/10/2023

Executive Summary

Water Services Reform

This initial asset management plan for Wai Tāmaki ki Te Hiku is a transitional arrangement to implement Water Services Reform in New Zealand. The delivery of water services is undergoing major reform to meet the needs of New Zealanders in the present and over the long-term.

This multi-year reform process is a once-in-a-lifetime opportunity to implement a uniquely New Zealand approach towards building a world-class water services system, guided by Te Mana o te Wai. The transition phase of this reform unlocks significant transformational benefits and opportunities for communities across New Zealand to prosper and grow, while protecting the environment.

Under the reform, delivery of our country's 'three waters' services (water supply, wastewater, and stormwater) operated by 66 councils are being combined into 10 regional Water Services Entities. The 10 entities will be established, in a staggered approach, by 1 July 2026. Wai Tāmaki ki Te Hiku (established first on *1 July 2024*) encompasses the districts of Auckland Council, Far North District Council, Kaipara District Council, and Whangarei District Council.

The goal of the reform is to significantly enhance the safety, quality, resilience, accessibility, performance, and affordability of three waters services in New Zealand. To meet pressing challenges of ageing water infrastructure, long-term climate change and a growing population, the reform will increase investment into critical water infrastructure while ensuring water services remain affordable for New Zealanders.

Better access to long-term funding to enable increased investment in services, as well as more efficient operations, underpin the reform programme. Spreading financing and charging for services over the long term supports affordability in a way that is equitable for all New Zealanders.

Initial Asset Management Plan

Our initial asset management plan lays out the strategy for investing in assets to achieve the outcomes of reform in our service area. We aim to achieve improved service delivery and environmental outcomes while ensuring affordability for our valued customers. The plan identifies areas for improvement, determines the necessary capacity to facilitate growth, and details plans for maintaining, enhancing, and renewing the existing asset base.

This future-focussed plan is complemented by (and should be read with) our initial funding and pricing plan which identifies the costs to deliver intended services and how these will be funded, while finding efficiencies and showing how consumers will be charged.

Under the legislative process for water services reform, these initial plans covering at least 10 years are prepared as drafts by the Department of Internal Affairs and, after consultations with councils and the Commerce Commission, adopted by each entity establishment board as a final initial plan. Water Services Entities are required to replace these final initial plans within a three-year period.

Investing in our Future

To meet the reform challenge, there will be a $14.4 billion (real dollars 2023) programme of investment in three waters services infrastructure within Wai Tāmaki ki Te Hiku over 10 years. This is an additional $3.6 billion in investment compared to local authorities' 2021-31 long-term plans.

Although Watercare and Auckland Council have projected Auckland water bills to almost double over the next 10-years, Wai Tāmaki ki Te Hiku will be able to keep Aucklanders' water bills close to the present level, and, at the same time, bring Northlanders' water bills down to the average Auckland cost. Fairness and equality will be assured across the Wai Tāmaki ki Te Hiku area with a new legislated and regulated approach to funding and pricing that will protect vulnerable customers.

For communities in Northland and Auckland, and across New Zealand, greater capacity to fund investment into critical water infrastructure means better health for water and the environment and people. Wai Tāmaki ki Te Hiku is playing a leadership role in implementing a step change in water services that will benefit generations of New Zealanders.

In delivering safe, reliable, and efficient water services that stay affordable, we are also working to improve customer experience. This encompasses greater transparency in our operations, making it simpler and easier to interact with us, and exploring new ways to involve customers in our decision making.

In a new transparent water services system guided by Te Mana o te Wai, all New Zealanders will come to know their role in the water system and the value of water. Our families will stay safe, our communities will grow, and we will prosper through investment that unlocks housing and economic development.

Te Tiriti o Waitangi and Te Mana o te Wai

Water Services Reform aims to give Iwi/Māori a greater role in the new system, including pathways for enhanced participation by whānau and hapū as these services relate to their Treaty rights and interests. A transformed system will improve outcomes for Iwi/Māori in relation to three waters service delivery.

The Water Services Entities Act 2022 requires Water Services Entities to give effect to the principles of Te Tiriti o Waitangi and Te Mana o te Wai. To achieve this, genuine participation and engagement is required with mana whenua. Te Tiriti underpins the fabric of Te Mana o te Wai.

In line with these principles, we will uphold and implement Te Mana o te Wai, which is recognised and developed as a fundamental driving force behind this initial funding and pricing plan and asset management plan. We will ensure that Te Mana o te Wai is integrated as we develop and mature as an organisation and is applied to the relevant duties, functions, or powers to the fullest extent possible.

The National Policy Statement for Freshwater Management 2020 defines Te Mana o te Wai as a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.

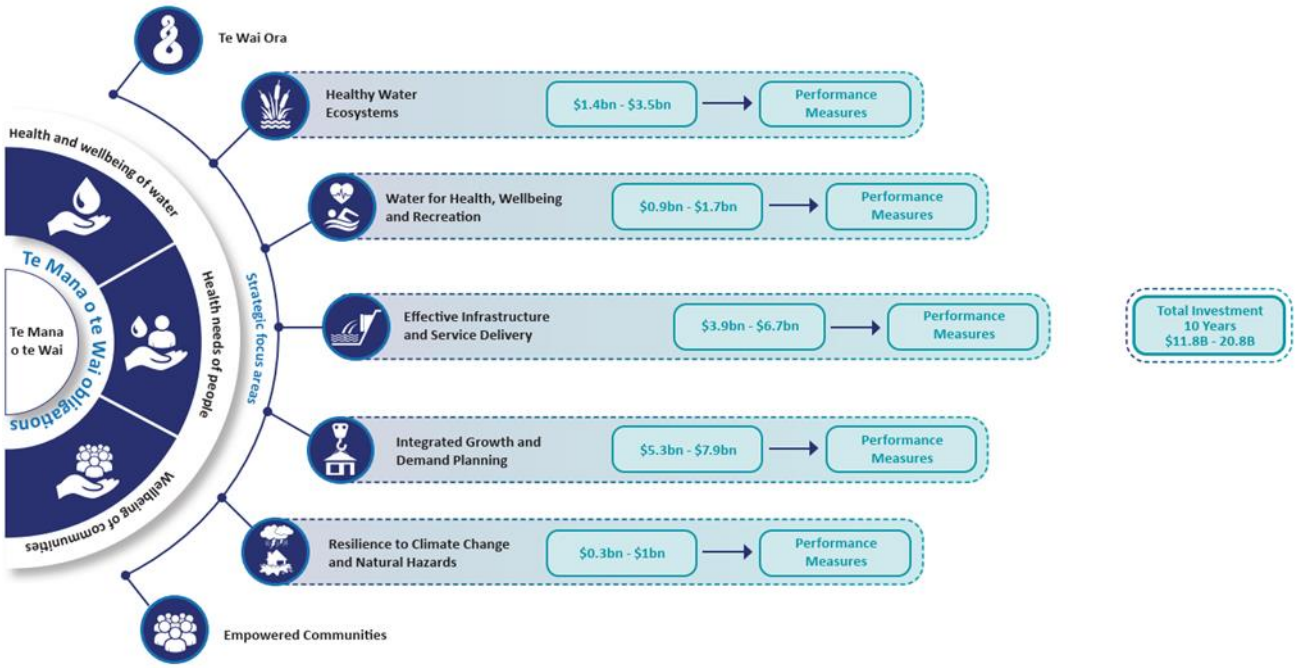
Purpose of the Plan

The purpose of this initial asset management plan is to set out how we will prioritise investment for our service area's three waters infrastructure assets, including how we will renew our current infrastructure and plan for new assets, in collaboration with stakeholders, to achieve the goals of the Water Services Reform Programme.

The Water Services Reform Programme is identifying priority infrastructure for investment based on the projection of future needs to support growth, improve levels of service, and increase resilience and efficiency within the Wai Tāmaki ki Te Hiku area over the next ten years. An example of these needs-based priority investments is the planned Mangawhai Wastewater Treatment Plant in the Kaipara District. The need for a reticulation system and treatment plant became a significant issue for Kaipara District Council in 1996, after septic tanks started polluting the Mangawhai Harbour.

The $70 million-dollar scheme to upgrade this treatment plant and associated reticulation system will boost the scheme capacity by almost 70 percent, to 5,000 connections. The shift to Wai Tāmaki ki Te Hiku would potentially mean the cost of Mangawhai's $70 million-dollar scheme is spread across more than 1.9 million people, rather than being borne by Kaipara District Council's approximate 25,000 ratepayers. This would allow Mangawhai's critical need for a reticulated wastewater scheme to be met, while ensuring that cost for customers remains affordable.

Our Approach



To achieve the purpose of our asset management plan, we will leverage the advantages of scale, streamline processes, and embrace technological advancements. By optimising our project delivery and operations, and investing in collaboration, we aim to achieve significant improvements in efficiency and effectiveness.

This initial asset management plan lays out an initial framework that encompasses the key components necessary for successful asset management, including details of our three waters asset inventory, asset condition and performance, future planning, renewal and operational planning and the capital and operational investment decision making and its outcomes, to ensure the long-term sustainability of our three waters infrastructure.

We have gained insights from the available infrastructure asset data which are applied in combination with the projection of future needs to inform planning and decision making. On this basis an initial investment profile has been developed to support growth, sustain levels of service, and improve resilience and efficiency over the next 10 years.

Strategic Focus

Over the period covered by the asset management plan (2024/25 to 2033/34), the primary focus will be on transitioning while ensuring priority investments are made across our entire asset portfolio. We aim to achieve this by implementing a controlled increase in capital investment over the planning period. This strategy will allow us to integrate and enhance the necessary technology, systems, and processes required to deliver improvements in efficiency and effectiveness and create the platform to deliver on the principles of the reform.

Seven focus areas have been adopted as transitional objectives for the purpose of this plan (refer to our introduction). These are expected to change following engagement with our communities and mana whenua to form Wai Tāmaki ki Te Hiku's strategic objectives in the future, and further to Te Mana o te Wai Statements. For each focus area we share our investment plan and how we will manage performance *(the investment decisions and performance measures will be finalised through the engagement process for this plan)*.

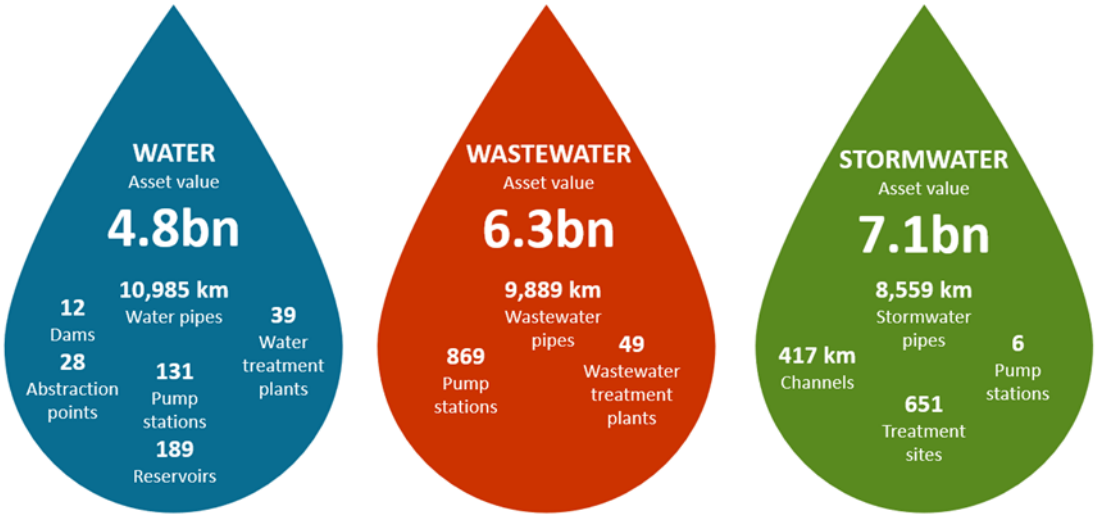
The focus areas of Te Wai Ora and Empowered Communities do not have a capital investment profile attached to them as they are about strategy, relationships, systems, resources, and knowledge.

We anticipate an overall capital forecast of $14.4 billion over the next 10 years, representing an increase of $3.6 billion compared to the 2021 Long-Term Plans (LTPs). We currently estimate to achieve efficiency savings of $1.5 billion in the capital program and approximately $740 million in operational expenditure during the planning period.

Overview of the Plan

Our Assets – summary of three waters asset inventory

We manage and operate almost 30,000 km of pipelines, 88 treatment plants, and over 1,000 pump stations and provide services to more than 625,000 residential properties. Collectively these assets are worth approximately $18.2 billion (2021/22). Water supply service coverage equals approximately 80%, whilst wastewater service coverage is 81% and stormwater service coverage are 87%. The asset inventory for each of the three waters services is summarised as follows:



Asset inventory summary

Highlights from our asset condition and performance assessment.

Renewal investments in Wai Tāmaki ki Te Hiku are primarily influenced by two factors: asset condition, particularly in the Far North and Whangarei regions, and a large volume of renewals and replacement of asbestos cement water pipelines, specifically in Auckland. The upgrade of several wastewater treatment works, along with some water treatment works, also require essential asset condition improvement and increased capacity to meet the current and future levels of service across all regions. In future we will ensure improved confidence in asset data for future asset management plans through standardised approaches that will enable effective decision making and proactive renewal planning and implementation.

Insights from our water assets' performance.

The safety of drinking water in our region currently achieves good compliance with the required health standards for bacteria and protozoal control, although it is noted that future compliance against more stringent drinking water standards will require some investment. We have observed a positive downward trend in average water consumption per capita in Auckland and the Far North, while the trendlines in Kaipara and Whangarei have remained relatively stable, except for seasonal fluctuations. In terms of water loss, the Northland councils have a rate above the national average, averaging at 27% compared to the national median of 20%. Additionally, Auckland experienced a significant volume of water loss, approximately 13.5 million cubic meters during 2021/22, emphasising the urgent need for improved investment in renewals and increased water use efficiency and demand management. However, we are proud to report that across our region, response times to faults have consistently met their required performance targets.

Taking care of our water

Taking care of our water through water use efficiency is a top priority for us and we encourage efficient water use through education and community engagement, and deliver it via our enhanced demand management programmes, as well as utilising technology, such as the expansion of the smart metering programme.

Insights from our wastewater assets' performance

Most wastewater overflows occur due to network blockages, highlighting the ongoing necessity for network renewal and maintenance. Additionally, during storm events, overflows are commonly caused by inflow, where stormwater enters through private gully traps, and infiltration, where groundwater seeps through cracks in pipes. To address these challenges, there is a pressing need to increase wastewater treatment capacity and undertake comprehensive network renewal across the entire region.

Protecting our environment

Protecting our environment is an integral part of our operations and to this effect we make use of several methods to avoid and minimise wastewater overflows, including inflow and infiltration detection, education campaigns, regular pipe flushing, enzymes to reduce fat accumulation in the network, strict trade-waste management and monitoring, network enhancements and investigation of repeated blockages.

Insights from our stormwater assets' performance

The recent flooding events of 2023 have had devastating effects, underscoring the urgency of re-evaluating the level of service we must provide to our communities. This reassessment will encompass continuous enhancements in the performance and capacity of both below-ground infrastructure (pipes) and above-ground features such as overland flow paths, waterways, and storage. These improvements are crucial to bolster resilience against future events. *At the time of writing this draft asset management plan, this work is still ongoing and in progress.*

Building resilience

Building resilience against hazards and extreme events will become increasingly important. We encourage our community through education to improve resilience, we promote water sensitive design and source control, and over time will rely more on overland flow paths and our natural assets, while improving our water bodies and in doing so enhancing performance of our stormwater assets.

Our future levels of service and performance measures

We are undergoing a significant change in our approach to determining future levels of service. This change aims to align with the principles of Te Mana o te Wai and emphasises a more strategic and results-oriented approach. To achieve this, we will translate its community outcomes and strategic priorities into tangible service provision levels.

To ensure effective management of service levels, we will adopt the national level of service framework. This framework will align with our investment decisions with the maintenance of service levels. It is designed to be adaptable, establish national benchmarking and consistency of service, encourage stakeholder engagement, and provide a means of measurement (refer to our outcome-based investment mapping below).

When developing future levels of service, we will consider various factors such as service quality, cost, and risk. To maintain flexibility, the service level targets will be adjusted accordingly. The process will involve analysing the benefits, outcomes, and potential risks associated with different levels of service through a cost, service, and risk optimisation process.

Overall, our shift towards a more strategic and results-oriented approach to determining future levels of service aligns with the principles of Te Mana o te Wai. By adopting the national level of service framework and considering multiple factors, we aim to optimise our service provision while managing costs and risks effectively.

Where we are going - planning for our future

Our population is expected to grow from approximately 1.9 million (2022/23 estimate) to more than 2.1 million people by 2033 and from insights from the three waters asset condition and performance it is evident that the region has a significant need to address renewal of assets, upgrades to sustain levels of service and to improve resilience and environmental impact.

The demand for capital investment over the initial years is projected to be dominated by level of service improvements, growth, and resource consent compliance.

A growing region

Our region is experiencing significant growth and development, with population growth projected to reach 2.35 million people by 2048. While the highest population and economic growth is projected for Auckland, the Northland region is also witnessing notable population growth, fuelled by its stunning coastal landscapes, cultural heritage, and economic opportunities. As both Auckland and Northland continue to draw in more residents and visitors, there is a concerted effort to strike a delicate balance between preserving their natural beauty, environment, and cultural identity, while also prioritising crucial infrastructure improvements, job creation, and sustainable development. In this regard, the role of three water infrastructure and services becomes paramount in shaping the future of our region.

Focus of our capital and operational investment plan

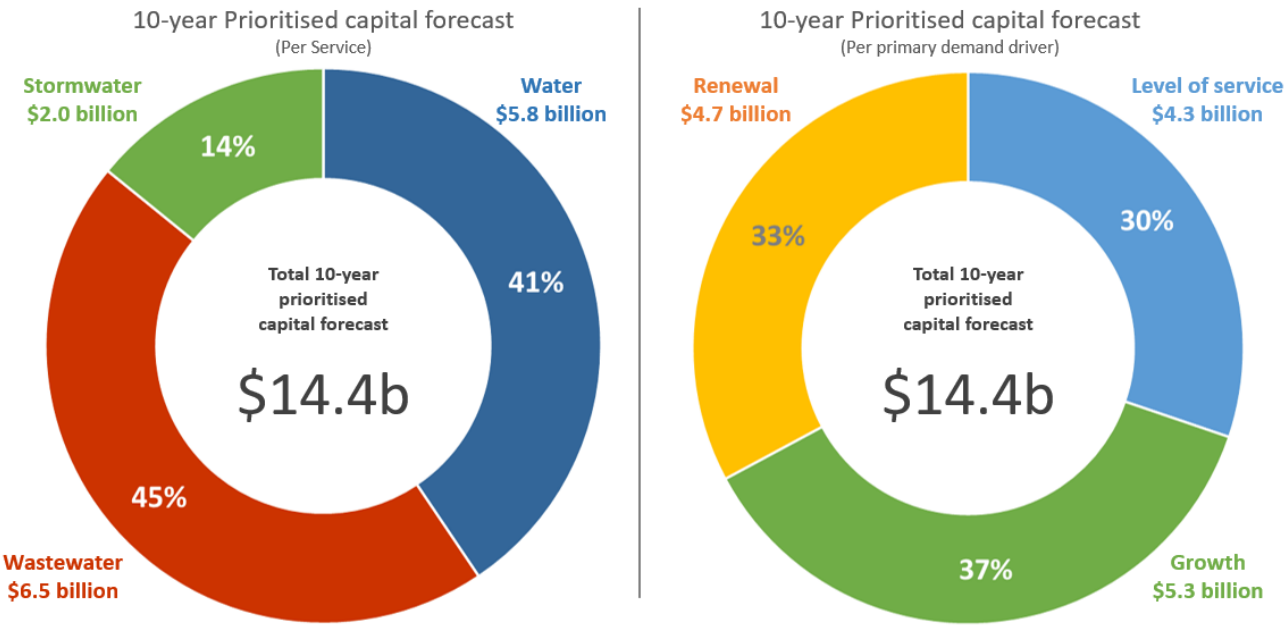
A transitional investment decision making framework was developed and implemented to meet the needs of our communities through a three-stage process.

- **Stage 1** – development of a needs-based forecast of capital projects, cost, and timings. This needs-based forecast did not take into consideration affordability and deliverability.
- **Stage 2** – prioritisation of the needs-based forecast utilising the investment decision making framework was completed with the relevant councils, taking into consideration affordability and deliverability, producing a draft capital works programme.
- ***Stage 3*** *– confirmation the draft capital works programme will be obtained through engagement with the councils, regulators, and mana whenua confirming that the objectives of reform are met.*

The approach to determine the appropriate level of capital investment is outlined in the initial funding and pricing plan.

Our prioritised draft capital investment forecast amounts to $14.4 billion as summarised below. It is noted that the most significant outcomes-based investment areas for Wai Tāmaki ki Te Hiku are:

- Integrated growth and demand planning through the traditional investment profile of growth, and
- Effective infrastructure and service delivery through renewals and improving levels of service.



10-year prioritised capital forecast (real dollars 2023, excluding efficiencies)

We are aligning our investment to our strategic focus areas, which are underpinned by Te Mana o te Wai principles. By mapping our investment to outcomes as shown below, we can highlight how we aim to address challenges faced by the entity and realise opportunities of Water Reform to benefit its communities. Our aim is to target capital investment outcomes by prioritising our need-based capital investment to address most of the challenges and realise opportunities to achieve our strategic outcomes. In the future our investment plans will be developed further with a prioritised, outcomes-driven and risk focus and utilising investment logic mapping to ensure optimum benefit to our communities and the environment.

Challenges and opportunities			Targeted capital investment outcomes (prioritised)
• Compliance with policy and regulatory changes • Consent compliance • Safe conveyance of wastewater (reducing overflows) • Safe treatment and disposal of wastewater • Safe collection and disposal of stormwater • Reduce service interruptions and complaints	**$2.3bn**	Health water ecosystems	Wastewater and stormwater legislative changes Wastewater and stormwater levels of service Resource consent compliance Environmental improvements
• Compliance with policy and regulatory changes • Provision of safe and healthy drinking water • Renewal of ageing above ground infrastructure • Water demand management improvements • Reduce service interruptions and complaints	**$2.6bn**	Water for health, wellbeing and recreation	Water legislative improvements Water levels of service (incl. fluoridation) Renewals (treatment and pump stations)
• Public health and safety • Capacity upgrades of existing infrastructure • Reduction of water loss • Reduction of inflow and filtration • Renewal of ageing pipeline networks • Replacement of hazardous pipe materials	**$4.3bn**	Effective infrastructure and service delivery	Health and safety of people Capacity constraints Renewals (pipe networks)
• New infrastructure and upgrades to support economic and population growth	**$4.7bn**	Integrated growth and demand planning	Growth (new infrastructure and upgrades)
• Improved resilience against flooding and extreme weather events • Improved resilience against droughts • Reduction of carbon footprint	**$0.5bn**	Resilience to climate change and natural hazards	Resilience – flood and natural hazards Carbon reduction

10-year prioritised capital forecast mapped against targeted strategic outcomes

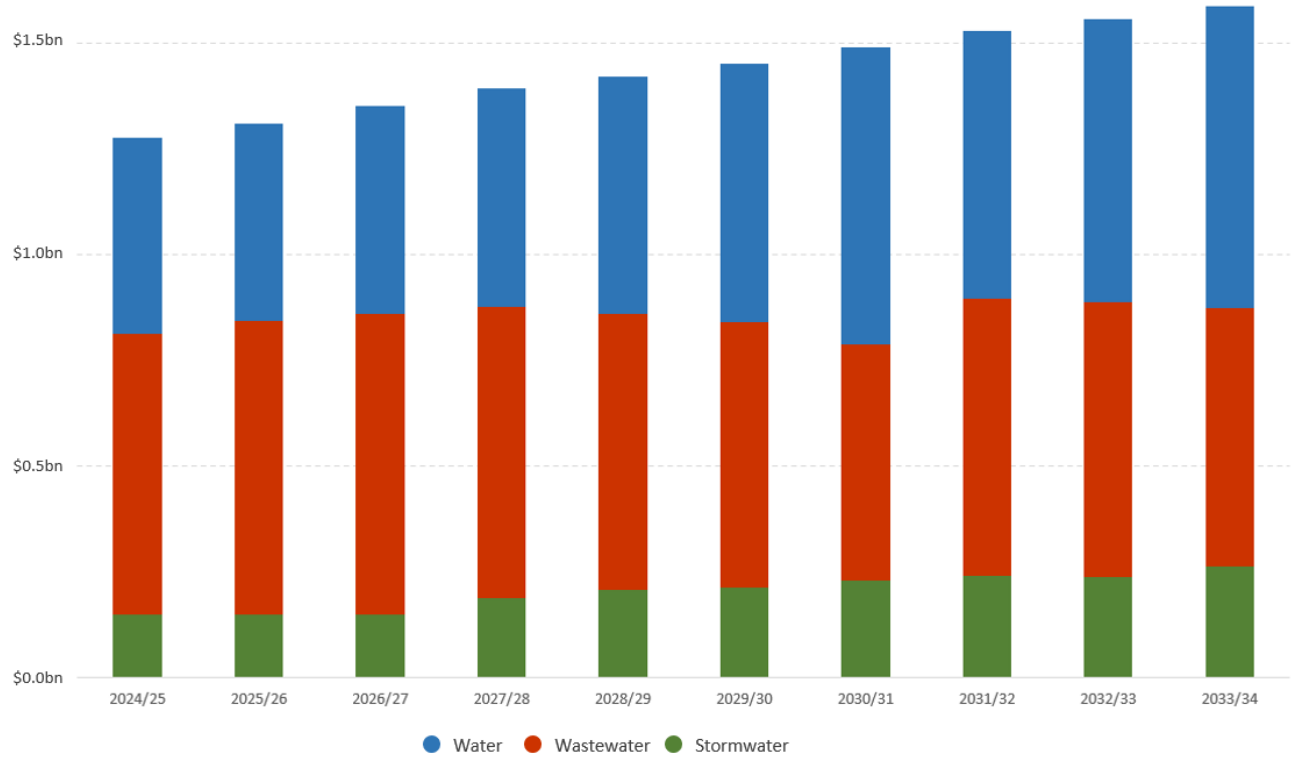
Further to the prioritisation of our capital forecast we have assessed the timing and duration of projects and programmes based on their criticality, interdependencies, and risk-based assessments. This additional level of prioritisation was applied to ensure deliverability and optimise affordability over the planning period while maintaining the necessary levels of investment to achieve our strategic outcomes.

Our investment prioritisation maintains a strong focus on achieving outcomes for health and safety of people, resource consent compliance, maintaining and improving levels of service, renewals and addressing capacity constraints. Most prioritisation adjustments (or re-scheduling) have been applied to projects and programmes related to growth (new infrastructure and upgrades) and renewals of pipeline networks with timing of specifically wastewater and stormwater pipeline replacements being delivered in the later years of the programme.

Not all of the needs-based investment identified by the councils is affordable within the short term, some projects have been shifted outside the 10-year planning period. These projects will remain within the 30-year investment strategy that will be developed by Wai Tāmaki ki Te Hiku within the next three years. This movement has not resulted in any shift in risk to levels of service, outcomes or performance. The development of the disaster recovery programmes currently underway may also address some of these projects sooner than expected.

We will continue to monitor and manage the risks associated with these and the other impacted projects and programmes as part of the managing risk and resilience governance model that will be outlined in the final asset management plan.

To support a successful transition, capital investment will steadily increase throughout the 10-year planning period from $1.27 billion to approximately $1.6 billion per annum in 2033/34. It is expected that a level of investment above $1.5 billion per annum will be maintained beyond the 10-year period.



10-year prioritised needs-based capital forecast – programme (real dollars 2023, excluding efficiencies)

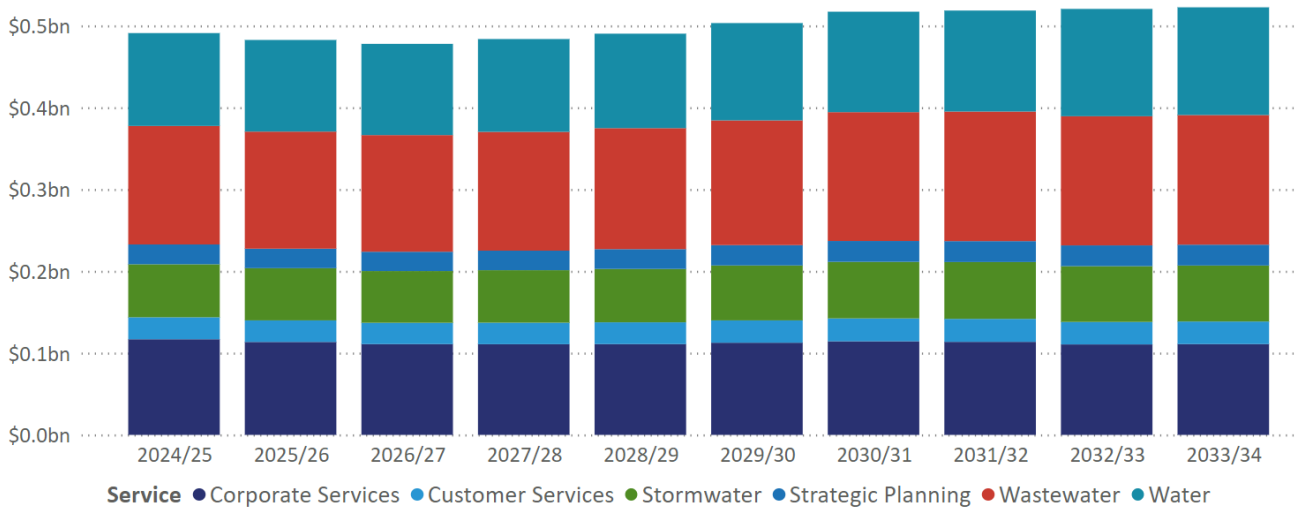
Some examples of our key projects by region include the following:

- Auckland - The new Clarks Beach Wastewater Treatment Plant (WWTP) to ensure improved level of service and to protect the environment.
- Auckland – The Huia Water Treatment Plant (WTP) upgrade

- Auckland - Western Isthmus stormwater upgrades to ensure level of service and resilience improvements.
- Kaipara - Upgrade to the Dargaville WWTP to accommodate growth.
- Kaipara – Upgrade of the Mangawhai WWTP
- Kaipara - Stormwater upgrades in Mangawhai to prevent flooding.
- Whangarei - Ruakaka treated wastewater disposal investigations and upgrades for improved level of service and environmental improvement.
- Whangarei - Poroti Water Treatment Plant (WTP) upgrade to ensure timely renewal of the asset.
- Whangarei - CBD flood hazard mitigation and improved resilience.
- Far North - Upgrade to the Kerikeri WWTP and network to support growth.
- Far North - Paihia WTP relocation and renewal of the asset.
- Far North – District wide stormwater improvements to ensure level of service and resilience improvements.

Operational investment requirements have been determined using a Base-Step-Trend methodology to provide a top-down operational expenditure forecast that included a normalised base, and trends in growth, regulation, legislation, productivity, and external costs. This method is appropriate for managing operational expenditure, as the activities involved are often repetitive, with trends that can be predicted ahead of time.

The total operational expenditure forecasted over the planning period across the key services is presented below. Water accounts for $1.2 billion (24%), wastewater $1.5 billion (30%) and stormwater 0.7 billion (13%). The shared services covering corporate services, customer services and strategic planning account for $1.6 billion.



10-year operational expenditure forecast (real dollars 2023, excluding efficiencies)

Supporting our communities

This Initial Asset Management plan defines the approach of Wai Tāmaki ki Te Hiku to managing its three waters assets and services during the 10-year period 1 July 2024 to 30 June 2034, setting out the investments needed for improved outcomes.

Under this commitment to enhancing and investing in three waters, more funding will be put into upgrading, improving and setting up water services so that our communities can thrive and be sure of safe and reliable drinking water, wastewater and stormwater.

Managing affordability is one of our foremost goals. We have incorporated strategies into this plan to strike a balance between financial considerations and affordability of water services. Costs for customers across the Wai Tāmaki ki Te Hiku area will be lower in the long term because efficient and well-maintained systems save money.

Funding has been allowed to enable Wai Tamaki ke te Hiku to improve its understanding of Te Mana o Te Wai, its relationship with mana whenua, understanding of needs for un-serviced communities, marae, papakāinga and venerable customers.

Increased investment means we will have stronger, more sustainable, and resilient water services and systems that will help us be better prepared for the effects of climate change and extreme weather events. The Auckland network has 1.6 times the level of water supplies available based on current demand (or a 0.6 resilience factor). International benchmarking suggests a major city should have a 2.2 factor. Therefore, there is still a need to improve resiliency over time.

Under our structure, the organisation's profits are invested back into Wai Tāmaki ki Te Hiku towards improving operating water services infrastructure and delivering watering services in an inefficient and financially sustainable manner. As the population grows across our region, more money for water means more housing for people, and better support for the development of suburbs, towns, and cities to meet the needs and aspirations of growing and diverse communities. Wai Tāmaki ki Te Hiku is dedicated to creating a new standard of water services for Northland and Auckland that will improve the wellbeing of our people and environment for decades ahead.

Data confidence and reliability

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Overall data confidence and reliability gradings vary from high to low, meaning some data is based on sound records, procedure, investigations, and analysis which is properly documented but in most cases there still are minor shortcomings and, in some cases, data is based on uncertain records, procedures, investigations, and analysis which is still incomplete. This is therefore a key improvement area for our entity and supported by our top five improvement areas including asset condition assessment programmes, demand / supply forecasting, our asset data strategy, a full review of our capital projects database and assessment of our competency framework and skills and resource gaps, amongst others.

1 Introduction

1.1 Three Waters Reform

1.1.1 Transformation Vision

Water Services Reform in New Zealand is realising an ambitious vision. Our country is implementing large-scale change to significantly raise the standard of our water infrastructure along with building a world-class water services system.

This once in a lifetime opportunity to transform how we deliver our water services will address the compounding impact of decades of under-investment in water infrastructure overlaid with new demands into the future from accommodating population growth and mitigating climate change and natural disasters.

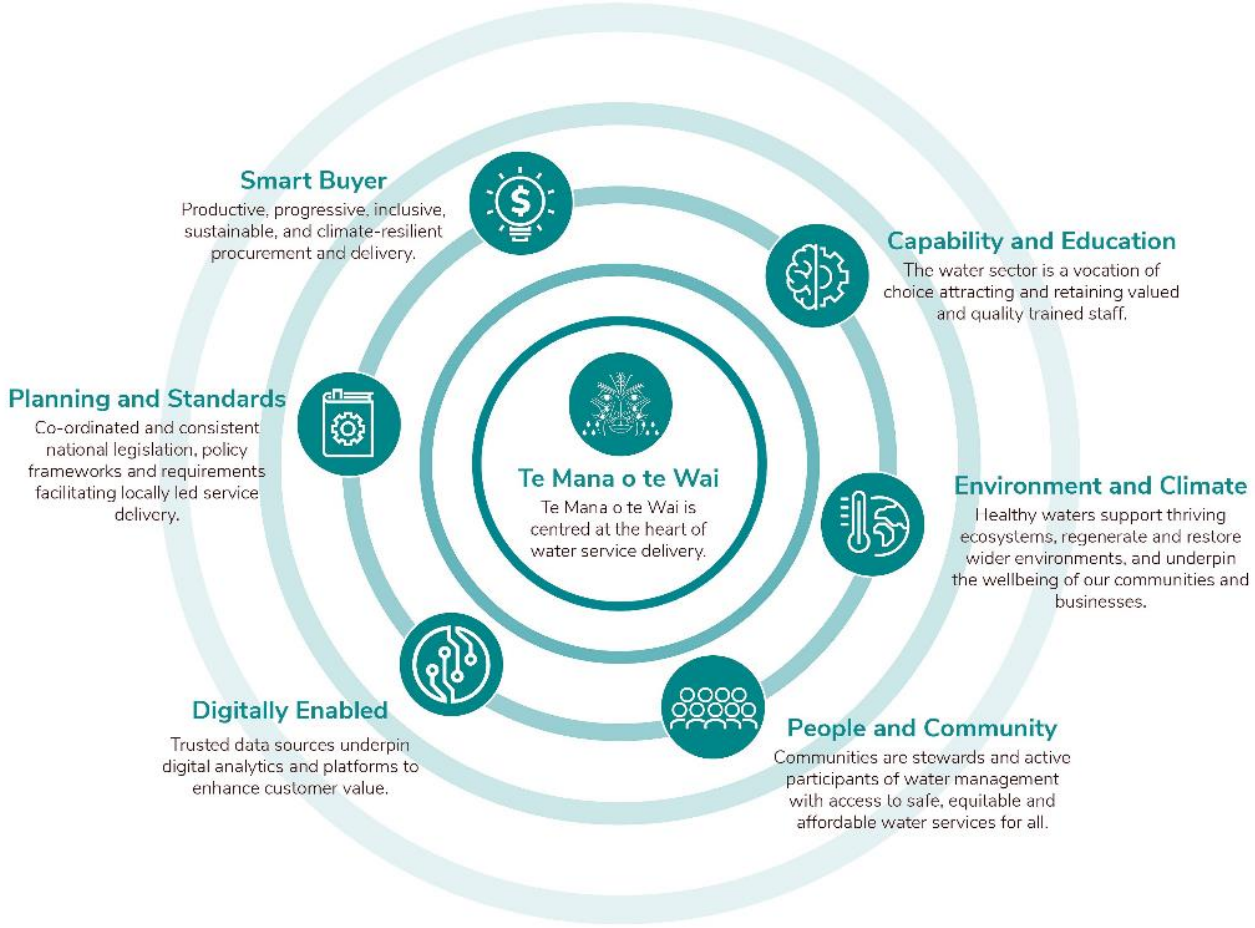


Figure 1 – The Water Services Reform vision

This step change is about:

- A uniquely New Zealand approach to building a world-class water system guided by Te Mana o te Wai.
- Leveraging scale and structural changes that will enable the significant investment required in water infrastructure that is out-of-reach of individual councils alone.
- Creating the conditions to build and sustain a highly skilled and adaptable water workforce that can innovate and collaborate to drive outcomes for NZ and are world leading.
- Being customer and community focused, leveraging new technologies, while also building customer awareness of their role in the water system and the value of water.

The Water Services Reform Programme aims to significantly improve the safety, quality, resilience, accessibility, and performance of three waters services, in a way that is affordable for New Zealanders now and into the future. The purpose of the entities is to provide safe, reliable, and efficient water services. High-level objectives include:

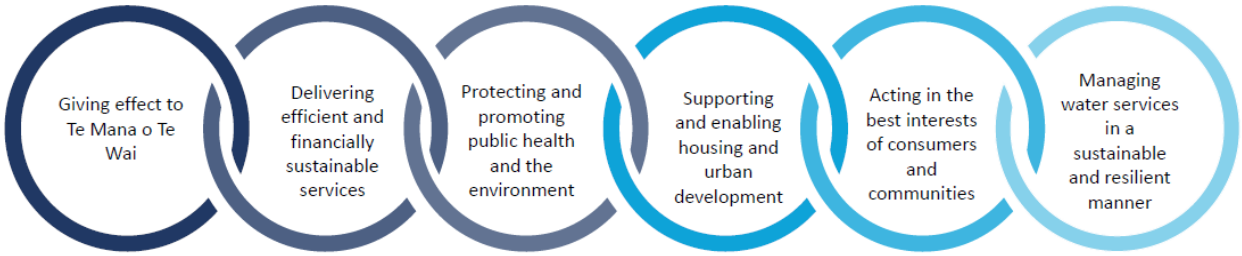


Figure 2 – High-level objectives of the Water Services Reform

The Government needs to ensure it delivers on Treaty-related obligations, including by improving outcomes for iwi/Māori in relation to three waters service delivery and upholding Te Mana o Te Wai. Integral to this is effective infrastructure delivery, underpinned by an efficient, high-performing, financially sustainable, and transparent three waters system. At the heart of this is Increased investment in critical water infrastructure while ensuring water services remain affordable for New Zealanders.

1.1.2 The Three Waters Challenge

In many parts of the country, communities cannot be confident that their drinking water is safe. The campylobacter outbreak in Havelock North in 2016 brought into sharp focus the challenges in the water supply system, and the risk to public health if left unaddressed.

The condition of water infrastructure across New Zealand too often causes poor environmental outcomes related to water services, such as discharge of treated and untreated wastewater into water bodies and large volumes of drinking water lost through leaks in pipes. Current water infrastructure is generally unfit to accommodate growth in population and housing, or to manage the impacts of climate change and natural hazard risks.

The nationwide cost of addressing the issues facing water services, from repairing and replacing outdated infrastructure to investing to deliver equitable access to more communities has been estimated at between $120 billion and $180 billion across the country over the next thirty years. Individual councils, even those representing large metropolitan areas, are not able to finance these costs.

From 2023 there are several challenges to address across Northland and Auckland, with significant growth and a large number of consent renewals required as well as recent flooding revealing the need for more investment into water infrastructure. Climate change and the need for greater resilience is a long-term issue that is already impacting suburbs and towns in the Wai Tāmaki ki Te Hiku area.

More frequent extreme weather events mean we need to invest into strengthening our water services infrastructure to make it more resilient. Recent flooding across the Wai Tāmaki ki Te Hiku area have devastated communities with extensive damage done to people's homes and properties and essential infrastructure like roads.

Ageing wastewater pipes have struggled under unusually heavy rain, making harbours not safe to swim at or gather kai. Stormwater infrastructure has worked as designed (at the time it was constructed) but it could never consider the extremities being experienced today.

With the population of the Wai Tāmaki ki Te Hiku area expected to grow from around 1.9 million to more than 2.1 million people by 2033, planning for climate change is essential. Increased investment into our drinking water, wastewater and stormwater networks will help to meet population growth, minimise climate change impacts and improve our environment. Many resource consents for water treatment plants are about to expire within the next five years. There are several ‘red zones’ occurring across Auckland and Northland that are impacting the ability to meet expected population growth.

1.1.3 Stronger Community Representation

The Three Waters Review began in mid-2017 and with ongoing consultations the process for change evolved to a regionally led 10-entity model in 2023. A model based more closely around existing regions recognises the importance of water services entities having clear and direct links with their communities, to ensure New Zealanders have confidence that the entities will listen and respond to their needs.

The new water regulation ecosystem that Wai Tāmaki ki Te Hiku is part of has the rigour of strong local governance that combines strategic representative oversight with diverse skilled management. Iwi/Māori rights and interests in water are protected with provision for mana whenua to make Te Mana o te Wai statements, which prioritise the health of water, people, and the environment. Local people can have their say on how Water Services Entities operate too, through Community Priority Statements. These statements are distinct from each other yet are complimentary.

1.1.4 Long-term benefits and opportunities

Water services are essential building blocks for communities. The transition to Water Services Entities is not just fixing the status quo of ageing infrastructure. It is a foundation for significant transformation opportunities.

Increased investment into our drinking water, wastewater and stormwater networks will help to meet population growth, minimise climate change impacts and improve our environment. Over time we are building a world class water system and this change delivers significant advantages for communities, cities, and regions.

Wai Tāmaki ki Te Hiku is leading the charge in working toward a whole different way of managing our three waters system, including long-term infrastructure investment and more integrated ways of doing things such as taking a catchment-based interconnected view of the water system instead of a fragmented approach that can lead to inconsistencies and adverse outcomes.

A Te Mana o te Wai partnership-based approach helps drive Water Services Entities to be responsive to the diverse communities we serve, bringing benefits not only for customers but also for the water workforce in terms of the new opportunities and the organisational cultures created. Water sector professionals will benefit through upskilling, career pathways, innovation, and creating a world standard we can all be proud of.

As highlighted above, transformation is about bringing a stronger customer focus and New Zealanders knowing their role in the water system and the value of water. Technology-driven and data efficiencies will improve the service experience we deliver, and we want our customers to feel they are able to participate in change as appropriate.

Through system reform, together we can look forward to greater wellbeing. Our cities, towns and rural areas will grow and prosper through investment that unlocks housing, employment, and economic development.

1.2 Purpose of this AMP

The purpose of this initial asset management plan is to set out how we will prioritise investment for our service area's three waters infrastructure assets, including how we will renew our current infrastructure and plan for new assets, in collaboration with stakeholders, to achieve the goals of the Water Services Reform Programme.

The Water Services Reform Programme is identifying priority infrastructure for investment based on the projection of future needs to support growth, improve levels of service, and increase resilience and efficiency within the Wai Tāmaki ki Te Hiku area over the next ten years. An example of these needs-based priority investments is the planned Mangawhai Wastewater Treatment Plant in the Kaipara District. The need for a reticulated treatment plant became a significant issue for Kaipara District Council in 1996, after septic tanks started polluting the Mangawhai Harbour.

The $70 million-dollar scheme to upgrade this treatment plant and associated reticulation system will boost the scheme capacity by almost 70 percent, to 5,000 connections. The shift to Wai Tāmaki ki Te Hiku would potentially mean the cost of Mangawhai's $70 million-dollar scheme is spread across more than 1.9 million people, rather than being borne by Kaipara District Council's approximate 25,000 ratepayers. This would allow Mangawhai's critical need for a reticulated wastewater scheme to be met, while ensuring that cost for customers remains affordable.

1.3 AMP Objectives

To achieve improved service delivery and environmental outcomes while ensuring affordability for our valued customers, the objectives of this plan are to:

- Clearly outline the current state of our assets, identify the requirements for future needs, and articulate the strategic path to bridge gaps.
- Highlight our strategic approach to safeguarding the long-term integrity of water infrastructure assets by formulating precise objectives and targets and delineate the actionable steps to be taken for their successful implementation.
- Identify and present the current challenges and available opportunities for improvement and growth and outline the implementation strategies for capitalising on these opportunities, whilst addressing challenges and mitigating risks.
- Demonstrate the interconnections between various relevant plans, documents, business planning processes and policies, including the funding and pricing plan, to showcase the comprehensive alignment of our asset management efforts with broader organisational goals and objectives.
- Ensure stakeholders are provided with transparent and relevant information regarding asset investment needs, investment programmes, as well as the proposed asset management practices to be implemented during the initial 10-year period of the new entity's operation.

1.4 Included in this Plan

The initial asset management plan is intended to inform a 10-year capital and operational investment programme and describes.

- **Our services and the assets we manage** – an overview of three waters assets and services with an assessment of condition and criticality.
- **Current levels of service and performance** – an overview of different levels of service provided to our communities and an assessment of asset and service performance.
- **Future levels of service and performance measures** – proposed levels of services and targets based on industry and regulator expectations still need to be developed. We will work with our community to set targets against these service levels, this information will be included in our 2027 asset management plan.
- **Planning for the future** – factors affecting future service demand and measures required to meet demand in the short and long term.
- **Managing risk and resilience** – an assessment of how risks, including climate and natural hazard risks, cost escalations and funding are incorporated into the management of the activities.
- **Asset operation and maintenance needs** – an overview of future approaches and practices around operations and maintenance.
- **Asset renewal needs** – an overview of our renewal drivers and approaches, a forecast of our renewal needs, and a renewal plan developed to meet these needs.
- **Asset improvement and disposal needs –** an overview of how we plan to deal with vested assets, non-capital improvements and disposal of assets.
- **Capital and operational investment decision making** – the transitional and proposed future decision-making frameworks for investment.

- **Prioritised capital and operational investment forecast** – our initial 10-year forecast of capital and operational investment needs with ongoing consultation with councils, mana whenua, Commerce Commission, Taumata Arowai and other crown agencies.
- **Financial summary** – our current prioritised capital, non-capital improvements and operational forecasts for to achieve most of our capital and operational investment objectives, considering deliverability and affordability.
- **People, Processes and Systems** – an overview of our workforce, processes and systems needs to enable effective asset management from day one of our entity.
- **Continual Improvement** – an overview of the quality and effectiveness of our current asset management practices, and proposed improvements where current gaps have been identified.
- **Appendices** – appendices include,
    - Appendix A - asset management plan summary for each of the councils
    - Appendix B – future levels of service and performance measures
    - Appendix C and D - detailed financial information

1.5 Climate Change and Natural Hazards

Climate change, natural hazards and associated service delivery resilience are increasingly an area of concern for service providers. Climate change affects assets and their operation and maintenance in several ways but particularly through flooding, drought, and heat events. By design, there is limited constructed capacity and resilience of infrastructure to manage these events while providing the agreed level of service to customers.

Section 7 discusses the maturity of climate change and natural hazards across our entity and covers how as a risk to three waters infrastructure, they are considered in asset management planning and the prioritisation of investments.

1.6 Giving Effect to Te Mana o te Wai

To recognise and respect the Crown's responsibility, an overarching requirement in the Water Services Entities Act 2022 is that all persons performing or exercising duties, functions, or powers under the Act must give effect to the principles of Te Tiriti o Waitangi/the Treaty of Waitangi. They must also give effect to Te Mana o te Wai, to the extent that Te Mana o te Wai applies to those duties, functions, or powers.

The concept of Te Mana o te Wai is not a new concept for Māori. For generations Māori have continued to hold the principle of restoring and protecting the mauri of water at the forefront of decisions. The development and architecture of Te Mana o te Wai was purposeful and deliberate. Therefore, its application should be purposeful and deliberate in our decisions.

Te Mana o te Wai is a guiding principle for us to make decisions (and report) on how best to deliver water services to our communities. Under the Act, Te Mana o te Wai has the meaning set out in the NPS-FM1.

1. Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community.
2. Te Mana o te Wai is relevant to all freshwater management and not just to the specific aspects of freshwater management referred to in this National Policy Statement.

[1] https://environment.govt.nz/publications/national-policy-statement-for-freshwater-management-2020-amended-december-2022/

Te Mana o te Wai reflects a hierarchy of obligations, firstly to the health of the water, secondly to the health needs of people and thirdly the wellbeing of communities. Achieving the balance of all three obligations will better advance a collective advancement of Te Mana o te Wai.

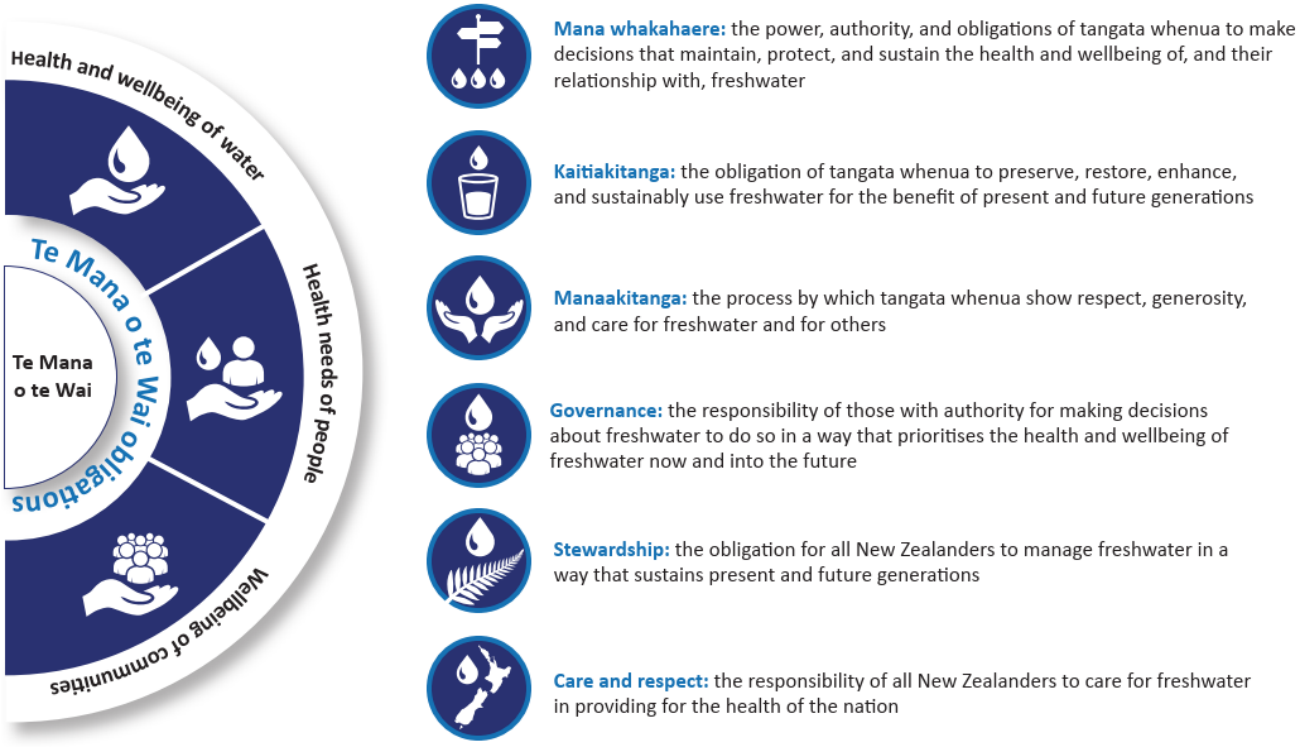


Figure 3 – Te Mana o te Wai obligations and principles

Water Services Legislation sets out the process for mana whenua to make Te Mana o te Wai statements and for entities to respond to such statements. We will engage with mana whenua to develop our response to any Te Mana o te Wai statements and develop how these are integrated and implemented in future.

Our efforts to give effect to Te Mana o te Wai are essential for ensuring the protection and sustainable management of water resources and assets and therefore integral to this plan.

The following are a few examples of practical initiatives that aim to uphold Te Mana o te Wai:

- Collaborative decision-making: Engaging in meaningful partnerships with mana whenua, indigenous communities, and relevant stakeholders to incorporate Māori perspectives, knowledge, and values into water management decisions. This involves recognising and respecting the role of Māori as kaitiaki (guardians) of water and involving them in governance processes.
- Incorporating tikanga Māori: Integrating traditional Māori knowledge systems, protocols, and practices into water management approaches. This includes incorporating concepts like mauri (life force), wairua (spiritual essence), and whakapapa (genealogy) into decision-making frameworks, ensuring a holistic and interconnected view of water resources.
- Implementing holistic monitoring and assessment: Adopting comprehensive monitoring and assessment frameworks that go beyond conventional water quality measures. This involves considering ecological health, cultural values, and the interconnectedness of water bodies to assess the overall well-being of water resources.
- Restoring and protecting waterways: Undertaking active measures to restore and protect degraded water bodies, including river clean-up initiatives, riparian planting, and the removal of invasive species. These actions are aligned

with the principle of restoring the mauri of waterways and supporting their ability to sustain diverse ecosystems and cultural practices.

Te Mana o te Wai provides the overarching guiding principle for Water Services Entities to make decisions (and report) on how best to deliver water services to all communities.

1.7 Implementing the Changes Driven by the Three Waters Reform

A suite of legislation sets in place the reform of water services regulation and service delivery in New Zealand.

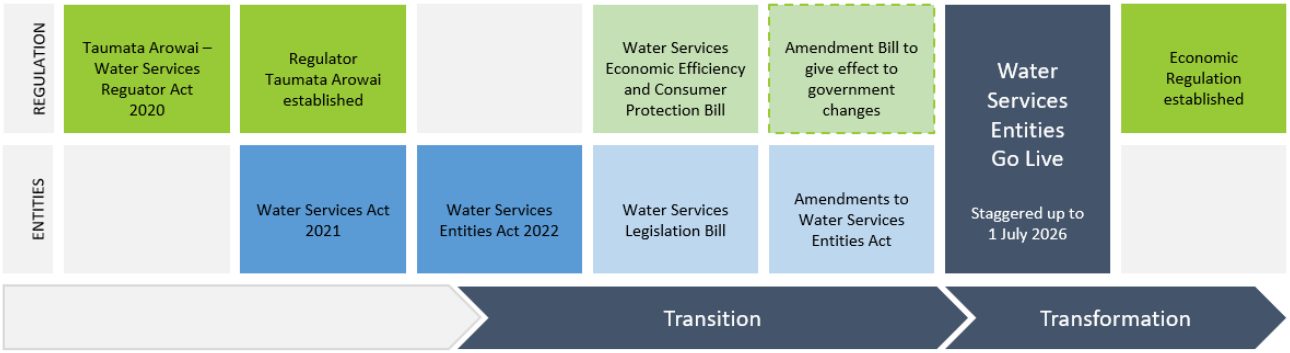


Figure 4 – Summary of legislative process.

This initial asset management plan is one of a series of planning and reporting tools required by the Water Services Entities Act 2022. An initial asset management plan and initial funding and pricing plan are foundational to the establishment of each Water Services Entity. Entities must replace these initial plans within a three-year period.

These two initial plans are supported in legislative requirements by an establishment water services plan which takes the place of a statement of intent for a transitional period. The establishment plan outlines how the entity will be established, as well as details around the processes, policies, and guidelines for the first year of operation. The establishment plan also includes the processes and timing for the development of the initial asset management plan and initial funding and pricing plan. Shown below is the initial suite of three establishment-related plans and the ongoing key planning and reporting cycle for accountability.

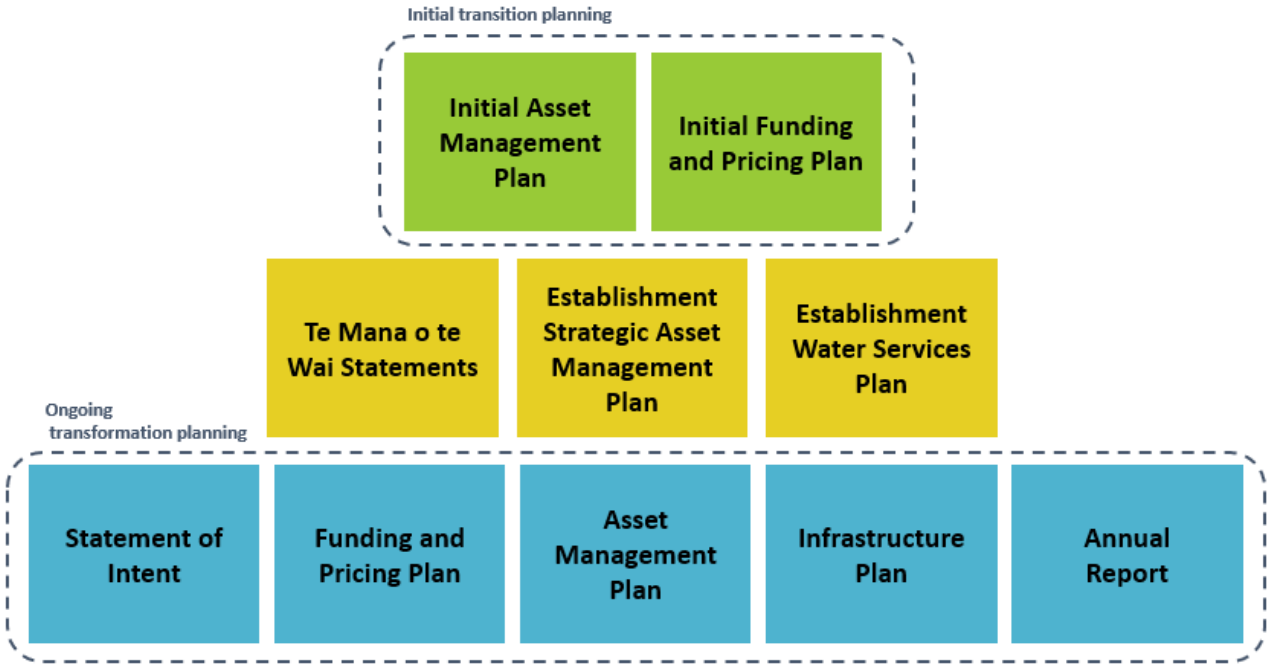


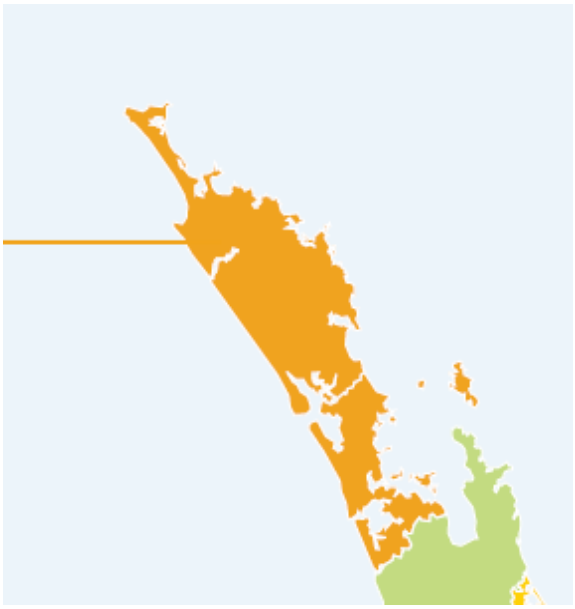
Figure 5 – Key planning and reporting documents.

Summary of key planning and reporting documents:

- **Initial Asset Management Plan** – this provides an initial outline of how assets will be invested in to deliver the intended services and meet strategic outcomes as described in *Section 1.2* above.
- **Initial Funding and Pricing Plan** – this provides the initial plan identifying and indicating costs to deliver intended services and how these will be funded, while finding efficiencies and showing how consumers will be charged in future.
- **Te Mana o te Wai Statements** – Accountability matters include Te Mana o te Wai Statements for water services. Mana whenua may prepare and submit statements. Water Services Entities are required to acknowledge receipt of the statements, engage with mana whenua who provided the statements and respond to the statements with a plan that sets out how the entity intends to give effect to Te Mana o te Wai.
- **Establishment Strategic Asset Management Plan** – this transitional document will provide initial strategies indicating how our entity's objectives will be converted into asset management objectives during the establishment period, the approach for developing future asset management plans, and the role of the asset management system in supporting the entity's objectives.
- **Establishment Water Services Plan** – this replaces the statement of intent for the initial year of the entity, identifying key factors around the establishment and transfer of functions, staff and assets to the Water Services Entity.
- **Statement of Intent** – this sets out the strategic intentions, setting a base for performance to be assessed, so public accountability can be promoted.
- **Funding and Pricing Plan** – this identifies the costs to deliver intended services and how these will be funded, while finding efficiencies and showing how consumers will be charged.
- **Asset Management Plan** – this outline how assets will be invested in to deliver the intended services and meet strategic outcomes. It identifies where improvements are needed, where additional capacity to support growth is required, and how the existing asset base will be maintained and renewed.
- **Infrastructure Plan** – this identifies significant infrastructure issues and the main options for managing them, outlining how existing assets will be managed and new assets developed for at least a 30-year period.
- **Annual Report** – this is the opportunity to inform the public as to the entity's performance over the last financial year, showing how well-planned strategic outcomes are being met.

1.7.1 Wai Tāmaki ki Te Hiku Water Services Entity

Our water services entity is responsible for the water services being provided to consumers within the districts of Auckland Council; Far North District Council; Kaipara District Council; and Whangārei District Council.



For Wai Tāmaki ki Te Hiku it is estimated that currently more than 80% of the population receive three water services. There are more than 625,000 dwellings and non-domestic properties that receive services across the region, receiving around 105 million m^3 of water in a year.

The total number of dwellings are expected to increase substantially in future and estimated water demand could increase to around 120 million m^3 per year in ten years' time. This includes a wide range of types of properties from private dwellings in a city environment serviced by large metropolitan systems, to extensive commercial users, to villages and towns served by small scale systems, to agricultural and horticultural premises.

With a total existing population of around 1.9 million spread across an area of around 17,500 km^2, there is a vast range when it comes to the nature and scale of the services provided.

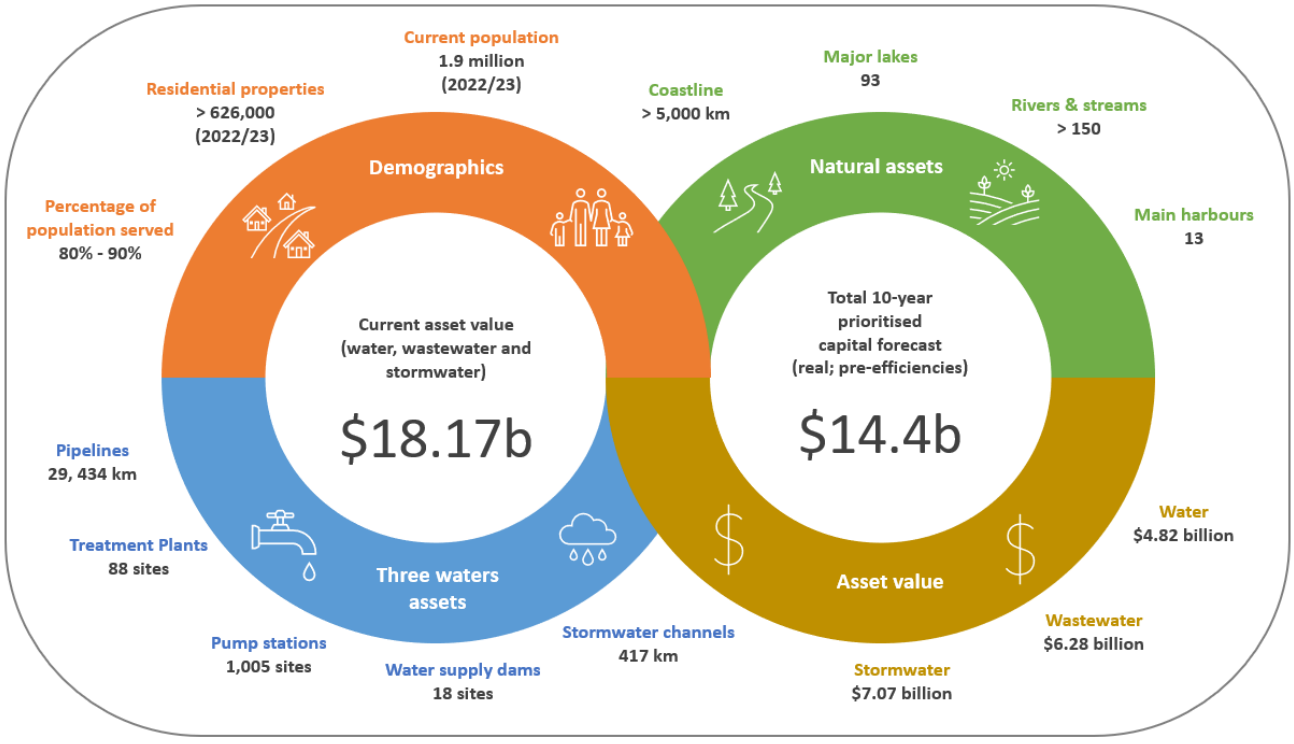


Figure 6 – Summary of our assets and their values

1.7.2 Scope of Water Services Entities' Services

Water Service Entities will provide services relating to water supply, wastewater, and stormwater:

- Water supply – those being served is primarily identified as those connected to a water supply network but can include those within close proximity to such a network, and so therefore deemed serviceable.
- Wastewater – similar to water supply those being served is primarily identified as those actually connected to a wastewater network but can include those within close proximity to such a network, and so therefore deemed serviceable.
- Stormwater – determining those receiving stormwater services is different than water supply and wastewater as in many cases it does not require a connection as such. So those being served are those inside or within 100m of a stormwater network.

Drinking water supply has a wider interpretation under the Water Services Act 2021 as this has a focus on healthy and safe water, and so includes stand-alone water operators, beyond domestic self-supply. However, for funding and pricing purposes these stand-alone water supply consumers are excluded.

Another generic exclusion is stormwater in rural areas, as they fall outside of the services being provided by a water services entity.

2 Our Partners and Stakeholders

2.1 Engagement on this asset management plan

This initial asset management plan has been developed using information provided by the contributing councils and their water service providers. Asset management experts drawn from these organisations, supported the generation of this plan and the proposed investment programmes.

Feedback will be sourced from the Commerce Commission, councils, mana whenua, Taumata Arowai and other crown agencies to determine if the investment plans are prudent, efficient and in the long-term interest of our customers and communities. An updated draft for adoption as the final initial asset management plan will incorporate feedback as well as any updated information under development to refine and finalise the investment profile. It is anticipated this will be available in early 2024.

2.1.1 Mana Whenua Engagement

The extended geographic spread of Wai Tāmaki ki Te Hiku provides further opportunities to give effect to the relationship-based arrangements that currently exist with the legacy councils. For example, the Mana Whenua Kaitiaki Managers Forum and Watercare relationship, Waikato Tainui (Waikato River take), Whangarei District Council Te Kārearea Strategic Partnership Forum Standing Committee, Far North District Council engaging at hapū level to form working groups on several council projects, and Kaipara District Council's mana whenua agreements and memorandum of understanding.

2.1.2 Engagement with stakeholders and partners

Stakeholders are groups or individuals that can affect, or be affected by, the services we provide. Key external stakeholders and their areas of interest and expectations are shown in the table below. These are based on previous interactions by the legacy council organisations; therefore, expectations will be confirmed through direct consultation as part of the next AMP review.

Table 1 - Partners and stakeholders

Stakeholders/Partners	Area of Interest	Expectations
Customers (domestic, commercial, and industrial)	Personal and business use of services	Safe, wholesome, reliable, and affordable water supply. Safe, effective, reliable, and affordable wastewater and stormwater services.
Local Councils	Sustainable and affordable services	Levels of service are met. Services are well planned to allow for growth and development. Value for money.
Commerce Commission - economic regulator	Regulation of cost of services provided by entity measured against key performance indicators.	Transparent, fair practice aligned with industry standards. Performance of service levels and investment delivery.
Iwi	Te Mana o te Wai Iwi and Hapū cultural heritage	All water to be respected and mauri of water to be protected and enhanced. Mana whenua to be involved in management of water supply, used water and stormwater issues. Responses to Te Mana o te Wai statements.
Taumata Arowai / Ministry of Health / District Health Boards	Drinking water safety	Taumata Arowai / Ministry of Health / District Health Boards.
Department of Conservation	Biodiversity and habitat protection	Natural waterbodies, and native aquatic flora and fauna protected.

Stakeholders/Partners	Area of Interest	Expectations
Ministry for the Environment	Environmental protection	Prevention of contamination of air, land, and water.
Regional Councils	Environmental protection Regulation	Efficient resource use. Minimising environmental impacts. RMA Compliance.
Fire and Emergency Services	Reliable water supply and minimal flooding	Water is available for firefighting and flooding hazards are minimised.
Other Utility Providers	Shared corridors and land use	Coordinated planning and limited effect on other services.

2.2 Future Consultation Mechanisms

Under the new system of strengthened water services regulation and service delivery in New Zealand, Wai Tāmaki ki Te Hiku is actively fostering collaboration with the following Regulatory Bodies to employ robust governance mechanisms within our entity.

- **Taumata Arowai** – Drinking Water Regulation.
- **Regional Councils** – Environmental Regulation.
- **Economic Regulator** – To be established shortly.

The Water Services Entity Act 2022 (Schedule 3, Part 2) sets out the requirements for engagement on asset management plan proposals. The new entity must establish new groups and forums to enable the entity to partner and engage meaningfully with Māori, territorial authorities, and their communities, including the following:

- **Regional Representative Group (RRG)** – the establishment by the entity of this group will include regional representatives from territorial authorities and mana whenua. The role of the group includes participating in the process of setting the entity's strategic direction and performance expectations and reviewing the performance of the entity.
- **Regional Advisory Panels** – the role of the panel is to provide advice to the RRG about how the panel considers the RRG should perform or exercise, its duties, functions, or powers. For example, in relation to asset management plans, funding and pricing plans and infrastructure strategies.
- **Community Priority Statements** – can be made to the RRG by qualifying persons or groups to provide their views and priorities related to water bodies in the entity's service area. The RRG must consider these statements when commenting on the entity's planning and reporting documents.
- **Te Mana o te Wai statements for water services** - Under the entity operating principles to partner and engage early and meaningfully with Māori, mana whenua may provide Te Mana o te Wai statements to the entity. The entity must give effect to Te Mana o te Wai and understand, support, and enable the exercise of mātauranga Māori, tikanga Māori, and kaitiakitanga. The Entity Board will make its response publicly available.
- **Consumer forums** – the water service entity must establish one or more consumer forms under the Water Services Entities Act 2022. The purpose of the forum is to assist with effective and meaningful consumer and community engagement. This includes gathering and compiling consumer views to assist in understanding consumer needs, expectations, service requirements and priorities. The group will reflect and represent the interests and diversity of consumers across the region.

The roles of these stakeholders in water regulation are indicated in the diagram below.

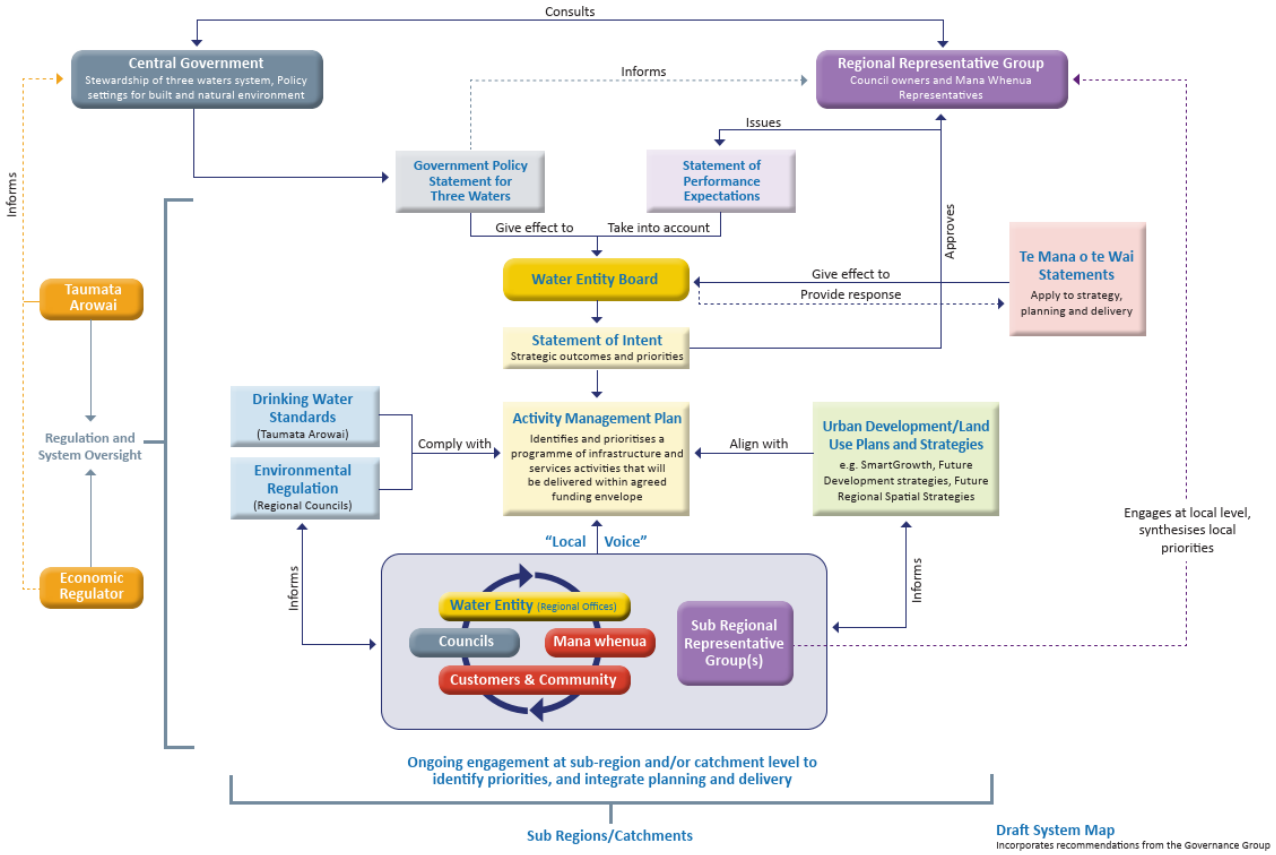


Figure 7 –Three waters regulators - current roles

3 Our Services and The Assets We Manage

3.1 Three Waters Overview

Wai Tāmaki ki Te Hiku is made up of the Auckland and the Northland regions and provides water, wastewater, and stormwater services to approximately 37% of all New Zealanders.

Highlights - The Assets we manage

We manage and operate a total of 29,434 km of pipelines, 88 treatment plants, and more than 1,000 pump stations, amongst other assets, which provide three waters services to approximately 1.9million people.

Asset condition insights

Kaipara and Far North areas of the Northland region have the highest number of water pipelines currently assessed to be in poor to very poor condition, which therefore remain a key focus of investment.

Due to the magnitude of the Auckland region's pipeline networks, the most significant pipeline renewal investment is required here, specifically to address poor pipe condition for the wastewater and stormwater network. The large amount of asbestos cement water pipelines require replacement due to higher burst rates and to reduce maintenance cost. These pipe replacements is a key renewal driver in this region which shifts the majority of investment needed for renewals to the water network.

Asset condition assessment of networks for all three waters in the Whangarei area of the Northland region are reportedly based on physical condition assessments only and does not indicate theoretical remaining useful life, thus showing high percentages of pipes as not being assessed. This will require some further development of data on theoretical asset condition to inform potential risks and investment decision making.

Assessment of other water assets indicates that upgrades to several wastewater treatment plants, and some water treatment plants, are needed to improve asset condition, drinking water and effluent quality, increase capacity and meet current and future levels of service with improved performance.

Currently many of the data sources reflecting asset condition is based on local and operational needs which is prone to be subjective. In future, data and information improvement is a vital focus to provide a more objective view of investment needs.

Generally, opportunities for improvement of data lie in the further detailing of above-ground assets, increased condition assessment of pipelines, confirmation of the criticality of three waters assets and the impact of assets owned by others. To maintain confidence in asset data, a standardised approach will be employed in future.

Most of our population is concentrated in the Auckland region with approximately 1.7 million people. The remainder of our entity's population is spread out geographically with the Whangarei area being one of the larger centres in the Northland region.

We manage assets worth over $18.17 billion (2021/22). The management of our asset inventory requires a significant improvement to enhance our investment decision making. Based on information available from the recent Water New Zealand National Performance Review, Statistic New Zealand and information from contributing councils, our three waters assets are broadly described in the following tables.

Table 2 - Assets and service area overview

	Auckland	Kaipara	Whangarei	Far North	Total
Area (km2)	4,941	3,109	2,712	6,687	17,449
Total population estimate (2022/23)	1,692,400	27,700	101,800	74,700	1,896,600
Total number of residential properties estimate (2022/23)	545,589	12,599	42,131	26,309	626,628
Water supply service coverage (%)	83%	30%	67%	39%	80%
Wastewater service coverage (%)	84%	46%	60%	50%	81%
Stormwater service coverage (%)	88%	44%	91%	60%	87%

*Based on estimated data for 2022/23 (Source: Data provided by relevant councils and sources mentioned above)

Water supply $4.82bn	Number of registered water supply zones, schemes	39 zones
	Pump stations	130 sites
	Total length of public water supply network	10,985 km
	Water supply reservoirs	187 sites
	Water treatment plants	39 sites

Wastewater $6.28 bn	Catchments	16 catchments
	Pump stations	869 sites
	Total length of public wastewater network	9,890 km
	Wastewater treatment plants	49 sites

Stormwater $7.07bn	Catchments	37 catchments
	Pump stations	6 sites
	Total length of open water course channels	47 km
	Total length of public stormwater network	8,559 km

Network assets include all pipes, laterals, and structures that enable the flow of water, wastewater, and stormwater, mainly under-ground. Open channels (natural or modified) are linear waterways that form part of the network.

Treatment plants are purpose-built facilities comprising structures, buildings, and complex systems to improve the quality of water, or treat wastewater. Plants and pump stations are built to serve as a water source, storage, treatment and/or pumping functions. Most water supply, wastewater and stormwater sites are facilities with tanks and pumps. Stormwater sites also include basins and reserves that store and treat water. The extent of the three waters networks in our region is mapped below.

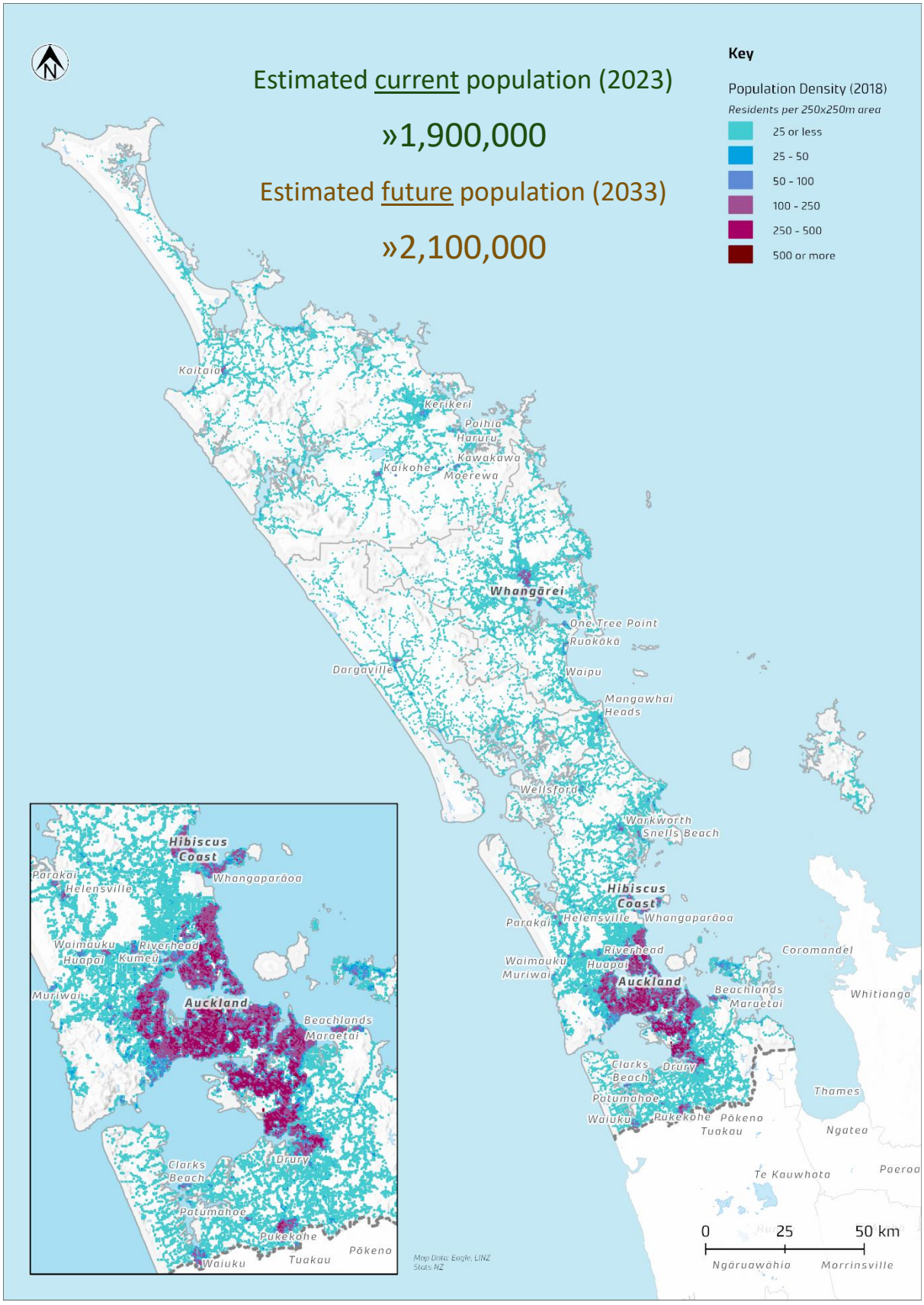


Figure 8 – Population density

3.1.1 Water supply

We manage over 39 registered water supply zones, supplying water to approximately 80% of our current population. Connected properties comprise 92% residential and 8% commercial connections.

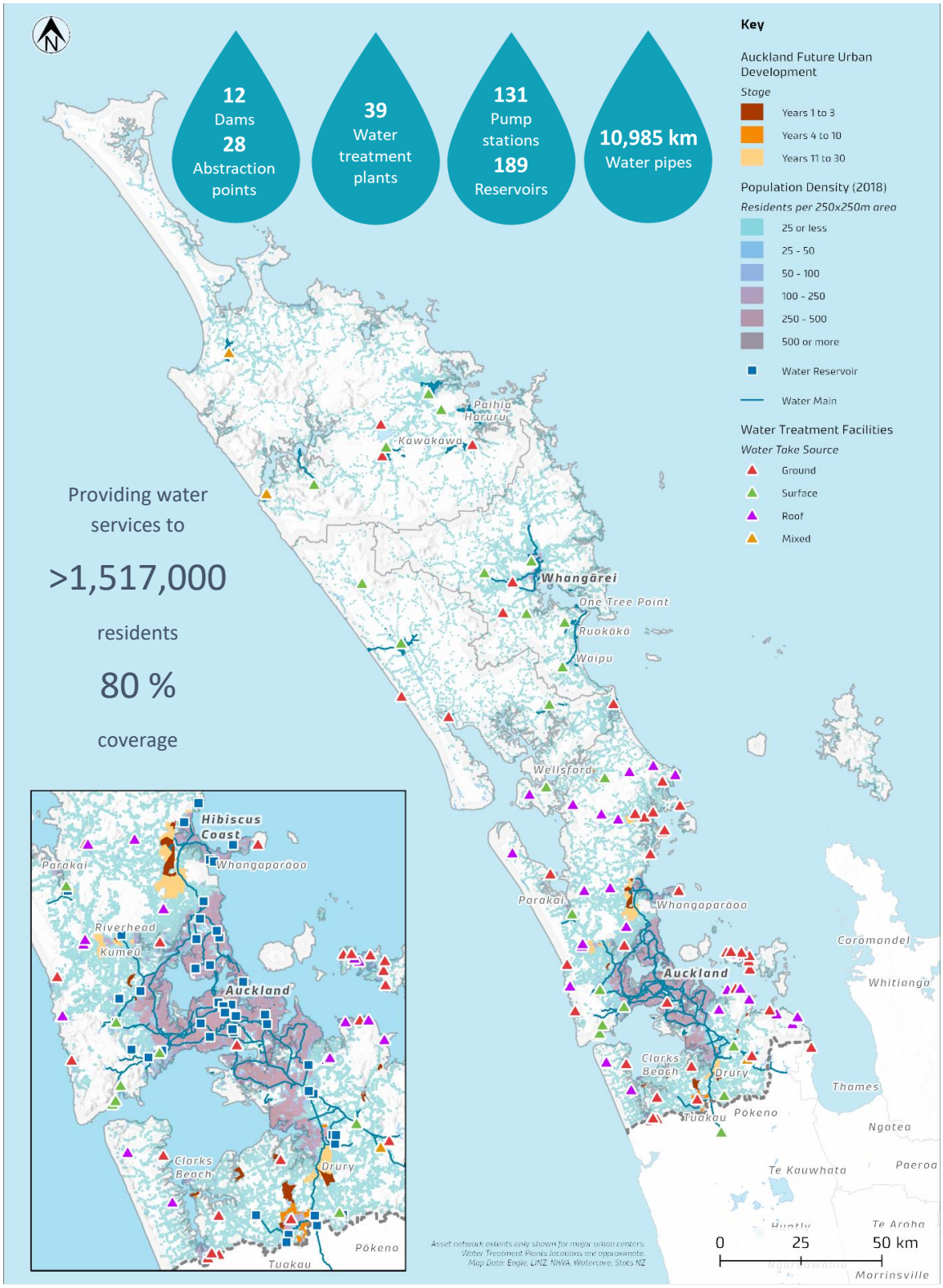


Figure 9 – Map of water supply service.

3.1.2 Wastewater

We manage over 16 serviced wastewater catchments, to approximately 81% of our current population, while connected properties consist of 93% residential and 7% commercial connections.

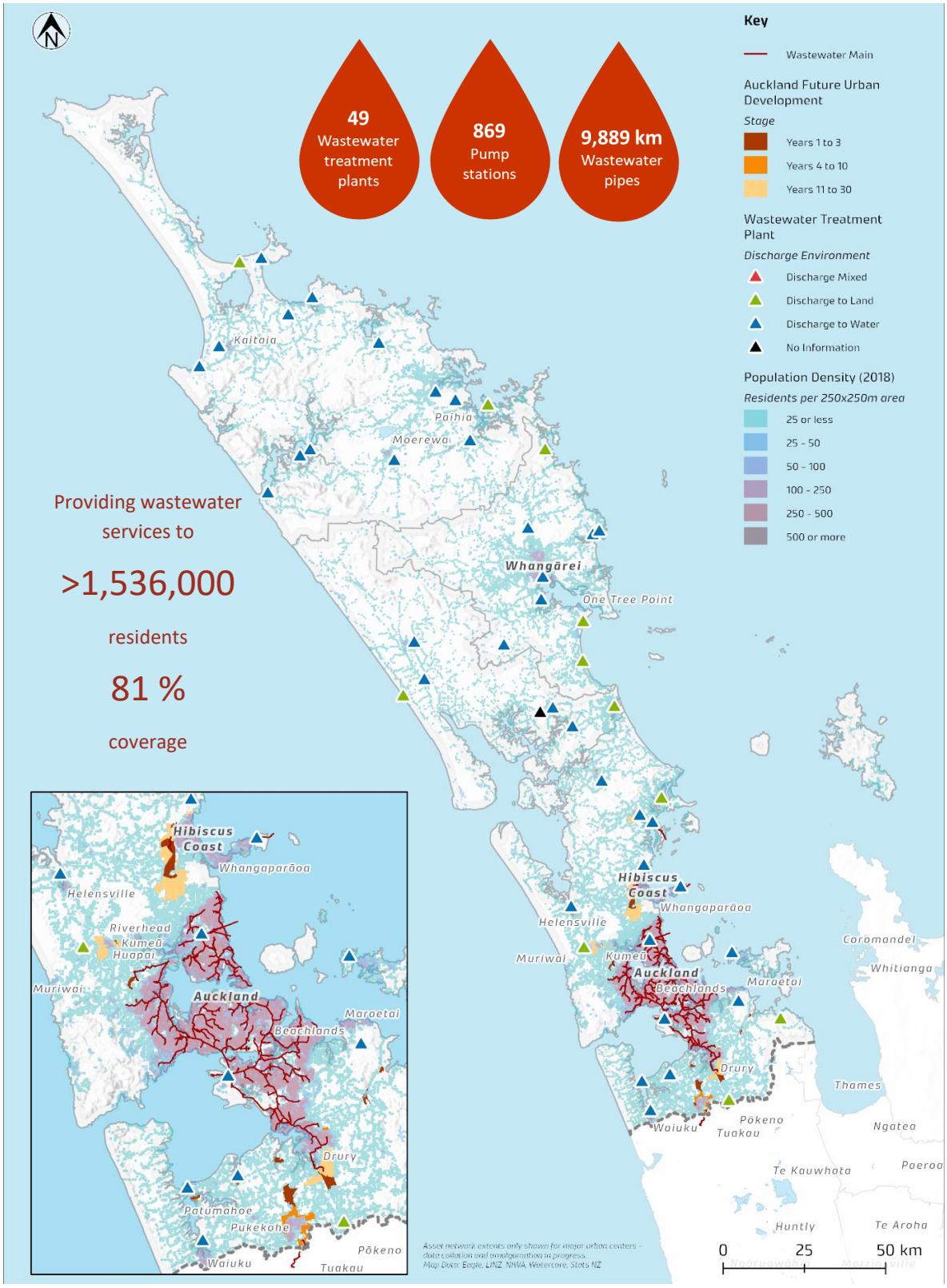


Figure 10 – Map of wastewater services.

3.1.3 Stormwater

There are a total of 37 stormwater catchments, crossing over the Auckland and Northland regions and including several large river catchments as indicated below. Stormwater services cover approximate 88% of the current estimated population.

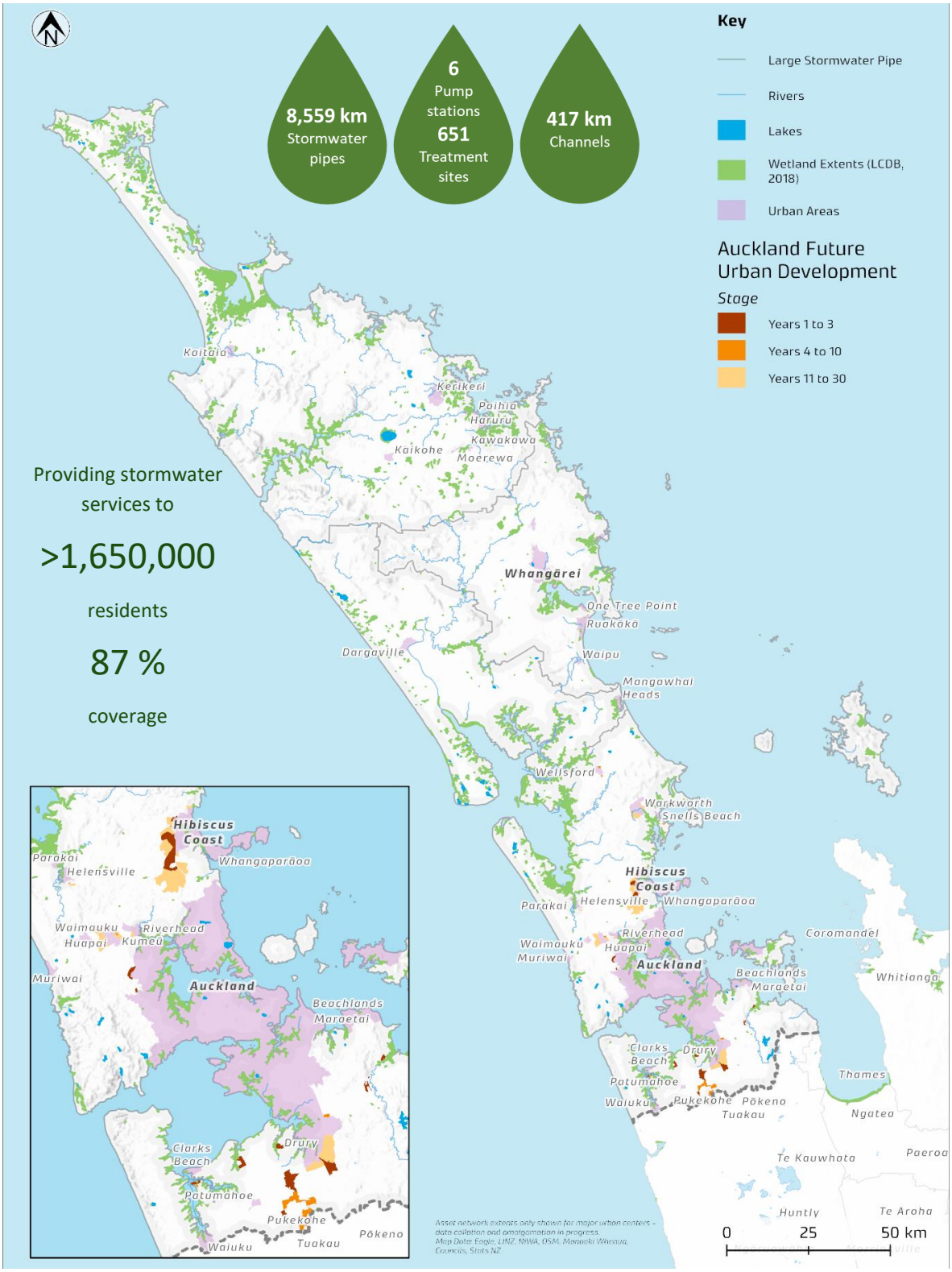


Figure 11 – Map of stormwater services.

3.2 The Role of Natural Water Bodies in Service Provision

Freshwater bodies are an important source of drinking water for local communities, agriculture, and industries. Both fresh and marine water bodies receive stormwater and treated wastewater from human activity. Our natural freshwater bodies are diverse and unique. These have several special characteristics which include lakes, ponds, rivers, streams, groundwater aquifers and wetlands. They are home to a wide range of flora and fauna, including several rare and endangered species.

There are several large river catchments including the Awanui, Oruaiti, Waima, Kawakawa, and Wairoa rivers, amongst others. Northland has more than 400 dune lakes, found within old sand dune systems mostly on the west coast. Dune lakes are one of the rarest and most threatened aquatic habitats in the world. The lakes are grouped on the Aupōuri, Karikari and Poutō peninsulas. There are also a few volcanic lakes, alluvial (valley bottom) and some man-made lakes with the Omapere and Waitakere Reservoir being some of the most prominent.

Our coastal areas are extensive with many bays and estuaries on either side of the Northland peninsula and Auckland region. Marine environments are home to a wide range of flora and fauna habitats including estuaries, brackish water lagoons and open sandy beaches.

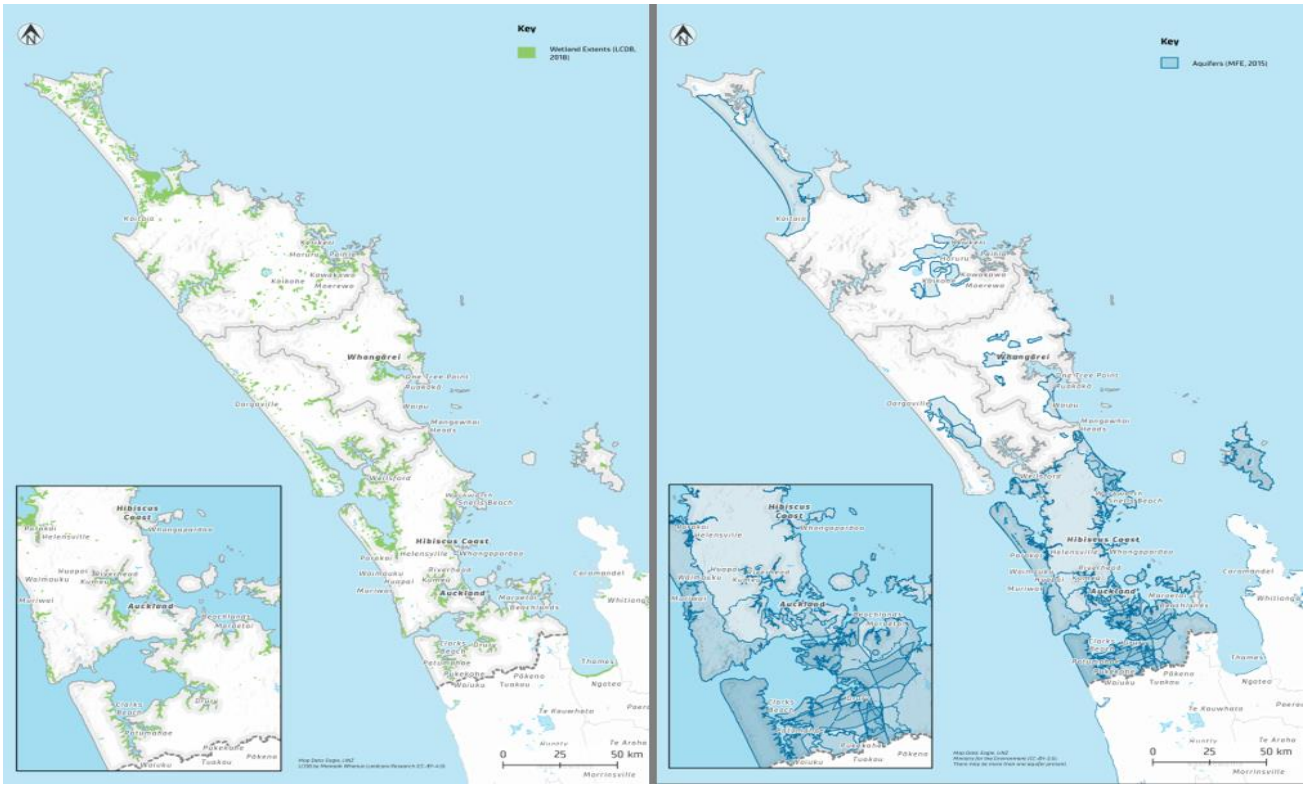


Figure 12 – Major wetlands and aquifers.

The region's fresh and marine water ecosystems are highly sensitive to environmental changes and human activities, and conservation efforts are crucial to protect their ecological integrity. Additionally, these water bodies offer recreational opportunities for fishing, swimming, and boating, and they hold significant cultural and spiritual value for Māori communities. Furthermore, Auckland and the Waikato region have a deep and interconnected relationship when it comes to water, with the Waikato River being a vital water source for Auckland. The iwi, particularly the Waikato-Tainui iwi, plays a significant role in shaping the relationship between Auckland and the Waikato region when it comes to water. As guardians of their ancestral lands and waterways, the iwi holds deep cultural and spiritual connections to the Waikato River. Their involvement in water management and conservation efforts is crucial in ensuring the sustainability and preservation of this vital resource.

Table 3 – Natural water bodies and their role

Waterbody	Information	Interactions with Three Waters Services	Potential Impacts on Waterbody
Groundwater Aquifers	There are numerous groundwater aquifers and bores spread throughout the region.	Source of drinking water.	May be impacted by over-abstraction and by stormwater and wastewater contamination.
Rivers and Streams	There are more than 150 rivers and streams across the region which play a major part in the provision of water services.	Intakes abstract freshwater from streams and rivers for treatment and drinking purposes. The Wairua, Mangakahia, Manganui, Waima and Kaihu Rivers are some of the major rivers in the region that enable the flow of stormwater. Treated wastewater effluent is discharged to several of these rivers.	May be impacted by over-abstraction and by stormwater and wastewater contamination.
Lakes	There are approximately 63 major lakes in Northland (excluding many smaller dune lakes mentioned above) and 30 in the Auckland region.	Mainly receive stormwater discharges. Some lakes provide raw water for drinking purposes.	May be impacted by over-abstraction and by stormwater and wastewater contamination.
Wetlands	There are numerous natural wetlands. Examples of notable wetlands include Te Werahi, Muriwhenua and the Aupouri Peninsula wetlands	Wetlands support plant and animal life, and act as catchment and treatment for stormwater. These areas filter water, reduce sediment, nutrients, and contaminants, and reduce flood risk. Wetlands provide habitat for a diverse range of plants and animals, including rare and threatened species.	May be impacted by stormwater and wastewater contamination.
Marine environment (Harbours and estuaries, ocean)	**Auckland -** 1,800km of coastline of which two thirds are made up of estuaries, harbours, and small inlets. **Northland -** 3,200 km of coastline with two marine reserves, and several estuaries. There are 13 main harbours in the region.	Wastewater from coastal settlements is typically discharged into the Pacific Ocean and Tasman Sea. Stormwater flows to these major water bodies in the form of rivers, channels and/or pipes. Estuaries act as a transition zone between land and sea, playing a vital role in maintaining marine ecosystem health by filtering out contaminants and retaining sediments and nutrients. They serve as critical habitats for marine wildlife, offering sheltered waters that act as nursery and feeding grounds.	May be impacted by stormwater and wastewater contamination.

3.3 State of the Assets

3.3.1 Asset Condition

We manage and operate 29,434 km of pipelines, 88 treatment plants, and 1,005 pump stations and provide services to more than 625,000 properties and businesses.

The condition of an asset is directly related to the level of service it can provide. Well-maintained assets are more reliable, efficient, and cost-effective, and can provide a higher level of service to users over time. Performance is also monitored and discussed further in Section 4.

For below ground assets, this is typically the structural condition of the pipe in transferring water at the required range of flows and pressures. For above ground assets, conditions can largely be assessed using visual inspection. Other aspects of condition should be assessed as well, depending on the type of asset and its nature, e.g., seismic, civil structure, mechanical, electrical, or electronic.

Knowledge of an asset's condition is gained through regular condition assessments throughout its lifecycle. It helps in predicting an asset's remaining service life and deciding when an intervention will be needed before it fails. Intervention decisions also factor in the criticality of assets which is discussed in this section.

Above ground assets.

For civil and structural assets, visual and detailed technical assessments, including seismic assessments, are carried out on reservoirs, buildings, and other structures to understand the rate of deterioration, predict failures and plan for intervention. Historic constraints in funding and other resources have contributed to ad-hoc programmes of inspection rather than routine inspections. This information is usually kept in technical reports instead of being added to information systems, making it difficult to analyse systematically.

Mechanical assets such as pumps, mixers, aerators, blowers, etc are also inspected and conditions assessed based on a combination of physical assessments and testing, performance, and history. Similarly electrical, instrumentation and automation equipment's condition are typically assessed through inspection and its performance, to inform projections of its estimated remaining useful life. As above, this information is often stored in technical reports, rather than transferred into information systems.

We will need to collate existing above ground asset information from various information sources, evaluate and input to its asset management system to inform future decision-making processes. This will also need to include collation of seismic assessments and the status of upgrades to improve seismic resilience.

Below ground assets.

For piped network assets, closed-circuit television (CCTV) inspection is a common type of assessment used to determine the condition of wastewater and stormwater pipe and chamber assets. Other techniques, such as sonar and laser profilometry, are also available to assess critical assets.

Water supply pipes are often pressurised and isolating them without affecting water flow to communities can be a challenge. Although various non-intrusive techniques are available, the norm has been to use the pipe's age as a proxy for assessing its condition. This approach has been supplemented by occasional laboratory testing of samples taken from the network near pipe repair sites, and by creating short-term plans based on the records of bursts and failures. Seismic risk, typically forming the basis for insurance evaluations, is generally assessed in terms of pipe material, joint type, age, and ground conditions.

It is worth nothing that most of the entity's current pipeline network asset condition assessment data are mostly derived from desktop assessment based on age profiles, maintenance histories and estimated risk profiles, with the need for physical pipe condition assessment and validation to be increased for improved data quality in future.

Summary of overall water assets condition

The current overall condition of water assets is illustrated below, based on available historical data. We will continue to update and provide relevant comparisons of this data in future.

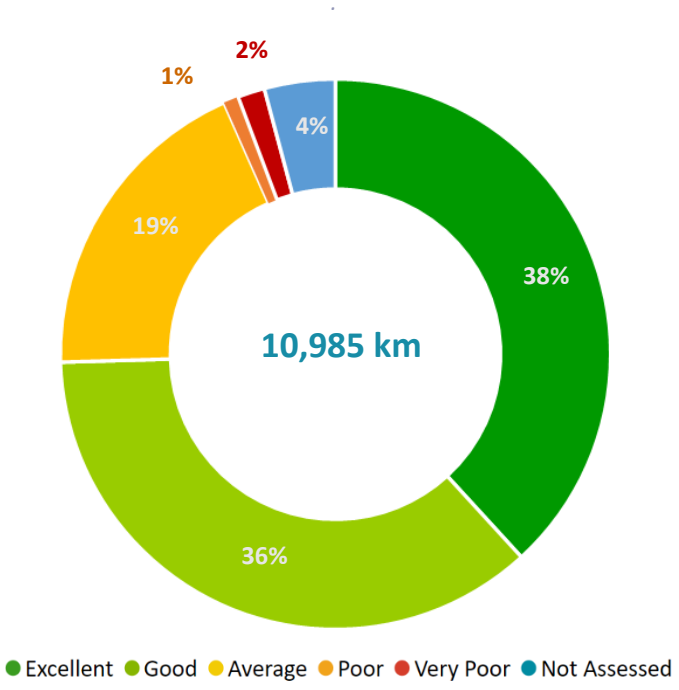


Figure 13 – Overall water network asset condition (Source: Data from councils)

Approximately 3% of all water supply pipelines are assessed to be in a poor or very poor condition. In the case of Auckland, it is also noted that a large portion of its local water network consist of asbestos cement and cast-iron pipelines. One of the key issues we face is the remaining life of our asbestos cement (AC) pipes, these were typically laid between 1950 and 1970. We know that this material can deteriorate quicker than expected due to attack from surrounding soils and could pose a perceived health risk.

To confirm our longer-term management of this asset base, a strategic economic appraisal is to be undertaken, based on further research with subject-matter experts. In the meantime, our approach to cover an initial period is to ensure the replacement of all AC pipes before they reach their service life. These pipe materials comprise an approximate water pipeline length of more than 3,500 km.

Water treatment and storage condition assessments involve physical condition assessment as described above. The overall condition of these assets is generally also reflected in their performance which is indicated in *Section 4*.

Potential solutions to poor asset condition - Water asset renewal

Potential solutions for renewal of water assets in Wai Tāmaki ki Te Hiku are planned to ensure continued water supply that meets the current level of service and quality requirements and reduces water loss. It also supports the drive to move from a "run to fail model" to a proactive renewal model which improves network resilience, reduce water loss and service interruptions, and achieves more efficient operation and maintenance of the water network. These planned projects will also replace critical assets which have reached the end of their economic life.

Auckland - major potential programmes are planned throughout Auckland for the renewal of local network and transmission water mains, and large watermain replacements such as at Upper Nihotupu. Water Treatment Plant (WTP) upgrades are also planned at the Huia WTP and Waitakere WTP.

Northland – potential water network renewal programmes are planned in all the Northland region, as well as several Water Treatment Plant (WTP) upgrades such as the Maungaturoto WTP in Kaipara, Poroti WTP in Whangarei and the Paihia WTP in Far North. In Whangarei, to counteract increasing average age trends an additional end of life renewal programme is planned and includes the replacement of outdated materials and resolving historic performance issues.

Asset Renewal is discussed further in *Section 9.*

Summary of overall wastewater asset condition

The current overall condition of wastewater assets is as follows, based on available data and those provided by forming members of our entity. Wai Tāmaki ki Te Hiku will continue to update and provide relevant comparisons of this data in future.

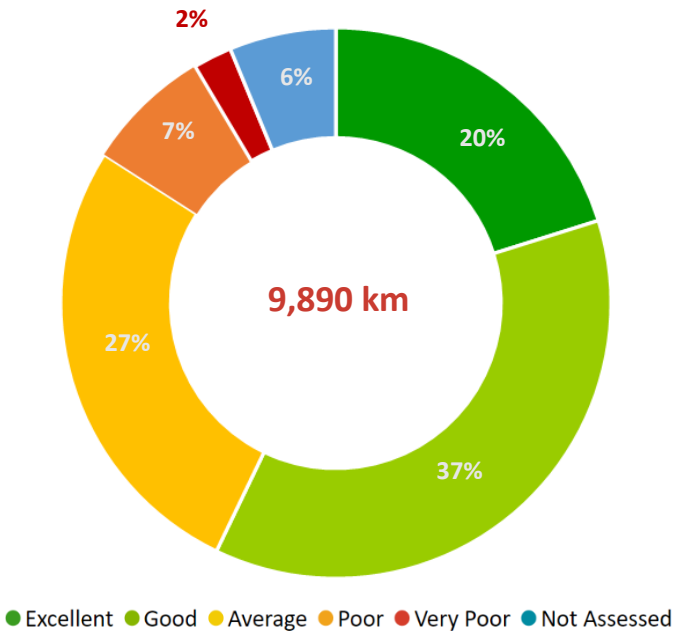


Figure 14 – Overall wastewater network asset condition (Source: Data from councils)

Wastewater treatment and pump station condition assessments involve physical condition assessment as described above. Approximately 9% of all wastewater pipelines are assessed to be in a poor or very poor condition. In Auckland a large portion of wastewater network pipelines (more than 2,000 km) are asbestos cement pipelines which may not be reflected being in poor condition but will require replacement. The overall condition of these assets is generally also reflected in their performance as detailed in *Section 4*.

Potential solutions to poor asset condition - Wastewater asset renewal

Potential solutions for renewal of wastewater assets in Wai Tamaki ki te Hiku are planned to replace existing assets approaching the end of their economic life. This reduces the risks of increased wastewater overflows. This helps prevent potential environmental and health impacts on the public and reduces inflow and infiltration into the wastewater network. Several wastewater treatment plant upgrades are planned to ensure consent compliance and protection for receiving environments.

Auckland - major potential programmes are planned throughout Auckland for the renewal of wastewater network pipelines. Several pump station equipment replacements and renewal and Wastewater Treatment Plant (WWTP) upgrades are also planned such as the Mangere WWTP renewal.

Northland Councils – potential wastewater network renewal programmes are planned in all the Northland Councils, as well as Wastewater Treatment Plant (WWTP) upgrades such as the Dargaville WWTP in Kaipara and the Kerikeri WWTP replacement in Far North. In Whangarei, to counteract increasing average age trends an additional end of life renewal programme is planned as well as an intention to move from a run-to-failure strategy towards a proactive renewal approach.

Asset Renewal is discussed further in *Section 9*.

Summary of overall stormwater asset condition

The following details indicates the current overall condition of stormwater assets, based on available data and those provided by the forming members of our entity. Wai Tāmaki ki Te Hiku will continue to update and provide relevant comparisons of this data in future.

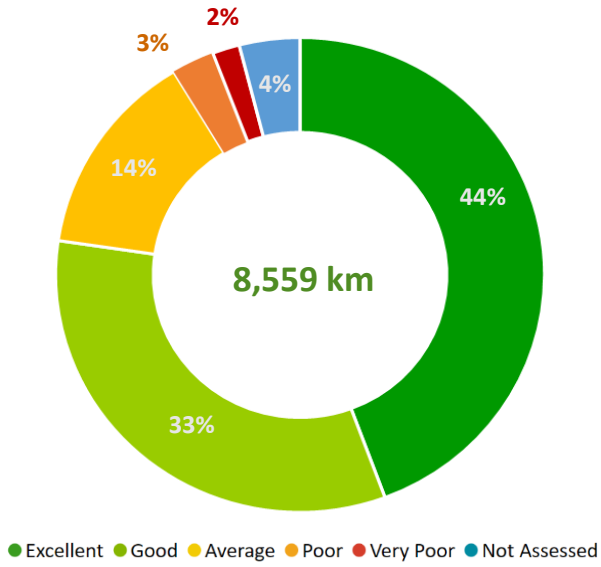


Figure 15 –Overall stormwater network asset condition (Source: Data from councils).

The condition assessments for manholes, outfalls and culverts are typically considered alongside and included with those of the network pipelines. The condition assessment for other assets, such as ponds, wetlands, treatment devices and more, involves a physical condition assessment that is limited by the data available. Approximately 5% of all stormwater pipelines are assessed to be in a poor or very poor condition. This figure may not reflect the need to replace asbestos cement and corrugated steel pipes not yet in poor condition but requiring replacement due to health concerns and high risk of structural failure. The overall condition of these assets usually aligns with their performance, as outlined in *Section 4*. Condition data is heavily influenced by Auckland; data for the northern councils show pipes in the northern regions are in a poorer state.

Potential solutions to poor asset condition - Stormwater asset renewal

Potential solutions for renewal of stormwater assets in Wai Tamaki ki te Hiku are planned to replace existing assets approaching the end of their economic life. This mitigates the risk and reduces the impact of flooding or potential environmental and health impacts on the public. Renewal of stormwater assets is based on condition, age, criticality, and population affected.

Auckland - major potential programmes are planned throughout Auckland for the renewal of the stormwater network pipelines and critical assets, and renewal of ponds, treatment facilities and stream rehabilitation.

Northland Councils – potential stormwater network renewal programmes are also planned in all the Northland Councils and increased condition assessment programmes, such as those planned in Whangarei, will result in an increase in asset renewal.

Asset Renewal is discussed further in *Section 9*.

Summary of pipe network asset condition per council

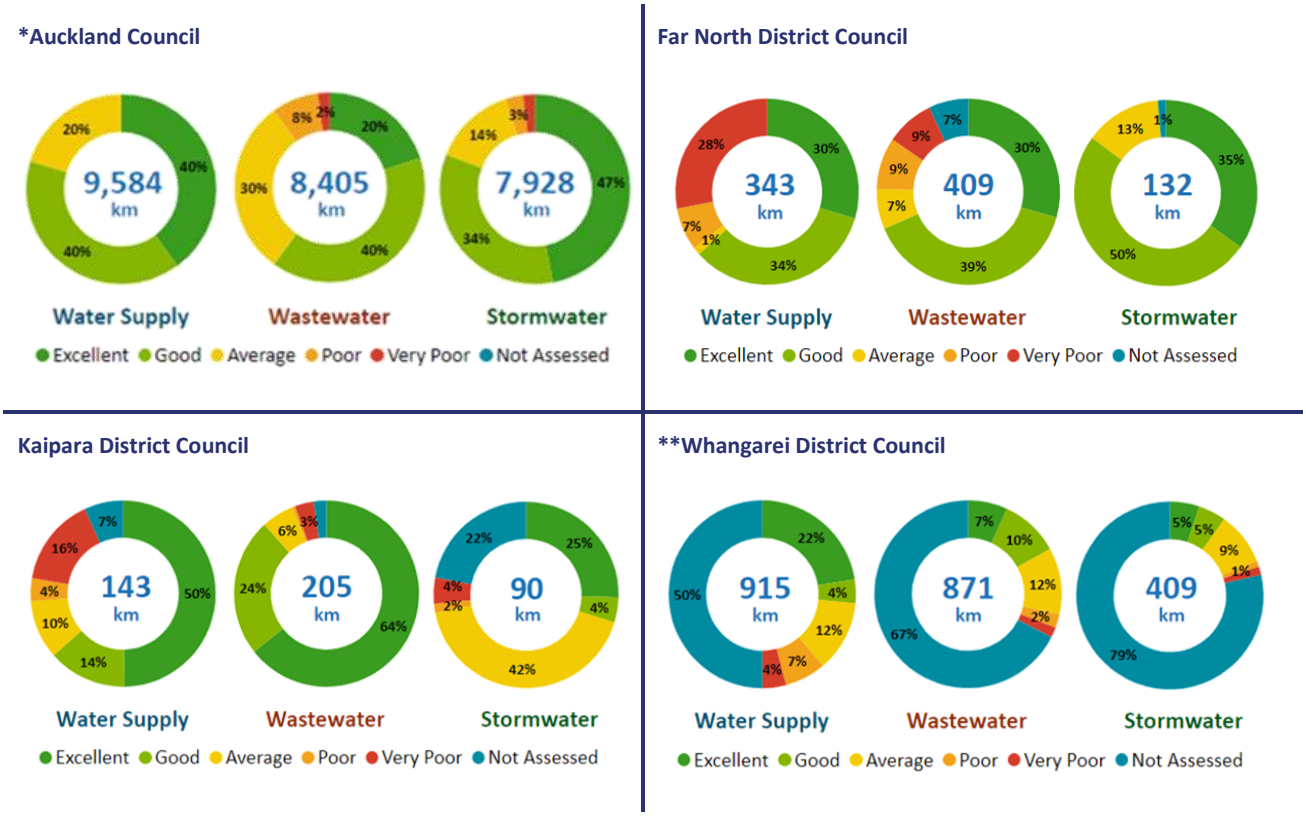


Figure 16 – Pipe condition and lengths for three waters networks (Source: Data from councils and NPR, 2021/22).

* It should be noted that the pipe network asset condition graphs for Auckland above are mostly derived from a desktop study based on age profiles, maintenance histories and estimated risk profiles. It does not fully capture a large proportion of it network assets consisting of asbestos cement (AC), cast iron (iron) or corrugated steel pipes which will require replacement due to health concerns, and may not be in a poor or very poor condition yet. The graph below provides an indication of large amount of existing water and wastewater pipes which are asbestos cement (more than 5,200 km) and iron pipes (more than 1,100 km), while these materials are less prominent in stormwater network assets.

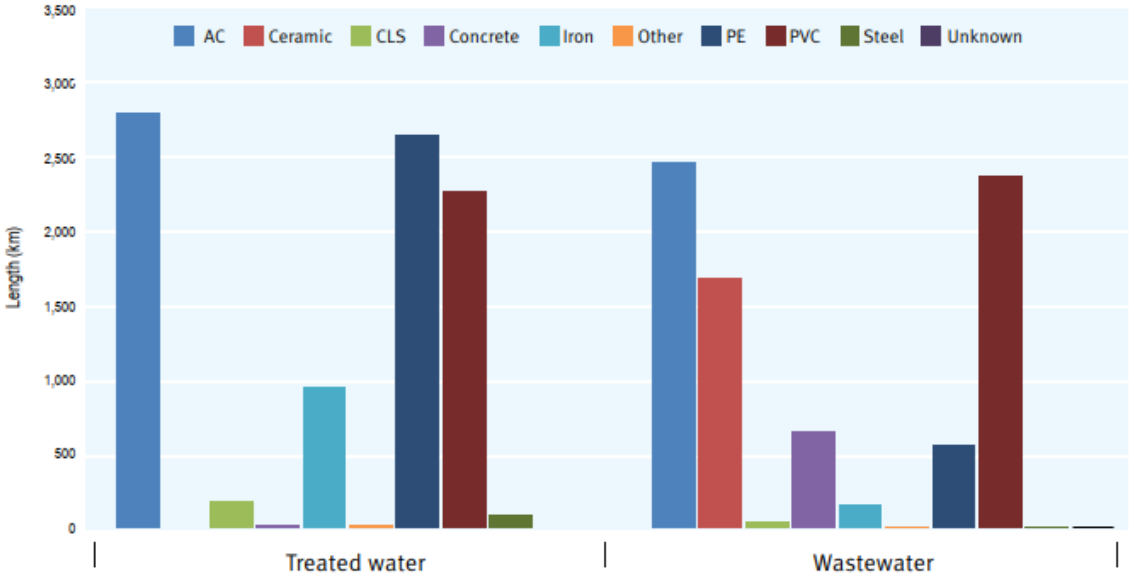


Figure 17 –Pipe materials of existing water and wastewater networks in Auckland (Source: Data from councils).

** Whangarei District Council currently bases their data on physical condition assessments only. It does not indicate the theoretical remaining useful life of assets (as is the cases for the other councils in this entity), hence showing high percentages of unassessed pipes.

Insights: Pipe network condition

- **Auckland Council** – based on currently limited condition assessment data most renewal needs, based on pipes in poor or very poor condition are required for the wastewater pipelines (with approximately 840 km in poor to very poor condition) and stormwater pipelines (with approximately 380 km in poor to very poor condition). However, when considering the substantial amount of asbestos cement and cast-iron pipelines to be replaced, the need for water renewals (with approximate length of more than 3,700 km) shifts the renewal/replacement focus to water, narrowly followed by wastewater (with an additional 2,600 km of asbestos cement and cast-iron pipes to be replaced). Asbestos cement pipe replacement for the Auckland stormwater network is likely to increase the need for renewals by approximately 6 % (approximately 450 km).
- **Kaipara District Council** - the need for renewals and network upgrades are required across three waters assets for water pipelines (with approximately 28km in poor to very poor condition), wastewater pipelines (with approximately 8km in poor to very poor condition) and stormwater pipelines (with approximately 5km in poor to very poor condition). There are also some gaps in condition assessment, especially for piped water and stormwater assets, as well as asbestos cement replacements to be addressed.
- **Whangarei District Council** – currently bases their data on physical condition assessments only. It does not indicate the theoretical remaining useful life of assets, hence showing high percentages of unassessed pipes. Renewals and network upgrades based on assessed assets are required across three waters assets for water pipelines (with approximately 119km in poor to very poor condition), wastewater pipelines (with approximately 35km in poor to very poor condition) and stormwater pipelines (with approximately 10km in poor to very poor condition). If a similar condition ratio is applied to the pipe networks that have not been assessed yet, the number of pipelines in poor to very poor condition could potentially be more than double the current estimates. Whangarei, therefore, has plans to increase assessments of both the physical and theoretical asset conditions.
- **Far North District Council** - the need for renewals and network upgrades are most significant for water pipelines (with approximately 121km in poor to very poor condition), followed by wastewater pipelines (with approximately 72km in poor to very poor condition). There are also gaps in condition assessment, especially for piped wastewater assets and asbestos cement replacements that need to be addressed.

3.3.2 Impact of Assets Owned by Others

Performance and operations of our network assets depend on several external factors. We must consider these factors while setting up performance targets and operational procedures. Our data collection of below ground and above ground three water assets owned by others are currently a work in progress. The table below provides a high-level list of assets owned by others (e.g., private property owners, Waka Kotahi, local councils) and their impacts on three waters services based on staff knowledge and experience. These will be considered while setting up performance targets and operational procedures.

Table 4 - Assets owned by others and their impacts

Categories of Assets owned by others	Potential Impact to Our Network
Stormwater assets in road corridors such as sumps, pipes, culverts, catchpits	Insufficient maintenance and deferred renewals lead to blockages and flooding issues.
Watercourses, stormwater systems and overland flow paths on private properties	Discharge / debris from landowners is hard to monitor and/or control which can result in downstream blockages, flooding, and potential breaches in discharge consents.
Privately-owned pressure pipes and water systems connected to the public network with no backflow prevention	Risk of contamination of public system due to backflow is mitigated through the installation of backflow prevention devices, inspections, and testing, all leading to additional resources and expenditure. Potential damage to surrounding infrastructure, e.g., sinkholes due to leakage.
Privately owned and managed backflow prevention systems	Failure of privately owned systems / devices has the potential to cause contamination of public water systems. Hence need to implement measures to ensure compliance leading to additional resources and expenditure.
Private sewerage systems and laterals	Damage to privately owned under-ground sewerage pipes and cross-connections to water or stormwater networks from private connections may lead to: i) discharge of harmful contents into surrounding soil or contamination of water and stormwater which could be harmful to the public. ii) inflow of stormwater during rain events causing capacity issues in wastewater network, amongst others.
Private stormwater systems, downpipes, sumps, gully traps	Damaged and non-compliant privately owned stormwater systems lead to inflow into wastewater network causing capacity issues in wastewater network.
Shared assets with other territorial authorities and regional councils	Work in progress.

3.4 Data Confidence and reliability

Asset data is made up of different datasets which include asset registers, valuations, criticality, condition, and performance. Asset data is used to inform operations and maintenance, capital, and renewal activities. The quality of asset data is important for making asset management decisions. Having high-quality and reliable asset data enables better-informed and more effective decisions.

Different methodologies and grading systems are currently being used to define asset data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 5 – Asset data confidence rating

Rating	Description/Grade
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)** Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	Asset register	Asset valuations	Asset condition
Stormwater	B	C	D
Wastewater	B	C	D
Water	B	C	D

Figure 18 –Initial data confidence rating – the assets we manage.

Confidence in our asset condition data is given a low grade (D) since the majority of our assets, with the exception of some water and wastewater pipe networks, do not currently have a formal asset condition grading. Overall physical condition assessment verification data is still limited, especially in the case of our treatment plants and pump stations. This is a key improvement focus area for our entity.

Due to current asset valuations being sourced at an individual council level we acknowledge that there are differences in the unit rates and assumptions applied to compile these figures. Therefore, our current data confidence in the resultant data is graded medium (C).

Overall asset register data confidence is high, especially for our pipeline networks, with some improvement needed for treatment plants and other above ground assets.

3.5 Opportunities for improvement

- **Asset data** – confirm existing data accuracy and completeness. Develop an asset data management strategy that aligns with levels of service, performance measures and initiatives to improve efficiency. The strategy would include a prioritised programme of improvements with an estimate for funding required over at least a 10-year period. An asset data management strategy offers several benefits, including improved decision-making, enhanced operational efficiency, regulatory compliance, and better collaboration. It provides accurate information for optimised asset utilisation, proactive maintenance, and risk management. By centralising asset data, organisations can make smarter decisions, improve performance, and drive operational excellence.
- **Above ground asset condition** - collate existing above ground asset information from various information sources, evaluate and input to asset management system to inform future decision-making processes. This will also need to include collation of seismic assessments and the status of upgrades to improve seismic resilience.
- **Below ground asset condition** - develop protocols for underground asset condition assessment and confirm existing information to date prior to committing to a medium to long term renewals programme.
- **Asset criticality** - develop and implement a criticality framework based upon national standards, which can be applied to (standardised) asset classes where possible. This will improve investment decision making by prioritising renewals and upgrades to those critical assets most at risk of failure.
- **Assets owned by others** – cross-reference with available legal property information and improve the capture of assets owned by other parties and the impact that may have for the operation and management of our networks and assets.
- **Asset data and confidence** - develop a standardised approach to the assessment and description of asset confidence and accuracy which aligns with national standard practice.

4 Current Levels of Service and Performance

This section covers our current provision of levels of service and how Te Mana o te Wai statements for water services are received and (to be) addressed. The current service levels are reported by use of:

- Department Internal Affairs performance measures (based on the latest council annual reports).
- National Performance Review on asset performance (based on annual reviews coordinated by Water New Zealand).

Highlights - Asset performance (current levels of service)

Insights from water assets' performance

Generally, the safety of drinking water currently achieves good compliance with the currently required health standards for bacteria and protozoal compliance. Compliance with more stringent drinking water standards in future will require investment to maintain such higher levels of service. Estimated average water consumption per capita trends downward for Auckland and Far North, with trendlines in Kaipara and Whangarei remaining mostly flat. Within all Wai Tāmaki ki te Hiku councils, the response times to faults are within their required performance targets.

Water loss is above the national average in the Northland councils, while the total volume of water loss in Auckland highlights a significant need for improvement. Water supply interruption frequencies and complaints vary between councils, with poor water supply network conditions contributing to these in Northland. Water treatment or other operational issues seem to correlate with complaints in Auckland.

Insights from wastewater assets' performance

The most significant cause of wastewater overflows is blockages in the wastewater network. This indicates a significant need for renewal of the ageing wastewater network. Next is wet weather overflows which require a reduction in inflow and infiltration. Kaipara and Far North have higher overflow frequencies when compared to other areas. This is likely due to poor wastewater network conditions and specifically plant failures in Kaipara. Wastewater complaints in the region also reflect the above needs. An increase in wastewater treatment capacity and renewal is needed across the entire region.

Insights from stormwater assets' performance

The devastating effects of recent flooding events have highlighted the need for ongoing improvement in the performance and capacity of stormwater assets in terms of resilience to mitigate the impacts of extreme events. The unknown conditions of stormwater assets in Whangarei require improvement to inform decision making and manage potential risks.

Currently many of the data sources reflecting asset performance is based on local and operational needs which is prone to be subjective. In future data and information improvement is a vital focus to provide a more objective view of investment needs.

4.1 Organisational Priorities and Measures

To inform future appropriate levels of service to meet customer, iwi/ hapū , stakeholder and community expectations, historical performance data can be useful for:

- Demonstrating the current and past level of service provision.
- Identifying gaps between the current and appropriate status of asset performance.
- Mapping the pathway of achieving the desired level of service to meet expectations.

This section shows the performance against current levels of service provided by the four contributing councils as assessed by the following (where relevant and available):

- Non-Financial Performance Measures Rules, Department of Internal Affairs, 2013, known as the Non-Financial Mandatory Performance Measures (based on council annual reports for the last five years).
- National Performance Review on asset performance (based on National Performance Reviews coordinated by Water New Zealand for 2021/22).
- Regional resource consent compliance (based upon information provided by regional councils in 2022).

The data in this section represents a selection of key performance measures to assess three waters service performance and does not represent the full set of measures available. These can be found in council and the National Performance Review annual reports.

4.1.1 Non-financial mandatory performance measures and targets

In 2010, the Local Government Act was amended, requiring local authorities to report non-financial mandatory performance measures via their annual reports. The aim was to help the community contribute to discussions in determining levels of service and allow them to compare the level of service provided by different councils.

Current levels of service frameworks implemented by the contributing councils have adopted the non-financial mandatory performance measures as a minimum. A few councils add their own measures for specific purposes.

In practice, results and targets are not benchmarked against other councils and there is little evidence that this reporting is used to improve performance or inform investments.

Performance against the mandatory performance measures for the four contributing councils has been collated for the last five years (based on council annual reports and availability of data). The mandatory performance measures from four key areas are indicated below and details are presented for each water service in the sub-sections.

Table 6 - Department of Internal Affairs mandatory performance measures.

Performance Categories	Measures	Systems
Compliance	Safety of drinking water (Part 4 and Part 5)	Water supply
	Discharge compliance	Three waters
Customer satisfaction	Customer complaints	Three waters
Fault response times	Attendance and/or resolution for a fault, unplanned interruption, or a flooding event	Three waters
Service performance	Water loss	Water supply
	Water consumption	Water supply
	Wastewater overflows	Wastewater
	Habitable floors affected by flooding events	Stormwater

4.1.2 National performance review

The National Performance Review, coordinated by Water New Zealand, collates and compares water, wastewater, and stormwater service provision across the nation. Its principal purpose is to provide accessible and comparable data to identify improvement opportunities. A combination of data from the mandatory performance measures and national performance review have been used to indicate the current levels of service and asset performance in the following sections.

4.2 Response to Te Mana o te Wai statements

The board of Wai Tāmaki ki Te Hiku, once established and as soon as practicable will acknowledge receipt of Te Mana o te Wai statements, engage with mana whenua who provided these statements and respond to such statements including a plan that sets out how the entity intend to give effect to Te Mana o te Wai, to the extent that it applies to the entity's duties, functions, and powers under the Water Services Entities Act 2022.

4.3 Levels of Service and Measuring Performance

Current levels of service are based on national legislative requirements and performance measures built upon industry regulatory requirements and standard practices. Details of current levels of service can be found in each of the councils existing asset management plans and its performance measurements can be found in relevant annuals plans. These are also reflected in the asset performance measures mentioned below.

Asset performance is defined as the asset's ability to meet service objectives (or measurable targets) related to capacity, reliability, quality, efficiency and / or utilisation.

Performance monitoring is intended to show whether an organisation is delivering the agreed outcomes for its customers (level of service). Organisations set up asset management objectives and level of service which are then translated into measures and targets (metrics). The metrics are measured regularly to inform network performance which comprises many assets and services (customer experience). Metrics allow management to intervene and take required remedial actions if there is a failure to meet required targets.

Asset condition and performance are linked as 'cause' and 'effect' respectively. That is, condition deterioration is a cause of failure – the effect of failure is poor performance (failure to meet required levels of service). Conversely, assets in good condition enable required or better performance.

The performance of three waters network can be measured in many ways. The most indicative and suitable measures, drawn from the Department Internal Affairs performance measures and the National Performance Review on asset performance, have been selected for the asset management plan. These measures are:

Water

- Safety of drinking water.
- Water consumption rate (demand management).
- Water loss.
- Water supply interruptions.
- Water supply complaints and fault response times.

Wastewater

- Wastewater overflows.
- Wastewater consent non-conformance (discharge compliance).
- Wastewater complaints and fault response times.

Stormwater

- Flooding.
- Stormwater consents (discharge compliance).
- Stormwater complaints.

The following section is a summary of network performance based on available information for contributing councils.

4.4 Water Supply Performance

The performance of water assets is discussed under the following performance criteria:

- Safety of drinking water
- Water consumption rate (demand management)
- Water loss
- Water supply interruptions

  Water supply complaints and fault response times

Potential solutions to address performance issues – Water level of service improvements.

Potential level of service initiatives for water in Wai Tāmaki ki Te Hikuis to ensure that the current levels of service can be maintained, while improving resilience against climate change impacts, addressing seasonal fluctuations and ensuring safe drinking water and the continuity of water supply. These include upgrades to water networks and treatment facilities as well as augmenting the Entity's water resource portfolio.

Auckland Region - in Auckland the potential projects to improve and maintain level of service are mostly driven by improved resilience. This could include projects such as the capacity upgrade of Ardmore Water Treatment Plan from 350 MLD to 480 MLD to enable supply continuity during extended peak summer demand periods caused by climate change.

Northland Region - in the Northland councils potential projects to improve and maintain level of service include mostly upgrades to water storage, network upgrades and increased capacity at Water Treatment Plants. Such projects could include upgrades to the Kaiwaka reticulated water supply, Rotu pump station and water networks in Kaipara, drought resilience and security of supply initiatives in Whangarei and upgrades to water treatment capacity and networks at Kerikeri, Kaitaia and Kawakawa in the Far North.

4.4.1 Safety of Drinking Water

Part 4 and Part 5 of the drinking water standards (Ministry of Health, 2018) monitor bacteria and protozoal compliance of drinking water supply. The table below presents the results on compliance with Part 4 and Part 5 performance measures in recent years. From this data our councils are currently mostly compliant with these drinking water quality performance criteria. However, it is known that there are some process control challenges in the Northland councils and at smaller more remote treatment plants across the region. The abovementioned measures have been replaced by the Water Services (Drinking Water Standards for New Zealand) Regulations 2022 and updated regulatory compliance data under the governance of Taumata Arowai is currently being collated and analysed for the 2022/23 year.

Compliance with Part 4

Contributing council	2017/18	2018/19	2019/20	2020/21	2021/22
Auckland					
Far North					
Kaipara					
Whangarei					

Compliance with Part 5

Contributing council	2017/18	2018/19	2019/20	2020/21	2021/22
Auckland					
Far North					
Kaipara					
Whangarei					

Compliant Not compliant Partially complaint N/A

Figure 19 – Drinking water safety compliance (Data provided by councils and Annual Reports)

It is noted that the new Drinking Water Standards for New Zealand (2022) is significantly more extensive than Part 4 and Part 5 of the drinking water standards by the Ministry of Health (2018) and investment will be made for increased process control and monitoring, as well as necessary upgrades to treatment facilities to ensure compliance.

4.4.2 Water consumption rate (demand management)

The average consumption of drinking water per day per resident is currently a DIA mandatory performance measure of the effectiveness of demand management within each of its councils. The average residential water consumption trendlines show a downward trend for Auckland, Kaipara and Far North in recent years, while Whangarei consumption seems to fluctuate. Compared to the national median, only Auckland's consumption per capita is similar. The Northland councils' consumption ranges from 13% to 78% higher than the national median, impacted by the seasonal influx of holidaymakers.

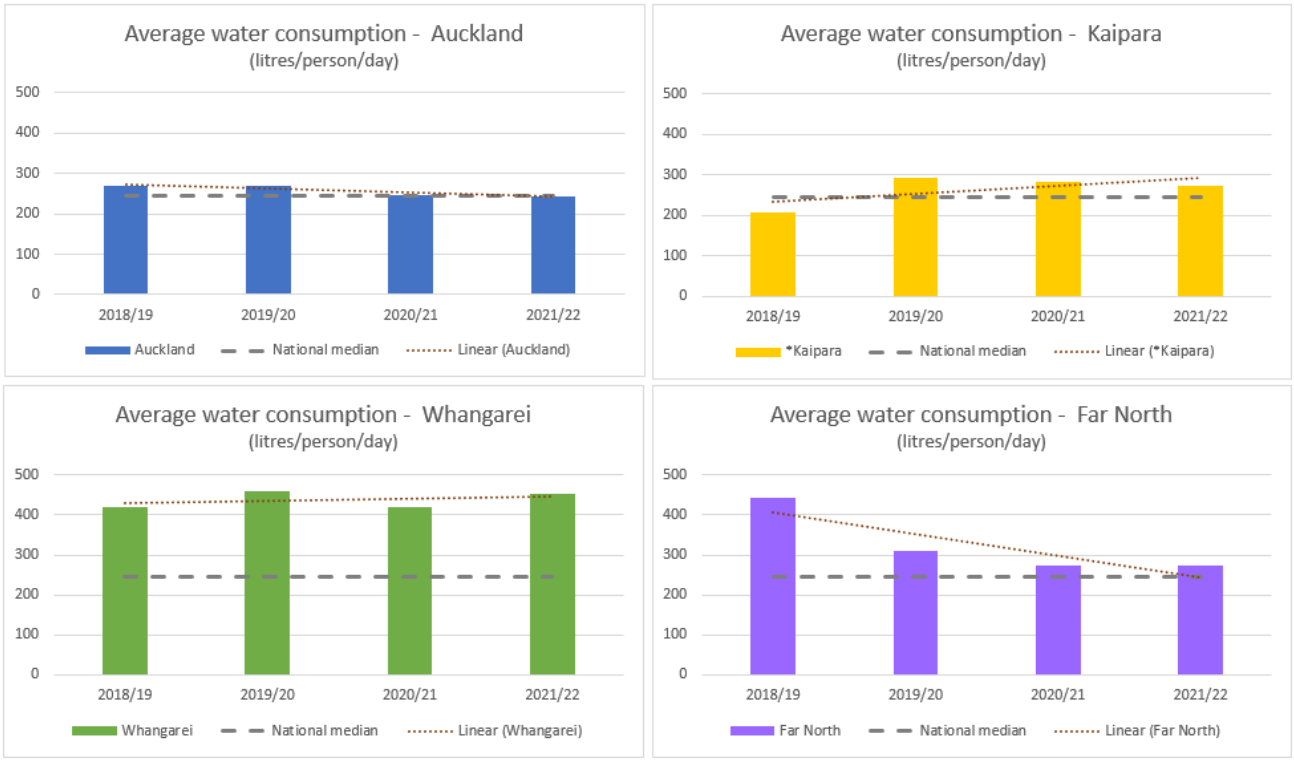


Figure 20 –Estimated average residential water consumption per resident (Data provided by councils and Annual Reports)

Insights: Water use efficiency and demand management

Through proactive water demand management, we aim to balance the needs of our growing population, preserve water resources, and build a resilient and sustainable water future. Water use efficiency and demand management measures include public awareness campaigns, water-saving devices, leak detection programs, water restriction policies (during droughts), irrigation controls, and investment in infrastructure upgrades to optimise water supply and distribution.

Taking care of our water through water use efficiency is a top priority for us and we encourage efficient water use through education and community engagement, and deliver it via our enhanced demand management programmes, as well as utilising technology, such as the expansion of the smart metering programme.

4.4.3 Water Loss

Water loss occurs when treated water is lost (mostly from underground leaks on water mains and water service pipes) before it is used by customers. In line with Kaitiakitanga: "the obligation of mana whenua to preserve, restore, enhance, and sustainably use freshwater for the benefit of present and future generations", investment should be directed to improve the effectiveness of the networks.

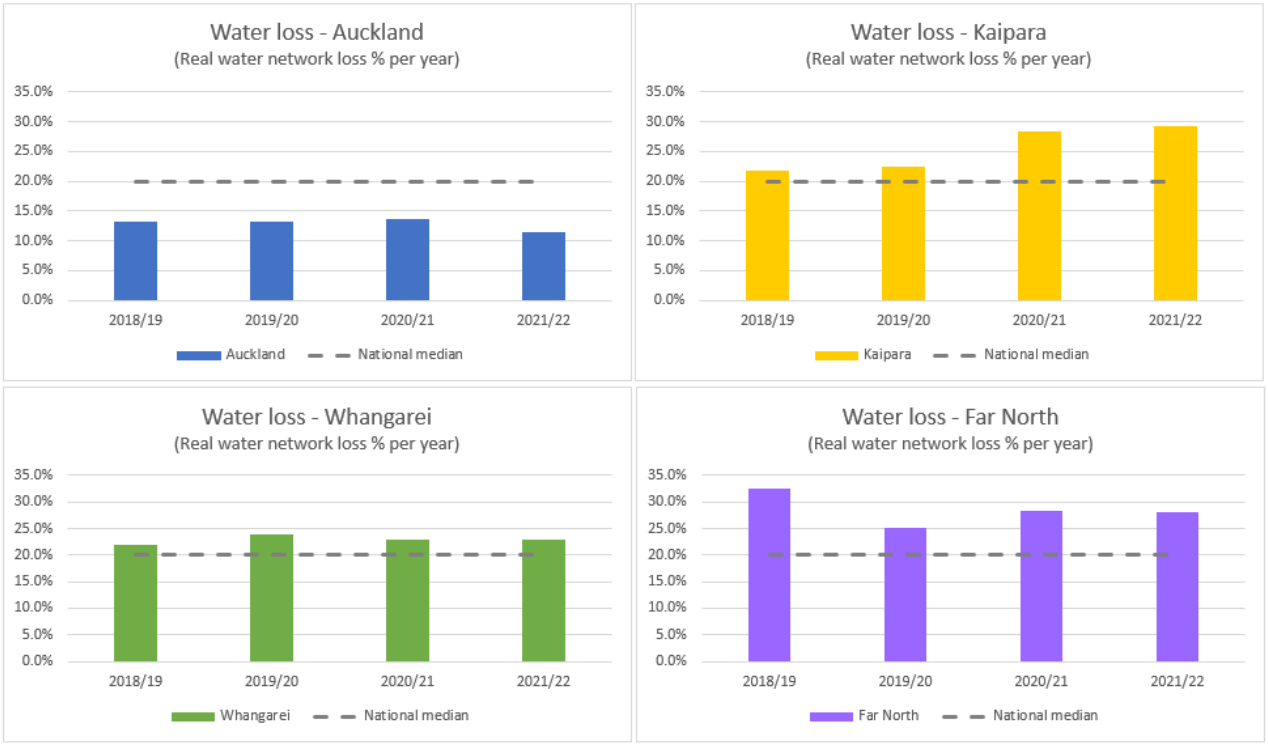


Figure 21 –Percentage real water network losses per year (Data provided by councils and Annual Reports)

The percentage of total water network losses range from 15% in Auckland up to an average of approximately 27% for the Northland councils. Water loss shown for smaller communities, such as several of those in the Northland councils, should be considered within the local context.

The following table provides additional detail on water loss indicators:

Table 7 - Water loss data (Data provided by councils and NPR, 2021/22)

Variable	Unit	Auckland	Kaipara	Whangarei	Far North	Average
CARL (current annual real loss)	m^3/year	21,555,992	356,627	2,037,867	952,624	**6,225,778**
CARL (current annual real loss)	m^3/km mains/day	6.2	0.7	5.8	7.6	**5.1**
Water pipelines in poor or very poor condition	%	0.04%	20.00%	4.07%	35.30%	**15%**

The total water loss is approximately 24.9 million cubic metres per year. The biggest losses are in the major urban areas as indicated by the data provided above.

The greatest risk these water losses pose involves the increased demand on water resources and impact on levels of services to these communities. The additional cost also negatively impacts on operational expenditure.

The Infrastructure Leakage Index (ILI) and % network losses for the networks is another measure that provides an indicator of where investment should be directed to improve water loss and improve the effectiveness of the networks for these communities. However, currently not all councils within our entity make use of this measure and therefore data is insufficient at this time and have been excluded.

Insights: Water loss

Data on water losses indicate that the percentage of total network water losses for Kaipara, Whangarei and Far North are similar, ranging from 23% to 29%. This is higher than the national median of 20% (based on the National Performance Review 2021-22, which data excludes Auckland and other councils and may not offer an appropriate comparison). In Kaipara and Far North, water losses correlate with the high percentage of water pipelines which are in poor to very poor condition, with Kaipara having 20% and Far North 35% of their water pipelines in these categories. Whangarei suffers from network losses comparable to the other Northland councils and due to its current method of pipe condition assessment a comparison between pipe condition and losses cannot be established. Increased losses are more likely in areas with larger pipe network and higher operating pressures within its system. These losses can be reduced through better pressure management, faster and higher-quality repairs, active leakage control, and investing more in the water pipeline renewal programmes.

Auckland data indicates that network losses amount to approximately 15%, which compares well against the current national median, but the level of data confidence and requires confirmation and improvement. When looking at the volume of actual water loss in Auckland, substantial investment in improved water loss management measures and infrastructure renewals is warranted. This is due to an estimated 13.5 million m^3 of water lost per year, which translates to about 8 m^3 (or 8,000 litres) of water lost per person per year.

Our aim is to reduce both water losses and achieve water use efficiency rates across the region, which are below appropriate international benchmarks for similar size water networks, which may vary within the entity's regions. Moving forward, our entity will improve its monitoring and data quality regarding water loss in line with best practices, such as the 3rd Edition of the IWA Manual of Best Practice Performance Indicators for Water Supply Systems, listing the following three reliable indicators that are available for real losses:

- **Real Losses per connection** (l/connection/day when system is pressurised), for urban distribution systems.
- **Real Losses per mains length** (l/km/day when system is pressurised), for bulk supply and low service connection density (rural) distribution systems.
- **Infrastructure Leakage Index (ILI):** the ratio between actual real losses and an estimate of the minimum real losses – calculated using the Unavoidable Annual Real Losses (UARL) formula – that could be technically achieved for the system operating pressure, average service connection length and service connection density.
- **Infrastructure Leakage Index (ILI):** the ratio between actual real losses and an estimate of the minimum real losses – calculated using the Unavoidable Annual Real Losses (UARL) formula – that could be technically achieved for the system operating pressure, average service connection length and service connection density.

4.4.4 Service Interruptions and Response

Water supply interruptions occur when there is a service disruption to the water supply service, which can be planned or unplanned. Planned interruptions occur when scheduled maintenance or repairs are planned on the public network and customers are notified that an interruption to their service will or may occur. An unplanned interruption occurs when there is an asset failure in the public reticulated network. Unplanned interruptions do not include interruptions caused by third parties or those within the property boundary of the customer.

The figure below provides an overview of the total number of water supply interruptions and the frequency at which they occur (based on the number of interruptions per 1,000 connected properties).

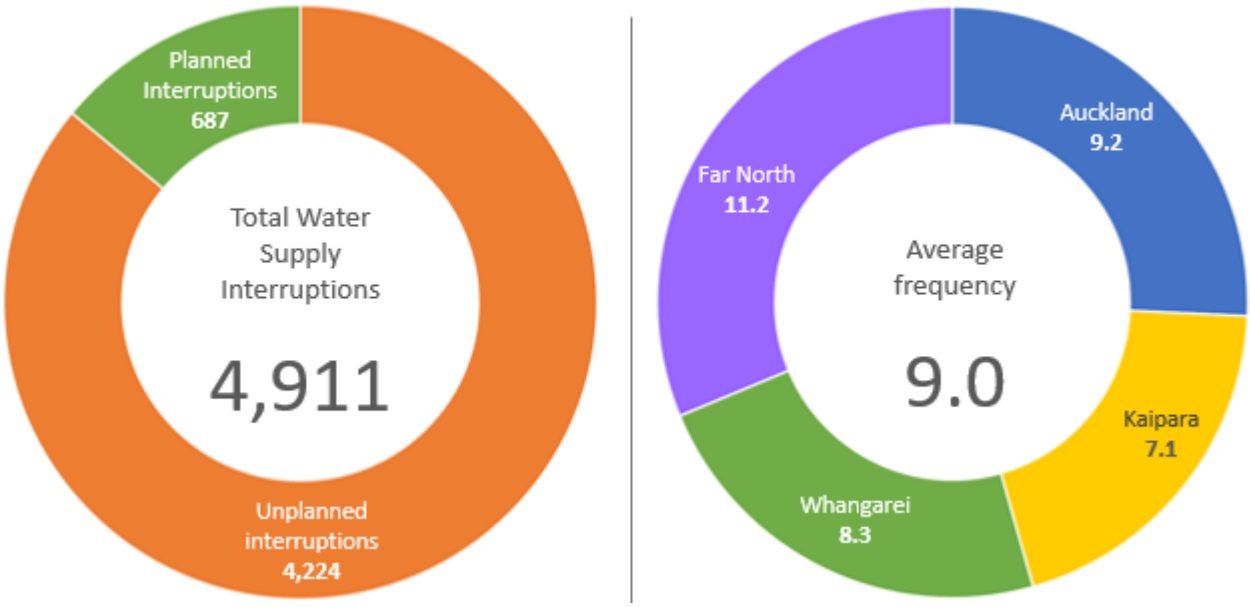


Figure 22 – Water supply interruptions (Data provided by councils and NPR, 2021/22)

A high level of unplanned interruptions indicates a network that probably requires some renewals and upgrades to improve performance. The frequency of these interruptions seems to be almost similar across councils. Such unscheduled disruptions can be costly to customers due to expensive disruption of their businesses; emergency repairs are typically also an expensive alternative.

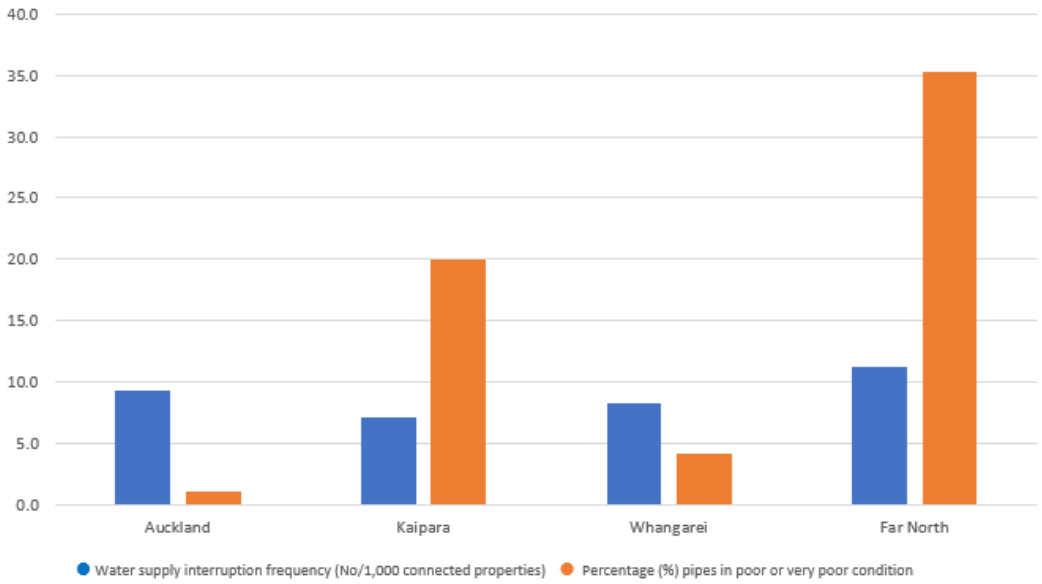


Figure 23 –Indicative water supply interruption frequency vs pipeline condition (Data provided by councils and NPR, 2021/22).

Insights: Water supply interruptions

Data on water supply interruptions indicate that in Kaipara, Whangarei and Far North the proportion of water pipelines that are in poor to very poor condition may be a significant contributing factor to the interruption in water supply. In Auckland, the impact of poor water pipeline conditions seems to be less of a factor contributing to interruptions. With more than 66% of its water supply complaints being related to pressure, flow, clarity, and taste, it appears that the water treatment plants, and supply pump stations could be the more significant cause of supply interruptions. In Whangarei, the data indicates some interruptions could be due to poor pipeline conditions and, like Auckland, more than 60% of its water supply complaints are related to pressure, flow, clarity, and taste. This too indicates that the water treatment plants, and supply pump stations could be another significant cause of supply interruptions. Future investment in proactive and predictive maintenance systems could reduce unplanned interruptions.

4.4.5 Customer Satisfaction

Service failure complaints are the likely result of poor or unsatisfactory performance by the network or its operation. These complaints are normally logged by the customers and consumers when they experience a failure of the network or if some aspect of the network does not align with their expectations. Measured complaints for the asset management plan include continuity of supply, clarity (or colour), taste, odour, and flow-pressure complaints.

The figure below shows the total number of water supply complaints and the frequency at which they occur (based on interruptions per 1,000 connected properties). Kaipara Council has the most substantial frequency of water supply complaints.

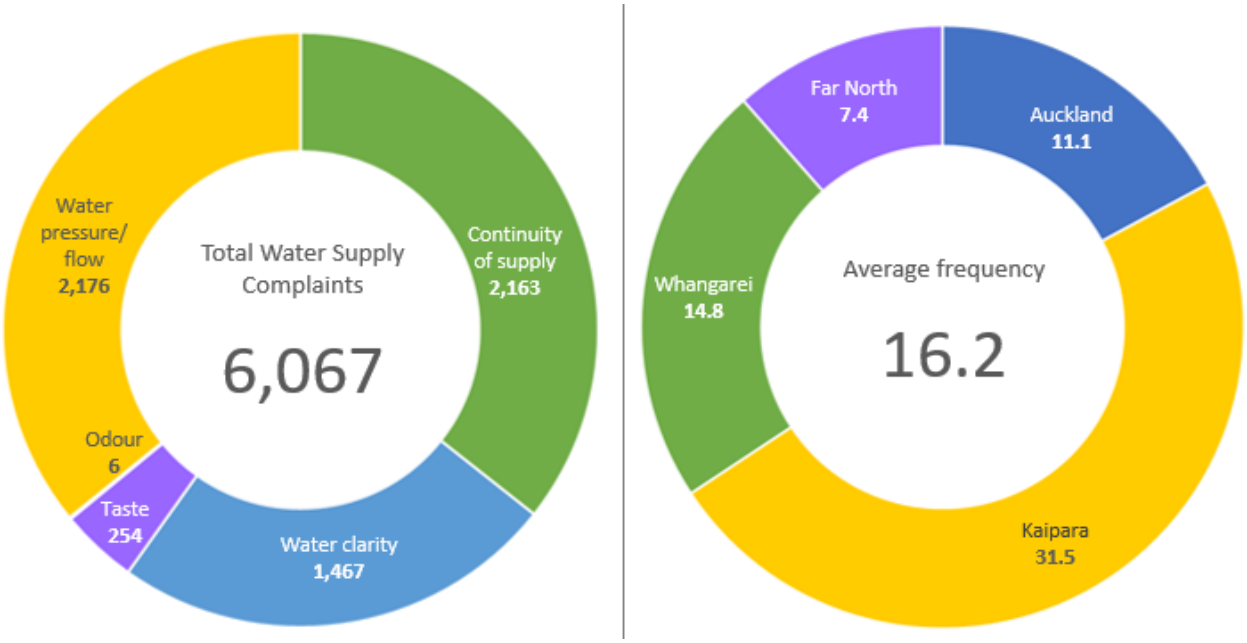


Figure 24 –Water supply complaints (Data provided by councils and NPR, 2021/22)

Insights: Water supply complaints

Data on water supply complaints in Wai Tamaki ki te Hiku show two major issues: continuity of water supply (36% of all complaints) and drinking water pressure complaints (36% of all complaints). These issues appear to be linked to water losses and interruptions in water supply, particularly in the Northland councils. In Kaipara and Far North, the condition of pipelines seems to be a contributing factor. In contrast, for Auckland, the complaints correlate with water supply interruptions but not with water losses and poor pipeline conditions. This suggests that the problems might stem from water treatment plants, pump stations and supply reservoirs, or other operational issues.

The remainder of complaints (28% of all complaints) are related to the clarity, odour and taste of water which can most likely be attributed to complex raw water conditions and subsequent difficulty of treatment to meet aesthetic requirements. Water clarity contributes 24% out of the remaining 28% and could also be caused by backflow or the numerous interruptions in water supply.

The fault response times for urgent water supply-related callouts are indicated below, all of which are well within the required performance targets.

Table 8 - Water supply fault response times (Data provided by councils and Annual Reports, 2021/22)

	Unit	Auckland	Kaipara	Whangarei	Far North	Average
Median response time to urgent callouts	minutes	59	45	26	55	46.3
Median resolution time to urgent callouts	hours	3.1	2.8	1.7	3.03	2.7

4.5 Wastewater Performance

Performance of wastewater assets is discussed under the following main performance criteria:

- Wastewater overflows
- Wastewater consent non-conformance (discharge compliance)
- Wastewater complaints and fault response times

Potential solutions to address performance issues – Wastewater level of service improvements.

Potential level of service initiatives for wastewater in Wai Tāmaki ki Te Hiku to ensure the maintenance and enhancement of service levels. The planned projects aim to boost the capacity and capability of Wastewater Treatment Plants (WWTP), meeting both consent and performance requirements while increasing resilience. Additionally, upgrades to the wastewater network are planned in specific areas to preserve the current service levels.

Auckland - the potential wastewater projects addressing level of service include the new Clarks Beach WWTP; Rosedale WWTP sludge conditioning; Wairau Valley diversion; upgrade of Beachlands WWTP and several upgrades at Mangere WWTP involving sludge conditioning, biogas for co-generation, and peak flow treatment.

Northland Councils - the potential wastewater projects addressing level of service include the new Ruakaka WWTP disposal investigations and upgrades, community wastewater services and new connections in Whangarei, the additional wet weather storage at the Dargaville WWTP in Kaipara, and the Kaikohe WWTP upgrade in Far North.

4.5.1 Wastewater Overflows

Wastewater overflows from wastewater treatment plants and the wastewater network can be a serious source of pollution. These potentially pose significant health risks to the public and can cause damage to receiving environments. Wastewater overflow events are mainly caused by blockages in the network (including pump stations), plant failures (both treatment plant and pump stations), and overflows during wet weather flow events, which often indicates a lack of capacity and infiltration into the network. Some of the older wastewater networks were designed to overflow and without remedial investment such as attenuation structures or increased capacity they will continue to pose a challenge to our entity.

The figure below summarises the number of wastewater overflows and their frequency of occurrence (based on the number of interruptions per 1,000 connected properties).

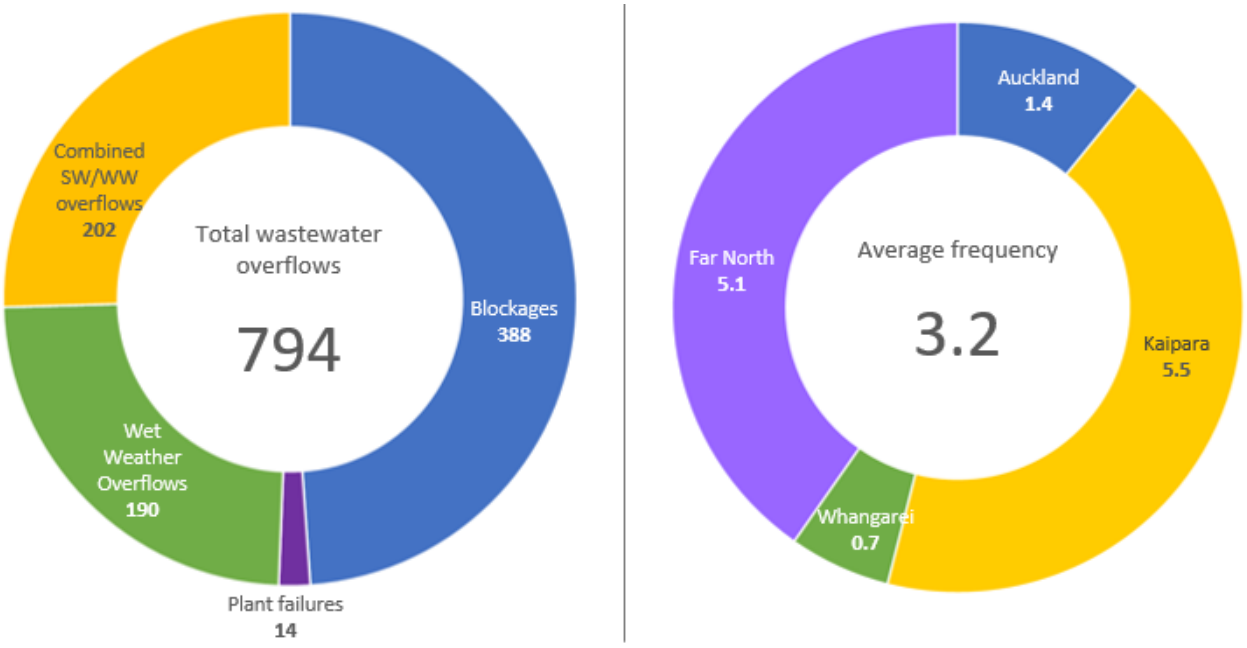


Figure 25 –Total wastewater overflows and frequency per council (Data provided by councils and NPR, 2021/22).

Insights: Wastewater overflows

Data on wastewater overflows indicates that the most significant cause of overflows are blockages in the wastewater network (49% of all overflows), followed by wet weather overflows from the wastewater network (24% of all overflows) or wet weather overflows from combined stormwater/wastewater networks (25% of all overflows). Overflows due to plant failures seems to be limited, contributing only 4% to the total overflows. Capacity deficits in the network, and significant inflow and infiltration, are behind some of the main causes of wastewater overflows, indicating a significant need for renewal of ageing pipelines. There is also a requirement to replace and separate networks where stormwater and wastewater are still combined.

When assessing the frequency and location of wastewater overflow, the frequency per 1000 connected properties seems low and similar for Auckland and Whangarei, with Kaipara and Far North having a significantly higher frequency of overflows. In Far North this is largely attributed to wet weather overflows from the wastewater network (>75% of overflows in Far North). This indicates a need to upgrade the wastewater network to reduce inflow and infiltration and to lower the impact of wet weather peaks where possible. Approximately 18% of wastewater pipelines in Far North is assessed to be in poor to very poor condition, while 7% has not been assessed. In Kaipara the cause for overflows is predominantly plant failures (>75% of overflows in Kaipara) which highlights the need to upgrade wastewater treatment plants and pump stations.

4.5.2 Wastewater consent non-conformance (discharge Compliance)

Non-compliance with consents for wastewater treatment plant and network discharges indicate that the treatment plants and the wastewater system are not performing as expected.

The figure below shows the number of wastewater overflows and the frequency at which they occur (based on number of interruptions per 1,000 connected properties).

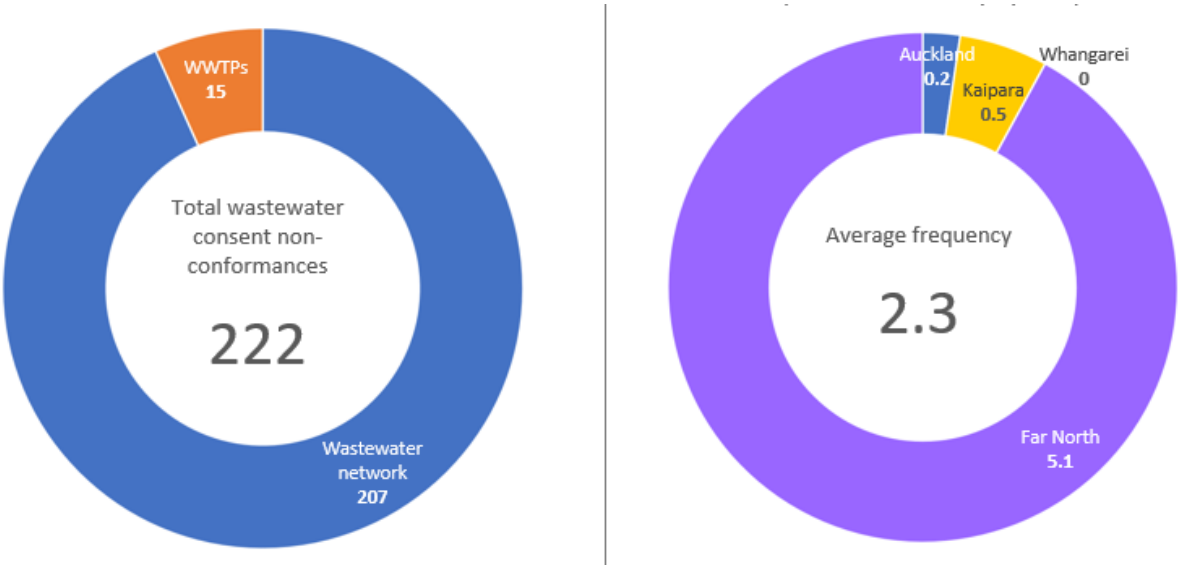


Figure 26 –Total wastewater consent non-conformances and frequency per council (Data provided by councils and NPR, 2021/22).

Insights: Wastewater consent non-conformances

Data on wastewater consent non-conformances indicate that the most significant cause of consent non-conformances occur at the wastewater network (93% of total). The highest frequency of overall non-conformances occurs in Far North, while those at treatment plants mostly occur in Auckland contributing 43%, and Far North contributing 50% to the total consent non-conformances at plants. The high frequency of wastewater consent non-conformances for Far North, as indicated above, demonstrates the specific need for improvement in the region. It should be noted that the above is a general overview of consent non-conformances, which should not be used as a comparison since the condition of consent varies within councils and between plants, which should be considered when addressing such issues.

4.5.3 Wastewater complaints

The total number of wastewater complaints and the frequency at which they occur (based on number of interruptions per 1,000 connected properties) is illustrated below.

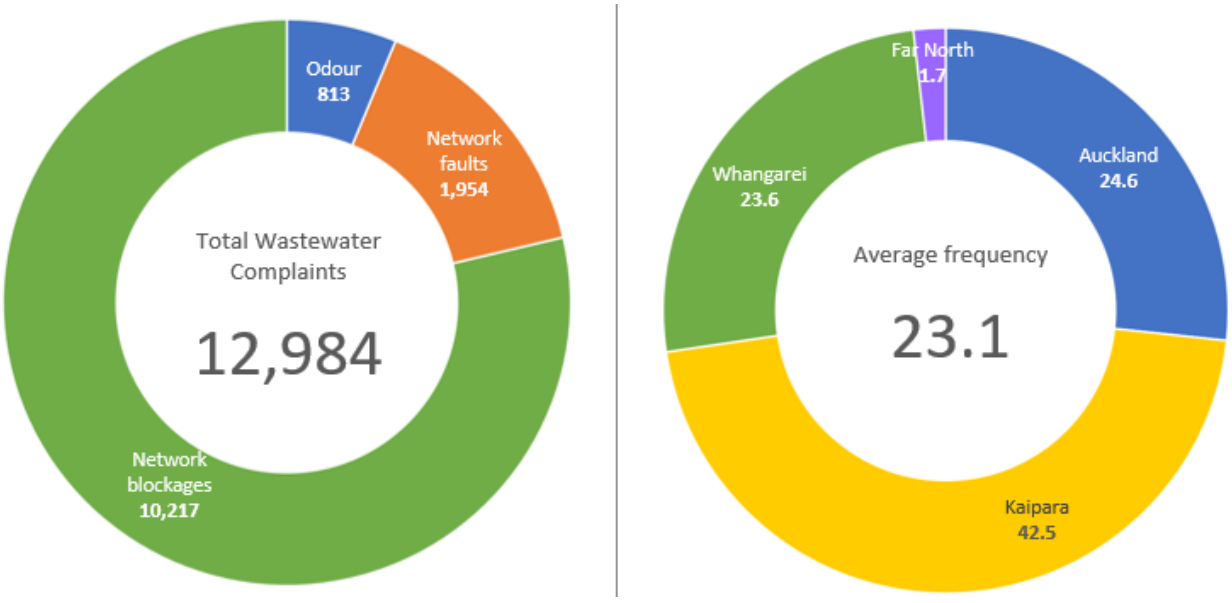


Figure 27 – Wastewater complaints (Data provided by councils and NPR, 2021/22)

The fault response times for urgent wastewater overflow-related callouts are indicated below, all of which are well within the required performance targets.

Table 9 - Wastewater overflow fault response times (Data provided by councils and Annual Reports, 2021/22)

	Unit	Auckland	Kaipara	Whangarei	Far North	Average
Median response time to urgent callouts	minutes	63	40	36	68	51.8
Median resolution time to urgent callouts	hours	3.7	2.7	2.9	3	3.1

Insights: Wastewater complaints

Data on wastewater complaints indicate that the most significant source of complaints are related to wastewater network blockages (79% of total). Complaint frequencies within the region are highest in Kaipara with most complaints being network fault and blockage complaints. Complaints frequencies in Auckland and Whangarei are similar, with blockage complaints most significant in Auckland and network fault complaints being the majority in Whangarei.

4.6 Stormwater Performance

Performance of stormwater assets is discussed under the following main performance criteria:

- Flooding
- Stormwater consents
- Stormwater complaints

Potential solutions to address performance issues – Stormwater level of service improvements.

Potential stormwater level of service initiatives is planned across Wai Tāmaki ki Te Hiku to maintain and improve the level of service which are mostly driven by improvements in resilience, flood protection, water quality and consent compliance.

Auckland Region - potential stormwater projects addressing level of service include the Western and Eastern Isthmus projects, flood protection, alleviation and controls, containment management, and stream and environmental improvements.

Northland Region - potential stormwater projects addressing level of service include improved resilience at Wood and Upper Robert Street, Mangawhai for improved flood prevention and network upgrades in Kaipara, stream and network improvements, catchment flood mitigation and CBD flood hazard mitigation in Whangarei, and district-wide network upgrades in Kaitaia in Far North.

4.6.1 Flooding

As a result of climate change, severe weather events, including those that may overwhelm our stormwater network, are becoming increasingly frequent. New Zealand has experienced some extreme events after the 2022 NPR data was collected, so it may look quite different for the next survey. For example, the severe flooding in Auckland and the impacts of Cyclone Gabrielle in early 2023 resulted in several fatalities and extensive damage to properties and infrastructure across the region. The region is still recovering from the aftermath of these events.

The figure below shows the flooding data reported in 2021/2022.

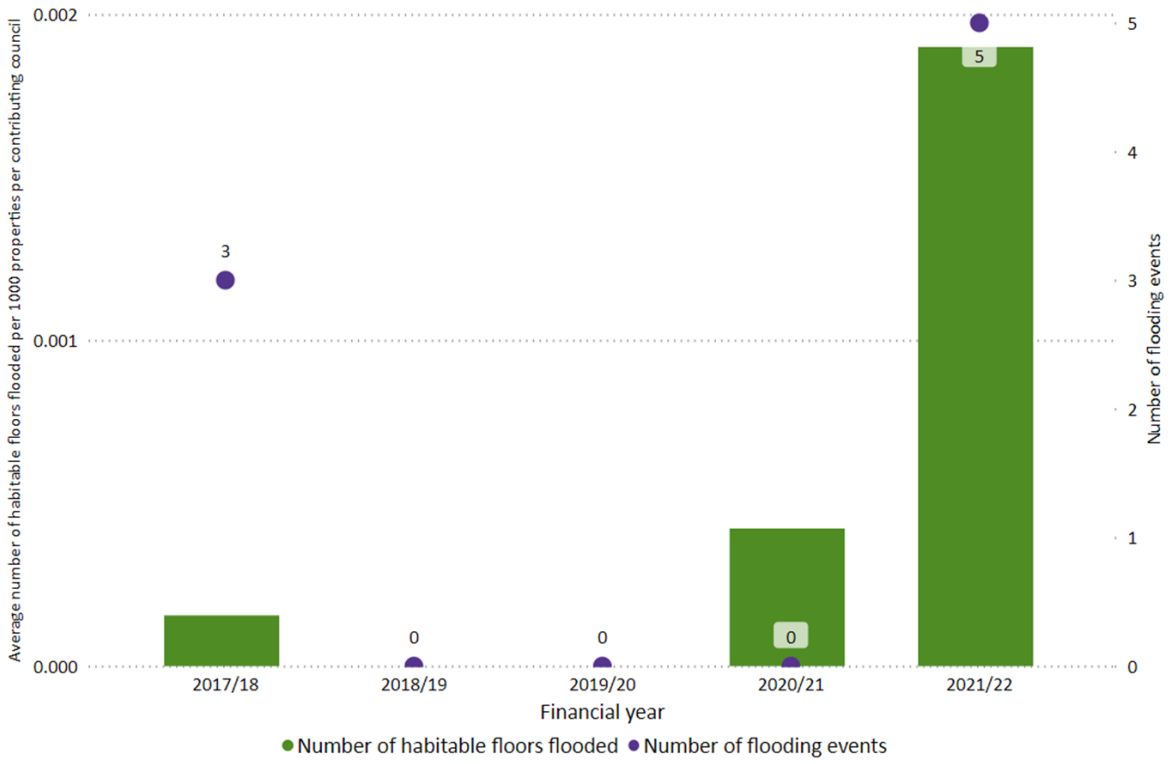


Figure 28 –Flooding by type of event (Data provided by councils and NPR, 2021/22)

Insights: Flooding

Data on flooding events indicate that the greatest impact of flooding occurred in Auckland. This is expected due to its high population density. There are many events that overwhelm stormwater capacity, which impacts the number of habitable floors. The recent events in 2023 significantly impacted the above figures. This is expected to dictate the necessary planning and investment in stormwater infrastructure and systems in coming years to mitigate the risks and impacts of such extreme events.

4.6.2 Stormwater quality (Discharge Compliance)

Improving stormwater quality is a key driver across New Zealand. Regional councils are changing their discharge quality standards to ensure that the water quality of discharges into the receiving environment improves. Further investigation into stormwater quality and resource consent compliance levels is needed. These should be considered as a performance measure for stormwater infrastructure.

4.6.3 Stormwater complaints

The figure below summarises the total number of stormwater complaints and the frequency at which they occur (based on the number of interruptions per 1,000 connected properties).

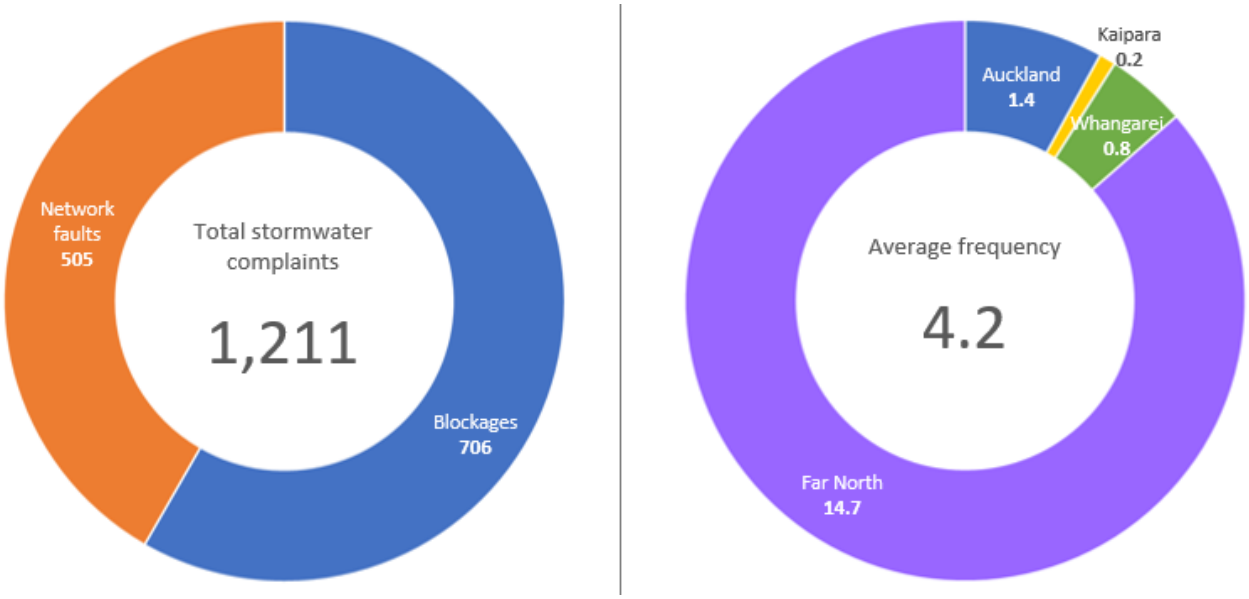


Figure 29 –Stormwater complaints (Data provided by councils and NPR, 2021/22)

Insights: Stormwater complaints

Data on stormwater complaints in Wai Tāmaki ki Te Hiku indicates that the most significant source of complaints is mostly related to stormwater blockages, closely followed by network faults complaints. Complaint frequencies are highest in Far North with blockage complaints being the highest. However, the above figures do not incorporate the devasting impacts of flooding during early 2023 and will therefore likely change.

4.7 Resource Consent Compliance

We hold more than 1,600 active consents which are required to operate our activities. Significant amounts of data regarding consents are currently not available in detail and present several challenges in sourcing of data. Out of the total number 1,603 active consents approximately 14% have unknown expiry dates and the compliance status of 65% of all consents are unknown, mostly consisting of minor or low risk consents. Improving data quality to better manage consent compliance in future is one of the key focus areas for our entity. Most of the existing consents involve coastal activities, water discharges and diversions, land use consents, stormwater activities, discharges associated with our wastewater treatment plants, water storage and dams and water takes.

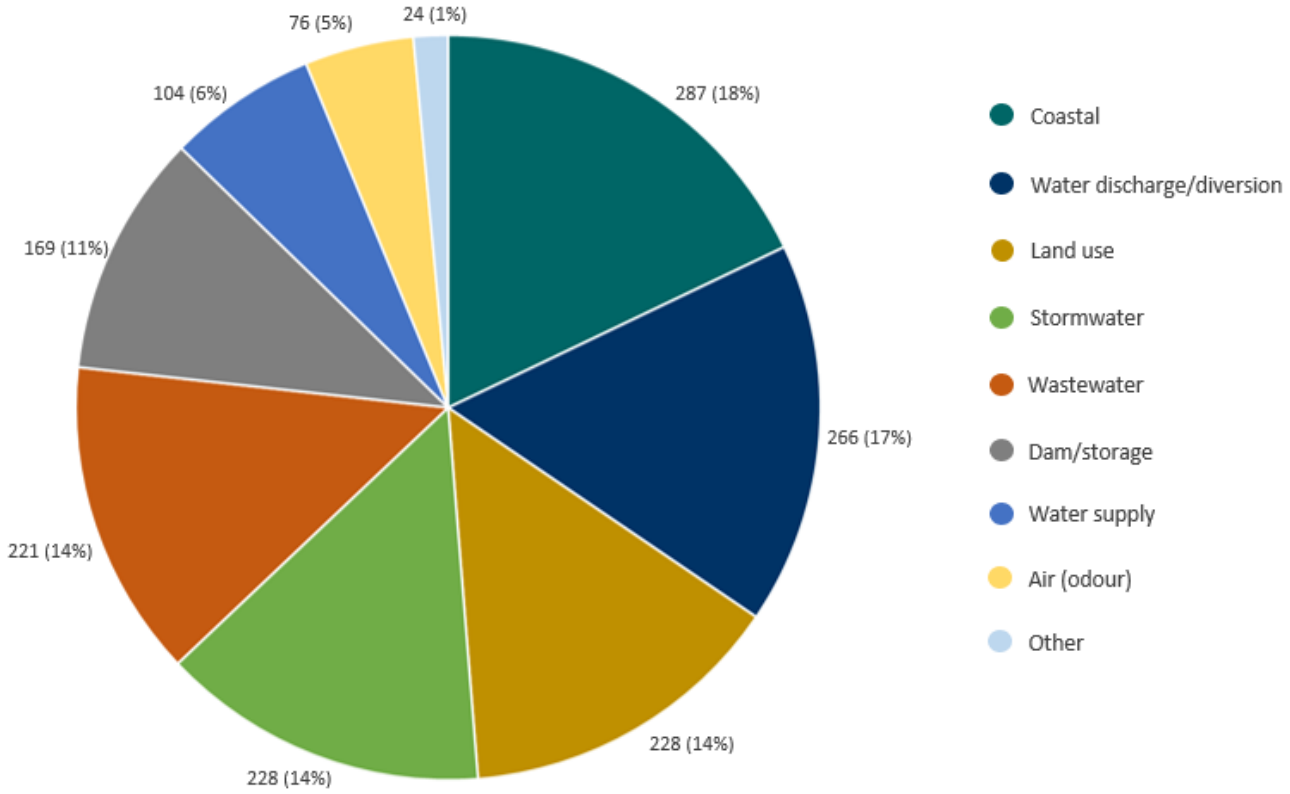


Figure 30 –Consent number and types (Data provided by councils and NPR, 2021/22)

Data on the compliance status of active consents indicate significant non-compliance of only 3 consents, which include one coastal and two wastewater discharge consents which are planned to be addressed. Moderate and minor non-compliances comprise approximately 3% of the total active consents, mostly consisting of water supply, wastewater discharge and coastal consents. There are also approximately 29% of total consents under ongoing monitoring to ensure its compliance and another 3% which involves construction activities and monitoring.

The expiry dates of our consents are shown in the graph below. More than 430 consents will need to be renewed within the 10-year planning period up to 2033/34. The investment profile for consent renewal will be further aligned with this requirement as part of the detail investment profile developed in the final initial asset management plan.

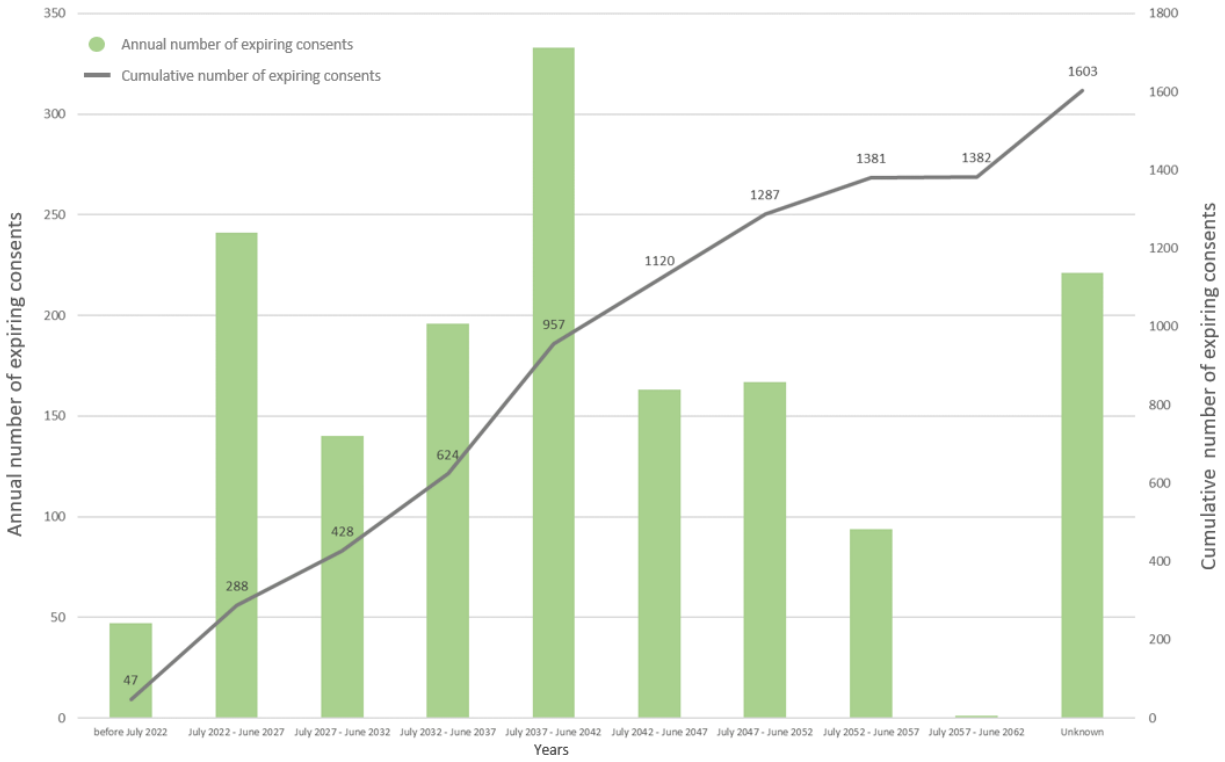


Figure 31 –Status of expiring consents (Data provided by councils and NPR, 2021/22)

4.7.1 Forecasted capital investment addressing consent compliance.

An investment of approximately $634 million is currently planned in the next 10 years to renew the expiring resource consents and to improve and ensure compliance. The investment profile below indicates good correlation with current needs for renewal of expiring consents in our region. This investment profile is a work in progress and will be finalised with the final initial asset management plan, due to for completion in early 2024.

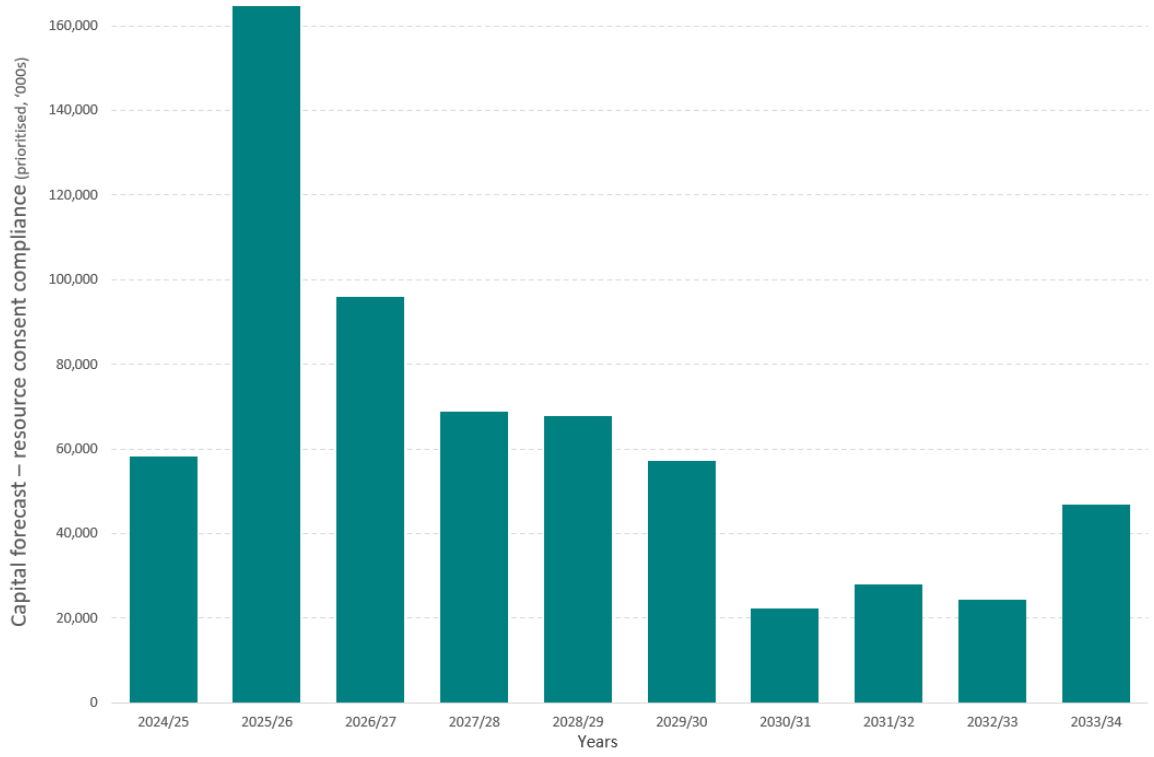


Figure 32 –Forecasted capital investment in resource consent compliance (Real dollars 2023, prioritised)

Some of the most significant projects where investment is driven by resource consent compliance include the new Clarks Beach WWTP and Army Bay WWTP upgrade in Auckland, the new effluent disposal system at Ruakaka WWTP in Whangarei, Kaikohe WWTP upgrade in Far North and the additional emergency wet weather storage at the Dargaville WWTP in Kaipara.

4.8 Data Confidence and Reliability

Performance data is made up of different datasets which includes drinking water safety compliance and water consumption data, water loss calculations and estimates and work orders for service interruption history. The data received has an overall confidence of medium due to the historical data having slightly different levels of service targets through which performance is measured against.

Different methodologies and grading systems are currently being used to define asset data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 10 - Asset data confidence rating

Rating	Description
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)** Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	Levels of service	Performance measures	Resource consents
Stormwater	B	C	D
Wastewater	B	C	D
Water	B	C	D

A - Very High | B - High | C - Medium | D- Low | E - Very Low

Figure 33 –Initial data confidence rating – the asset performance.

The sourcing and collation of data related to resource consents have been challenging. Due to these challenges and some uncertainty identified in reconciliation of data from regional and city councils our current data confidence grading is low (D). This will be a key improvement focus area managed at an entity level in future.

Due to some differences in the reporting of performance measures when comparing data provided by councils, the National Performance Reviews, council annual plans and other sources, data confidence is graded as medium (C) for performance measures.

Levels of service is generally well defined and consistently reported within each council. Future standardising of performance measures and levels of service approaches will contribute significantly to enhancing the overall quality and consistency of these datasets.

4.9 Opportunities for improvement

- **Drinking water compliance** – alignment with requirements from Taumata Arowai in future.
- **Reducing water loss** – investigate water supply networks with high water loss and develop a remediation programme which may include an upgrade of poor condition assets, metering unmetered supplies.
- **Reducing wastewater overflows** – investigate wastewater networks with a high incidence of dry weather overflows to determine the root causes and apply mitigation measures. This may include real-time monitoring of the wastewater network; asset management practice (regular inspection, cleaning, and repair of pipes, pumps, and other equipment); capacity investigations and upgrades; public education to reduce the amount of non-flushable items and other materials that can cause blockages and overflows.
- **Reducing inflow and infiltration** – investigate wastewater networks with high inflow and infiltration and develop a remediation programme which may include testing for illegal stormwater connections and upgrade of poor condition assets.
- **Resource consent compliance** – collate and verify resource consent information into one database. Undertake a review and prioritisation exercise to identify focus areas based on expiry dates, work done to date, non-compliances, and engagement with mana whenua.
- **Resource consent compliance** - in conjunction with Resource Management Reform, undertake an overall review. This is to identify opportunities to improve compliance and streamline consenting processes. The review will include consideration of if/when to apply for comprehensive stormwater consents for the areas without one, and the potential to standardise conditions where appropriate.
- **Resource consent compliance** - develop a co-governance framework with mana whenua and regulatory bodies (both councils and central government). This will help establish a common approach to existing and future consents.

5 Future Levels of Service and Performance Measures

This section defines how Wai Tāmaki ki Te Hiku will set and monitor the level of service expected to be delivered to its customers, and how the overall performance of the organisation will be managed.

The formation of our entity represents a step change from current practice to a more strategic and results-oriented approach to setting service levels. This change is designed to better align with the principles of Te Mana o te Wai. It involves turning our community outcomes and strategic priorities into tangible service provision levels.

This section also presents a national level of service and performance framework that has been developed in accordance with legislative and industry regulation and practice. It includes draft performance measures and a schedule for reporting and addresses future considerations for levels of service such as carbon reduction and dam safety compliance.

Our aspiration, with the engagement of our customers and community, we will agree the level of service targets for the 2027 Asset Management Plan, aligning investment spend with the management of service levels.

Within the framework there is a suite of economic regulation measures from our entity's establishment date (day 1). We will work collaboratively with the new regulatory bodies to agree a future suite of measures that will demonstrate the benefits of water reform through improved performance for our customers.

5.1 National Level of Service Framework

A national level of service framework has been developed to be:

- **Adaptable** - providing for the adjustment of performance measures being reported, thus enabling them to align with changing strategic priorities. This adjustment can be observed in documents such as the Government Policy Statement, and other relevant National Policy Statements that impact the delivery of three waters services.
- **A Benchmark** - ensuring the data reported from each entity is comparable with other entities (enabling effective water sector benchmarking and competition by comparison). This framework may replace current industry benchmarking such as the Water New Zealand national performance review and the non-financial performance measures rules (Department of Internal Affairs).
- **Consistent** – removing variability and ambiguity from the performance reporting framework by mandating the approach to be used to calculate performance measures.
- **Engagement-focused** – ensuring national measures and any entity-specific performance measures meet the needs of customers, mana whenua and stakeholders.
- **Measurable** - specifying only those performance measures which are considered important our operation or for effective regulatory oversight of the sector. This means rationalising the performance measurement system to remove those performance measures that:
    - Do not add significant value through driving performance improvement.
    - Cannot practically be achieved through responsible investment, or
    - Cause unintended negative consequences through their application.

5.1.1 Source Legislation and Policy

In developing the national framework, reference was given to:

- Department of Internal Affairs – Transforming the system for delivering three waters services – The case for change and summary of proposals, June 21.

- NZ Government – Exposure Draft – Water Services Entities Bill v14.0, December 2021.
- Ministry for the Environment – National Policy Statement on Freshwater Management, August 2020.
- Taumata Arowai – Our regulatory approach www.taumataarowai.govt.nz/about/what-we-do/
- Climate Change Commission – Statement of Intent.

5.1.2 Strategic Focus Areas

From these government publications, seven key focus areas emerged:

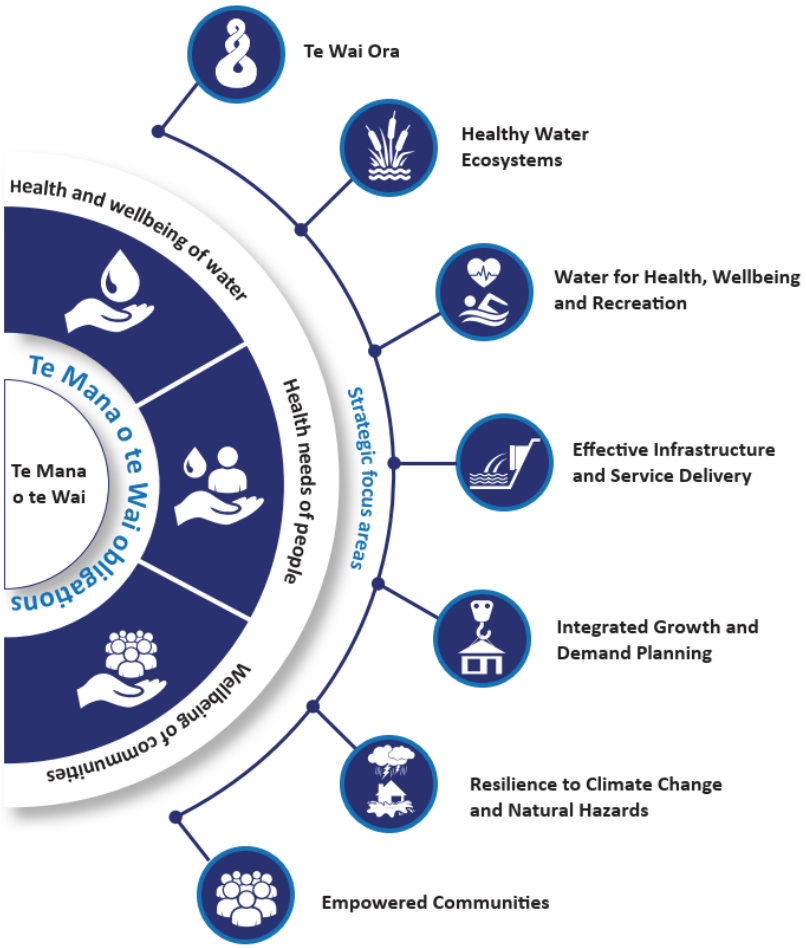


Figure 34 –Strategic focus areas

Seven focus areas have been adopted as our transitional objectives for the purpose of this plan. We expect these will change following engagement with our communities and mana whenua to form our strategic objectives in the future, and further to Te Mana o te Wai Statements and Community Priority Statements.

Te Mana o te Wai is at the heart of what we do. The seven focus areas can be linked back to the hierarchy of obligations which are: health and wellbeing of water, health and needs of people and wellbeing of communities.

Alignment of levels of service and performance to corporate and governmental strategic direction is vital. It ensures organisations are monitoring and reporting on issues important to the success of the organisation and is a fundamental driver in investment decision making. The figure below shows the seven strategic focus areas and the main outcome areas linked to each within the framework.

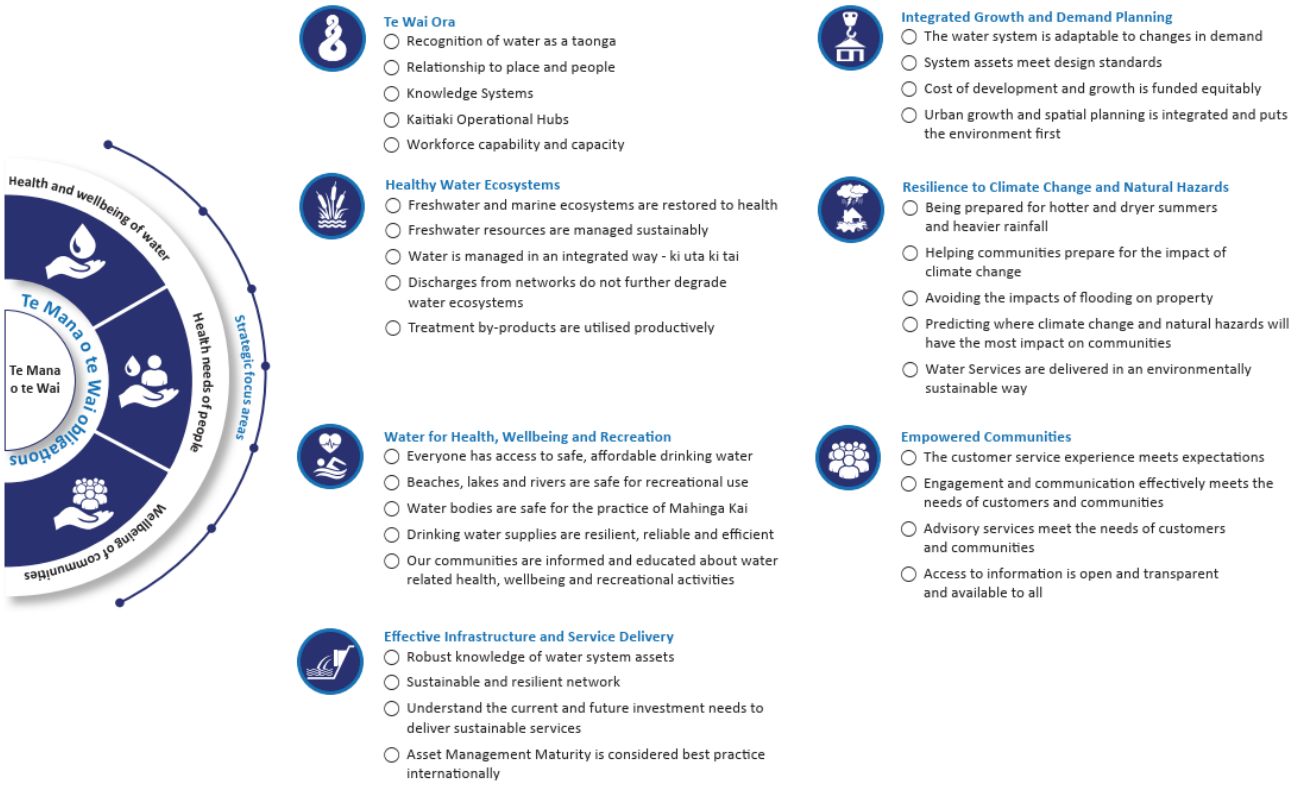


Figure 35 –Strategic focus areas and their definitions

5.2 Framework Implementation

Performance management is the process of ensuring that the expectations, as set in the Establishment Water Services Plan for an entity, will be met, and reported on, consistent with the requirements of the Water Services Act 2022. Performance measures monitor how we provide services and business functions to manage the customer experience and stakeholder expectations.

The performance framework allows our performance to be monitored, communicated clearly, and reported on to customers, mana whenua, stakeholders, and regulators. The framework is an important link between the strategic outcomes sought, what we aim to achieve, what we do and what we must manage well. Performance is assessed against a set of measures across many aspects of the business, including:

- Levels of service
- Asset management maturity
- Business management
- Financial management
- Service delivery
- Communications and stakeholder relationships

The figure below shows how planning processes and documents are positioned within the performance framework to deliver the strategic objectives for the water sector.

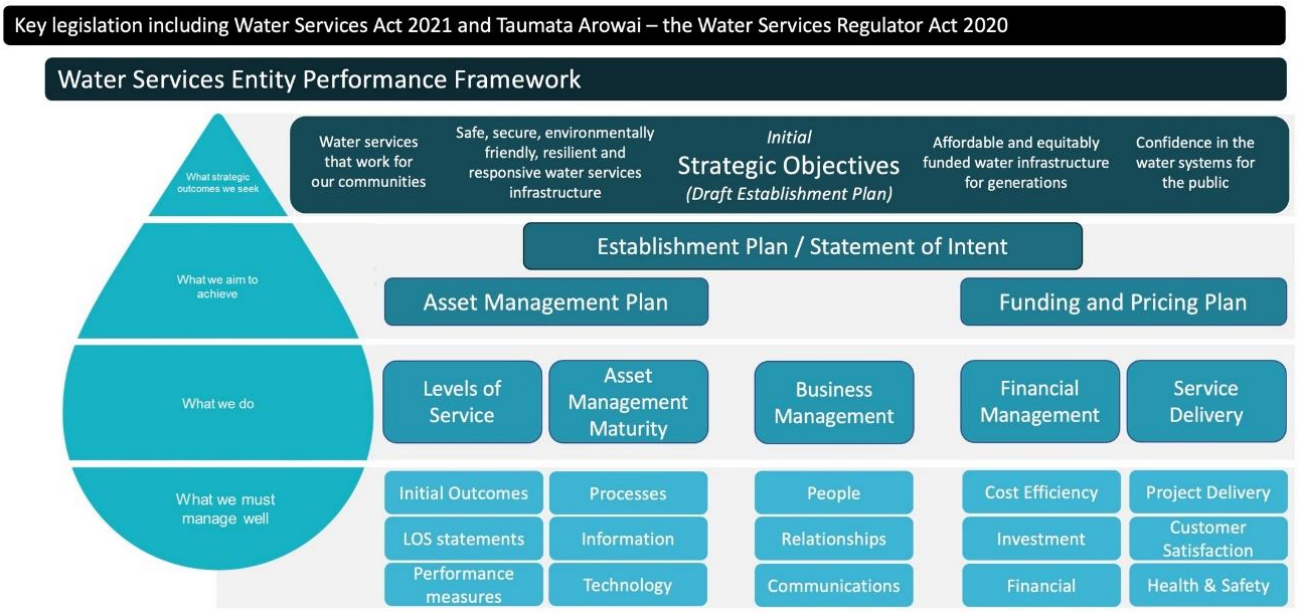


Figure 36 –Proposed Performance Framework

5.2.1 Levels of Service Structure

Levels of service require a coordinated set of information to align outcomes with what is delivered and monitored. The proposed level of service structure comprises:

- **Initial outcomes** - as described by the Te Mana o te Wai focus areas.
- **Levels of service statements** - a description in words, of what customers, mana whenua and stakeholders can expect for a given level of investment including benefits and consequences.
- **Performance measures** - describe both the metrics used to monitor and manage the levels of service and the target, usually in numbers, that describes the actual service level provided.

Data and information are vital to calculating and monitoring performance measures. This requires investment, and it is important to regularly assess the effectiveness of these investments. This ensures that the measures put into place can be continuously evaluated using data that is already available or can be easily obtained.

5.2.2 Level of Service Options

To enable informed decision making, level of service options should be put forward that consider service, risk, and cost.

Service is described using the architecture above including outcomes, level of service statements, and performance measures.

Risk is assessed for each option as the residual risk once the levels of service have been delivered.

Cost is assessed for each of the options.

Some levels of service will have more flexibility than others when it comes to assessing options.

- Minimum standard service levels must be met, i.e., compliance to achieve the standards such as meeting drinking water standards or resource consent conditions. The cost to deliver these levels of service should be optimised.

- Other service levels are more flexible and require consideration of different levels of service, the investment required to achieve the levels of service, and assessment of the residual risks.

The more flexible levels of service need careful consideration during level of service option development. This is done by adjusting the service level targets. The benefits, outcomes achieved, and risk consequences are identified through the cost, service, and risk optimisation process.

We will need to address the service, risk and cost when setting targets against the proposed national levels of service.

5.2.3 Setting Level of Service Targets

Developing effective levels of service will be an on-going process for us, they will evolve as our maturity increases and will be influenced by regulatory changes.

Setting the initial levels of service targets requires the following steps:

- **Base data** – collection of the base data for the performance measures identified. Sufficient time should be given to reporting on them externally to customers, mana whenua, stakeholders, and regulators.
- **Collaboration with regulators** – as they develop new, or enhance existing, performance measures.
- **Setting targets** – for contemplating the investment programmes and residual risks.
- **Community engagement** – on the initial performance measures and exploration of suitable targets.

To successfully implement this performance framework by 2027 we will also need to consider:

- **Remaining measures** – develop the remaining measures such as growth and mātauranga-based measures with a focus on Tier 1 data sets so the framework is complete and useable.
- **Reviewing outcomes** – review the focus areas once we are established, we have our own Statement of Intent and defined Strategic Objectives.
- **Continuous review** – initiate a continuous review process so the levels of service stay relevant and fit for purpose. This includes embedding an organisational culture that understands the value of the data collected.

The measures and targets will require engagement with our communities, mana whenua and regulators before they are set.

5.2.4 Performance Reporting Structure

The performance measures have been grouped into three reporting tiers. This provides the different stakeholders with the appropriate level of information to track our performance.

The three tiers and their intended audience are described below.

Tier 1 performance measures are a smaller set of aggregated measures to summarise performance to the Board and senior management teams to ensure they are providing good services to customers and stakeholders and assurance to regulators and oversight by government agencies.

Tier 2 performance measures are also summary metrics but aimed at the management level to track performance internally and identify performance trends.

Tier 3 performance measures are generally used by the operational teams to track performance internally at a technical level.

Tier 1 performance measures are summarised in the table below showing the linkage to the relevant Focus Area (refer to full suite of measures in Appendix B). Tier 2 to 3 performance measures are provided in Appendix B.

5.2.5 Performance Reporting Timeframe

Performance reporting starts from the establishment date of our entity, giving assurance to customers, stakeholders, and regulators that we are providing services as expected. There will be a staged rollout of performance measures based on the following timeline:

- **On day 1** – our establishment date.
- **Should do by** – the second year of establishment.
- **Aspirational** – timeframe not set (at this stage). Some of the measures in this category require the development of suitable measurement criteria and/or a weighted index methodology.

5.3 Proposed National Levels of Service and Performance Measures

For each of the seven focus areas, a suite of performance measures has been developed. These measures are a combination of national and international best practices for the water industry (Refer to *Appendix B* for details).

The intention of the suite of measures is to enable national consistency for performance. This suite may be added to, for entities to meet the specific needs of their communities. Within the suite are measures that still need to be defined alongside engagement with the community and mana whenua. One example is how the delivery of Te Mana o te Wai principles is demonstrated.

Each measure has been assigned a hierarchy to ensure they are used by their intended audience. Tier 1 measures are listed here. The full suite of measures can be found in *Appendix B*.

Table 11 - Tier 1 performance measures

Tier	Te Mana o te Wai Obligation	Focus Areas	Performance measures	Activity	Measure status
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	% of connected population receiving consented three water services rated Good or better (based on the Regional Council Overall Annual Compliance Consent Rating)	3 waters	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	Have consent conditions been met for rate of take and volume of abstraction? (report at a Network-level)	Water supply	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	Infrastructure Leakage Index (ILI) (report at a Network-level)	Water supply	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	Total number of consent enforcement actions (abatement, infringement, enforcement and convictions)	Water supply	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	The number of dry weather sewerage overflows from sewerage systems, expressed per 1000 sewerage connections to that sewerage system	Wastewater	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	Total number of consent enforcement actions (abatement, infringement, enforcement and convictions)	Wastewater	Current
Tier 1	Health and Wellbeing of Water	Healthy Water Ecosystems	Total number of consent enforcement actions (abatement, infringement, enforcement and convictions)	Stormwater	Current
Tier 1	Health needs of people	Water for Health, Wellbeing and Recreation	Compliance days per year achieving Drinking Water Quality Assurance Rules	Water supply	Current
Tier 1	Health needs of people	Water for Health, Wellbeing and Recreation	Compliance days per year drinking water that complies with the Water Services (Drinking Water Standards for New Zealand) Regulations 2022	Water supply	Current
Tier 1	Health needs of people	Water for Health, Wellbeing and Recreation	Compliance days per year of schemes achieving the Code of Practice for Fluoridation of Drinking-water Supplies in New Zealand, where Entity has been directed by the Director-General Heath to fluoridate community water supplies	Water supply	Current
Tier 1	Health needs of people	Effective Infrastructure and Service Delivery	Number of urban service connections that experience an unplanned interruption for longer than eight hours (report at a District-level)	Water supply	Current
Tier 1	Health needs of people	Water for Health, Wellbeing and Recreation	Number of wastewater overflows on private properties attributable to service provider.	Wastewater	Current
Tier 1	Wellbeing of communities	Resilience to Climate Change and Natural Hazards	For each flooding event due to a storm, the number of habitable floors affected (Expressed per 1000 properties connected to the stormwater system)	Stormwater	Current

Tier	Te Mana o te Wai Obligation	Focus Areas	Performance measures	Activity	Measure status
Tier 1	Health and Wellbeing of Water	Te Wai Ora	Mātauranga based metric for demonstrating Te Mana o te Wai principles into 3-waters services [requires development of a suitable methodology]	3 waters	Current needs development
Tier 1	Wellbeing of communities	Resilience to Climate Change and Natural Hazards	Entities have assessed the risks that climate change poses for all 3 waters services outcome areas, including but not limited to; - Water Quality - Firefighting supply - Flooding - Coastal inundation - Increased sedimentation	3 waters	Current needs development
Tier 1	Wellbeing of communities	Effective Infrastructure and Service Delivery	Entities risk maturity/appetite articulated across all asset and service delivery areas [requires development of a suitable methodology]	3 waters	Current needs development
Tier 1	Wellbeing of communities	Empowered Communities	Community and Stakeholder participation and decision-making measure [requires development of a suitable methodology]	3 waters	Current needs development

5.4 Industry changes affecting levels of service.

The water industry is undergoing significant change via multiple sources, e.g., legislation, technology, climate change impacts, customer and political demands, and others. These include and are not limited to:

- Improvements to future levels of service driven by Te Mana o te Wai.
- Water sanitary services assessments and provision of services to non-serviced communities.
- Planning for carbon reduction.
- Fluoridation of our water supplies.
- Dam safety regulations.
- National Engineering Standards and procedures for incident/emergency management.
- Circular Economy.

5.4.1 Improvements to future levels of service driven by Te Mana o te Wai.

With our increased focus on putting water first and giving effect to Te Mana o te Wai it is expected that this will impact our future levels of service and the need for currently unknown upgrades or changes to the way we implement and operate our assets. As an entity we will continuously improve our understanding of the Te Mana o te Wai principles through engagement with iwi and by integrating these learnings it into our future levels of service through our business planning and operations.

5.4.2 Water sanitary services assessments and provision of services to non-serviced communities.

Wai Tāmaki ki Te Hiku will conduct the necessary assessments and develop the required planning and project solutions to address the specific obligations to make assessments of drinking water, wastewater, and sanitary services and to ensure communities have access to safe drinking water as defined by the Water Services Act of 2021. The outcome of these assessment may impact our project planning and may require additional funding. As part of compliance with these obligations there will be a specific focus on improvement of services and access to services for marae and papakāinga across the region.

5.4.3 Planning for Carbon Reduction

The Zero Carbon Act requires New Zealand to contribute towards the global effort to limit the global average temperature to less than 1.5°C through emissions reductions. The Aotearoa New Zealand's First Emissions Reduction Plan includes emissions budgets and reduction targets, and the Carbon Neutral Government Programme encourages non-mandated government entities to develop emissions baselines and set science-based emissions reduction targets.

International standards and frameworks have been developed to establish methodologies and/or best practice for managing, quantifying, and reducing carbon in infrastructure assets. For instance, the PAS 2080:2023 is an international standard on the management of whole life carbon in buildings and infrastructure, ISO 14064-1 is suite of standards that provides a consistent framework for quantifying, measuring, reporting and assurance of GHG emissions, and the Greenhouse Gas Protocol is the alternative international carbon measurement standard.

The targets specified by the Zero Carbon Act (ZCA) provide a minimum biogenic and non-bio-genic emission reduction target for New Zealand. The Act sets out the following domestic greenhouse gas emissions reduction target for New Zealand:

- Reduce net emissions of all greenhouse gases (except biogenic methane) to zero by 2050.
- Reduce gross biogenic methane emissions:

- by 10% by January 1, 2030 (in comparison with 2017 emission levels)
- to 24-47% by January 1, 2050 (in comparison with 2017 emission levels)

- Due to the urgency of responding to the impacts of climate change, our entity will develop more ambitious decarbonisation targets.

Planning for Carbon Reduction is further discussed in *Section 7*.

5.4.4 Fluoridation of water supplies.

The Health (Fluoridation of Drinking Water) Amendment Act 2021 shifted decision-making on fluoridation from local authorities to the Director-General of Health. Te Whatu Ora subsequently directed 14 local authorities to add fluoride to some or all their water supplies, including Kaipara and Far North.

Table 12 - Water Treatment Plants (WTPs) requiring addition of fluoridation.

District	Water Treatment Plants - Fluoridation to be added
Kaipara	Dargaville WTP
	Maungaturoto WTP
Far North	Kaikohe WTP
	Kawakawa/Moerewa WTP
	Okaihau WTP
	Omapere WTP
	Paihia WTP
	Rawene WTP

The timing when each of the above needs to fluoridate its water supply range from 18 months in Far North to 36 months in Kaipara.

5.4.5 Building (Dam Safety) Regulations 2022

New dam safety regulations will take effect on May 13, 2024, requiring dam owners to assess their potential impacts and to submit a Dam Safety Assurance Programme to the regional authority. Medium and high-risk dams are required to submit a programme 12 months and 2 years after registration, respectively, while low-risk dams will be reassessed every 5 years. Wai Tāmaki ki Te Hiku will be identifying the necessary steps to comply with the new regulations for dam safety, which may require additional funding. The necessary details of these were not available at the time of writing this initial draft asset management plan. We are expecting to prioritise these compliance measures by developing a Potential Impact Classifications and Dam Safety Assurance Programme.

5.4.6 National Engineering Standards and procedures for incident/emergency management

A technical code for drinking, waste and stormwater reticulation infrastructure is being developed to create national alignment on methods of design and construction and to provide more efficient and productive delivery of water of water infrastructure to New Zealand communities. Combined with the drinking water incidents and emergencies procedures implemented by Taumata Arowai we expect these new standards to add significant value and support efficiencies to the projects and operations of Wai Tāmaki ki Te Hiku.

5.4.7 Circular Economy

A circular economy is inherently designed to be restorative, focused on preserving the highest utility and value of products, components, and materials throughout their lifecycle. Wai Tāmaki ki Te Hiku recognises the transformative potential of embracing this circular approach, aligning with the principles of Te Mana o te Wai, which underscore the intrinsic worth of water and its pivotal role in the interconnected well-being of ecosystems. In line with these principles, our entity seeks to transcend conventional water management paradigms, striving for fully integrated water ecosystems. Our commitment revolves around prioritising the revitalisation and safeguarding of water quality and ecological health while concurrently reimagining our operations within the framework of a circular economy. Initiatives encompassing water recycling, efficient distribution, responsible waste management, bioresource recovery, and electricity cogeneration from biogas not only contribute to the rejuvenation of water bodies and ecosystems but also pave the way for new value creation. This approach not only benefits the environment but also enhances resilience and yields economic advantages by curbing operational costs and nurturing innovation within the water sector. As New Zealand aspires to a greener and more sustainable future, the integration of circular economy principles into its water utilities, harmonised with Te Mana o te Wai, emerges as a promising avenue for progress that reveres the intrinsic value and welfare of water.

Our forthcoming efforts to implement a circular economy approach will revolve around the following key initiatives:

- **Value chain synergy:** We will develop a comprehensive understanding of how our approaches and activities interact within the broader value chain. This entails managing both the direct and indirect impacts of our activities across the entire value chain.
- **Highest value preservation:** Our focus will be on maintaining products and materials at their peak value. This involves strategies such as water reuse, waste reduction, and the extraction of energy and nutrients from water and wastewater.
- **Resource management innovation:** We are committed to pioneering sustainable resource management practices that generate business value. This may include maximising the utilisation of existing assets for multiple services, promoting asset recovery, and optimising resource efficiency. Digital solutions are also envisaged to play a key role in this regard.
- **Community engagement and collaboration:** We recognise the importance of transparency with our communities and the value of forging collaborative partnerships to develop and implement circular economy approaches effectively. Together, we can drive meaningful change and contribute to a more sustainable future.

5.5 Opportunities for improvement

- **Data and information** - collecting and storing data and information to calculate performance measures consistently over a period requires investment. The effectiveness of invested measures also needs to be continuously evaluated to ensure they are measurable, and that they meaningfully inform improvements. This also include necessary compliance related data such is the case for future dam safety regulation compliance.
- **Measures and targets** - the measures and targets require engagement with the water service entity's communities, mana whenua and regulators before they are set.
- **Improved understanding of Te Mana o te Wai** – Improving our understanding of Te Mana o te Wai and engagements to improve our ability to give effect to its principles will be a continuous improvement focus area.

6 Planning for The Future

Our region is experiencing significant growth and development, with population growth projected to reach 2.5 million people by 2048. Whilst the highest population and economic growth is projected for Auckland, the Northland region is also witnessing notable population growth, fuelled by its stunning coastal landscapes, cultural heritage, and economic opportunities. As both Auckland and Northland continue to draw in more residents and visitors, there is a concerted effort to strike a delicate balance between preserving their natural beauty, environment, and cultural identity, while also prioritising crucial infrastructure improvements, job creation, and sustainable development. In this regard, the role of three water infrastructure and services becomes paramount in shaping the future of these regions. By effectively managing water resources, addressing wastewater and stormwater capacities, and ensuring sustainable water practices, the region can pave the way for a thriving and environmentally conscious future.

6.1 Understanding Demand Drivers

Understanding the demand drivers for three waters services is critical for the effective planning and delivery of three waters services. This is particularly important for planning and investing in three waters services, including building new treatment plants, expanding infrastructure, improving service reliability, and tailoring services to meet the needs of different customers. Knowledge of demand drivers can help us identify opportunities for efficiency gains and cost savings. The primary and secondary demand drivers (also defining the investment prioritisation categories) are described further in the following sections.

Highlights – Planning for the future Our population is expected to grow from approximately 1.9 million (current) to 2.5 million people by 2048.

Our population is expected to grow from approximately 1.9 million (current) to 2.5 million people by 2048.

Auckland - Auckland is expected to see the largest population growth with a 28% increase by 2048. This drives the need for significant increase in all three waters network capacity and several water and wastewater treatment capacity upgrades. The main concern to meet growth demands is the capability and capacity of the water industry to deliver.

Kaipara - population in Kaipara district is expected to increase by 42% by 2048. Whilst there is a need for increased capacity across all three waters, this area has urgent need to increase wastewater capacities. The main concern to meet growth demands include lack of wastewater capacity and the continued impacts of severe weather events.

Whangarei - population in Whangarei district is expected to increase by 30% by 2048. Whilst there is a need for increased capacity across all three waters, this area has an urgent need to increase stormwater capacities. The main concern to meet growth demands include climate change impacts, current stormwater network inadequacies, and potential impacts of project deferments.

Far North - population in the Far North district is expected to increase by 26% by 2048. Whilst there is a need for increased capacity across all three waters, this area has an urgent need to increase wastewater and stormwater capacities. Main concerns to meet growth demands include the increased frequency of droughts

6.1.1 Level of service demand drivers

The below figure shows how primary and secondary level of service demand drivers are built upon Te Mana o te Wai obligations and the strategic focus areas introduced in Section 5.

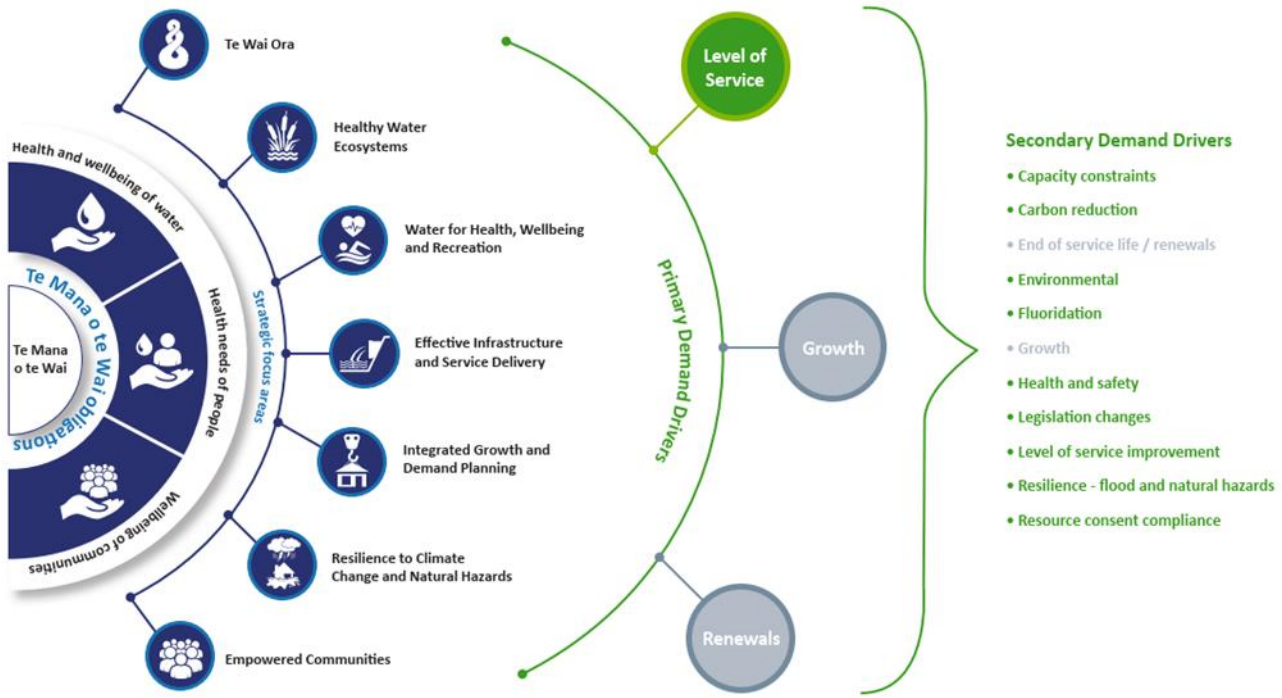


Figure 37 –Level of service demand drivers built upon Te Mana o te Wai obligations and strategic focus areas.

The level of service is one of the three primary drivers for asset investment and development. The secondary demand drivers that impact on future levels of service and performance measures are detailed below.

Level of service demand drivers:

- **Capacity constraints** - networks that are currently at capacity affecting pressure, flow, or containment of water within the networks. Increased demand for the services will exacerbate existing issues and could limit any further growth potential.
- **Carbon reduction** - delivering on the council's climate change action policies and plans, including reducing built or operational carbon. This will require further efforts to manage the increasing flows.
- **Environmental** - projects or programmes that will enhance or protect the environment. If no action is taken, the negative impacts currently being mitigated could increase as demand grows.
- **Fluoridation** – upgrades to provide fluoridation as per Ministry of Health requirements. Increased water use could result in greater fluoridation needs.
- **Health and safety** – protection of the safety of staff, contractors, community etc.
- **Legislative changes** - includes drinking water compliance and any other legislative changes, many of which are targeted at protecting human and environmental health. Meeting these changes will need to also consider impacts from changes in flows and loadings.
- **Level of service improvement** – refers to either providing or increasing services in areas that currently lack them or improving the current level of service in areas where there is a demand for better service.
- **Resilience** - improving resilience to mitigate flooding risk and or natural hazards.

- **Resource consent compliance** - projects required to meet current or future consent requirements. Future consents will likely come with more conditions. These will need to account for any increases in water flow and biological loading.

6.1.2 Growth demand drivers

The below figure shows how primary and secondary growth demand drivers are built upon the Te Mana o te Wai obligations and the strategic focus areas introduced in Section 5.

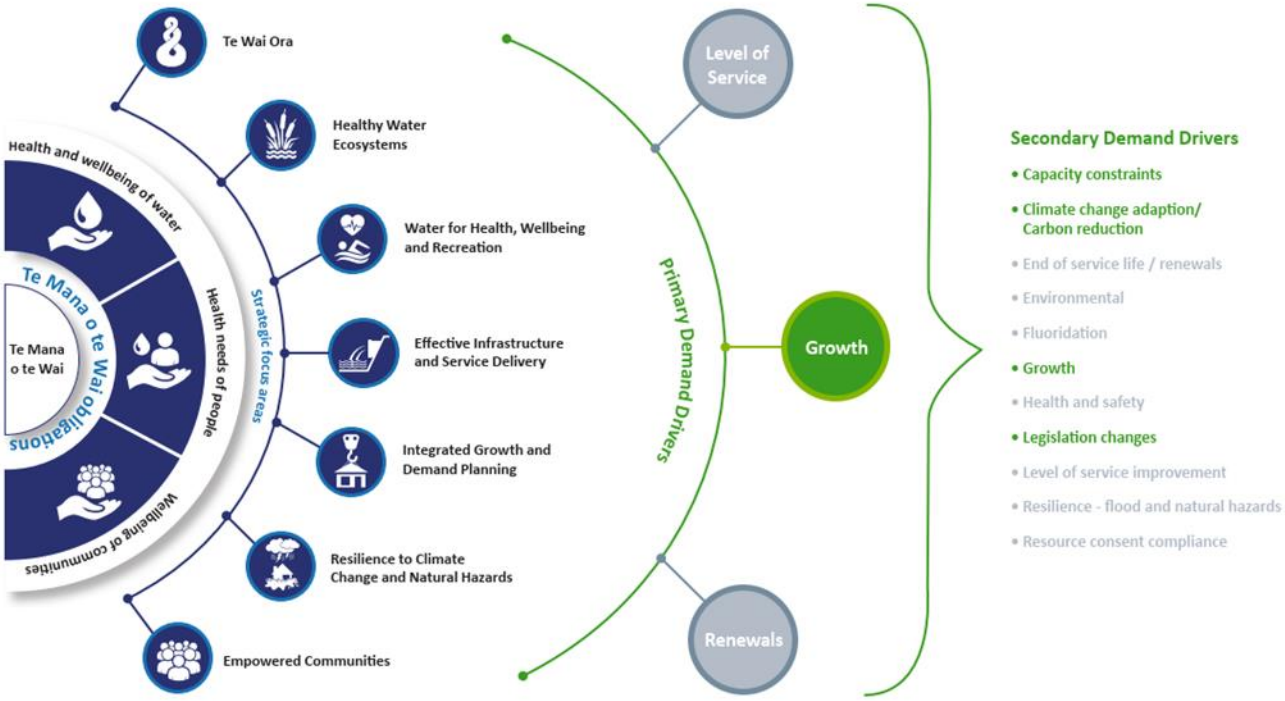


Figure 38 –Growth demand drivers built upon Te Mana o te Wai obligations and strategic focus areas.

Secondary drivers which may impact on growth demand for three waters services in are:

Growth, driven by:

- **Population, and land use change** - population growth will result in increased consumption of potable water and discharge of wastewater. It will also generally result in land-use intensification.
- **Demographics** – changes in demographic can lead to changed diurnal and seasonal demand patterns for water and wastewater services.
- **Consumer behaviour change** – consumers' behaviours directly impact demand, such as choosing to adopt water conservation practices to reduce demand for water and consequently reduce wastewater discharges.
- **Seasonal demand** – fluctuations in demand for water and wastewater services due to seasonal changes such as tourism and industry.
- **Economic change** – economic growth, such as the introduction of new industry, can significantly increase demand for water supply, alter wastewater discharge flows and characteristics, and increase impervious areas.

And:

- **Capacity constraints** - networks that are currently at capacity affecting pressure, flow, or containment of water within the networks. Increased demand on the services will exacerbate any existing issues and could limit any further growth potential.

- **Legislative, regulatory and policy change** – these aspects can incentivise or otherwise modify consumers' behaviour or how the service is provided.
- **Climate change adaptation and carbon reduction** – adapting practices and infrastructure to accommodate the effect of climate change and reducing built and operational carbon**.**
- **Extension of services –** Extension of services are required to service several communities and areas currently not serviced. These include several marae and papakāinga who require additional service provision and could support the entity in managing these services in future.

6.1.3 Challenges in Meeting Demand

Projecting the levels and timing of water supply, wastewater, and stormwater infrastructure investment to meet demand is a complex process that presents several challenges, including:

- **Uncertainty in demand projections** - projections of demand for infrastructure are influenced by factors like population growth, land use changes, climate change impacts, and economic growth. However, these are subject to uncertainty, making it challenging to determine appropriate investment levels. The current economic climate is a risk to investment planning for new and existing infrastructure, as interest rates and inflation are rapidly increasing. The result is the potential slowing of economic and residential growth. Under-utilisation of infrastructure in low-uptake areas could have severe funding and affordability impacts on investments and should be considered in planning for growth.
- **Cultural impacts** - to give effect to Te Tiriti o Waitangi and Te Mana o te Wai, changes are required to services. This is especially relevant with respect to wastewater discharges and surface water takes but has implications across all aspects. Te Mana o te Wai puts the heath of the water first, compared typical traditional approaches to put the health of the people first. A cultural mindset shift is required to embrace the health of water at the highest importance, which will provide the foundation for the health of people and our communities.
- **Meeting community expectations** - as society changes, expectations for better service levels rise. Some of these expectations are defined by legislation and standards while others, like resilience, are less clearly defined. Community expectations are changing in key areas like wastewater overflows, network resilience, vulnerability to flooding, and ecological impacts. There are also several areas which are currently not serviced, particularly several marae and papakāinga , where the extension of services are required.
- **Limited financial resources -** infrastructure investment requires significant financial resources, and it may not be possible to invest in all necessary infrastructure at once. We will prioritise investment decisions based on the most pressing needs.
- **Regulatory requirements** - regulatory requirements may impact the nature, timing, and scope of infrastructure investment. We must ensure that investment decisions are compliant with all relevant regulations.
- **Political considerations** - infrastructure investment decisions may be subject to political considerations, which may also impact the nature, timing, and scope of investment.
- **Challenges in reducing water demand** – changing deeply ingrained water use habits, access to water saving technologies and awareness are ever present challenges which require ongoing public engagement, education and incentives, investment, and other interventions to foster a culture of conservation.

6.1.4 Key Entity-Specific Demand Drivers

The demand for capital investment over the next three years is dominated by growth, renewals, resource consent compliance, capacity constraints and levels of service. Factors that influence demand for water supply, wastewater services and stormwater management and our specific investment needs are further described in the following sections.

6.2 Demand Planning

6.2.1 Planning Toolkit

Methodologies for understanding demand currently vary across the region. As part of the transition, a base standard methodology will be considered and established for Wai Tāmaki ki Te Hiku.

Key planning tools generally include:

- **Population forecasting** – to understand the level of growth, when and where it will occur, population forecasting models are developed. In general, the local council would use population projection data from Statistics NZ. This data is usually run through a forecasting model that allows for area zoning, transport and constraints, through which population projection data is produced to feed into hydraulic modelling, servicing strategies and/or masterplans.
- **Te Mana o te Wai planning** – learning from and listening to iwi about protection of the environment and the meaning of Te Mana o te Wai provides an opportunity to work together to implement Te Mana o te Wai principles through our planning initiatives and projects.
- **Servicing strategy** - to assess and determine the servicing needs of a community, usually a new development area. This process assesses current servicing situation and identifies servicing options to enable the growth in the community, as well as their triggers.
- **Hydraulic modelling** – modelling of all water supply and wastewater systems/networks/schemes to determine current capacity and levels of service, predict the future system performance under current and future scenarios (developed from population forecasts), and test solutions to improve current and future system performance. The outcome of this work informs future investment.
- **Master planning** from outputs of hydraulic modelling.
- **Monitoring water supply systems** parameters to understand current system performance and provide data for hydraulic modelling. Monitoring tools include pressure and flow meters, rainfall stations, and river, dam and reservoir storage levels.
- **Monitoring of wastewater system** parameters to understand current system performance and provide data for hydraulic modelling. Monitoring tools include level and flow monitoring and wastewater characterisation.
- **Modelling and monitoring of the piped stormwater network**, overland flow paths and natural water courses to understand the current system performance and predict future system performance under current and future scenarios. The outcome of this work informs future development and infrastructure investment. Monitoring tools include level monitoring of rivers and dams, flow gauging and rainfall stations. Models include climate change, weather, rapid flood hazard mapping and hydraulic models.
- **Catchment planning** from output of stormwater hydraulic modelling.
- **Asset condition assessment** as part of determining renewal investments. This is discussed further in *section 9*.
- **Risk and Resilience**, including climate change and natural hazards considered in asset management planning. This is discussed further in *section 7*.

6.2.2 Meeting Existing Demands

The ability of the networks to manage current demand varies as evidenced by performance against levels of service targets covered in *Section 5*. Key aspects associated with meeting existing demand are given below. Also refer to *Section 5.2* on asset performance.

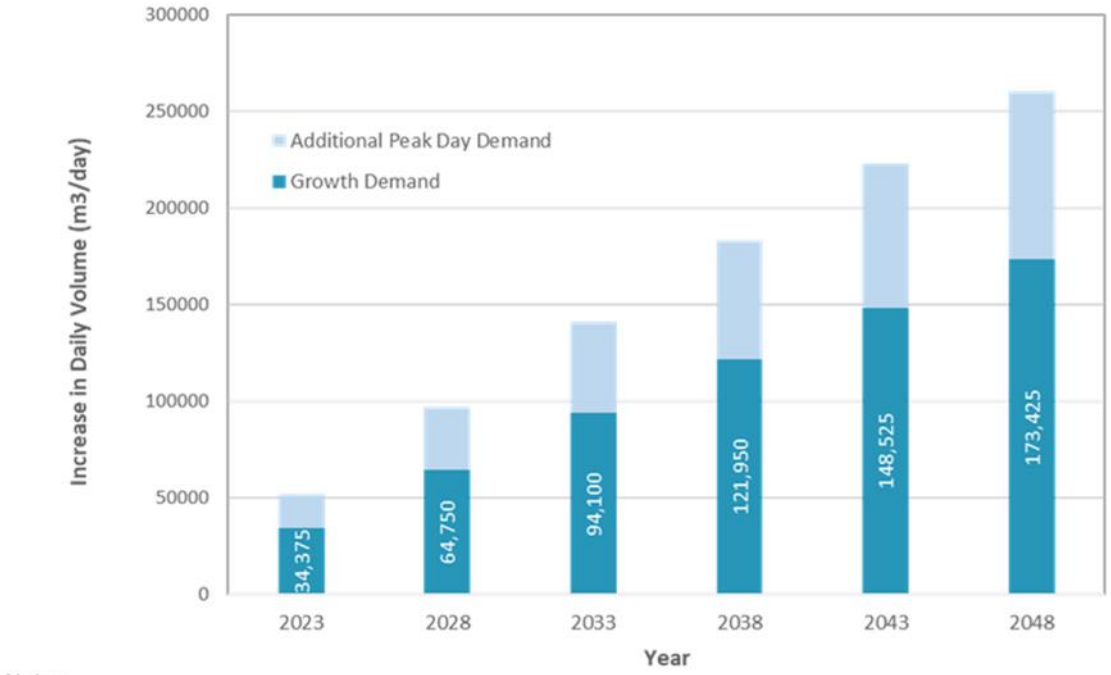
Table 13 – Meeting existing demands.

Service Goal	Comment
Water Supply	
Provision of safe and healthy drinking water. As measured by compliance with DWSNZ.	Of the 39 water supply schemes, the majority are compliant with the drinking water standards (bacterial, protozoal, and chemical). Three plants have had historical non-compliance issues which have now been addressed. Some of these non-compliances were relatively minor process or infrastructure issues, while some have required major capital upgrades. An assessment of areas currently not serviced, such as marae and papakāinga will be conducted to develop appropriate solutions to service these communities.
Provision of water which meets community expectations. As measured by drinking water complaints regarding: • clarity • taste • odour • pressure or flow, and • continuity of supply.	We have received an average of 11 complaints per 1000 connected properties. Overall, 72% of complaints relate to continuity of water supply, pressure, and flow, whilst the remaining 28% relate to water quality issues (clarity, taste, and odour). Kaipara and Whangarei have lower satisfaction.
Provision of firefighting water supply to maintain public safety. As measured by compliance with SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice.	Measuring direct compliance with SNZ PAS 4509:2008 is not achievable at scale and is not done by any water suppliers in NZ. This results in a variety of approaches. The larger councils have hydraulic models which give an understanding of capacity, set levels of service, and identify improvements. Moving forward it will be important to develop a more consistent approach that can be applied nationally. Under section 73 of the Fire and Emergency New Zealand (FENZ) Act 2017, FENZ must review the code of practice every three years. It will be important that we input into this review.
Wastewater	
Safe treatment and disposal of wastewater which protects public health and the environment. As measured by compliance with consent conditions at each treatment facility. Relocation or changes to discharges to some receiving environments could be considered with the inputs from iwi and other stakeholders.	Insights from the data on wastewater consent non-conformances indicate that the most significant cause of consent non-conformances occurs at the wastewater treatment plants (49% of the total). These non-conformances mainly occur in Auckland, contributing 43%, and Far North contributing 50% to the total consent non-conformances. An assessment of areas currently not serviced, such as marae and papakāinga will be conducted to develop appropriate solutions to service these communities.
Safe conveyance of wastewater which protects the environment. As measured by number of dry and wet weather overflows from the network.	Insights from the data on wastewater overflows indicate that the most significant cause of overflows is blockages in the wastewater network (49% of all overflows), followed by wet weather overflows from the wastewater network (24% of all overflows) or wet weather overflows from combined stormwater/wastewater networks (25% of all overflows). Overflows due to plant failures seem to be limited contributing only 4% to the total overflows. Most wastewater overflows per 1000 connected properties occurred in Kaipara and Far North.
Stormwater	
Safe collection and disposal of stormwater which protects the community property. As measured by the number of events of flooding of habitable or commercial floors through inadequate capacity of the stormwater network to manage stormwater runoff.	Of the four councils, two had data available on the number of habitable floors affected by flooding in the last 5 years, which was dominated by Auckland. However, this measure is highly influenced by one or two significant events (such as those experienced during early 2023). As such this is not a good measure of risk. To address this predictive modelling using a similar approach will be required.

6.2.3 Demand Projections

The following figures provide estimated projections for water and wastewater demand up to the year 2048. These estimates are based on predicted population growth and generalised, high-level assumptions about demand. Note that the demand for water and wastewater varies depending on the specific scheme and its user base. Detailed information for each scheme will be developed and considered on a project-level basis.

Water



Notes
* Stated volume given for Growth Demand only
* Assumes 250 l/head/day (220 l/hd/day residential and 30 l/hd/day commercial)
* Assumes 1.5 peak day factor
* Assumes no allowance included to overcome additional leakage

Figure 39 –Estimated long-term water demand up to 2048 (based on population growth)

The above projection is based on growth only, which typically is the most significant demand driver for water supply which varies across the region. From a risk perspective, the water demand projections require comparison with the availability of water, considering potential climate change impacts. Such analysis requires further development for consideration (also refer to potential risks and opportunities below). We aim to address and accommodate the growing demand for water by implementing specific projects and other initiatives to mitigate potential risks.

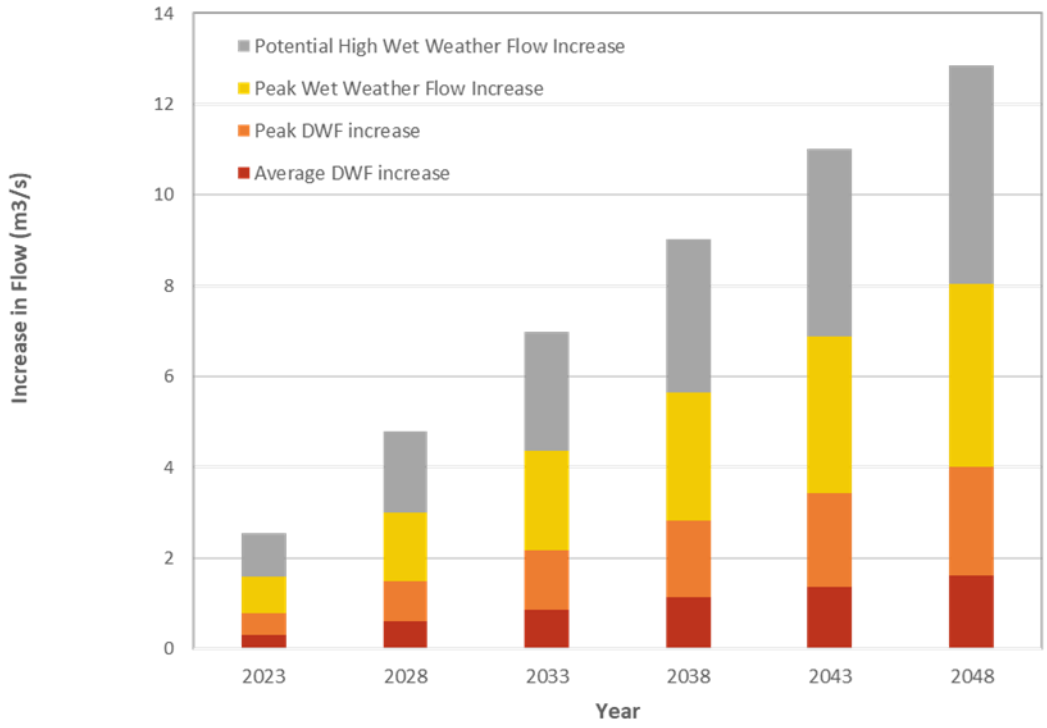
Potential solutions to address growth – Water.

Several potential water projects are planned to expand services to cater for an increase in population growth, increased development, and densification.

Auckland Region - in Auckland the planned water projects addressing growth include the North Harbour water main duplication, Waikata A Stage 1, Orewa No. 3 water main, increase in service connections and water meters (including replacement), the Waikato watermain No. 2, capacity for developer assets, and the Huia raw water main.

Northland Region - the planned water projects to address growth are included in their renewal and upgrades of several water treatment plants, such as the Maungaturoto in Kaipara.

Wastewater



Assumes
*ADWF = 200 l/head/day (180 l/hd/day residential and 20 l/hd/day commercial)
*PDWF = 2.5 x ADWF
*PWWF = 5 x ADWF
*Envelope for High PWWF = 8 x ADWF

Figure 40 –Estimated long term wastewater capacity demand up to 2048 (based on population growth)

The above projection is based on growth only, which typically is the most significant demand driver for wastewater capacity which varies across the region. The average and peak dry weather flow growth above is generally an indicator of the increased capacity required by the wastewater network and treatment plants. An increase in peak wet weather flow indicates the future need to accommodate and mitigate overflows. The high peak wet weather flow increase provides some indication of the potential risk posed by climate change impacts (refer to potential risks and issues below). We aim to address and accommodate the growing demand for wastewater capacity by implementing specific projects and other initiatives to mitigate potential risks.

Potential solutions to address growth – Wastewater.

Several potential wastewater projects are planned to expand services to cater for an increase in population growth, increased development, and densification.

Auckland Region - in Auckland the planned wastewater projects addressing growth include the upgrade to Hingaia pump station, Pukekohe network upgrade, Erin Tunnel, and Helensville wastewater upgrades.

Northland Region - the planned wastewater projects to address growth include: a capacity upgrade for 5,000 connections and extension of the network in Mangawhai, an upgrade to the Dargaville WWTP and network, an upgrade to pump stations in Kaipara, the Kerkeri and Kaikohe WWTP, and network expansions in Far North.

Stormwater

Demand for stormwater infrastructure is directly linked to the creation of imperviousness. Other factors influencing stormwater demand are rainfall intensity patterns, building materials and human activities. Land development increases imperviousness (roads, paving and houses), alters the natural terrain, changes natural overland flow paths, and affects soil permeability (compacted fill). The maximum permitted impervious surface is limited by each respective district plan.

Stormwater demand projections, especially their timing, are often challenging due to the lack of robust and consistent data sources. However, with increased land use change and intensification, we expect there will be significant demands in this area, especially in Auckland where new developments could more than double the current imperviousness towards the 2048 horizon. Additionally, the following key considerations impact on demand for stormwater infrastructure:

- **Addressing flooding issues** - as community expectations around protection from flooding events increase combined with more frequent and larger events due to climate change and urban densification there is expected to be a significant increase in demand for flood mitigation initiatives.
- **Water quality treatment and waterbody restoration** – to deliver on Te Mana o te Wai, stormwater quality treatment and restoration of our waterbodies is going to become increasingly important.

Potential solutions to address growth – Stormwater.

Several potential stormwater projects are planned to expand services to cater for an increase in impervious surface area due to population growth, increased development, and densification.

Auckland Region - the planned stormwater projects addressing growth include the Urban Auckland programme and several growth-related projects.

Northland Region - the planned stormwater projects to address growth include upgrades in growth projects in Kaipara, and the Kerikeri stormwater network centralised management programme in Far North.

6.2.4 Meeting Future Demands

Our population projections based on a medium growth scenario are provided below. Population volume is dominated by Auckland with an approximate 28% increase in population from 2018 to 2048. However, population growth in Northland councils is significant at a local level, ranging from an approximate 26% increase in population in the Far North to 30% and 42% increase in Whangarei and Kaipara respectively from 2018 to 2048. With our entity providing enhanced levels of service, this can lead also lead to a stimulus for higher levels of economic and population growth in the region. It should be noted that population and subsequent demand projects will be updated in future based on the latest available data.

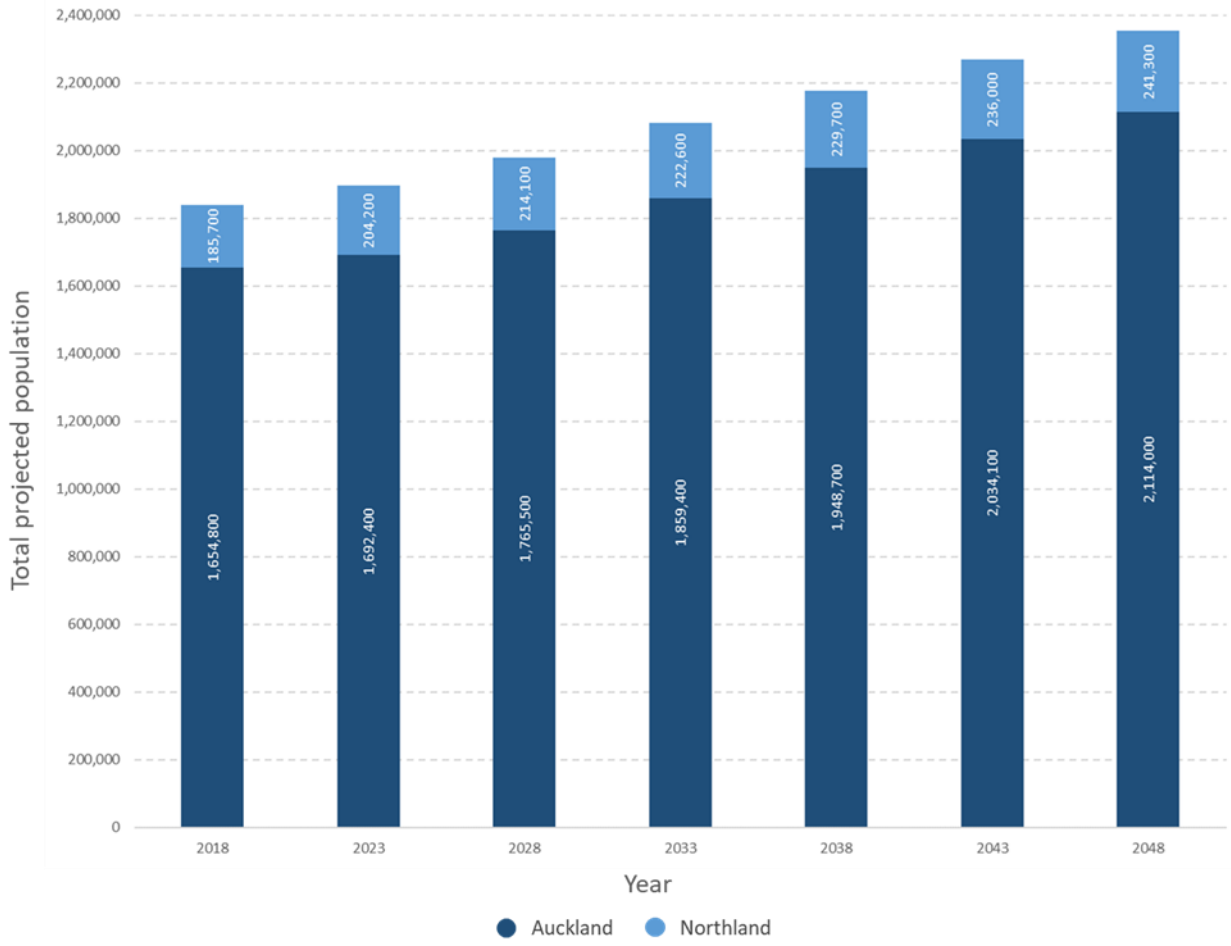


Figure 41 –Population projections– 30-year forecast (Source: Statistics NZ)

Demand drivers and their expected impact on three waters services to meet future demands are outlined below.

Table 14 – Demand drivers and impacts

Driver	Trend and Impact on Demand
Population	Population growth is a significant demand driver for water services infrastructure. Population growth results in increased demand for water and wastewater treatment services. Infrastructure planning must, therefore, consider the expected population growth and ensure that the water supply and treatment capacity are sufficient to meet the demand. The population is forecast to continue growing across the region, with the highest growth rates in Kaipara (approximately 42% population growth from 2018 to 2048), followed by Whangarei and Auckland districts (30% and 28% growth respectively) and Far North district (26% growth). Overall, the projected total population growth equals 28% from 2018 to 2048, with a projected total population in 2048 exceeding 2.35 million people, compared to the existing estimated population of 1.9 million (2022/23).

Driver	Trend and Impact on Demand
Land use change	Land use change and intensification increase demand on existing wastewater and water supply infrastructure, thus causing capacity constraints. It also causes the increase of impervious surfaces through infill subdivision, increasing rainfall runoff into the stormwater systems which could impact overland flow paths if not well managed. This drives the need for increased stormwater network capacity, and protection of overland flow paths. The National Policy Statement for Urban Development (NPS-UD) 2020 has identified Auckland as a Tier 1 Urban Environment, experiencing high levels of growth through intensification. Whangarei has been identified as a Tier 2 urban environment with medium to high levels of growth and intensification.
Un-serviced areas (Work in progress)	The following un-serviced areas have been identified by contributing councils that may require a future service: • Waipapa wastewater reticulation for industrial-zoned land (Far North) • Matauri Bay wastewater services (Far North) • Kerikeri area (Far North) • Mangawhai area (mostly un-serviced) (Kaipara) • Clevedon (service expansion by Watercare) (Auckland) • Marae and papakāinga across the region Current three waters service coverage for Kaipara and Far North, at 30% and 39% respectively are low compared to the rest of the region. This is mostly due to the predominantly rural location of their population density. Rural households may be located far from existing infrastructure and widely dispersed, making it difficult and not economically feasible to provide essential services. Increasing the abovementioned service coverage would therefore require area-specific feasibility analysis.
Demographic change	Like the rest of New Zealand, an ageing population influences parts of the region. The challenges of a shift in demographic include changes in lifestyle and potential peak demand times for water supply and related services. Demographic change is more notable in terms of its impact on the Northland councils' demands.
Consumer behaviour change	Consumer behaviours are expected to generally remain static. However, this can be directly influenced by demand management programmes. Changing water consumers' behaviour can be achieved through a multifaceted approach that focuses on awareness, education, and potentially incentives and policy interventions, in addition or as part of demand management initiatives.
Seasonal demand	Seasonal demand changes, such as an increase in holidaymakers, large events, or seasonal workers or changes in industrial demand over the course of a year, can significantly impact wastewater and water supply demands. To manage these impacts, we may need to invest in the upgrade of existing networks, treatment plants and storage to cater for increased demand and allow for fluctuations in demand. Northland councils are specifically susceptible to the influx of holidaymakers and in some cases seasonal workers, whilst in Auckland these factors are less evident due to the scale of services.
Policy and regulation changes	Changes in regulations and policies can significantly impact the delivery of wastewater, water supply, and stormwater services. For instance, some existing assets may need to be renewed before the end of their useful lives due to changes in water quality standards, discharge consent limits, and zoning regulations. These changes can impact future planning and investment decisions for three waters infrastructure.
Economic growth (Work in progress)	Economic growth (with annual GDP growth of more than 4% during 2021/22) throughout the region leads to urban densification and to increased demand for water supply and wastewater treatment services. These demands from growing population influx and business growth are specifically evident in Auckland. Increased infrastructure resilience can significantly boost business growth by providing a solid foundation to withstand and recover from various challenges and disruptions.
Climate change adaption, carbon reduction and energy costs	Climate change adaptation and carbon emission reduction will affect the delivery of water services, requiring more sustainable and resilient infrastructure. Upgrading existing systems, reducing energy consumption, investing in renewable energy, and implementing efficient water management practices will be necessary. This may also include cogeneration from biogas and bioresources recovery at wastewater treatment works.

Driver	Trend and Impact on Demand
	Energy costs can also impact the delivery of water supply and wastewater services. Substantial pumped systems and wastewater treatment are energy-intensive, and changes in energy costs can impact the affordability of these services.

6.3 Demand management

We propose to use strategies to manage demand to achieve a common standard of service provision. The goal is to implement priority projects while maintaining relationships with local councils for growth and land use planning. We will introduce our own instruments and utilise the national code of practice to help us manage demand. To manage seasonal changes in demand, we will use non-asset operational demand management programmes. These programmes aim to influence behaviour and minimise reliance on asset-based solutions.

Demand management objectives and measures that we will utilise are described below.

Table 15 - Demand management objective and measures

Demand Management Objectives	Demand Management Measures
• Optimise utilisation / performance of existing assets. • Reduce or defer the need for new assets. • Meet organisational strategic objectives. • Deliver a more sustainable service. • Respond to customer needs.	• Operation control and optimisation, e.g., metering and reduction in leakage and inflow and infiltration. • Regulation, though instruments • Incentives, e.g., pricing structure. • Educational initiatives to change customer behaviour. • Demand substitution, e.g., water reuse.

6.3.1 Integrated Approach to Land Use Planning

Community aspirations and strategies for growth have the potential to impact the natural environment and the three waters services through:

- New greenfield development can degrade receiving environments and increase flooding risks.
- New developments may increase the size and extent of the networks, increasing operation and maintenance costs.
- Extra growth and demand can exceed the capacity of present infrastructure and / or the ability of the environment to provide sufficient water supply or be the sink for waste streams (treated wastewater and stormwater).
- Intensification of existing urban areas, which can significantly increase rainfall runoff, placing additional stress on the capacity of existing infrastructure and exacerbating existing adverse effects.
- Land use change is particularly relevant to stormwater management services. To manage stormwater effectively, a comprehensive approach that incorporates water-sensitive design from the beginning of the land use planning process is needed. This approach should be combined with the provision of good quality green spaces and built infrastructure.

Approaches for the three waters services vary, but include:

- Working across councils to identify areas that are unsuitable for new growth or intensification, or which are subject to stormwater management constraints that must be resolved before development can occur.
- Aligning work programmes and investment priorities with council growth priorities and their infrastructure strategies.

- Active involvement in plan changes and other major consents/development processes to ensure effective three waters services outcomes. This includes developing provisions that encourage sustainable stormwater management and networks.
- Developing and communicating guidelines, including for urban design, that enable communities and developers to apply water sensitive/low impact design principles and techniques.
- Developing robust and integrated quality assurance measures,
- Setting standards for subdivision and development and establishing processes for transferring ownership (vesting) of new three waters infrastructure.
- Supporting growth by obtaining required discharge consents that are in line with priority areas for intensification and future urban development, thus enabling expansion.
- Working with other infrastructure providers to identify opportunities for collaboration and sequencing of infrastructure.

6.3.2 Operation Control and Optimisation

- **Water loss detection and management** - management of water loss from the networks includes addressing leaks and bursts, meter failures and under-registration. Responses include acoustic leak detection guided by monitoring of District Metering Area night flows, reticulation maintenance and renewal programmes, pressure management and continual improvement of meter management. Refer *Section 3* for current water loss management performance. International best practice targets for water loss in a city often aim to achieve a level of water loss that is both economically and environmentally sustainable. A commonly referenced target is the "Non-Revenue Water" (NRW) rate, which includes both physical losses (leakages) and commercial losses (unbilled consumption and inaccurate metering). The International Water Association (IWA) recommends that cities strive for an NRW rate of below 25%. However, some leading cities have set more ambitious targets, aiming for NRW rates as low as 10% or even single-digit percentages. These targets encourage comprehensive leak detection and repair programs, efficient water infrastructure management, accurate metering systems, and consumer engagement initiatives to minimise wastage and improve overall water system efficiency. It is noted that water loss targets should accommodate differences between cities and smaller towns or rural supply networks.
- **Pressure management** - an infrastructure change that reduces the amount of water lost to leaks and used by internal household devices by moderating the normal operating pressure of the network. It also helps extend the life of the pipes and reduce the break rate. Most water networks have some form of pressure management, however further opportunities exist to improve this.
- **Inflow and infiltration studies** - stormwater entry into the wastewater network through inappropriate connections and surface flooding, and ingress of groundwater through reticulation faults, is managed by some councils through specific inflow and infiltration programmes. Measuring inflow and infiltration in wastewater networks is of utmost importance as it provides critical information for effective infrastructure management and maintenance. By quantifying and projecting inflow and infiltration, we can make informed decisions regarding infrastructure repairs, rehabilitation projects, and preventive measures to reduce the unnecessary burden on the wastewater network, enhance its efficiency, and optimise the utilisation of resources.

These programmes use a variety of approaches including:

- Identifying issues with private connections and requiring property owners to resolve these or council resolving them directly.
- Renewal of ageing wastewater infrastructure and replacement of combined wastewater and stormwater systems.
- Identification and rectification of locations where stormwater is entering the wastewater network (e.g., manholes in a flood plain).

As an example, experience within Auckland has shown that between 50% to 60% of inflow and infiltration comes from private drains (also known as 'laterals'). Correcting these defects is necessary to achieve a reduction in wet weather flows through the implementation of an inflow and infiltration programme. Furthermore, we are jointly developing catchment-specific improvement programmes with Watercare and Auckland Council's Healthy Waters to:

- Provide new stormwater enhancements to enable separation and local catchment augmentation.
- Alleviate uncontrolled discharges into local catchments.
- Identify issues with private connections and require property owners to resolve these, or we resolve them directly (particularly in lower socioeconomic areas).
- Inform renewal of ageing infrastructure.

6.3.3 Regulation

Typical wastewater management and water demand management regulatory methods include:

- **Water restrictions.** Water restrictions are a behaviour change that is undertaken in a phased approach when there is a risk that demand will approach or exceed supply. Water restriction phasing progress from heightened awareness and requests to reduce water use, to steadily increasing restrictions on outdoor use. Restrictions are common to manage summer and peak holiday season demands.
- **Trade waste bylaws** are used to regulate the volume and nature of wastewater that commercial and industrial customers can discharge to the network. Trade waste volumes in the Northland councils appear to be negligible, whilst in Auckland flows from consented trade waste amounts to approximately 34% of wastewater flows. Trade waste bylaws are an important tool in ensuring that the network and wastewater treatment plant can convey and treat the wastewater it receives, especially given the relatively high trade waste load in Auckland.
- **Development controls.** Increasing demand on stormwater systems is managed by requiring new developments to not increase the runoff compared to the pre-development condition. This is achieved using stormwater detention and soakage devices. Different communities A are at very different places with their approach to these devices, which often have a high operational cost that is not budgeted for. Another development control for stormwater management is to restrict the development of flood-prone land. There is significant room for improvement in this area.

6.3.4 Incentives

Water metering. Incentivisation and infrastructure changes can encourage behaviour change and reduce leaks in the water network. Most residential customers and non-residential customers (>92%) are currently metered, with most also volumetrically billed, which incentivises users to reduce their consumption.

6.3.5 Educational Initiatives

Education is a critical part of the behaviour change component and is a cost-effective tool. Currently, education programmes are in place and vary across the region. These include:

- Water, wastewater and stormwater programmes through social and printed media, radio, and television, as well as specific community forums and school visits. The water programmes focus on water conservation; wastewater focuses on what should go down the sewer; and stormwater on minimising contaminants entering the stormwater system.
- In addition to the above, some councils have targeted programmes for specific users, such as those on septic tanks, low pressure sewer and other technologies with specific requirements.
- Direct engagement with high water users such as commercial and industrial customers.
- Participation in the formulation of government policy, regulation, and standards (e.g. flushable products).

We will continue to provide education and campaigns which focus on water supply demand management. Some include free education programmes to schools and community groups, and a water advisory service to help households and businesses increase water efficiency. Over time these existing programmes will be consolidated into a single programme for our region.

6.3.6 Demand Substitution

Water demand substitution measures in the region encompass a range of strategies and investments aimed at reducing water usage and diversifying water sources. With the frequency of extreme weather events, such as droughts, expected to rise it is important to diversify our sources of water to increase resilience. While still conceptual, investigation is underway for two types of alternative options for new water sources in the long term: the reuse of purified recycled water and the desalination of seawater for potable use.

Building on these options, wastewater treatment plants will be regarded as 'resource recovery plants' in future and where possible and practicable - energy, biosolids and other resources will be beneficially reused.

Customer initiatives will also be implemented to increase residential and commercial customers' awareness of water use and potential rainwater and reuse opportunities where drinking water is not necessary, such as watering gardens or washing facilities, to lower demand on existing sources.

6.4 Data confidence and reliability

Different methodologies and grading systems are currently being used to define asset data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 16 - Asset data confidence rating

Rating	Description
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)** Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	Demand projections
Stormwater	D
Wastewater	D
Water	D

A - Very High	B - High	C - Medium	D- Low	E - Very Low

Figure 42 –Initial data confidence rating – planning for the future.

The population projections, along with the associated data, as well as the methodologies currently employed for calculating future water demand and wastewater volume, exhibit significant disparities among councils. This highlights the need for enhancing data quality, consistency, and refining modelling approaches. Consequently, a current low grading (D) is assigned to this aspect. Enhancements in predictive modelling will also be targeted to assess the potential impacts of climate change and natural hazard scenarios on future demands and infrastructure needs.

6.5 Opportunities for improvement

- **Population forecasts** - develop a common forecast across the region based upon 2023 census and other relevant information to inform three waters master planning.
- **Un-serviced areas** - investigate drivers and status of un-serviced areas which may be connected to our services in the future.
- **Economic growth** - develop and implement a mechanism to monitor commercial and industrial developments which are likely to affect residential growth patterns and demand for three waters services.
- **Climate change adaptation, carbon, and energy reduction** - utilising collated existing information, develop programmes that implement measures addressing the impacts of climate change on services. Incorporate carbon and energy reduction considerations into capital programmes.
- **Water source forecasts** - develop an overall long-term assessment of water sources, including future demand/availability, issues, and risks (this may be completed as part of master plans).
- **Land use change** - work with contributing council to align development processes to allow robust, long-term planning of three waters services.
- **Three waters master plans** - develop long-term plans for services which holistically consider existing and likely future demand for three waters services. These plans will align with contributing councils' long-term plans, consider stakeholder expectations, and inform future capital programmes.
- **Demand management** - develop an overall demand management strategy and programme that considers and evaluates existing practices and industry best practice. Determine the benefit and effort and prioritise initiatives to be implemented or in areas that would benefit most.
- **Regulation** - develop and implement regulations with key stakeholders to manage demand for services.
- **Implementing technology and improved data management** – improved data management, Artificial Intelligence (AI), and digital technologies have the potential to transform water demand management by providing valuable insights, enhancing efficiency, and enabling proactive decision-making. By leveraging advanced data analytics and machine learning algorithms, water utilities can analyse vast amounts of data collected from smart meters, sensors, and other sources to identify patterns, trends, and anomalies in water consumption. This enables the identification of high-demand areas, leakages, and inefficient usage patterns, allowing for targeted interventions and

optimisation of water distribution systems. Furthermore, real-time data monitoring and predictive analytics can enable utilities to anticipate demand fluctuations, optimise supply, and implement demand response strategies. Digital technologies also facilitate the dissemination of information to consumers, empowering them to make informed decisions about their water usage. Overall, these technological advancements provide a more accurate understanding of water demand, optimise resource allocation, reduce water losses, and promote sustainable water management practices.

7 Managing Risk and Resilience

Wai Tāmaki ki te Hiku as yet does not have a risk management policy or framework for this initial asset management plan to refer to. To provide information for this asset management plan, a high-level assessment was undertaken to create a baseline of information for the entity.

During the establishment period, Wai Tāmaki ki te Hiku we will design and implement a consistent and uniform risk policy and integrated risk management system. Our risk management processes will be consistent with established risk management standards including ISO 31000 and will be underpinned by the principles of Te Mana o Te Wai. These risk-based approaches will be integral to our future business operations, inform our strategic decision making and operative controls while building resilience and stronger community links. It is anticipated that the entity's risk process will typically have the following basis.

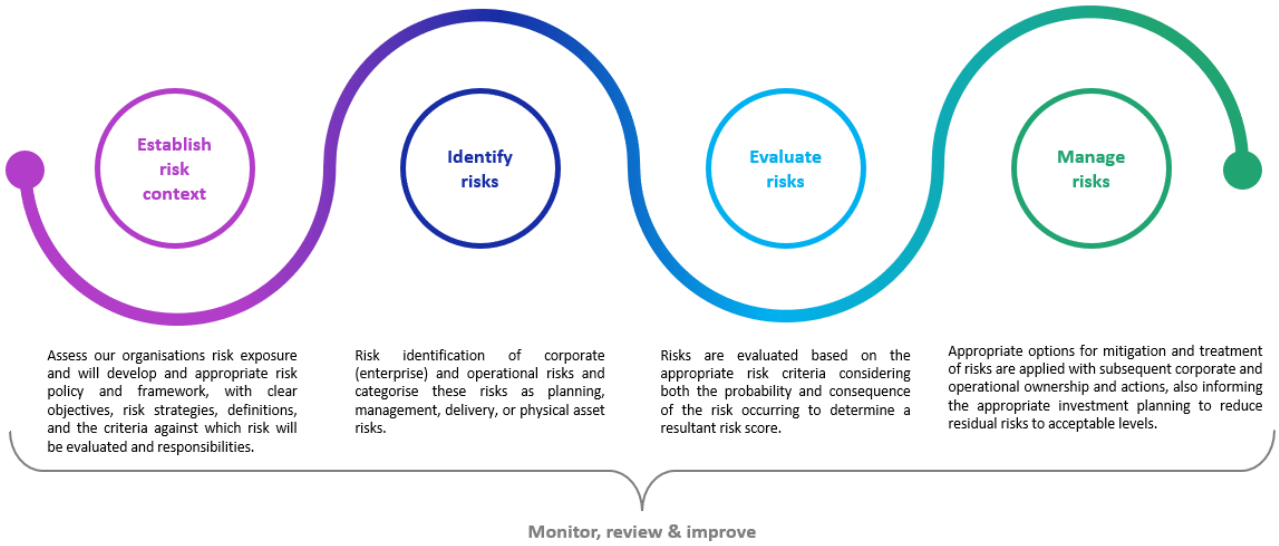


Figure 43 – Our risk framework development basis

Highlights – Managing risk and resilience.

The top 5 risks identified as part of the initial high-level risk assessment are as follows.

1. Activity management and delivery impacting on environmental and community well-being.
2. Addressing demands of specific growth factors.
3. Climate change Impacts to community well-being.
4. Capability and capacity of staff and teams
5. Cost impacts of programming and planning.

The top investment drivers which aim to address and mitigate these risks are renewals, growth, environment and resource consents.

We will confirm our overall risk baseline and establish a risk policy and risk management framework as part of the transition period and through continuous review and improvement in future.

7.1 Initial high-level risk assessment

An initial high-level risk assessment was conducted for Wai Tāmaki ki Te Hiku, to provide an indicative baseline of the top five risks within the region. The tools and techniques used to establish the “baseline” risk profile have used the following sources.

- Council information, summarised in the Asset Management Plans on a Page – Appendix A. The baseline has considered information documented under "Risks and Issues", and "Priorities and Challenges".
- National areas of highest risk to water services management, planning, and delivery assessed from a sample of 2021 asset management plans with standardised scores for uncontrolled risk.

Risk ranking for the entity has been based on the number of councils within the entity referencing a specific risk in the 2023 individual council summaries. The top five risks identified have been assigned to initial (typical) risk categories and domains as indicated below. The figure below also indicates the ranking of risk investment drivers which will likely be applied to mitigate these risks. Detailed risk assessment and mitigation will be developed as part of our entity’s risk management framework.

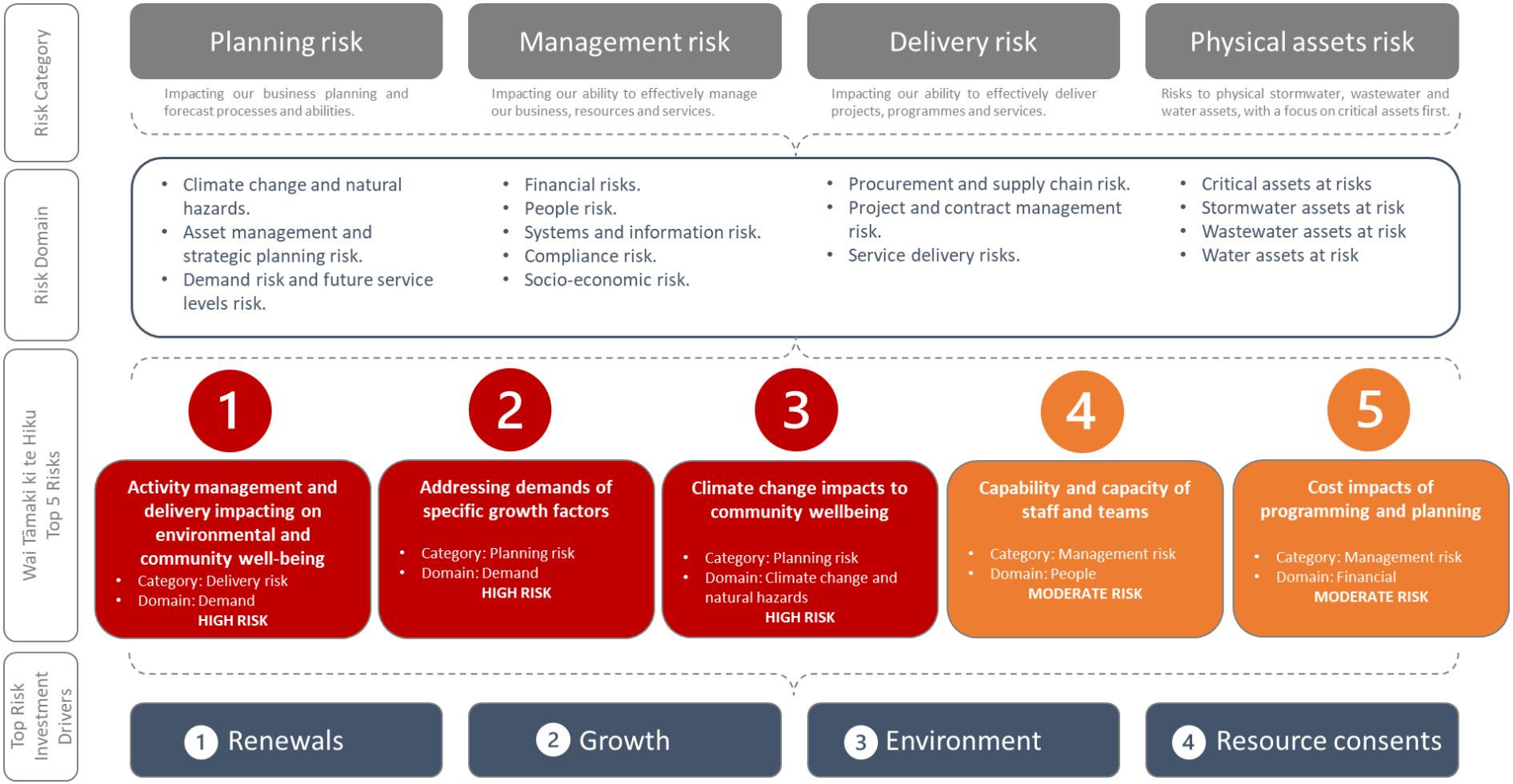


Figure 44 – Top 5 risks in Wai Tāmaki ki Te Hiku identified as part of initial high-level risk assessment.

Further development of the above and detailed risk assessments and mitigation measures will be developed as part of our risk management framework. The following sections provide details of typical components and categories of risk that could be included in the risk management framework. These include some initial insights in terms of critical assets, climate change, natural hazards, and resilience.

7.2 Planning risks

Planning risks refers to the potential challenges and uncertainties that can affect our entity's ability to develop and execute effective planning and forecasting for managing three waters infrastructure and services. These are critical risks which could impact on our ability to deliver reliable and sustainable services to our customers. Some key planning risks could include the following.

- Climate change and natural hazards
- Asset management and strategic planning risks
- Demand risk and future service levels risk.

7.2.1 Climate change and natural hazards

Climate change impacting on community well-being (referring to the impacts of climate change such as flooding, droughts, high temperatures and sea level risk) has been identified as one of the top five current risks within our entity.

The Water Services Reform Programme aims to significantly improve the safety, quality, resilience, accessibility, and performance of three waters services, in a way that is affordable for New Zealanders now and into the future. Therefore, it is crucial that our entity has good knowledge on how climate change and natural hazards will impact our three waters assets, especially critical assets, and to make tactical and informed decisions on asset management and planning.

For this initial asset management plan, a high-level climate change risk and natural hazard assessment was undertaken. These assessments will be improved upon in the future.

7.2.1.1 Climate change

The climate change risk analysis had the following objectives.

- To identify gaps in the knowledge of climate change risks across the entity
- To understand relevant adaptation strategies/policies in place
- To recommend areas for further investment through the asset management plans to improve understanding, awareness, preparedness, and adaptation for climate change.

Climate Change information availability

Information on climate change projections is generally available throughout the region. Auckland has initiated climate change projections and assessments across a variety of climate change hazards to 2120, including, temperature, extreme weather (rainfall and wind), coastal hazards (coastal inundation, erosion, and coastal flooding) and drought. For the Northland region, climate change information is available at a regional level and highlights key changes of temperature, rainfall, storms, and coastal hazards. These projections were both completed by NIWA and provide a consistent overview of anticipated climate changes.

However, our assessment indicates that there are gaps in the availability of climate change projection information specific to future water scarcity and drought issues. This includes gaps in the potential changes to regional groundwater levels which are an important water source for rural settlements and agricultural water supplies. There is also a large variety in the level of details available for projections of future extreme weather events (e.g., tropical cyclones, atmospheric rivers, hailstorms, extreme winds) and where these effects will be observed.

The figure below provides an entity overview of where climate change projection information is available or not. Showing the percentage of contributing councils who have climate change hazard projections for a specific project or have access to hazard projections from other sources (e.g., MfE, NIWA or the regional councils). For example, 100% of coastal inundation means all councils in Wai Tāmaki ki Te Hiku have access to information to understand the coastal inundation hazard from rising sea-level.

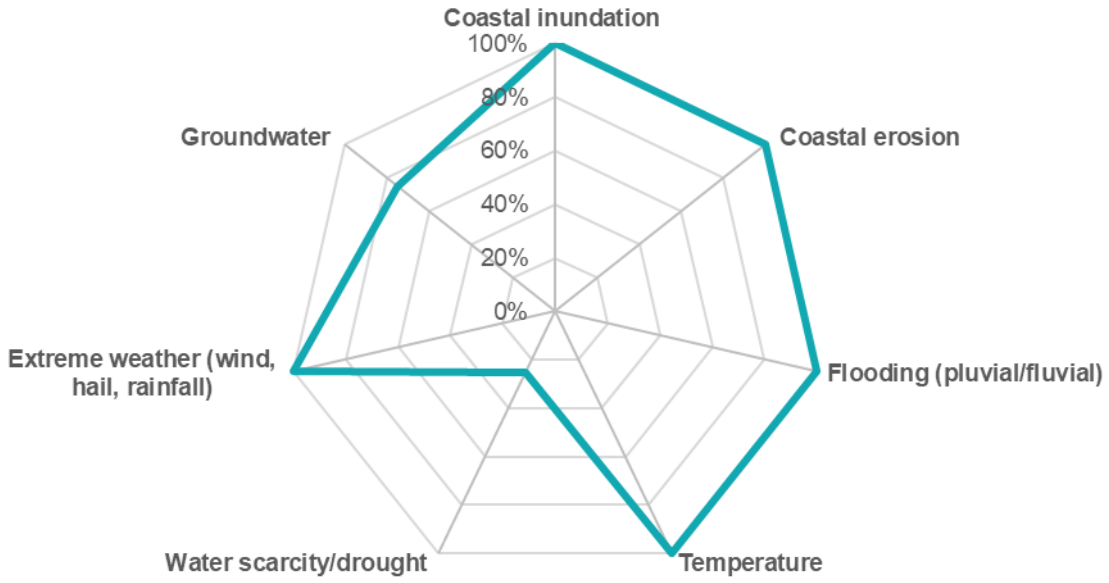


Figure 45 –Availability of climate change information

Climate change risk awareness

The overall assessment for climate change risk awareness for Wai Tāmaki ki Te Hiku is presented in the figure below, showing where there may be gaps in the awareness of climate change risks to three waters assets of our entity. It shows the assessed scoring on whether each contributing council has used the climate hazard information available to complete a risk assessment for the three waters assets, i.e., they are aware of the potential climate risk to three waters assets. A risk awareness score of 1 means the contributing council does not mention or only in very general terms, climate change drivers and potential risks to three waters services/assets. This means no climate change risk assessment/projection is undertaken. On the other hand, an advanced risk awareness score of 5 means the abovementioned risks are assessed in detail with results clearly showing the vulnerable assets within the climate change risk prone zones.

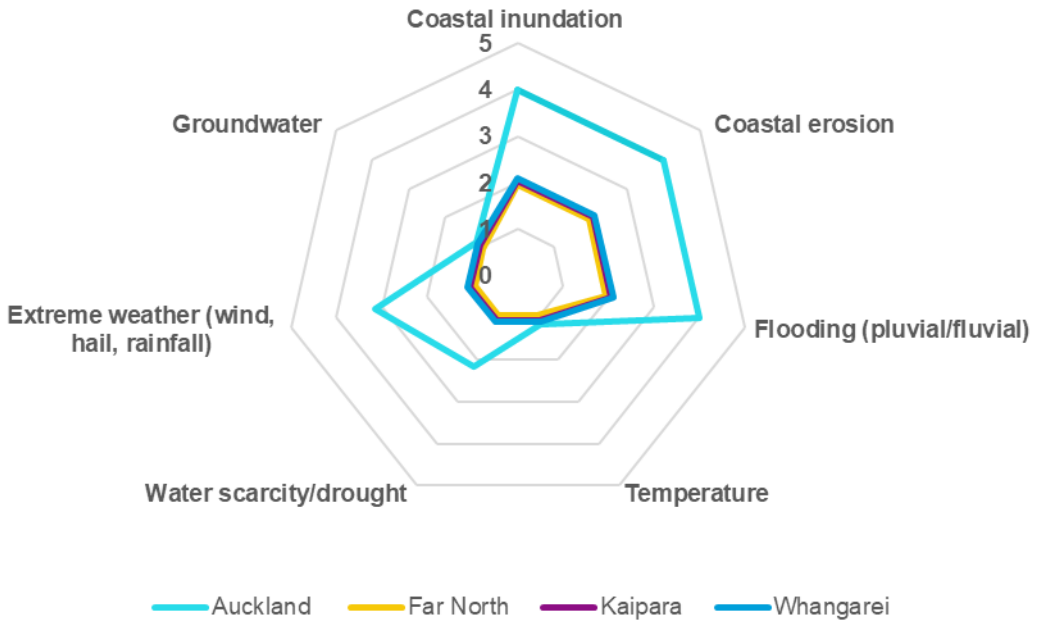


Figure 46 – Climate risk awareness for Wai Tāmaki ki Te Hiku

Initial climate change risk assessment.

Climate change will bring several potential changes to three waters infrastructure and services provision to Wai Tāmaki ki Te Hiku, driven by the following risks which have been initially identified.

- **Increased temperatures** - Higher temperatures and increased hot days are expected throughout the region. These temperature increases will result in greater evaporation rates and drive increased water demand. This may potentially also cause a reduction in water storage. This reduction combined with the issue of water scarcity will place water supply systems in the entity under pressure and water restrictions may be required more frequently and earlier in summer seasons.
- **Water scarcity** - It is projected that Auckland and Northland will experience more frequent and more severe droughts. Drought risk is highest for east and west coasts and southern inland areas, placing future stress on water supply systems. The Waikato River has been identified as a reliable water source to augment surface water resources, especially for Auckland areas. Understanding the implications of drought for the entire regions water supply, including backup alternatives, is necessary, especially for Northland.
- **Extreme rainfall and flooding** – Climate change is likely to increase the intensity of extreme rainfall events across the region, with more frequent and severe coastal and estuarine flooding being projected. In Auckland alone, approximately 8,000 buildings are in floodplains, 7,000 buildings are in overland flow paths and 1,000 buildings are in flood prone areas at risk of inundation in a 1 in 100-year flood event. The capacity of stormwater systems is likely to be exceeded more frequently due to heavy rainfall events, as occurred throughout Auckland and Northland in early 2023 with damage to public and private properties because of the flooding. The ageing stormwater infrastructure and deteriorating asset condition in WSE A may result in increased numbers of unexpected asset failures as they are exposed to beyond-design events with climate change.
- **Coastal hazards** – Future sea-level rise is a significant issue for the communities and infrastructure near the coast. Sea level at the Port of Auckland has risen by 1.60 ± 0.08 mm per year since the early 20th century, with an acceleration of sea level rise in recent years. The three waters assets located near the coastal zones may face increased risk from coastal erosion and inundation. The increased frequency and magnitude of coastal storms as well as reduced drainage capacity in stormwater systems connecting to the sea will further affect the performances of the stormwater systems. The increased sea level will create risks for the wastewater treatment plants near the ocean, e.g., Rosedale Wastewater Treatment Plant in Auckland and Taipa Wastewater Treatment Plant in Far North. Detailed assessment on the potential risks and impacts of coastal hazards on the critical waters assets is needed. Sea-level rise will lead to additional coastal erosion and retreat of coastal cliffs, affecting coastal assets such as pump stations, stormwater outfalls and buried networks.
- **Groundwater** - Due to sea level rise, groundwater levels will rise in coastal areas. Additionally, the changes to rainfall, river flows, and groundwater abstraction demand could potentially affect aquifer water quality and allowable water takes. The Aupouri Aquifer review was undertaken for Northland region, aiming to improve the understanding of potential aquifer changes from climate change. Completing a similar study for Auckland aquifers (Waitemata sandstone and volcanic aquifers) would improve understanding of future risks and sustainable management of groundwater abstraction as a source of water.

Climate Change Maturity Assessment

An analysis was conducted to identify gaps in information on climate change and understand relevant adaptation strategies/policies that may already be in place across the region. Publicly available reports, documents and data on climate change projections and adaptation for Wai Tāmaki ki Te Hiku were reviewed against predefined criteria, presented in the table below. The criteria focus on evaluating the level of maturity of climate change risk awareness and adaptation preparedness at a local and regional level.

Table 17 - Document review analysis criteria

Level of maturity	Score	Climate change risk awareness	Climate change adaptation preparedness
Aware	1	Climate change drivers and potential risk to three waters services/assets not mentioned or only in very general terms; no assessment/projection is undertaken.	No climate change strategy/policy/study published or conducted; briefly mention climate change consideration/factor in documents like long term plan, infrastructure strategy.
Basic	2	Climate change drivers and potential risk to three waters services/assets not mentioned, with potential issues and scenarios broadly identified.	High level statement/objective of organisational goals regarding climate change adaptation.
Core	3	Climate change drivers and potential risk to three waters services described, appears to be based on high-level assessment.	Evidence of the strategy/policy/action plan on climate change and detailed framework on strategic goals, organisational statement, roles and responsibilities.
Intermediate	4	Climate change drivers and potential risk to only some critical three waters assets are assessed with detailed assessment methodology or mapping studies.	Evidence of the strategy/policy/action plan on climate change and well-developed strategic goals embedded in the asset management process for three waters systems.
Advanced	5	Climate change drivers and potential risk to all three waters assets are assessed with detailed assessment methodology with results clearly showing the vulnerable assets within the climate change risk prone zones.	Strong integration of the climate change strategy/policy/action plan and advanced asset management of three waters systems within the organisation.

Climate change adaption

Overall, the contributing councils in Wai Tāmaki ki Te Hiku have embarked on a range of adaptation measures to respond to climate change. Across the contributing councils, there is a recognition of the importance of adapting three waters networks to climate change. Broadly, these councils have begun to incorporate climate change considerations into their planning processes, policies, and provisions. For example, Auckland Council has well-established climate change goals and measures through Auckland Plan 2050 and Auckland's Climate Change Plan. Watercare has published the Watercare Adaptive Water and Wastewater Infrastructure Planning and Watercare's own Climate Change Strategy. There are plans to consider measures such as infrastructure upgrades and improved management practices to enhance the resilience of these networks to climate-related risks, including flooding, sea-level rise, and extreme weather events.

At the Northland regional level, the Northland Regional Council has published Te Tai Tokerau Climate Adaptation Strategy in 2022. Kaipara has adopted relevant adaptation plans, for example, Climate Action Plan 2021 and Community Adaptation Plan. Whangārei District Council published Coastal Management Strategy 2002 and have a draft Climate Action Plan. In general, action planning is in place to help respond to coastal, flooding and sea level rise hazards for hazard prone areas. However, specific plans, for example, targeting water scarcity and droughts are not well developed yet. Far North District adopted the Te Tai Tokerau Climate Adaptation Strategy published by the Regional Council but does not appear to have its own climate change adaptation or action plan in place yet. We also note that the available council climate adaptation plans are usually intended for high-level council guidance and specific risk and adaptation plans for three waters entities are still to be developed across the region.

The existing body of work within Auckland is at a detailed level from the Watercare studies and Auckland Council leadership, however a similar depth of information is not yet available for the wider area. There is a need to develop and implement regionwide adaptation planning that is tailored to meet the local community and stakeholders' expectation for three waters services. The table below demonstrates the high-level assessment of maturity of climate change adaptation for our entity.

Table 18 - Level of maturity for climate change adaptation. (Refer to the above for definitions and description of scoring)

Climate change adaptation preparedness	Auckland	Far North	Kaipara	Whangārei

We will further develop community focused climate change strategies for the areas and assets where it is not already completed for. This includes developing an overarching climate change strategy and policy, defining the roles and responsibilities of stakeholders, and providing support and guidance for communities and their local three waters assets. Those strategies and policies will feed into the development of a long-term plan and further development of our asset management plan.

Next steps

The following recommendations from the initial climate change study will be undertaken in our first three years as an entity. These are also referred to in *Section 14* in the entity's improvement plan following the asset management maturity assessment.

- Undertake studies to understand the future trend of the risk of water scarcity and droughts and link with the groundwater prediction for the next 50-100 years.
- Undertake detailed assessment on the potential effects of climate change on hotspots and critical three waters assets in Wai Tāmaki ki Te Hiku.
- Develop an overarching climate change strategy and policy, defining the roles and responsibilities of stakeholders, and providing support and guidance for communities throughout our region.
- Review the various adaptation plans and strategies and compile into one document for the whole entity.
- Develop work planning and procedures for recording and monitoring the impacts of climate change on three waters infrastructure in our entity to document the emergence of the risks and for eventual use in adaptive management plans.

7.2.1.2 Natural hazards

A natural hazards data maturity and risk to assets assessment was also carried out with the following objectives:

- To summarise maturity of existing knowledge around asset risks from natural hazards.
- To summarise water services infrastructure risk from natural hazards.

The scope of this initial natural hazards assessment focused on the following:

- An exposure assessment of the Water Treatment Plant and Wastewater Treatment Plants assets to flooding (including coastal inundation, river (fluvial) flooding and stormwater (pluvial) flooding, tsunami, coastal erosion, and earthquake ground shaking.
- A maturity assessment of existing knowledge around asset risks from natural hazards with focus the abovementioned hazards plus co-seismic hazards (liquefaction and fault response), volcanic ashfall and landslides.

The assessment considered risk posed by natural hazards to water services assets directly. Indirect, cascading, or operational risks were not assessed.

Impact of natural hazards on water services assets

The abovementioned natural hazards pose the following typical damages to water services assets:

- **Flooding** – water supply intakes damaged or blocked, bores contaminated, reservoirs overtopped or otherwise compromised, pump stations or treatment plant infrastructure inundated, erosion or sediment deposition in open channels, coastal inundation leading to corrosion damage.
- **Tsunami** – as with flooding, additional debris, structural damage, and saltwater damage.
- **Coastal erosion** – undermining and soil collapse /wave action leads to infrastructure damage.
- **Seismic hazards** – damage from ground shaking, differential settlement or other ground movements, drainage networks inundated with liquefaction ejecta.
- **Volcanic ashfall** – damage to electrical systems, blockages to inlet and drainage networks, damage to treatment processes.
- **Landslides** – rupture damage primarily to horizonal network infrastructure

Natural Hazards Maturity

An assessment was carried out to review the existing information held by councils and their understanding of and planning for natural risks to their infrastructure. A range of asset management and lifelines documents were scored on a scale of one to against a range of criteria to assess the data maturity across hazard information (above), exposure, vulnerability, criticality, risk assessment, planning.

The following is a summary of the maturity assessment results.

- There is a lack of volcanic hazard information in the existing asset management plans, except for reference to the lifeline groups. Volcanic eruption was assessed in the lifelines study as having a frequent return period and severe to catastrophic consequence. Earthquakes and volcanic eruptions and were assessed as the highest priorities. The study states, “restoration of treatment and transmission systems destroyed or damaged by ash or the eruption could take months or years”. The focus of the recommendations for volcanic eruptions in the lifelines study was only on response planning. Greater consideration should be given to ashfall vulnerability and resilience of critical assets, in much the same way as seismic risk assessments (recommended by the lifelines study) are carried out for key assets. The Northland lifelines study also identified volcanic eruption as being a hazard that could lead to widespread local failures.
- The risk assessment and resilience planning that has taken place has focussed on seismic resilience (primarily of reservoirs, e.g., Whangarei District Council). Further natural hazards within the entity area need to be considered and included in risk assessments – for example tsunami, which was identified in both the Northland lifelines study and to a lesser extent in Auckland’s, as a priority hazard but for which little information about impacts on water service infrastructure was provided. Northland’s lifelines study identified several water and wastewater treatment plants at risk from a tsunami.
- Both Northland Regional Council (NRC) and Auckland Council have extensive datasets of natural hazard information available. Flood hazard has been extensively mapped in both council areas. NRC has regional flood mapping available in areas outside of the 26 catchments that it has modelled in detail. Both councils have mapped coastal erosion and coastal hazards. This information, along with national datasets, should be more than adequate for assessing the risk to critical assets.

Initial Infrastructure Exposure Assessment

To better understand the geographic spread of natural hazard risks to critical infrastructure, a geospatial exposure assessment was carried out. This compared the location of the water (WTP) and wastewater (WWTP) treatment plant sites with the natural hazards mentioned earlier in this section.

A GIS analysis was done comparing the location of the plants against the coverage of the different hazards whereby each plant was then scored from zero to five based on how many hazards it was exposed to.

In summary is noted that the Mangere WWTP stands out as a highly critical asset exposed to four out of five natural hazards assessed. This should be the subject of a more detailed risk assessment.

Several water treatment plant sites on the east coast of the entity and Waiheke Island are assessed as being exposed to multiple hazards, which will require further investigation in the future.

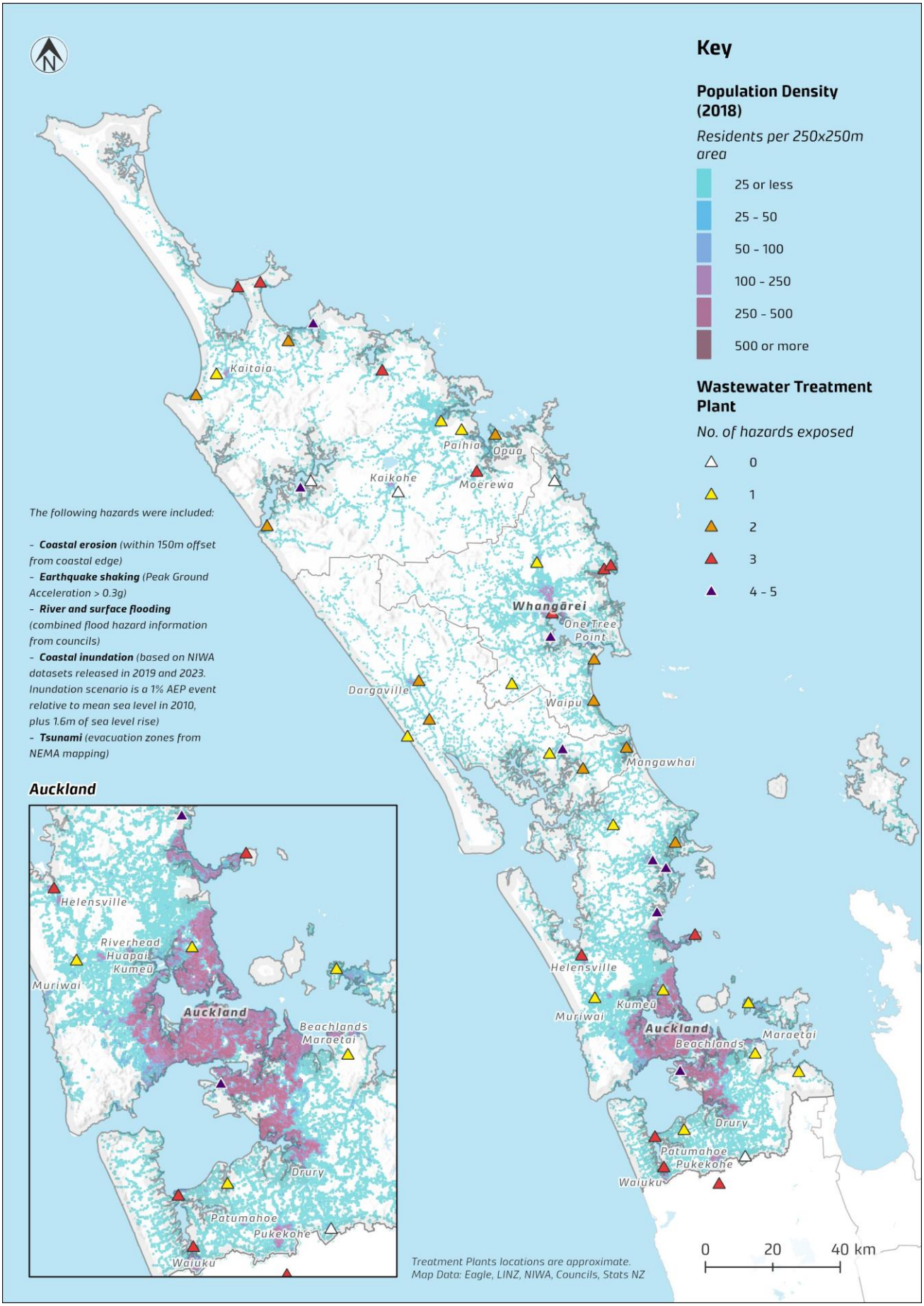


Figure 47 –Wai Tāmaki ki Te Hiku WWTP natural hazards exposure map

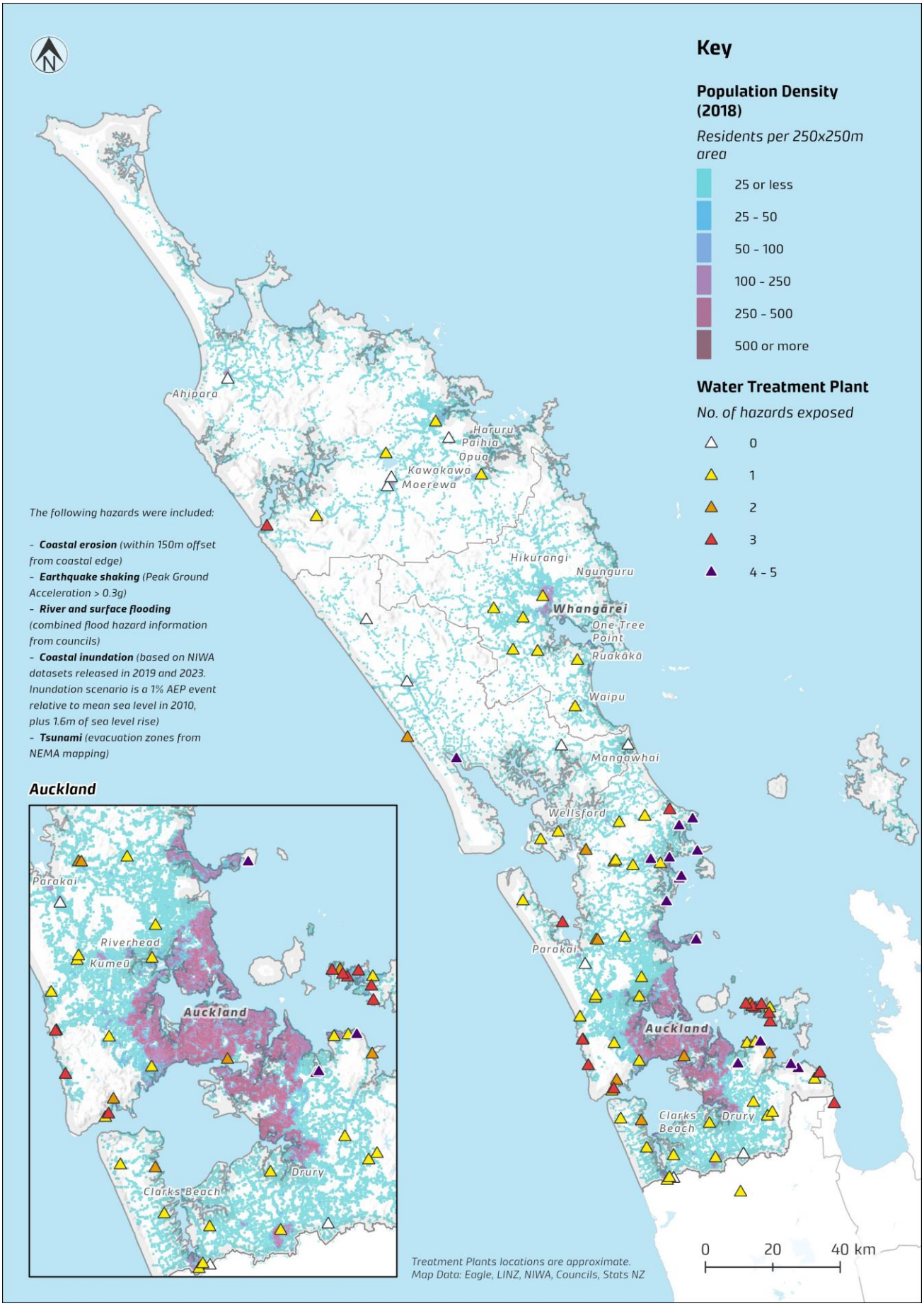


Figure 48 – Wai Tāmaki ki Te Hiku WTP natural hazards exposure map

7.2.2 Asset management and strategic planning risks

Potential asset management and strategic planning risks in our entity involve uncertainties in long-term planning and decision-making, often created due to a lack of data quality and maturity. These risks encompass factors like inaccurate demand forecasts, changes in regulatory requirements, and the inability to adapt to emerging technologies or environmental concerns. These can lead to costly investments in infrastructure that may not align with future needs or challenges. Furthermore, a lack of data maturity in terms of asset condition and performance could lead to inefficient operation, maintenance and renewal strategies which ultimately impact the entity's ability to deliver its levels of service.

During the initial years of establishing Wai Tāmaki ki Te Hiku there will be a substantial focus on improving the maturity and quality of data that impacts on our ability to effectively implement our asset management and strategic planning initiatives.

7.2.3 Demand risk and future service level risks

In our pursuit of operational excellence, we recognise the critical importance of addressing two key challenges: demand risk and future service level uncertainties. To address these issues effectively, we will devise a comprehensive strategy that standardise our approaches and combines cutting-edge methodologies and advanced predictive modelling techniques to enhance our ability to establish future levels of service with a higher degree of precision. By doing so, we aim to bolster our confidence in meeting these forthcoming objectives.

7.3 Management risks

Management risks refer to potential challenges and uncertainties that can impact the efficient and effective day-to-day management of operation, maintenance, and oversight functions required. These are critical risks which could impact on our ability to deliver reliable and sustainable services to our customers. Some key management risks include the following.

- Financial risks
- People risk
- Systems and information risk
- Compliance risk
- Socio-economic risk

7.3.1 Financial risks

There are several potential internal and external financial risks which are being considered as part of the development of the asset management plan and the funding and pricing plan initially. These risks could range from economic shifts, inflation, funding, and political risks to operational and delivery related risks which impact on achieving capital and operational expenditure delivery efficiencies.

7.3.2 People risk

The availability and retention of a skilled workforce and talent within our entity is a risk current experienced by several of the councils with our region. Potential mitigation measures will be developed as part of our transition planning and overall risks management framework to ensure current knowledge and skills are retained and gaps in our workforce are effectively filled to support operation, maintenance, and oversight of our business activities. Ongoing training and development and engagement through the wider water industry will also be used as a platform to develop mitigation measures in this respect.

7.3.3 Systems and information risks

Transition preparations and planning will address the effective capture and transition of all existing data and information from councils to our new entity. Processing and cleansing of data will remain an ongoing risk which will be addressed as part of our data management strategy. Furthermore, we intend to utilise consistent and uniform systems across our entity which are aligned with national and international best practices, while being tailored to our specific entity needs.

7.3.4 Compliance risk

Non-compliances with regulations can have significant consequences, in terms of environmental damage, public health and legal ramifications. Some of the subsequent risks posed by such non-compliances could include the following.

- **Environmental impact** - Non-compliance can harm aquatic ecosystems and water quality.
- **Health concerns** - Contaminated water can lead to waterborne diseases and public health issues.
- **Legal consequences and regulatory sanctions** - Non-compliance can result in legal notices and actions. Regulators can impose compliance orders and increased oversight.
- **Operational disruptions** - Compliance issues can lead to service interruptions.
- **Reputational damage and community discontent** - Trust in the entity can erode, causing customer dissatisfaction and negative media coverage.
- **Financial impact** - Remedying non-compliance can be costly due to infrastructure upgrades and legal fees.
- **Sustainability threat**- Long-term viability of the entity may be at risk if non-compliances are prolonged.

To mitigate these risks, Wai Tāmaki ki Te Hiku will prioritise compliance, invest in infrastructure, maintain monitoring, and engage with regulators and the community frequently. Complying with regulations is crucial for environmental protection and public health. Therefore, as an entity we are planning to invest approximately $634 million in resource consent compliance projects over the initial 10-year period. Our current compliance status, challenges, and investment to improve and maintain compliance is further highlighted in *Section 4.7*.

7.3.5 Socio-economic risk

The risk management framework will include a specific socio-economic focus where relevant and appropriate. Affordability of three waters services is one of the key focus areas and a socio-economic risk in the entity that is targeted to be addressed by the objectives of water reform. Other macro-economic risks that require continuous assessment include, but are not limited to, the impacts of inflation, pricing levels (e.g., energy and operational consumables), interest rate fluctuations and regulatory changes.

7.4 Delivery risks

Delivery risks refer to potential challenges and uncertainties that can disrupt or negatively impact our ability to deliver capital and operational projects, programmes and maintain existing levels of service that are crucial to our entity's objectives. These are critical risks which could impact on our ability to deliver our projects and programmes as part of our asset management plan. Some key delivery risks could include the following.

- Procurement and supply chain risk
- Project and contract management risk
- Service delivery risk

7.4.1 Procurement and supply chain risk

In Wai Tāmaki ki Te Hiku, potential procurement and supply chain risks encompass potential disruptions, reliability and availability issues with suppliers, cost fluctuations, quality assurance concerns, regulatory compliance changes, lead time delays, inventory mismanagement, sustainability risks, transportation disruptions, workforce challenges, currency exchange fluctuations, and strategic supplier vulnerabilities.

We plan to develop effective risk mitigation strategies which may include diversifying suppliers, maintaining safety stock, contract negotiation, and staying informed about market trends to ensure supply chain reliability and operational efficiency. Mitigation measures will be integrated in our entity's delivery model design, with a strong focus on establishment of long-term partnerships and enhancing the capability and capacity of local suppliers through transparent programmes of work that boost market confidence and sustainability of workload.

7.4.2 Project and contract management risk

Potential project and contract management risks in our entity pertain to challenges like scope creep, budget overruns, timeline delays, quality assurance, resource shortages, regulatory compliance, contractual disputes, scope uncertainty, vendor reliability, environmental and safety concerns, stakeholder management, market volatility, weather and climate risks, technology integration, financial challenges, and legal and regulatory issues.

Through our delivery model design, we plan to implement effective risk mitigation measures which will be focused on advanced project planning, clear scope definition, robust and long-term contract negotiations, monitoring, early partnership and stakeholder engagement, adherence to standards, and contingency planning. Working with partners and growing our own skilled workforce and digital tools in this field is a key focus to effectively delivery our capital and operational projects and programmes.

7.4.3 Service delivery risk

Several factors have the potential to jeopardise service delivery and meeting minimum service standards across our region. However, our operational and management planning enhances our preparedness to minimise the frequency and duration of service interruptions and ensures swift response capabilities. It's crucial to acknowledge that rescheduling or deferring projects, whether due to prioritisation, feasibility concerns, or other factors, poses a significant long-term risk to maintaining consistent service levels and dependable delivery. This is particularly relevant in cases of rescheduling renewal programmes, as it can result in increased maintenance and a build-up of simultaneous investment needs to replace aging infrastructure, potentially eroding both capital and operational expenditure efficiency gains in the long-term.

7.5 Physical asset risks

Physical asset risks encompass the potential challenges and uncertainties associated with the tangible infrastructure and assets that are integral to our ability to deliver our levels of service for all three waters (our critical assets). Potential risks which impact most of our physical assets include the following.

- Aging infrastructure, asset degradation and reliability
- Asset resilience
- Operational efficiency
- Technological and technical obsolescence

Several projects in our current planning already include components of addressing risks to our critical and other physical assets such as replacement and renewal of aging pipelines and pump stations, relocation of treatment plants and pipelines impacted by recent flooding and natural hazards and reservoir upgrades that require structural remediation. Our ongoing improvement in asset condition assessments and data on asset criticality will further inform our risk assessment of exposure to physical asset risks in future. Some of our critical assets are described further below.

7.5.1 Critical assets

Our critical assets, their critical failure modes and impacts, and high-risk areas will be defined and assessed in more detail as part of our risk identification step in developing our risk management framework. This process will likely follow a uniform risks spectrum approach, with specific focus on areas such as the likelihood and impact of failure of critical assets, public health and safety impacts, non-compliance with relevant legislation, environmental damage, not meeting levels of service, etc.

7.5.1.1 Critical Assets and Asset Risk

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction in service provision. Typically, assets or facilities that service more customers, or vulnerable customers have a higher criticality rating, e.g., hospitals, aged care facilities, schools, and emergency centres. Details of these facilities will be identified as part of our risk management framework.

Identifying and assessing critical assets and their potential risk of failure allows the entity to prioritise its limited resources (time, funding, staff, and contractors) on activities that prevent or reduce service disruptions. To do this, it needs to understand the potential consequences and likelihood of asset failure and consider all the relevant risk criteria, such as social, environmental, and financial impacts, within its risk framework.

The below table provides a high-level list of three waters asset types and their typical level of criticality in providing services.

Table 19 - Critical assets within Wai Tāmaki ki Te Hiku

Critical Assets	Water Supply	Wastewater	Stormwater
High consequence of failure (Network wide issues, health and safety, impacts majority of customers)	16 Wells, 45 surface water intakes and abstraction points, 18 water supply dams, 39 Water Treatment Plants, Main Pipes	49 Wastewater Treatment Plants, Bulk pipes, Major Pump Stations	417 km of channels, Stop Banks, Dams
Medium consequence of failure (Local issues)	131 Pump Stations, Backflows	869 Pump Stations, Pressure pipes, Rising mains	Ponds, Basins, Wetlands, Storm filters, 6 Stormwater pump stations
Low consequence of failure (small number of customers)	Laterals 530,997 Water meters	Laterals, Local pressure sewer systems	Laterals, Rain gardens, Soakage

Asset Criticality Maturity

How we determine our critical assets differs across the region as it has been based on individual councils' knowledge and investment into developing a criticality framework for their assets. We will continue to improve in this space and bring all assets to a common level of asset criticality maturity.

We will develop and implement an entity-wide criticality framework based upon national standards, which can be applied to (standardised) asset classes where possible. This will also improve investment decision making by prioritising renewals and upgrades to those most critical assets at risk of failure.

7.6 Risk management maturity

The risk management maturity will be confirmed and further established as part of development of our entity's Risk Management Framework. This will be aimed at standardising approaches, data management and processes relating risk across the entity and in alignment with best practices.

7.7 Resilience

Infrastructure resilience is the timely and efficient prevention, absorption, recovery, mitigation, adaptation, and transformation of infrastructure functions which are exposed to current and potential future hazards. Wai Tamki ki te Hiku will have a significant focus on improving resilience of three waters infrastructure across the region which will be integrated as part of management and operational processes and include capital investment targeted to improve resilience and reduce related risks as far as possible. Carbon reduction is one such initiative which address climate change through emissions mitigation. Following are some initial baseline data pertaining our entity's carbon emissions and potential reduction targets.

7.7.1 Carbon reduction

Effective climate change addresses two sides of the climate change issue: mitigation and adaptation. Carbon Reduction focuses on emissions mitigation, i.e., not making climate change worse than necessary. We can help reduce the impact of climate change through mitigation efforts and low carbon approaches.

Greenhouse gas emissions (GHG) associated with three-waters infrastructure and processes are carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). These emissions are categorised as either embodied emission (e.g., emissions relating to extracting, manufacturing, or transporting materials or goods, construction emissions including fuel use) or operational emissions (e.g., chemical use, process emissions, or energy used to power plant during operations). GHG emissions can also be grouped and reported by scope, according to whether they are directly sourced or controlled by the entity (Scope 1), or indirectly associated through energy purchased by the company (Scope 2), or from sources in the company's value chain emissions (Scope 3).

Operational Emissions Baseline

This operational emissions baseline was completed using activity data which was sourced from councils through the national performance review (NPR). Additional activity data was collected through direct contact with some councils, the NZ Water Wastewater Treatment Plant Inventory (Water New Zealand, 2022), and online sources such as Stats NZ. The accuracy of these results is limited by the accuracy of this data and will be updated to create a more accurate baseline.

Table 20 - Summary of emissions baseline for Wai Tāmaki ki Te Hiku

Scope classification	Emissions source	Carbon emissions tCO_2e/year
Scope 1	WWTP operational emissions	58,000
	WWTP effluent discharge to land and water	14,000
	WWTP wetlands	6,100
	WWTP sludge treatment	9,300
	Total scope 1 emissions	**87,000 tCO_2e/year**
Scope 2	Wastewater treatment and network electricity	17,000
	Stormwater electricity	50
	Water treatment and network electricity	5,500
	Total scope 2 emissions	**23,000 tCO_2e/year**
Scope 3	WTP chemicals	6,900
	WWTP chemicals	6,500
	Electricity T and D	2,100
	WWTP sludge disposal	11,000
	Total scope 3 emissions	**27,000 tCO_2e/year**
Wai Tāmaki Ki te Hiku's total operational emissions		**137,000 tCO_2e/year**

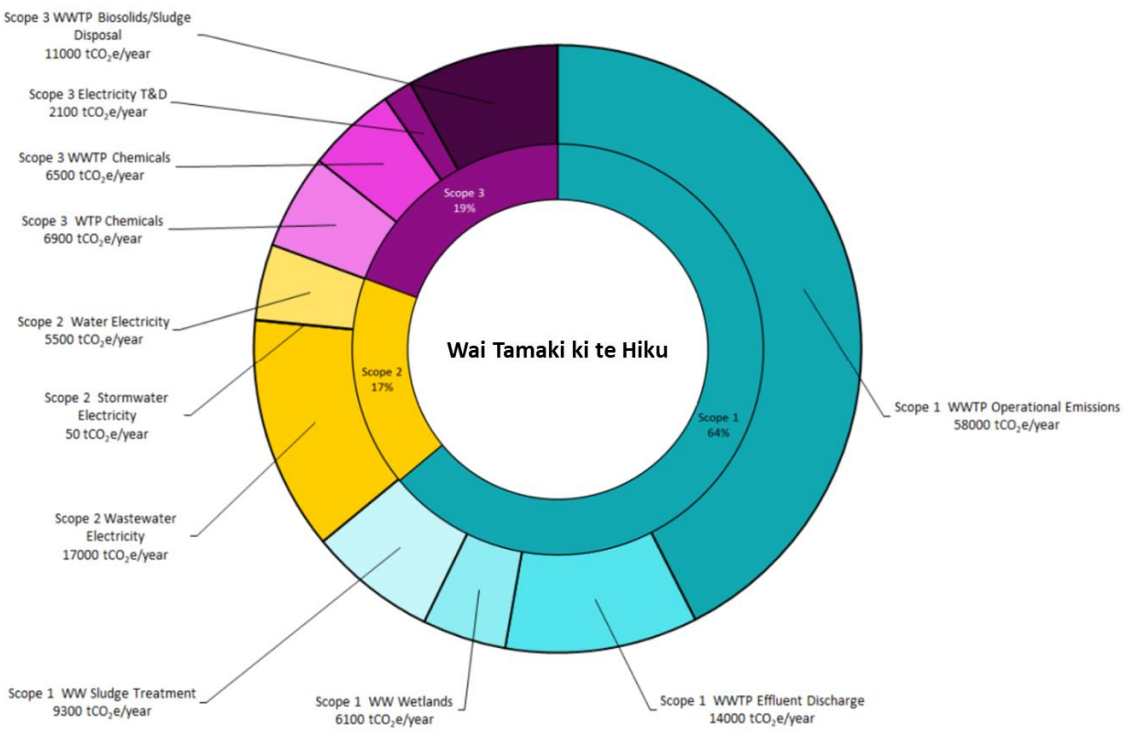


Figure 49 – Operational GHG Emissions for three waters services

Creating and implementing a carbon roadmap for Wai Tāmaki ki Te Hiku

During initial years of our entity establishment process, we will establish a decarbonisation roadmap and science-based targets appropriate to our region. Some key principles to follow will include the following.

- Confirm and use the baseline (above) and GHG inventory as a starting point.
- Set science-based reduction targets for operational and capital emissions (both intermediate and long-term)
- Monitor emissions regularly.
- Identify, invest in, and implement decarbonisation initiatives.

7.7.2 Forecasted capital investment in resilience.

The current prioritised capital forecast includes approximately $496 million under the primary investment driver for resilience (flood and natural hazards) and carbon reduction combined. The below capital investment profile provides an indication how investment in resilience will be increased over the 10-year planning period, with substantial increase forecasted from 2031/32 onwards.

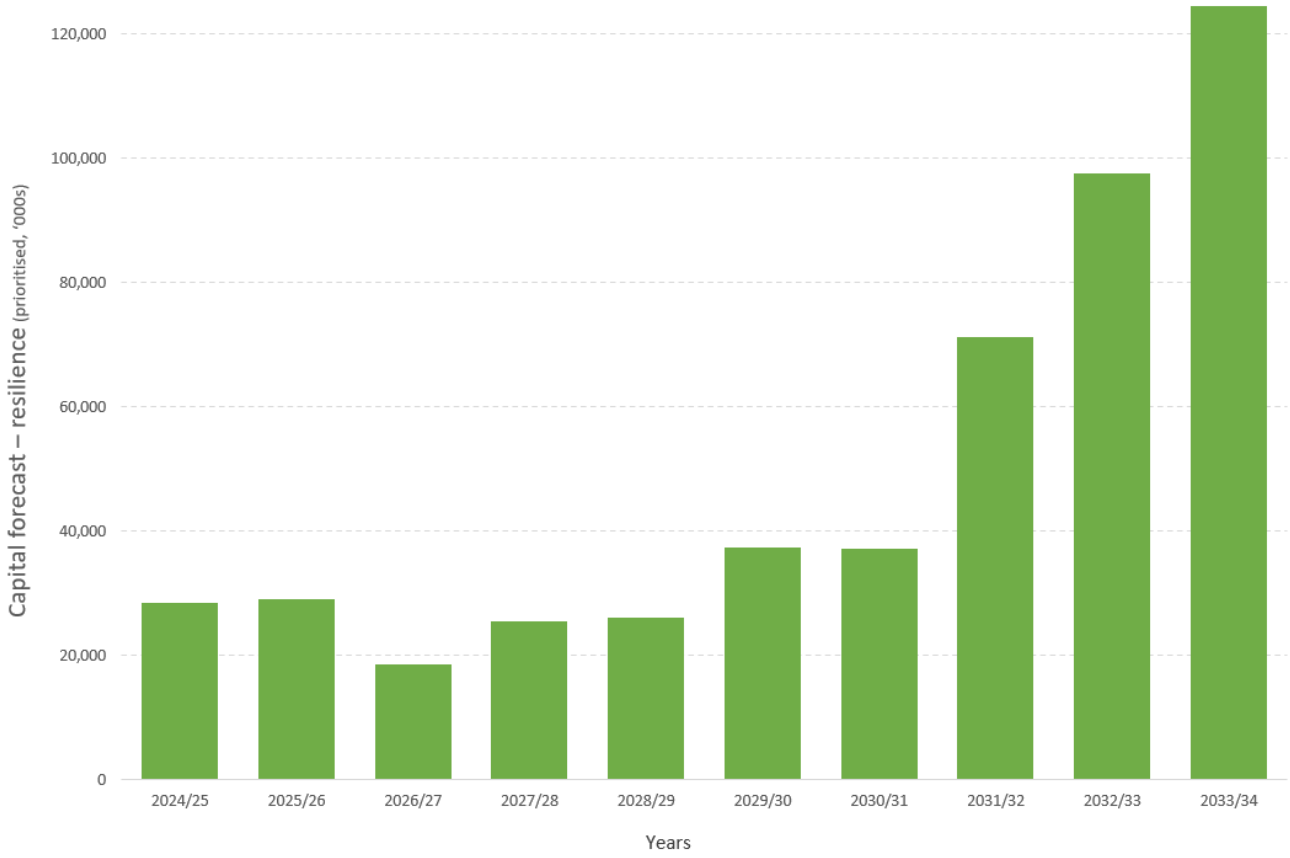


Figure 50 – Forecasted capital investment in resource consent compliance (Real dollars 2023, prioritised)

Some of the most significant projects where investment is driven by resilience include the urban flood control projects in Auckland, CBD flood hazard mitigation in Whangarei, drought mitigation water take increase in Dargaville and the Mangere co-digestion from biosolids and organic waste in Auckland. It is also worth noting that several of larger projects, especially renewal programmes include resilience components as secondary drivers.

7.8 Data confidence and reliability

Different methodologies and grading systems are currently being used to define asset data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 21 - Asset data confidence rating

Rating	Description
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)**

Rating	Description
	Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	Asset criticality	Risk and resilience
Stormwater	D	D
Wastewater	D	D
Water	D	D

Figure 51 –Initial data confidence rating – risk and resilience.

The data confidence related to risk is low (D) since we are still in the process of developing our risk management framework and detailed risk assessments have not yet been conducted. Similarly, the data related to resilience was developed as a high-level overview to provide an initial reference point for gauging risk and resilience.

Asset criticality is currently still limited, mostly to the Auckland region, and a uniform approach will be developed and implemented across the entity in future. Therefore, current data confidence is graded as low (D).

8 Asset Operations and Maintenance Needs

8.1 Operations and Maintenance Plans and Strategies

Our operational and maintenance strategies play a pivotal role in safeguarding the reliability, efficiency, and long-term sustainability of our three waters infrastructure, as well as our capacity to consistently deliver and enhance our levels of service while achieving greater efficiencies. Our primary objective is to cultivate asset operational and maintenance strategies that are rooted in the most current and effective industry systems and global best practices, while being underpinned by the principles of Te Mana o te Wai. These strategies will be thoughtfully applied, leveraging the collective local expertise of our regional teams, and incorporating valuable insights from key stakeholders and partners, including our regulatory authorities.

Our approach will revolve around three essential pillars: people, processes, and systems. These strategies will encompass the following critical components.

8.1.1 People

- **Safety culture** - Safety stands as our utmost priority, and our commitment to this ethos is unwavering. We will continue to furnish comprehensive training and resources, ensuring that every team member not only adheres to stringent safety protocols and reporting systems but also actively contributes to the continuous improvement of safety practices.
- **Skilled workforce development** - Our dedication to excellence extends to our workforce development initiatives. We are committed to investing in ongoing training and development programs for our personnel, keeping them abreast of the latest technologies and industry best practices in asset management, operations, and maintenance. This includes the establishment of a competency matrix to pinpoint skills gaps and tailor training accordingly. Moreover, we will actively encourage certifications and qualifications, promoting the professional growth of team members in relevant roles such as certified operators and engineers.
- **Cross-functional teams** - We will enable collaboration across various departments, fostering a culture of synergy among operations, maintenance, engineering, and other key stakeholders. Our aim is to adopt a holistic approach to effectively oversee and manage our assets. To achieve this, we will define clear roles and responsibilities within these interdisciplinary teams, ensuring seamless coordination and preventing the duplication of efforts.

8.1.2 Processes

- **Asset Inventory and Condition Assessment -** Our strategy involves the meticulous expansion of our existing asset data to construct a comprehensive inventory of our three waters assets. This inventory will encompass detailed infrastructure information and criticality assessments. Ensuring data quality remains paramount, we will institute a regimen of regular inspections and continuous condition assessments, leveraging cutting-edge technologies such as IoT sensors and drones to identify potential issues proactively whenever possible.
- **Predictive Maintenance** - We are committed to implementing state-of-the-art predictive maintenance techniques, harnessing the power of data analytics and machine learning to forecast equipment failures accurately and prioritise maintenance tasks. Our predictive maintenance approach will yield preventive maintenance schedules meticulously tailored to asset criticality and performance data.
- **Asset Lifecycle Management** - Our processes are designed with clarity in mind, encompassing well-defined procedures for asset procurement, installation, ongoing maintenance, and eventual disposal. These processes will seamlessly integrate with our capital improvement plan, guaranteeing that assets are replaced or upgraded at the conclusion of their lifecycle.
- **Documentation and Reporting** - The meticulous documentation of maintenance activities, repairs, and asset performance will be a cornerstone of our operations. We will maintain comprehensive records, generating regular reports that provide insight into key performance indicators (KPIs) such as asset uptime, maintenance costs, and energy efficiency.

8.1.3 Systems

- **Asset Management Software** - We are committed to the adoption of consistent and robust systems across our region, including the utilisation of Computerised Maintenance Management System (CMMS) and Enterprise Asset Management (EAM) software. These systems will serve as the backbone of our operations, facilitating streamlined work order management, asset tracking, and in-depth data analysis. Our vision includes the seamless integration of IoT sensors and data analytics platforms for real-time asset monitoring wherever feasible.
- **Data Analytics and Predictive Maintenance Tools** - Our forward-looking systems will increasingly harness the power of data analytics tools to process and scrutinise asset performance data. These tools will be integrated with our predictive maintenance systems, furnishing early warnings of potential issues, enabling timely interventions.
- **Automation and Remote Monitoring** - We are dedicated to implementing automation solutions wherever feasible to reduce reliance on manual labour and mitigate human errors. Additionally, the integration of remote monitoring and control for our assets will bolster our responsiveness and minimise downtime, optimising operational efficiency.
- **Geographic Information System (GIS)** - Our GIS capabilities will undergo expansion to comprehensively map asset locations, monitor changes, and support spatial analysis. This enhancement will bolster our region-wide planning and decision-making capabilities.
- **Security and Disaster Recovery** - Ensuring the resilience of our critical systems and data in unforeseen circumstances is paramount. We will develop a robust region-wide disaster recovery plan, encompassing stringent cybersecurity measures to safeguard sensitive infrastructure data and operating systems.

Through the seamless integration of people, processes, and systems into our operations and maintenance strategies, our goal is to secure the enduring reliability, efficiency, and sustainability of our three waters infrastructure, all while mitigating risks and optimising costs. These strategies will undergo continuous scrutiny and refinement to readily embrace emerging technologies and stay aligned with the latest industry best practices.

8.2 Key Operational Processes

8.2.1 Water

Providing safe and reliable drinking water to our communities is one of our most important functions. The key water operational processes of our entity generally include the following.

- **Integrated water resource management (IWRM)** - We take a holistic approach to water management that considers the entire water cycle, including water supply, treatment, and environmental sustainability, underpinned by the principles of Te Mana o te Wai.
- **Water quality management** - We ensure that water quality is consistently monitored, tested, and maintained to meet or exceed the Drinking Water Standards for New Zealand (2022) and requirements of Taumata Arowai to provide safe and potable water to consumers.
- **Water treatment optimisation** - We are continuously improving and optimising water treatment processes to enhance efficiency and reduce the environmental footprint.
- **Distribution system management** - Ensuring the safe and efficient transport of treated water from the treatment plant to customers through a network of pipes, pumps, and storage facilities.
- **Energy efficiency** - Implementing energy-efficient technologies and practices to reduce energy consumption in water treatment processes and optimise energy used for pumping, while reducing our carbon footprint.
- **Smart water management** - Leveraging data, sensors, smart meters and advanced technologies to improve the efficiency and responsiveness of water operations.
- **Resilience and water security planning** - Developing strategies to enhance the resilience of water systems to climate change, natural disasters, and other shocks. These strategies also focus on water security to ensure a reliable and safe water supply, especially in areas prone to water scarcity, drought, or contamination.
- **Public engagement and communication** - Engaging with the public and stakeholders to raise awareness about water issues, promote conservation, and build trust.

- **Water use efficiency, conservation, and demand management** - Water use efficiency entails optimising resource usage, reducing waste, and improving water delivery and treatment processes. Water conservation involves efforts to decrease overall consumption by customers and the utility itself, fostering responsible water use practices. Demand management strategies are employed to align water supply with customer needs, often using restrictions, and pressure management to ensure a reliable supply while minimising strain on resources and infrastructure.
- **Governance and regulatory compliance** - We operate transparently, ethically, and in compliance with relevant laws and regulations through our reporting to Taumata Arowai and our public disclosures. Several regulatory compliance and operational aspects are capture and implemented via our Water Safety Plans.
- **Research and innovation** - We continuously encourage research and innovation in water management to develop new technologies and approaches that could benefit our waters, communities, and the environment.
- **Emergency response** - Our water safety plans include comprehensive emergency response plans to address equipment failures, to manage water supply disruptions, natural disasters, and unforeseen contingencies.

These essential operational processes collectively enable us to deliver safe, dependable, and sustainable water services to its community, all while upholding regulatory requirements and preserving the long-term integrity of its infrastructure.

8.2.2 Wastewater

As an entity we are responsible for managing both the supply of clean water to customers and the treatment of wastewater generated by those customers. Our key wastewater operational processes generally include the following.

- **Wastewater collection** - Wastewater management starts by collecting sewage from residences, commercial establishments, and industries through an intricate network of underground sewer pipes and pump stations. This network serves as the initial conduit for transporting wastewater to centralised treatment facilities.
- **Wastewater treatment** - Our wastewater treatment facilities include screening, preliminary and secondary treatment involving biological process that reduces organic matter and pollutants in the wastewater, and tertiary advanced treatment techniques which are applied to remove remaining impurities, such as nutrients (e.g., nitrogen and phosphorus), suspended solids, and trace contaminants.
- **Energy efficiency** - Implementing energy-efficient technologies and practices to reduce energy consumption in wastewater treatment processes and optimise energy used for pumping, while reducing our carbon footprint.
- **Disinfection** - To ensure the treated wastewater is safe for discharge into the environment or reuse, disinfection is essential. Chlorination, UV disinfection, or ozone treatment are common methods used to inactivate harmful microorganisms.
- **Sludge management** - The sludge generated during primary and secondary treatment is processed to reduce its volume and make it suitable for disposal or reuse. Options include land application, incineration, or landfill disposal. We are also increasingly focused on developed on of on-site digestion of sludge, including the generation of biogas, which is used for cogeneration of electricity, while also reducing sludge volumes.
- **Effluent monitoring** - Continuous monitoring of the treated wastewater's quality is crucial to ensure compliance with consents and environmental regulations. Parameters as defined by specific consent conditions and regulations by Taumata Arowai are measured and reported as required.
- **Effluent discharge or reuse** - The final treated effluent may be safely discharged into a receiving water body, like a river or ocean, if it meets regulatory standards. Alternatively, it can be further treated for non-potable reuse, including irrigation, industrial processes, cooling or groundwater recharge.
- **Maintenance and operation** - Regular maintenance and operation of equipment, pumps, and treatment processes are paramount to ensuring the efficient and reliable functioning of our networks, pump stations and wastewater treatment facilities.
- **Monitoring and compliance reporting** - We maintain continuous vigilance over their wastewater treatment processes, diligently record data, and promptly report it to Taumata Arowai and other relevant agencies to demonstrate compliance with environmental regulations.
- **Research and innovation** - We continuously encourage research and innovation in wastewater management to develop new technologies and approaches that could benefit our waters, communities, and the environment.

- **Emergency preparedness** - Our wastewater risk abatement plans include comprehensive emergency response plans to address equipment failures, spills, and unexpected incidents. These measures prevent environmental harm and safeguard public health and safety.

These key wastewater operational processes are fundamental to our mission to effectively treat and manage wastewater, protect the environment, and ensure public health and safety.

8.2.3 Stormwater

Stormwater management is a critical responsibility for our entity, involving a range of operational processes designed to control and mitigate the impact of stormwater runoff on the environment and infrastructure. The precise methods employed can vary depending on factors like the location, size, and regulatory obligations imposed through consents. However, the following are key stormwater operational processes commonly implemented throughout our region.

- **Collection and conveyance** - Stormwater is gathered from diverse sources, including streets, rooftops, and parking lots, using an extensive network of stormwater drains, pipes, canals, and culverts. These systems efficiently transport runoff to designated discharge points, such as streams, rivers, or specialised stormwater management facilities.
- **Detention and retention** - To prevent flooding and control the velocity of runoff, stormwater detention and retention basins are integral. Detention basins temporarily store excessive stormwater and release it gradually into downstream systems. Conversely, retention basins retain water on a permanent basis, allowing for gradual infiltration into the ground or gradual evaporation.
- **Sedimentation and filtration** - To combat the erosion of soil and maintain water quality, stormwater management often involves sedimentation basins or filtration systems. These systems effectively remove suspended solids and sediments from stormwater, reducing the risk of sedimentation in receiving waters, which can have detrimental effects on water quality and aquatic habitats.
- **Stormwater treatment** - Depending on consent conditions and environmental concerns, stormwater treatment may target the removal of specific pollutants such as oil, grease, heavy metals, and nutrients. Treatment methods encompass oil-water separators, sedimentation tanks, and a variety of filtration systems.
- **Green infrastructure and nature-based solutions** - We have incorporated green infrastructure elements and nature-based solutions into our stormwater management strategies. These elements, including vegetated swales, permeable pavements, and green roofs, capture and treat stormwater at its source, facilitating infiltration, reducing runoff, and enhancing water quality.
- **Erosion control** - Robust erosion control measures are essential to prevent soil erosion during intense storms. These measures encompass the use of silt fences, erosion control blankets, and the establishment of vegetation to stabilise exposed soil.
- **Maintenance and inspection** - Regular maintenance of stormwater infrastructure is essential. This includes routine inspections, cleaning of storm drains, and the timely repair of damaged components to ensure proper functionality and prevent blockages.
- **Water quality monitoring** - Continuous monitoring of water quality in receiving waters is crucial to our objectives. This ongoing assessment helps evaluate the effectiveness of stormwater management measures and ensures compliance with established water quality standards and giving effect to Te Mana o te Wai.
- **Regulatory compliance** - Our aim is to fully comply with current consents and future regulations governing stormwater management. This entails regular monitoring and reporting on the quality and quantity of stormwater discharges, as well as the implementation of measures to meet regulatory standards.
- **Public education and outreach** - We often engage in educational initiatives aimed at raising public and business awareness about the significance of stormwater management. These campaigns cover topics such as proper disposal of hazardous materials, responsible pet waste management, and residential drainage maintenance.
- **Research and innovation** - We continuously encourage research and innovation in stormwater management to develop new technologies and approaches that could benefit our waters, communities, and the environment.

- **Emergency response** - We work with our local councils and the Auckland and Northland lifelines groups to maintain preparedness to respond swiftly to emergencies, including major storm events, flooding, and infrastructure failures. This involves having comprehensive contingency plans, mobilising response teams, and coordinating with relevant emergency management agencies.

The above operational processes collectively form part of our comprehensive stormwater management planning. The goal is to safeguard water resources, mitigate flood risks, and minimise the environmental impact of stormwater runoff, while providing appropriate levels of resilience.

8.3 Asset Maintenance

The asset maintenance objectives of Wai Tāmaki ki Te Hiku are integral to our mission of delivering safe, reliable, and uninterrupted three waters services to the community. These objectives are strategically designed to ensure the efficiency, longevity, and compliance of the utility's infrastructure while minimising costs and environmental impact. The following is a summary of our key asset maintenance objectives.

- **Reliability** - The foremost objective is to maintain three waters networks and facilities that customers can depend on, free from equipment failures and service interruptions, guaranteeing consistent levels of service.
- **Asset longevity** - Extending the operational life of critical assets, including pipelines, pumps, valves, and treatment facilities, is essential. Doing so reduces the frequency of costly replacements and upgrades.
- **Cost efficiency** - Effectively managing maintenance costs is crucial, striking a balance between preventive and corrective measures while avoiding unnecessary expenses and system downtime.
- **Regulatory compliance** - Adherence to stringent regulatory standards regarding water quality, safety, and environmental impact, amongst other, is a top priority, ensuring that we operate within legal and ecological boundaries.
- **Asset health monitoring** - Embracing data-driven approaches, such as predictive maintenance, to continuously monitor asset condition and performance enables early issue detection and proactive and preventive maintenance, resulting in overall cost savings.
- **Safety and public health** - Ensuring the safety of utility workers and the public by identifying and addressing safety hazards during maintenance activities is paramount to prevent accidents and uphold our service levels.
- **Energy efficiency** - Optimising energy consumption within treatment and network processes is a financial and environmental consideration, contributing to sustainability goals and cost reduction.
- **Customer satisfaction** - Meeting or surpassing customer expectations for service quality, reliability, and responsiveness fosters community support and trust in our entity.
- **Environmental stewardship** - Reducing environmental impact through responsible waste disposal and the minimisation of water losses, achieved through effective leak detection and repair, demonstrates a commitment to environmental responsibility, while giving effect to Te Mana o te Wai.
- **Resilience and emergency preparedness** - Developing robust contingency plans and emergency response strategies prepares us to respond effectively to unforeseen events or natural disasters, ensuring swift recovery and uninterrupted three waters services.

Our asset maintenance objectives are multi-faceted, encompassing reliability, cost-effectiveness, regulatory compliance, safety, environmental responsibility, and customer satisfaction. By adeptly managing these objectives, we aim to fulfil our mission of consistently delivering safe and dependable services to the community while operating sustainably and efficiently. Our maintenance teams, processes and systems make use of predictive, preventive, and reactive maintenance across all three waters and throughout our region.

8.3.1 Predictive and Preventive Maintenance

Integrating predictive and preventive maintenance in Wai Tāmaki ki Te Hiku involves asset assessment, advanced monitoring, and proactive planning. Predictive maintenance uses real-time and historic data and analysis to foresee equipment issues, while preventive maintenance adheres to a structured schedule. These approaches are merged to prioritise tasks, optimise maintenance, and ensure efficient operations. Root cause analysis, staff training, and ongoing improvement are integral, resulting in reduced downtime and costs while ensuring reliable levels of service.

Combining predictive and preventive maintenance in water, wastewater, and stormwater management involves using predictive data to enhance and optimise scheduled preventive maintenance tasks. Here are some examples of how we employ these methods.

Pump Maintenance:

- Predictive: Continuous monitoring of pump performance using sensors and data analytics to detect early signs of wear or potential failures.
- Preventive: Regularly scheduled maintenance tasks such as lubrication, cleaning, and seal replacement.
- Combination: When predictive data indicates impending pump issues, the preventive maintenance schedule is adjusted to prioritise the affected pump for inspection or replacement.

Pipeline Management:

- Predictive: Utilising data from inspections and sensors to predict potential leaks or weak points in water, wastewater, or stormwater pipelines.
- Preventive: Scheduled pipeline maintenance, including periodic inspections and repairs.
- Combination: Predictive data informs the timing and location of preventive maintenance efforts, ensuring that critical pipeline sections are addressed promptly.

SCADA Systems for Wastewater Treatment:

- Predictive: Analysing SCADA data to detect abnormal trends or deviations in wastewater treatment processes, which may signal equipment issues.
- Preventive: Scheduled maintenance of equipment like pumps, blowers, and clarifiers.
- Combination: Predictive insights trigger preventive actions, ensuring that maintenance resources are allocated to address identified process inefficiencies or equipment problems.

Stormwater Drainage Systems:

- Predictive: Monitoring water levels, pump performance, and weather forecasts to anticipate heavy rainfall and potential flooding.
- Preventive: Routine inspections and cleaning of stormwater drains, as well as pump maintenance.
- Combination: Predictive data about impending storms guides preventive maintenance activities, allowing for proactive flood control measures.

Water Quality Management:

- Predictive: Continuous monitoring of water quality parameters like turbidity and chlorine levels to detect deviations from standards.
- Preventive: Regular cleaning, calibration, and maintenance of water treatment equipment.
- Combination: Predictive data indicating a decline in water quality can trigger immediate preventive actions, ensuring that treatment processes are maintained at optimal levels.

Asset Lifecycle Management:

- Predictive: Using historical data and predictive analytics to estimate the remaining lifespan of critical infrastructure assets.
- Preventive: Planning for the replacement or refurbishment of assets based on their expected lifecycle.
- Combination: Predictive assessments inform the timing and priority of preventive maintenance, ensuring that aging assets are proactively addressed.

In these examples, the combination of predictive and preventive maintenance allows utilities to allocate resources more efficiently, reduce operational costs, and minimise downtime. It also enhances the reliability and resilience of water, wastewater, and stormwater systems by addressing issues before they lead to critical failures or service disruptions.

8.3.2 Reactive Maintenance

Reactive maintenance, also known as corrective maintenance, is a maintenance strategy where repairs and maintenance activities are performed in response to equipment or system failures or breakdowns. This involve addressing issues only when they occur, without any prior planning or scheduling. Reactive maintenance is generally considered the least efficient and cost-effective approach, as it can result in downtime, increased repair costs, and service interruptions. Wai Tāmaki ki Te Hiku have a strong focus on implementation and investment in predictive and preventive maintenance to reduce the need for costly reactive maintenance. Some typical examples of reactive maintenance we perform include the following.

8.3.2.1 Water

- **Pipe leak repair** - When a water main or pipeline unexpectedly ruptures, water utility crews must respond quickly to locate the leak, shut off the water supply, and make repairs to prevent water loss and service interruptions.
- **Equipment failure** - If mechanical, electrical, instrumentation or automation equipment in a treatment plant or pumping station breaks down unexpectedly, technicians must address the issue promptly to ensure a continuous water supply to consumers.
- **Water quality issues** - When there's a sudden contamination event, like a chemical spill or bacterial contamination, immediate action is required to investigate, mitigate, and rectify the issue to maintain safe drinking water quality.

8.3.2.2 Wastewater

- **Sewer blockage removal** - Reactive maintenance is needed when sewer lines become blocked due to debris or other obstructions, causing potential overflows or backups. Crews respond to clear the blockage and restore the flow.
- **Pump station malfunction** - If a wastewater pump station experiences a failure, it can lead to sewage backups or spills. Reactive maintenance involves repairing or replacing the malfunctioning components.
- **Equipment breakdown** - Equipment used in wastewater treatment, such as clarifiers, aeration systems, or chemical dosing systems, may unexpectedly break down, necessitating immediate repairs to avoid disruptions in the treatment process.

8.3.2.3 Stormwater

- **Drainage system blockages** - Stormwater drains, culverts, or catch basins can become clogged with debris during heavy rainfall, leading to localised flooding. Reactive maintenance involves clearing these blockages to prevent flooding.
- **Erosion control** - After a severe storm or heavy rainfall, erosion may occur along riverbanks, channels, or embankments. Quick action is required to stabilise these areas and prevent further erosion.
- **Damaged treatment and retention ponds** - Stormwater treatment and retention ponds can be damaged during storms, causing them to lose their capacity to control flooding. Reactive maintenance includes repairing these structures to ensure they function effectively.

Our lessons learnt from reactive maintenance responses and causes are integrated into our reporting systems and used for continuous improvement to our predictive and preventive maintenance efforts, as well as informing our investment planning of renewals.

8.4 Operations and Maintenance Plans

Our development of the operation and maintenance plans for our three waters assets, will involve a structured approach, making of use of and building on existing plans and progressively implement overarching standardised processes and systems targeting optimisation and efficiency of our operation and maintenance activities. These plans will be based on the operation and maintenance strategies and components described above and fully integrated with our business systems and financial planning. Our operations and maintenance plans will cover health and safety, asset assessment, regulatory compliance, risk evaluation, tailored maintenance strategies, budget allocation, operational procedures, staff training, data integration, emergency preparedness, sustainability practices, stakeholder engagement, performance monitoring, and continuous improvement. This approach ensures the reliable and sustainable functioning of these critical systems while meeting regulatory requirements and ensuring quality service delivery to customers.

The operations and maintenance plans for Wai Tāmaki ki Te Hiku will be take into consideration the requirements of our regulators and customers and will be developed over the initial years after our establishment. For more details on operational investment that is forecasted during our initial 10 years of operation, please refer to *Section 12* and the Funding and Pricing Plan. It should be noted that ageing assets, changing regulatory and legislative requirements, and level of service improvements are expected to increase operational costs in future.

8.5 Opportunities for improvement

- Consistent data collection and criticality frameworks are needed to improve asset condition understanding and renewal planning.
- Develop more detail about non-residential demand and forecast economic change affecting services.
- Develop a better understanding of trade waste regulation and management across our region.
- Update planning to accommodate future regulation affecting stormwater, flood plains and overland flow paths.
- Develop a better understanding of critical instrumentation and communications equipment (in addition to other aboveground assets) to improve monitoring performance and compliance.
- We will implement various asset management and maintenance management systems to fully realise operational efficiencies.
- An integrated infrastructure planning tool is required across the region i.e. GIS platform that shows infrastructure planning for all with a common datum.

9 Asset Renewals Needs

As assets age and deteriorate, the risk that they are unable to function as designed, or deliver the required service reliably or efficiently increases, and they can present health and safety risks to people and the environment. Renewal activities, such as replacement and rehabilitation works, mitigate these risks by returning the asset to its original condition, capacity and function.

9.1 Renewal Drivers

The below figure shows how primary and secondary renewal demand drivers are built upon the Te Mana o te Wai obligations and the strategic focus areas introduced in *Section 5*.

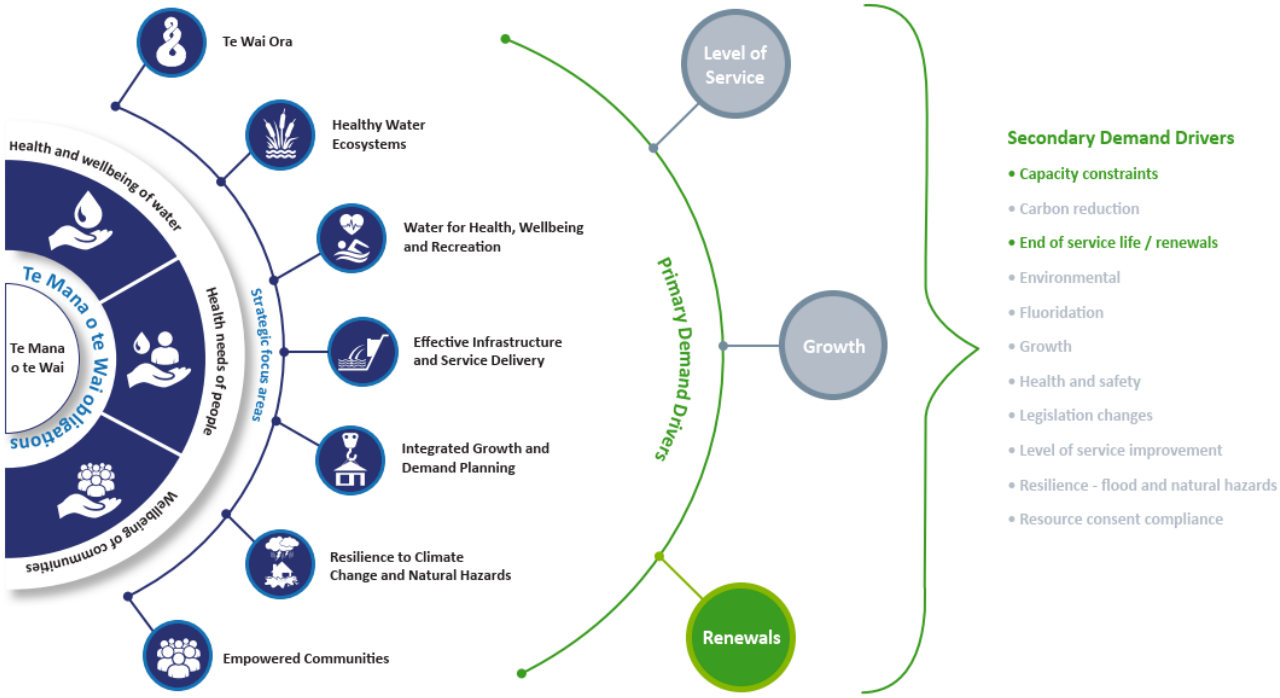


Figure 52 –Renewal demand drivers built upon Te Mana o te Wai obligations and strategic focus areas.

Our secondary drivers which may impact on renewal demand for three waters services are:

- **Capacity constraints** - networks that are currently at capacity due to growth. This affects pressure, flow, or containment of water within the networks. Increased demand for the services will exacerbate any existing issues and could limit any further growth potential.
- **End of service life (ageing infrastructure)** – water supply pipe assets that are in poor condition leak treated water, increasing the amount of raw water to be abstracted, treated, and distributed. Groundwater and stormwater infiltrates into wastewater pipes that are in poor condition, leading to increased flows to be conveyed and treated. Treatment facilities and pump stations perform below required efficiencies adding cost to operations and risks to drinking water quality. This also impacts the receiving environments. Stormwater assets not functioning will increase the impacts of flooding and water quality.

Also refer to *Sections 3 and 4* for further details and indication of how asset condition and asset performance impacts the need for renewals and upgrades.

Within the secondary drivers, key needs for the renewal of three waters infrastructure include:

- **Decreased performance** - structural deterioration leading to compromised ability to meet the required level of service. This includes leaks and infiltration with associated capacity consequences, tuberculation of ferrous water supply pipelines compromising pressure and flow, structural collapse, and blockage.

- **Increased maintenance** requirements and costs making it more economical to renew the asset instead.
- **Obsolescence** - the parts needed to maintain an important asset in operation may be difficult or impossible to source in case of failure.
- **Opportunistic** opportunities to coordinate programmes with other utility providers or works programmes are leveraged to achieve cost efficiencies (such as shared reinstatement costs) and potentially reduce disruption to the community. This can also include asset renewal because of growth requirements needing greater asset capacity.
- **Growth** asset renewal to address growth requirements needing greater asset capacity.

The approaches to long-term renewal forecasting vary ranging from probabilistic models to basic assessments of remaining useful life. There is also variability in the understanding of asset condition and criticality (as outlined in *Section 3*), leading to inconsistent renewal planning. The use of 'green' infrastructure and nature-based solutions for stormwater management is an emerging issue. Coordination with other utility providers is typically undertaken, but the understanding of growth needs could be improved in smaller communities. Consistent data collection and criticality frameworks are needed to improve asset condition understanding and renewal planning.

9.2 Renewal Approaches

9.2.1 Typical Renewal approaches

An important consideration in determining renewals is that a large amount of the original three waters networks, especially those in larger population centres, such as Auckland, were installed during various growth periods from the 1970's to 1990's. It is also noted that during this time asbestos cement and cast-iron materials were commonly used for development of all three waters networks which now require replacement due to health concerns and risks they pose. These network replacements further increase the length of pipelines to be replaced under renewal programmes, often not related to the condition of these pipelines.

Renewal forecasting approaches for long-term planning currently differ across our entity. They range from simple assessments of remaining asset life based on asset age compared to the expected lifespan, to more complex models that consider probabilistic condition profiles, deterioration curves, and intervention points based on asset criticality and failure risk. These renewal approaches will be consolidated and aligned to an improved proactive approach to renewal forecasting and planning.

Proactive approach to renewal planning

We will aim to implement a proactive approach to renewals, as summarised below:

Asset replacement and rehabilitation programmes are put 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 analyses. Asset renewal decisions for these assets are based on the potential and consequence of failure. The assessment considers the asset's age and life expectancy, condition, performance, system resilience and criticality.

Renewal of treatment plant assets is undertaken based on the observed performance of the assets in operation and 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 renewing our local network assets. There will be a corresponding rise in investment in this area to ensure that our customers continue to enjoy a positive experience.

Proactive renewal has substantial advantages such as reducing water pipe leaks and minimising infiltration into wastewater pipes. This approach conserves water and maintains the network and treatment capacity for customers. The New Zealand water industry already uses predictive models based on network profiles that assess the likelihood of failure or reduced performance. With the large volume of renewals needed, it is likely such models will be developed further for the water industry, as it is standard practice in the transportation sector. We will need to invest in the development of predictive models to improve our investment decision making process.

The drivers and need for a proactive approach to renewals include the following:

- The need for dedicated ring-fencing of funds for renewals to prevent trade-offs for growth or other applications.
- Rising costs of unplanned maintenance driven by the traditional run-to-failure strategy.
- Good asset maintenance governance to eradicate back-logs and prevent underinvestment in renewals in future.
- Simultaneous replacement needs for large groups of assets of similar age and materials, such as the replacement of asbestos pipes.
- The maturing and improving of asset information through physical and new technology condition assessment programmes, and better data collection and predictive renewal modelling to optimise the return on investment in renewals.

In the future our renewal approach for pipe networks will continue to be improved involving cutting-edge technologies, data-driven decision-making, and sustainable practices to ensure the longevity and efficiency of critical infrastructure. This approach begins with an extensive asset assessment that employs advanced robotics, artificial intelligence, and sensor technologies to accurately evaluate the condition of pipes, identifying potential issues proactively. Utilising predictive analytics, the system can forecast pipe deterioration and prioritise renewal efforts strategically. The implementation phase will require innovative rehabilitation techniques such as trenchless technologies, structural lining, and eco-friendly materials to minimise environmental impact and disruptions. Additionally, this approach emphasises continuous monitoring and performance evaluation through smart sensors and real-time data collection, enabling swift responses to any emerging problems. Public engagement and collaboration with research institutions further enhance the approach's success, with the aim to establish our approach as a benchmark for sustainable, efficient, and resilient pipe network management.

Renewal themes

Key renewal themes in our entity include the following:

- **Growth** - early renewal to facilitate growth with replacement pipes being larger. This has the financial implication of reducing the residual value of assets in accounting records.
- **Consenting and / or compliance issues** - resulting in early renewal or replacement of wastewater pipes in Wai Tāmaki ki te Hiku to upgrade capacity to reduce health risks pose by drinking water network pipe materials, minimise wastewater overflows and improve stormwater treatment or retention, amongst others.
- **Uncertain and inaccurate condition/criticality data** - resulting in budgets being more driven by historic experience of what has historically been delivered as opposed to data analysis / understanding of what is required.
- **Backlog of renewals**, i.e., historic smoothing and underspend results in backlog of renewal and programmes addressing condition assessment offers an opportunity to improve condition and performance data to assess the actual backlog of renewals within the entity.

9.3 Renewal Needs Forecasts

9.3.1 Pipeline assets

The length of three waters network pipelines assessed to be in poor or very poor condition, and therefore expected to be approaching the end of their service life is presented in the figure below. This indicates that more than 550 km of pipes are likely to begin failing, causing unplanned interruptions and associated consumer and community disruption, and requiring increased maintenance and renewal effort within the next 5 – 10 years, with a further 1,070 km of pipes likely over the next 10 to 20 years. These exclude the need for pipe replacement to remove hazardous pipe materials from the network. It should also be noted that the overall data quality of the condition of pipeline assets require substantial improvement across the region.

Considering the need for replacement of pipes that have been constructed using materials that pose a health risk, such as asbestos cement and cast iron it changes the demand for renewal of pipeline assets substantially as indicated below. Current renewal programmes and subsequent planned investment include for replacement of these hazardous pipe materials. The total length of these pipeline assets that require replacement is estimated to be more than 6,750 km, with replacement of asbestos cement water pipes being the most critical.

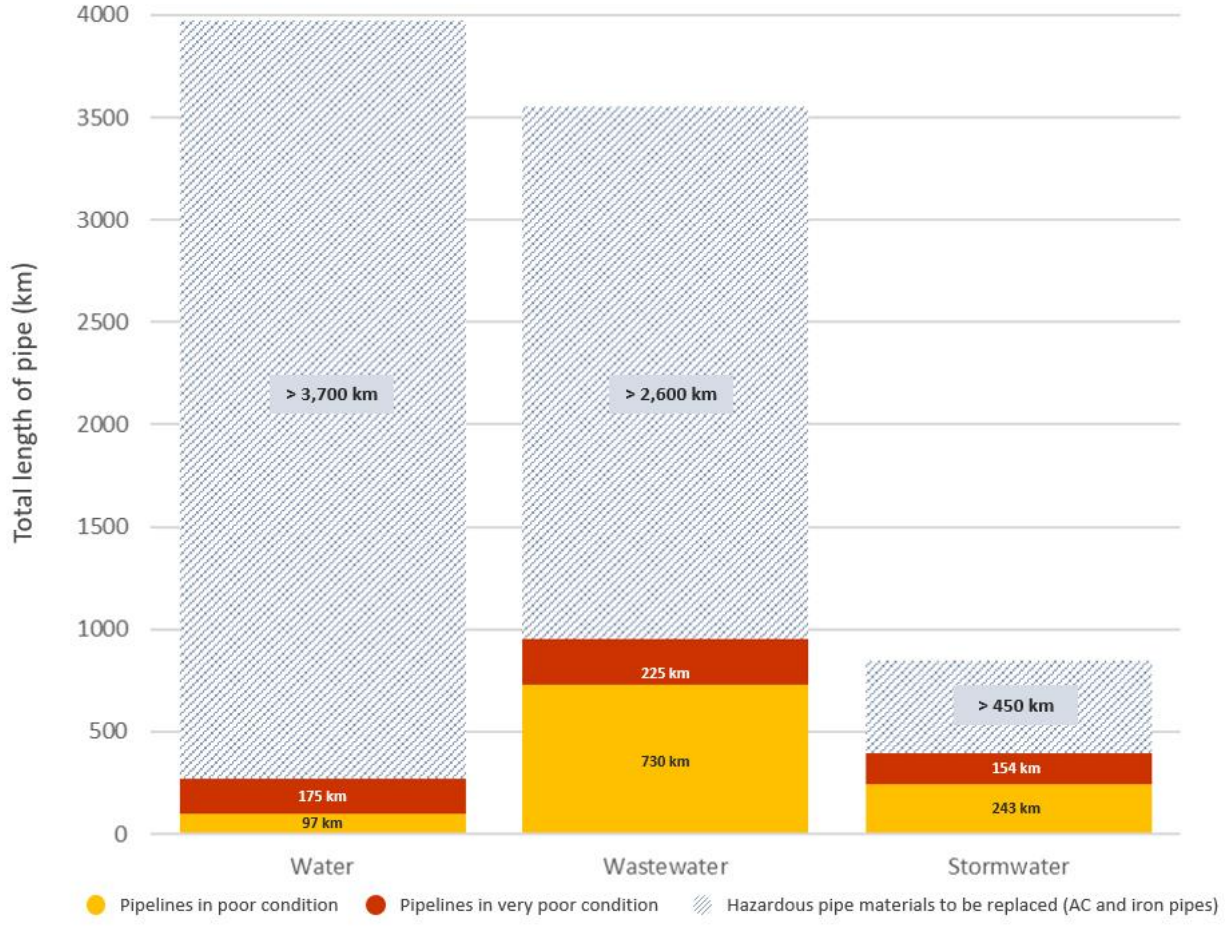


Figure 53 –Total lengths of pipelines in poor to very poor condition and pipe materials replacement (Data provided by councils)

9.3.2 Above ground assets

Current data of the condition and need for renewal of above ground assets need to be further developed for inclusion in future updates of the asset management plan. The renewal of these assets is captured within associated projects, but not yet supported by the level of detail required for separate reporting and planning. Therefore, aboveground asset renewals are not included in the renewal plan graphs in the following section.

9.4 Renewal Plan

Areas of proposed renewal expenditure throughout our entity generally comprise of the following. These are similar within all councils within our region.

- **Water** - Watermain renewal replacement based on age, material, condition, and performance. Treatment plant renewals of plant, infrastructure, consents, and reservoirs.
- **Wastewater** - Wastewater reticulation renewals based on condition and performance. Treatment plant asset renewals to continue compliance, level of service and sustainability.
- **Stormwater** - Stormwater critical asset renewals to maintain level of service and legislative compliance.

9.4.1 Water Supply

Water supply pipeline renewal expenditure requirement forecasts (needs-based) are presented in the figure below. This shows the significant need to increase investment in renewals over the initial 3 years from establishment, followed by sustained high levels of investment for at least a further 5 years to eradicate current backlogs, whereafter it decreases towards sustained levels expected by 2033/34. Further work is required to improve renewal forecasts. Current capital forecasts for water renewals reflects the significant volume of asbestos cement pipe replacement, with the largest need in Auckland, followed by Whangarei. The initial needs-based forecasts indicate a renewal investment forecast of approximately $3.86 billion over the initial 10 years, while the current prioritised forecast includes $2.8 billion, rescheduling the remainder beyond 2033/34. The prioritised renewal investment profile gradually increases up to 2023/31, whereafter it flattens, apart from an increase in 2032/33 involving completion of several large water treatment plant upgrades in Auckland. The risk posed by the impact of re-scheduled renewals due to prioritisation to support affordability of services requires further in-depth analysis and should consider the need to replace outdated pipe materials (i.e., AC pipes).

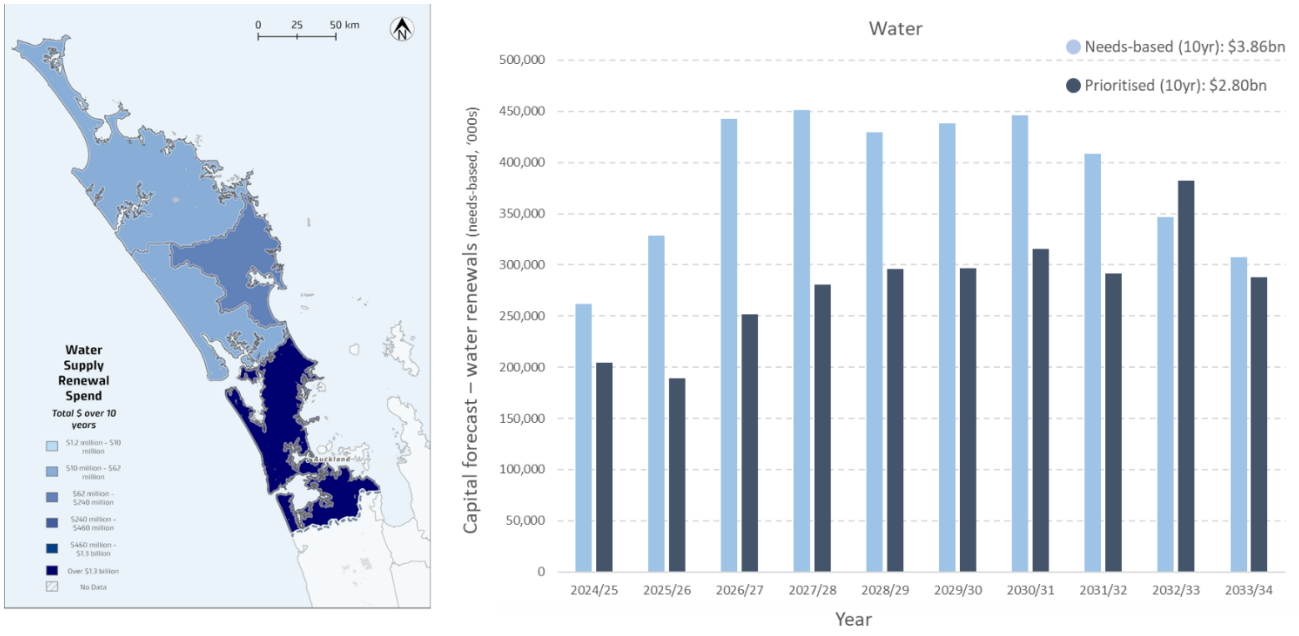


Figure 54 –Water renewal capital forecast and heatmap (real dollars 2023, needs-based vs prioritised)

9.4.2 Wastewater

Wastewater pipeline renewal expenditure requirement forecasts (needs-based) are presented in the figure below. This shows the significant need to increase investment in renewals over the initial 3 years from establishment, followed by sustained high levels of investment to maintained for the remainder of the planning period to eradicate current backlogs. Further work is required to improve renewal forecasts. Current capital forecasts for wastewater renewals reflects the largest need in Auckland, followed by Whangarei. The initial needs-based forecasts indicate a renewal investment forecast of approximately $2.71 billion over the initial 10 years, while the current prioritised forecast includes $1.34

billion, rescheduling the remainder beyond 2033/34. The prioritised renewal investment profile gradually increases up to 2031/32, with a significant increase from 2032/33 onwards with the start of major renewal programmes to address backlogs. The risk posed by the impact of re-scheduled renewals due to prioritisation to support affordability of services requires further in-depth analysis and risk assessment.

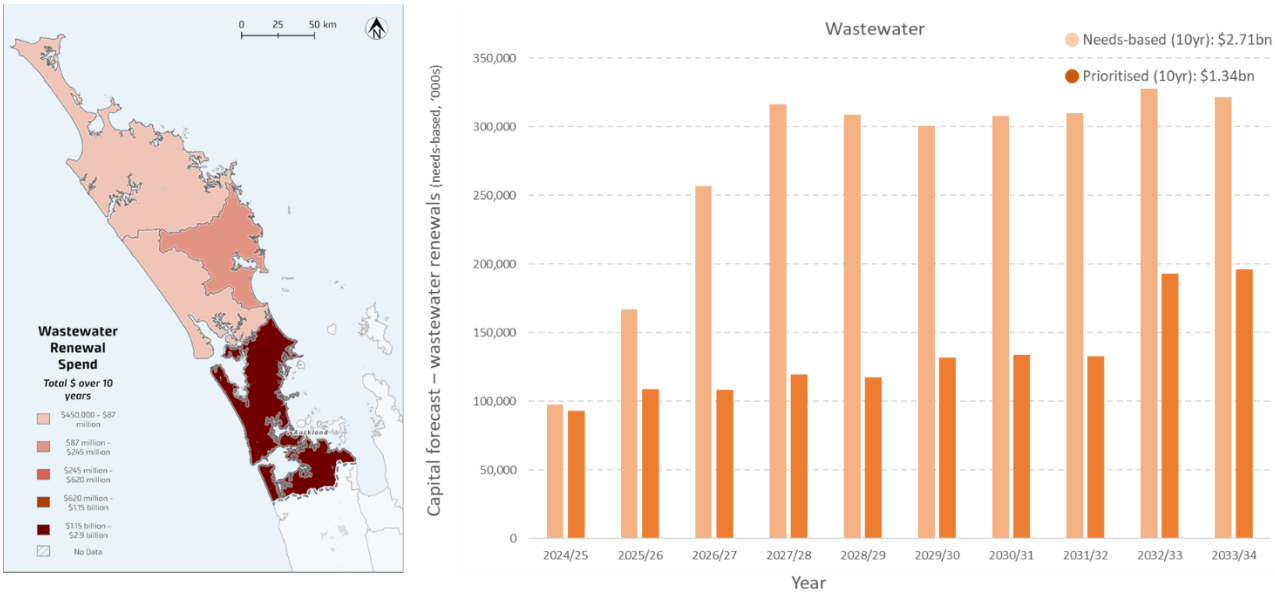


Figure 55 –Wastewater renewal capital forecast and heatmap (real dollars 2023, needs-based vs prioritised)

9.4.3 Stormwater

Stormwater pipeline renewal expenditure requirement forecasts (needs-based) are presented in the figure below. This shows the significant need to increase investment in renewals over the initial 8 years from establishment, whereafter it decreases towards sustained levels expected by 2033/34. Further work is required to improve renewal forecasts. Current capital forecasts for stormwater renewals reflects the largest need in Auckland, followed by Whangarei and Kaipara. The initial needs-based forecasts indicate a renewal investment forecast of approximately $0.95 billion over the initial 10 years, while the current prioritised forecast includes $0.58 billion, rescheduling the remainder beyond 2033/34. The current prioritised renewal investment profile remains mostly consistent over the 10-year period. The risk posed by the impact of re-scheduled renewals due to prioritisation to support affordability of services requires further in-depth analysis, specifically assessing the impact in terms of resilience and mitigation of potential risks posed by climate change impacts and natural hazards predicted in future.

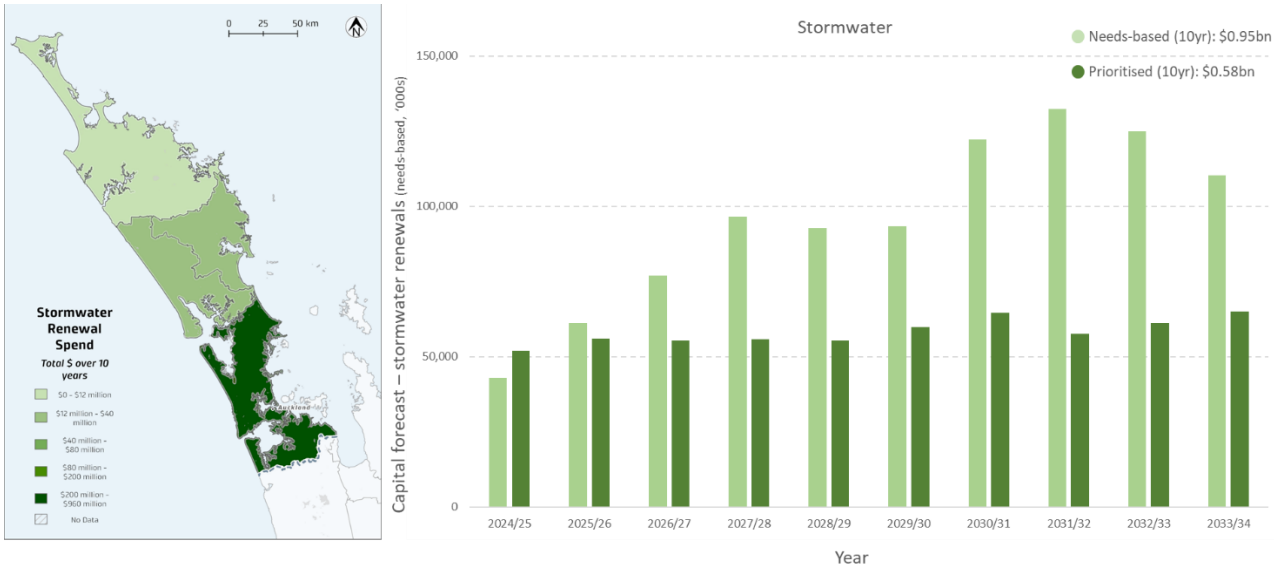


Figure 56 –Stormwater renewal capital forecast and heatmap (real dollars 2023, needs-based)

9.5 Effect of renewal deferrals on levels of service and maintenance

There is an historic backlog of renewal investment across the region. Delaying renewals, or carrying them out after the recommended replacement time, increases risk of levels of service being compromised through unexpected failure and result in increased maintenance needs. This can lead to:

- Service interruptions to customers.
- Damage to third party assets, including roads, flooding of private property and health, safety and environmental impacts associated with wastewater overflows.
- Repeated disruption to the community from the event, response and reinstatement works.
- Increased cost through repeated maintenance efforts.
- Discharges or leakage from poorly maintained assets is wasteful and culturally disrespectful counter to the obligations of Te Mana o te Wai.

We plan to attend to maintenance and renewal programmes, focusing on high-risk assets that affect the level of service and the community. The criticality of assets and their history of failures are taken into consideration. Project-level data analysis will be used to identify assets that have exceeded their useful life and, where needed, physical inspections will be undertaken to determine their condition and whether they can continue to operate. The process of improving data and increasing condition assessment will be a continuous process.

9.6 Data confidence and reliability

Different methodologies and grading systems are currently being used to define asset data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 22 - Asset data confidence rating

Rating	Description
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)** Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

It is acknowledged that most of the data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	Renewals
Stormwater	D
Wastewater	D
Water	D

A - Very High | B - High | C - Medium | D- Low | E - Very Low

Figure 57 –Initial data confidence rating – renewals.

In general, there is a pressing need for substantial improvement in the data related to renewal programmes, primarily concerning asset condition and performance data, which crucially informs decisions about renewal necessity and timing. This is specifically the case with forecasting accuracy concerning above-ground assets and the replacement of ageing pipe materials (such as asbestos cement pipes) requiring renewal. Given the uncertainties and gaps surrounding existing asset condition determination, the data supporting renewal planning is currently assigned a low grading (D).

10 Asset Improvement and Disposal Needs

10.1 Vested assets

Vested assets refer to infrastructure constructed by external parties, such as land developers, government agencies or groups which are subsequently transferred to our entity upon completion of development projects. The procedures for managing these vested assets, from development agreements to their integration into the entity's operations and maintenance, currently varies across councils, but will be standardised in future. Ideally, our entity will be involved from early stages and maintain some level of involvement to ensure the design and quality of vested assets meet their standards.

As part of the transition process, a structured approach for managing and documenting vested assets will be established. This is currently a work in progress. At a minimum, this approach will include:

- Recognition of vested asset revenue at its fair value, as assessed based on the values provided by developers at the time of transfer to Wai Tāmaki ki Te Hiku.
- Recording vested assets received as additions to the asset database, without classifying them as capital expenditures.
- Ensuring that vested assets are fit for their intended purpose and will meet their projected lifecycle, thus addressing network extension and upgrade needs.

10.2 Disposals

During the transition period, our organisation will establish an Asset Disposal Policy to guide the responsible and transparent disposal of all assets, aligning with best practices for the management of public assets. Any procedures related to asset disposal will adhere to a high level of transparency and will withstand rigorous scrutiny by auditors or other duly authorised individuals.

The Asset Disposal Policy will encompass, among other things:

- A policy for determining the significance of asset disposals.
- Guidelines for the allocation of proceeds from asset sales.
- Delegations of authority for decision-making in the disposal process.
- Protocols for managing disposals, including determining the sale value of assets and assigning responsibility.
- Specifications regarding the method of disposal, including valuation considerations.
- Adherence to relevant legislation and compliance requirements.
- Mechanisms for measurement and periodic review to ensure ongoing effectiveness.

10.3 Non-Capital improvements

Non-capital improvements refer to a category of projects, initiatives, or actions that we will undertake to enhance the operation, maintenance, and efficiency of our three waters management system without the need for significant capital expenditures. These improvements are typically focused on optimising existing infrastructure, processes, and practices to improve performance, reliability, and sustainability. Furthermore, these improvements aim to shift us from our current reactive approach to renewals to a planned and proactive approach. The following are some of the general non-capital improvements that we intend to develop in future.

- **Maintenance and repairs** - Regular maintenance activities such as repairing leaks, replacing worn-out components, and servicing equipment are essential non-capital improvements. These activities help ensure the system's continued functionality and prevent minor issues from becoming major, costly problems.

- **Condition assessments for assets** - Understanding the condition of our below ground and above ground assets will enable optimisation of both the renewals and maintenance programmes.
- **Operational enhancements** - Implementing operational improvements involves optimising the daily processes and procedures within the utility. This can include optimising pumping schedules, adjusting water treatment techniques, and improving energy efficiency in water distribution or wastewater treatment.
- **Water quality and compliance** - Non-capital improvements may include investments in advanced monitoring and testing equipment to ensure that water quality meets regulatory standards. Adjusting treatment processes or adding new chemical treatments may also be considered non-capital improvements if they are relatively minor.
- **Data management improvements** - Upgrading our management tools can help us to better track our operations, provide early identification of issues, and improve billing accuracy, amongst other. These improvements can lead to increased revenue and reduced water losses, as an example.
- **Training and workforce development** - Investing in the training and development of utility staff can lead to more efficient operations, improved safety practices, and enhanced problem-solving abilities.
- **Customer engagement and education** - Non-capital improvements may involve initiatives to engage with customers and educate them about water conservation, leak detection, and responsible water use. These efforts can help reduce water demand and improve overall system efficiency.
- **Risk management** - Developing and implementing risk management strategies, including emergency response plans and contingency measures, is crucial for ensuring the resilience and reliability of a water utility. These strategies can help minimise disruptions due to unforeseen events.

10.4 Effects of asset extensions and upgrades on maintenance

As the asset base expands or undergoes extensions, the overall maintenance requirement naturally increases. Nevertheless, the maintenance cost per unit within specific asset groups (e.g., per meter of pipe) tends to decrease for newly installed or upgraded assets. Furthermore, the integration of digital resources and technologies has the potential to enhance maintenance efficiency, resulting in cost reduction and reduced reliance on additional maintenance resources. Typically, newly installed or upgraded assets primarily demand preventive or planned maintenance, in contrast to the growing need for reactive maintenance often associated with aging infrastructure.

The expansion of assets within our networks will entail a gradual escalation in maintenance demands. This aspect has been duly considered in our maintenance expenditure projections across all regions.

10.5 Asset improvement and disposal plan

There is currently no asset improvement and/or disposal plan for the entity. However, both asset improvement and disposal are often considered as part of the renewal of assets and as such, funded through renewals and maintenance costs respectively. These will be included with renewal planning in future.

11 Investment Decision Making

To ensure a smooth and stable transition from councils to the entity, the development and use of decision-making frameworks played a crucial role in determining the capital and operational investment profiles. This section aims to elaborate on the process of creating these frameworks and the methodology employed to determine the capital and investment profiles. It is important to note that these frameworks and the decisions made based on them are considered transitional in nature.

To establish a high level of trust, a model emphasising transparency and accountability has been adopted for these frameworks. This entails accepting council information, which considers the current legislative process and establishment plans, at face value.

The frameworks do not consider or include any disaster recovery works. Identifying these works is still a work in progress and will be included in the final initial draft asset management plan.

Future frameworks will need to expand and include the objectives set by the Entity Board (we have used the seven focus areas as an interim guide, refer *Section 5*) and the Te Mana o te Wai statements.

By considering these key elements and incorporating them into the transitional frameworks, we aim to establish a solid foundation for the efficient delivery and management of water resources.

11.1 Capital Investment Decision Making

11.1.1 Decision-Making Framework Overview

The main objectives of the initial capital investment decision making framework aim to produce a simple and transparent prioritisation of projects and their associated qualitative risks alongside the constraints of deliverability, readiness, and funding.

Each of the contributing councils has a different level of maturity when it comes to their decision making and supporting information. The framework used for this asset management plan needed to ensure that all projects could be assessed using the same level of information. This first-generation model (this framework) that relies on a small non-financial data set provided by the councils and quantitative analysis and was used by Healthy Waters and the Northland regions to generate their capital investment profiles. Watercare has a more sophisticated (second-generation) model that was used to provide an initial level of prioritisation before linking into the entity model.

The framework was developed based on feedback from a selection of stakeholders and experts (Asset Management, Operations and Stormwater (AMOS) Technical Reference Group), Water Services Managers Group and Technical Working Group (Council Staff and Industry Experts) in late 2022.

The main objectives of the initial decision-making framework were established as follows.

Table 23 - Objectives of the transitional decision-making framework

1	Designed to provide a forward work programme that is deliverable, sustainable, and balanced with no community being worse off over the long term; with an assessment to be performed as part of finalising the asset management plan to test if funding levels are similar over the long term.
2	Meant to help guide processes to challenge when projects are funded not if they are funded.
3	Meant to be used as an overall quantitative approach supported by conversations with council staff to understand drivers and risk.
4	Allows for the factoring in of known interdependencies between internal (Three Waters) projects as well as recognising the interdependencies with external projects (i.e., roads, housing, etc.) and allowing for these to be reprioritised/adjusted based on external factors.

5	Support a capital programme that in years 1 to 3 (2024/2025 to 2026/27) must have the ability to enable consistent delivery such as processes to: i. Challenge projects which may not be deliverable in the immediate term. ii. Accelerate projects with high certainty to provide certainty to construction partners, while realising that the easy projects may not be the best projects. iii. Allow for projects that are being completely funded and contractually (or otherwise committed, regardless of the partner) to be prioritised as a high priority item and challenged for deliverability (but not deprioritised for other reasons).
6	Allows for prioritisation within the 3 categories of renewals, growth, and level of service (the 'transitional programme drivers') while the challenge step will allow for prioritisation to be refined (including between the 3 categories) after initial prioritisation.
7	The framework is reliant on council-submitted available data with the understanding that the councils have incorporated Te Mana o te Wai in their planning processes.
8	Allow for the delivery of compliance with health and safety and regulatory/legislative outcomes.

11.1.2 Prioritisation

Prioritisation Drivers

Ten prioritisation drivers have been identified for the transitional decision-making framework. These drivers are commonly used throughout the country.

Table 24 - Prioritisation drivers

Driver	Description
Capacity constraints	Networks that are at capacity and require to be renewed before any new development can take place. Not associated with a growth project.
Carbon reduction	Projects that are delivering on each council's Climate Change Action Plan or other.
End of service life	Includes poor condition, no longer meeting the required level of service, reaching its economic useful life, etc.
Environmental	Projects or programmes that will enhance or protect the environment.
Growth	New infrastructure associated with growth; this may also include upgrades to existing networks to enable growth.
Health and Safety	Any projects that protect the safety of staff, contractors, community etc.
Legislative changes	Includes drinking water compliance and any other legislative changes that are driving capital works.
Levels of service	Projects associated with improving levels of service to the community.
Resilience	Projects that relate to the mitigation of flooding risk and or natural hazards.
Resource consent compliance	Projects required to meet current or future consent requirements.

The drivers can be linked back to Te Mana o te Wai obligations and the seven strategic focus areas as described in *Section 5*. Note that the linkage back to the focus areas changes depending on the type of water, i.e., water, wastewater, or stormwater.

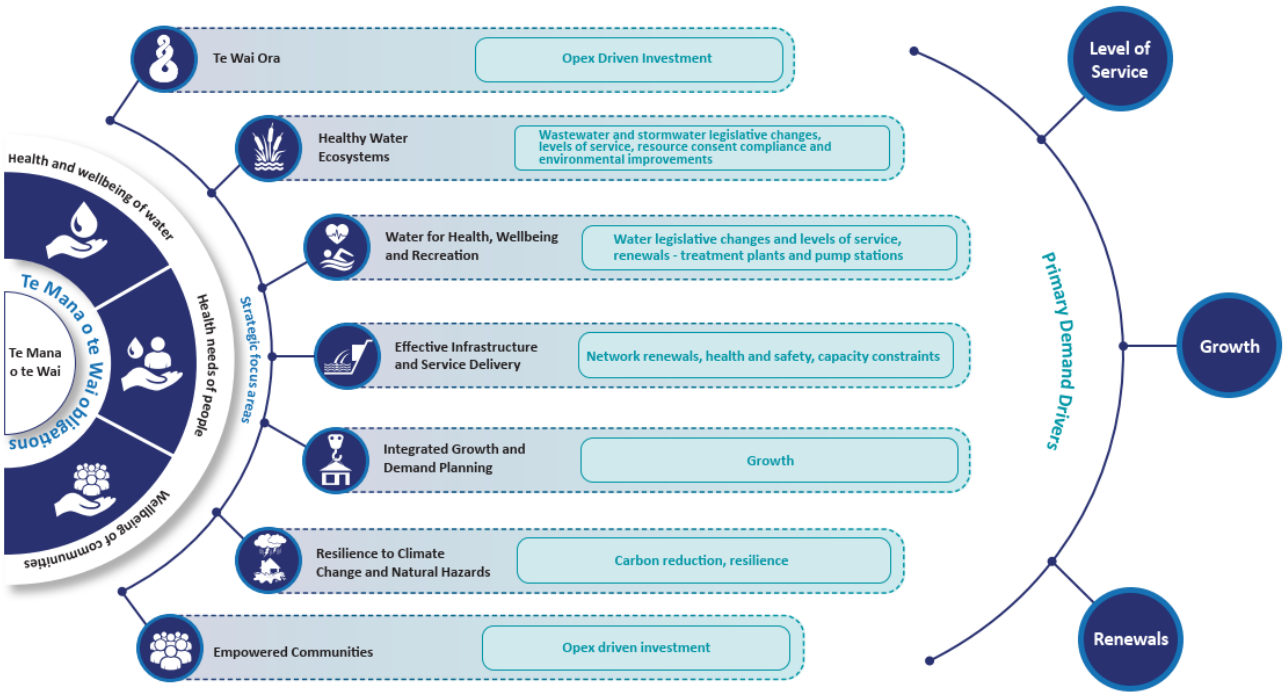


Figure 58 –Te Mana o te Wai and demand drivers

The decision-making framework ranks projects for a priority 1 to 5 using the investment drivers as above.

Prioritisation Categories

To ensure that there is continuation of works through the transition period, projects that are contractually committed by the councils prior to the entity being established are given priority in this framework, as illustrated by the figure below.

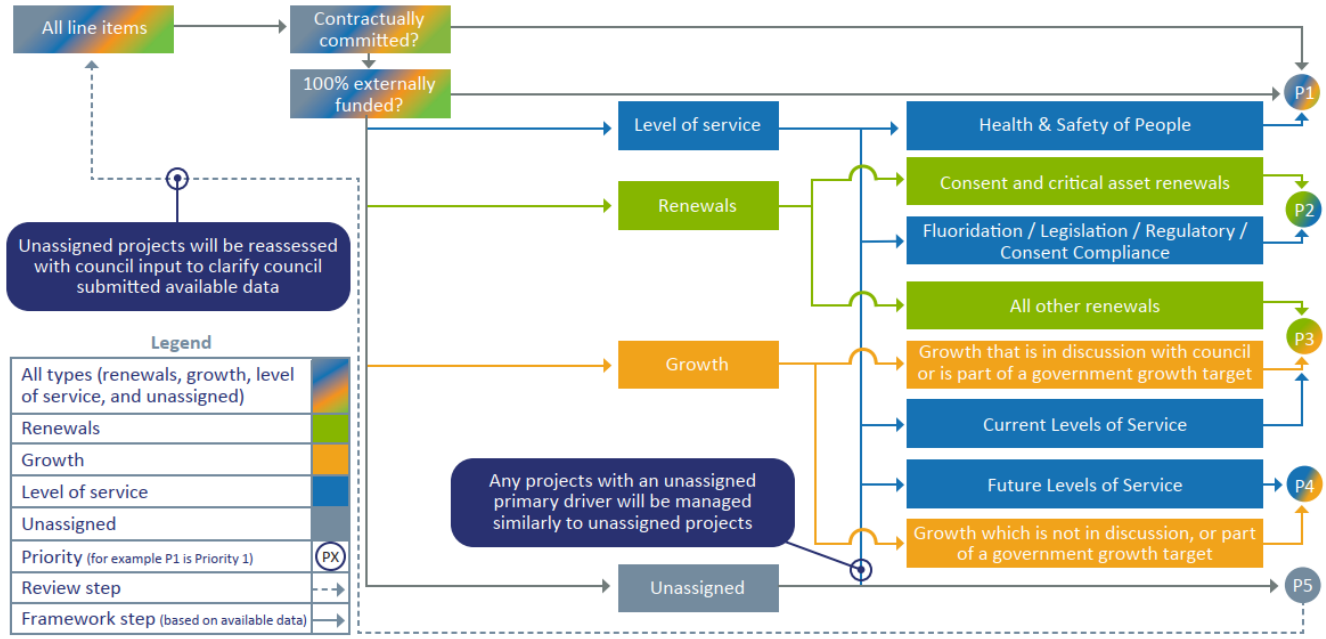


Figure 59 –Transitional prioritisation framework process

Prioritisation categories are defined as follows:

- **Priority 1 (P1)** – projects which are fully funded (externally), or contractually committed, and where the project's primary driver for the level of service improvement is health and safety.
- **Priority 2 (P2)** – projects where the primary drivers are legislative changes or resource consent compliance and *critical asset* provision or renewals.
- **Priority 3 (P3)** – all renewal projects (other than for critical assets) are assigned to priority 3. Also include projects where the primary drivers are achieving existing levels of service, environmental improvements, required land use purchases, growth that is in discussion with developers, within a district plan structure area and current timeframe, supports government growth projects (e.g., urban intensification), and or addressing infrastructure capacity constraints.
- **Priority 4 (P4)** – all projects driven by growth or level of service improvements not included under priority 1 to 3.
- **Priority 5 (P5)** – all projects which have not been assigned to priority 1 to 4 (e.g., shared services). Note that the priority 5 category will be reduced and ultimately eliminated as more detailed data on projects becomes available.

The Watercare decision making framework.

The framework used by Watercare is recognised as being a second-generation model as its more complex in nature and each project/programme is supported by non-financial information including risk, benefits, whole-of-life cost, assumptions etc. At a high level, it utilises the following principles.

- **Simplicity** – easy to comprehend, implement and adapt to suit the demands of the operating environment.
- **Transparency** – high visibility on output, rationale, assumptions, and inclusion.
- **Delivers outcomes** – focused on delivery of desired outcomes and risk mitigation whilst recognising Te Mana o te Wai hierarchy of needs.
- **Equitable for the community** – considers different needs of communities and ensures delivery and impact of projects are equitable across the region.
- **Deliver the most for least** – maximise value to the community within resource constraint limits.
- **Efficiencies applied** – identify where efficiencies can be found within the programme and apply these to the overall investment profile.

By 2027, our strategic objectives and Te Mana o te Wai Statements will be known and will drive the investment decision making process. These documents will determine what investment drivers are necessary and in turn describe the inputs into each of the prioritisation categories. It is envisaged that this model will be used for the 2027 asset management plans.

The outputs from the exercise conducted by Watercare were incorporated into the national framework to enable an entity wide view of the total capital expenditure portfolio.

The framework utilised by Watercare enabled:

- Projects to be categorised and ranked based on their impact on outcomes and business risk of deferral.

Timing decisions to be made using a prioritisation framework once the capital constraint is known.

The 3-stage framework used by Watercare in its decision-making process is illustrated below.

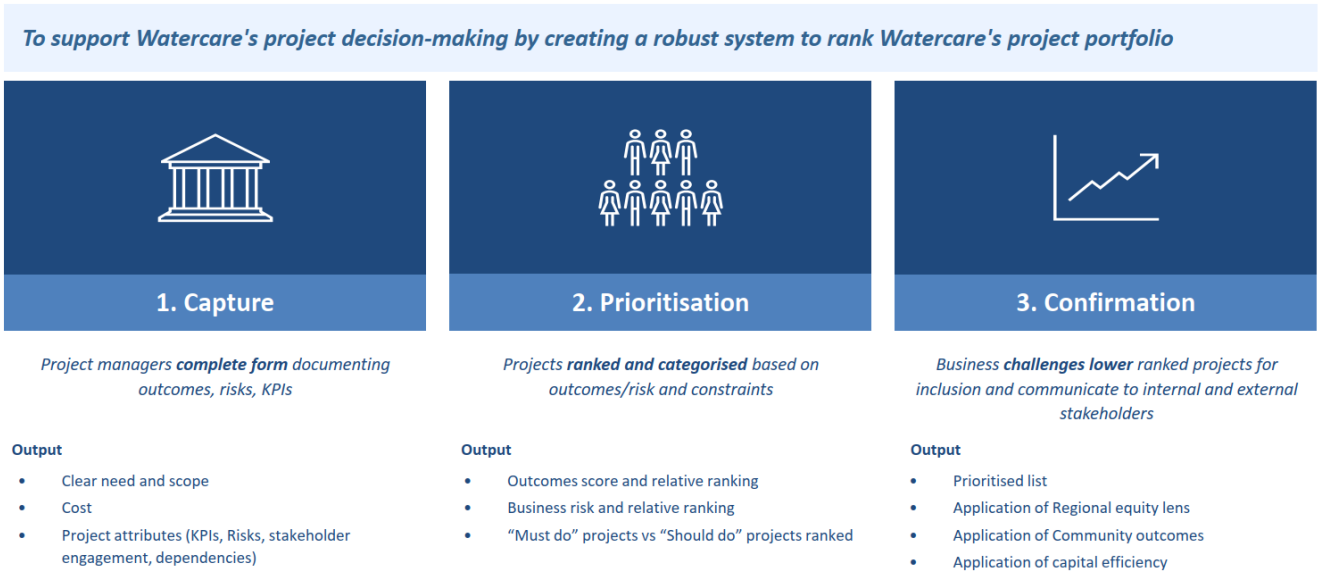


Figure 60 –Watercare prioritisation framework

The framework categorises projects into "Must do" vs "Should do" ranking in priority order based on outcomes/risk score while ring-fencing renewals programs.

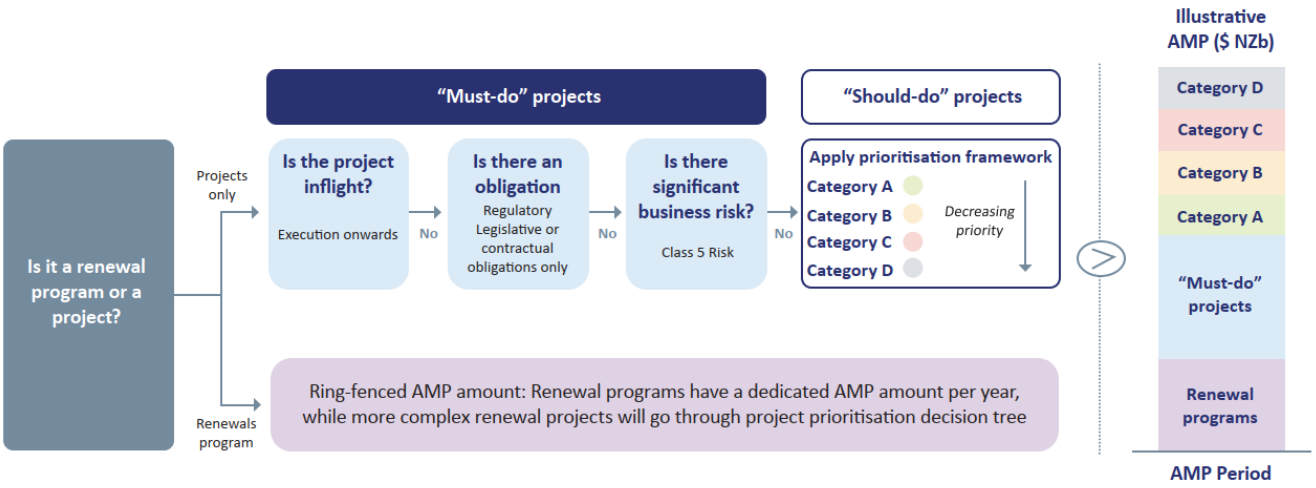


Figure 61 –Prioritisation decision tree

Watercare built a capital forecast with the following attributes:

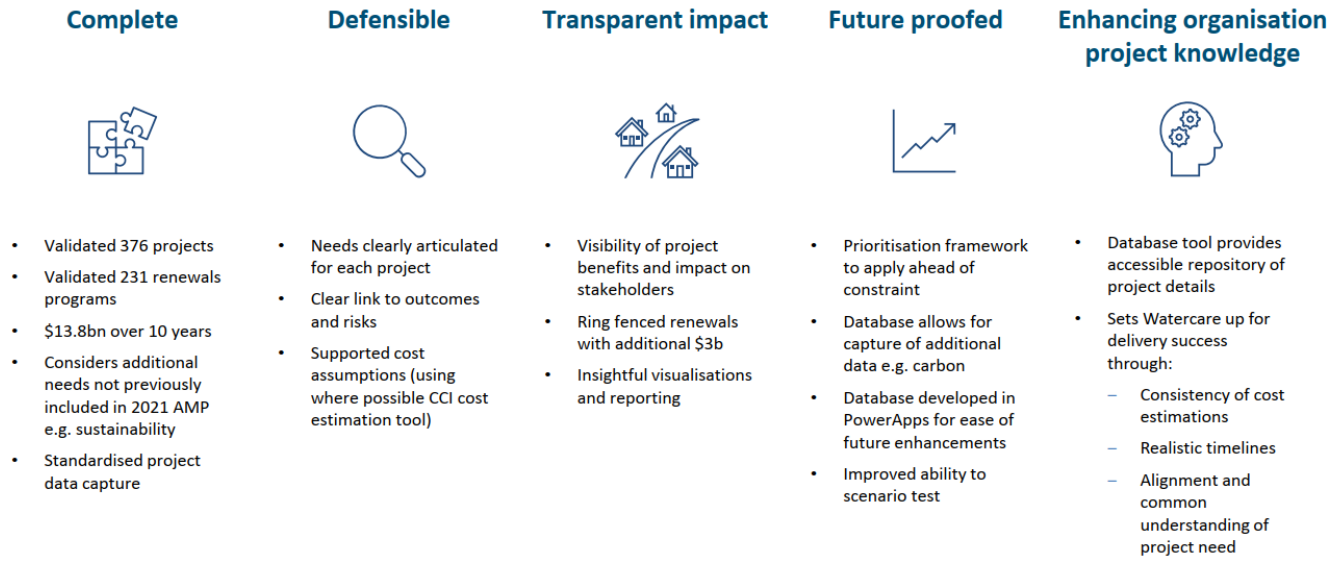


Figure 62 –Watercare capital investment forecast attributes.

The outputs from the validation of the projects have been aligned with the initial decision-making framework to provide a single output for the purpose of this asset management plan.

11.1.3 Capital Programme Readiness

Capital programme readiness takes into consideration the ability of councils to undertake the prerequisite works (engagement prior to design, or land purchase prior to construction etc) to enable us to be successful on day 1.

Readiness also includes the lifecycle management of each project to ensure that there is sufficient time and resources allocated to ensure successful delivery. The first three years of the programme require analysis to ensure that the programme is ready to be delivered.

The risks to be mitigated include:

- Alignment with expectations, more prevalent in future years as expectations change over time.
- Decision making, the objectives of our new organisation will not be known until after go-live date, which may lead to a change in the prioritisation of projects in years 2 and beyond.
- Data quality of supplied information may result in projects being incorrectly assigned.
- Identification of complex / high risk projects and project lifecycle review to ensure sufficient time has been allocated for their delivery i.e., complicated land purchases or consenting.
- Impacts on the community from the programme.
- Enhanced investment programme creates higher demand and ultimately higher construction prices.
- Impact of new legislation, known but untested and unknown.
- Prerequisite works are completed by the councils to enable in-flight projects to continue as per the programme.
- Transition and business process change is likely to affect performance, resulting in a decrease in outputs especially in the first year.

11.1.4 Supply Chain Deliverability Constraints

The supply chain deliverability takes into consideration the availability of professional and construction services and in-house resources such as project managers and supporting technical staff to ensure the success of a project.

Our capacity to deliver the council capital work programmes has steadily increased over time. The combined performance of the contributing councils shows that 108% of the Long-Term Plan (LTP) programmes have been delivered over the last 3 years.

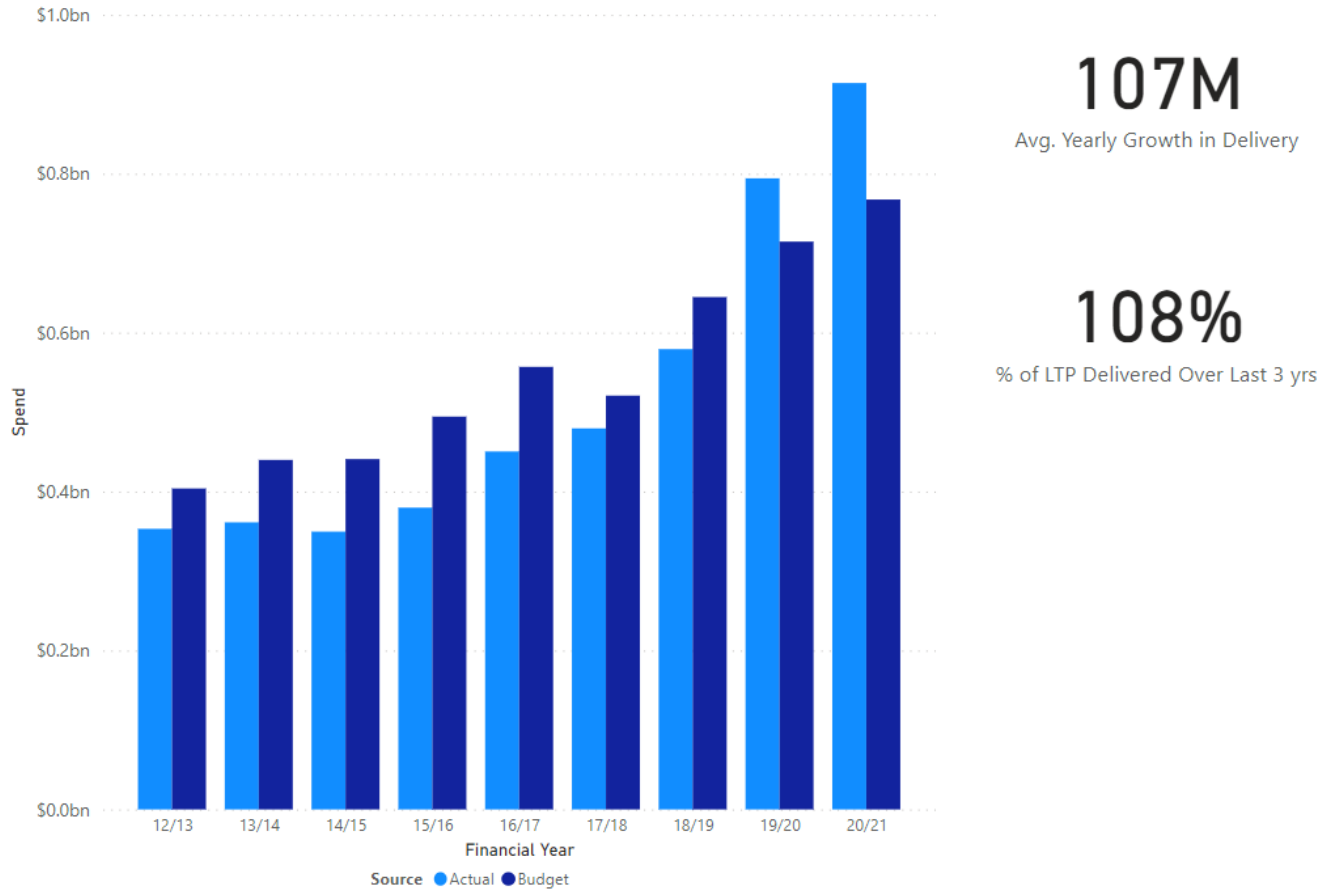


Figure 63 –Capital delivery performance (budgeted LTP and actual spend)

The yearly growth and high percentage of the Long-Term Plan budget delivered over the last 3 years is driven by Watercare and Healthy Waters and is due to:

- Substantial yearly increase in Long Term Plan forecast for Watercare due to some high-value projects.
- Emergency Drought Funding of $224 million was authorised by Auckland Council in the 2020/21 financial year to enable the delivery of a new Water Treatment Plant on the Waikato River. This project was completed within 1 year and the plant is in operation.
- In the 2020/21 financial year Auckland Council implemented the Emergency Budget and sought significant reductions in capital for stormwater from the original 2018 Long Term Plan. The budget was reduced from $129 million to $90 million, and projects already in progress could not be stopped.
- Introduction of an enterprise model at Watercare to facilitate the delivery of the capital programme.

In the last three years the Northland regions have delivered between 75% and 85% of their total Long Term Plan budget.

The reasons for under-delivering the Long-Term Plan programmes in the Northland regions typically stem from:

- **Resourcing** – availability of appropriately skilled internal and external resources.
- **Procurement** – supply chain management, lead-in time for materials, tendering and approvals, stakeholder agreement.

- **Project life cycle management** – business case approvals, scheduling, land purchases associated with developer-led timelines, incorrect investment appraisals, unforeseen technical issues.

To increase capacity within the supply chain across our region a transparent forward work programme is required that is supported by transformational change to procurement practices.

11.1.5 Affordability Constraints

The level of capital investment is set out in the draft initial Funding and Pricing Plan (FPP) for Wai Tāmaki ki Te Hiku for the purpose of establishing the new entity.

The FPP takes into consideration all possible sources of funding including water services charges, other fees and charges, infrastructure contribution charges, subsidies, grants, interest, vested assets, and water levies (if applicable).

Operational costs and capital investments are funded through these funding sources as well as deferring costs through financing, for example, borrowing.

Future FPPs and asset management plans will include public engagement and will follow an economic regulation framework produced by the economic regulator.

11.1.6 Decision Making Process

A hybrid approach was selected for the framework due to the limits of council-submitted data. The framework incorporates aspects of known methods where possible.

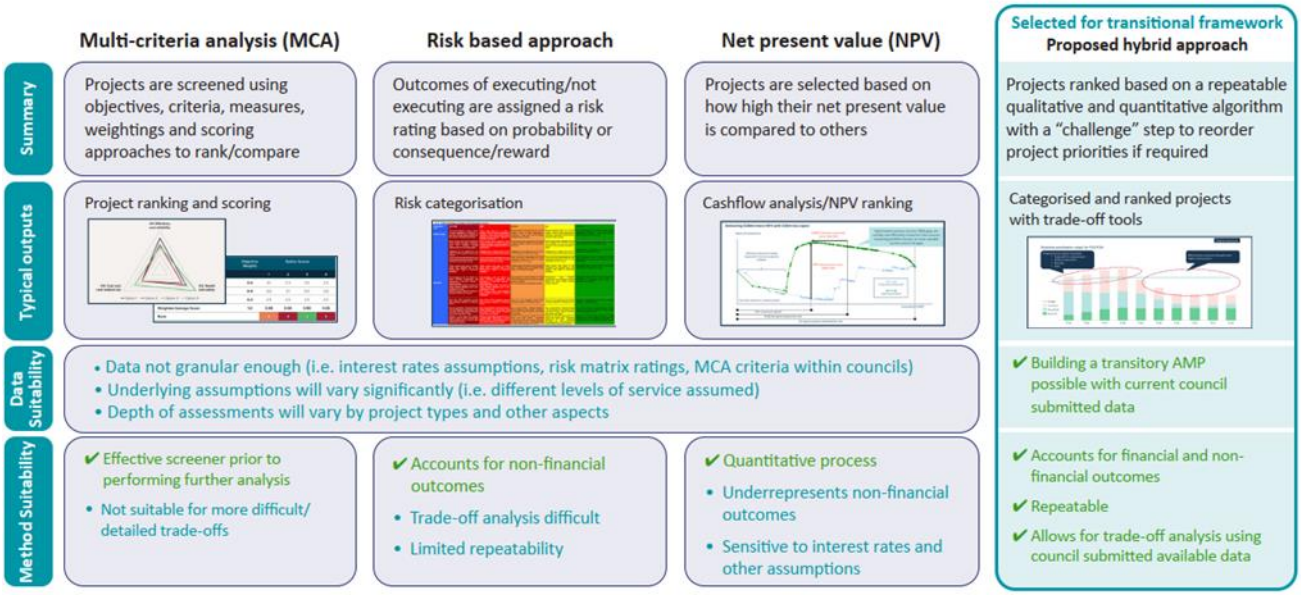


Figure 64 –Framework options and hybrid approach

Based on the above, an initial investment process was developed and implemented to meet the objectives of the water reform through a three-stage process, as follows:

- **Stage 1** – development of a needs-based forecast of capital projects, cost, and timings. This needs-based forecast did not take into consideration affordability and deliverability.
- **Stage 2** – prioritisation of the needs-based forecast utilising the investment decision making framework was completed with the relevant councils, taking into consideration affordability and deliverability, producing a draft capital works programme.
- **Stage 3** – confirmation the draft capital works programme will be obtained through engagement with the councils, regulators, and mana whenua confirming that the objectives of reform are met.

This report outlines the outputs from stage 1 and stage 2. Stage 2 is an iterative process, and the outputs are currently at a high level outlining the prioritised capital forecast by service, demand driver and prioritisation category with the focus on high value projects and programmes. These will be further refined as part of stage 3, the consultation process with councils, regulators, and mana whenua.

11.2 Operational Investment Decision Making Framework

In the water sector, operational costs can be classified into two main categories: direct operational costs and indirect operational costs. While the specific breakdown may vary depending on the location and council, there are some common components of operational expenditure in the water sector:

- **Direct operational costs** - direct operational costs are expenses directly associated with the core activities and processes involved in delivering water, wastewater, and stormwater services. These costs are easily identifiable and can be directly attributed to specific operations or functions. Examples of direct operational costs in the water sector include:
    - **Energy costs** - the expenditure on electricity, fuel, or other energy sources required to power pumps, treatment processes, and other equipment.
    - **Chemical costs** - the cost of chemicals and additives used in water treatment, such as coagulants, disinfectants, and pH adjusters.
    - **Maintenance and repair costs** - expenses related to the maintenance, repair, and replacement of equipment, pipelines, pumps, valves, and other infrastructure.
    - **Labour costs** - salaries, wages, benefits, and training expenses for employees directly engaged in operating and maintaining water infrastructure, including technicians, operators, and maintenance personnel.
    - **Water loss management costs** - expenditures associated with leak detection, repair, pressure management systems, and infrastructure upgrades aimed at minimising water losses.
- **Indirect operational costs** - indirect operational costs are expenses that are not directly linked to specific operational activities but are necessary to support the overall functioning of the water sector. These costs are generally shared across multiple functions and may not be easily attributable to a particular activity. Examples of indirect operational costs in the water sector include:
    - **Administration and overhead costs** - general administrative expenses, including office rent, utilities, office supplies, software licenses, and other overhead costs.
    - **Customer service and billing costs** - expenses related to customer service initiatives, billing processes, customer management systems, and associated administrative activities.
    - **Compliance and regulatory costs** - expenditures associated with monitoring, reporting, and meeting regulatory obligations, including laboratory testing, certifications, and compliance with water quality and environmental standards.
    - **Insurance and risk management costs** - expenses related to insurance coverage for potential risks, such as property damage, liability claims, and business interruption.
    - **Research and development costs** - investments in research, development, and innovation activities aimed at improving water treatment processes, efficiency, and sustainability.

It is important to note that the proportion of each expenditure category may vary depending on factors such as the size of the council, the complexity of the system, the region, and the specific challenges faced in providing water, wastewater, and stormwater services.

Operational investment decision making framework.

As each council currently manages its operational costs differently and there is no common categorisation. A top-down approach has been used to determine the high-level operational investment profile as outlined below:

- **Stage 1** – development of baseline forecast using information from the 2021 LTPs and asset management plans.
- **Stage 2** - add corporate overheads, reform operational costs associated with our new organisation and the regulatory environment and apply efficiency improvements.
- **Stage 3** – apportion forecast to direct and indirect operational costs based on the outputs from the PwC calculations that PwC worked on with Watercare and Healthy Waters.
- **Stage 4** – confirmation of the draft operational cost investment forecast following review by mana whenua, councils, and the Commerce Commission.

This asset management plan outlines the outputs from stage 1, 2 and 3. Stage 3 is an iterative process, and the outputs are currently at a high level outlining the operational costs by service, whether they are direct or indirect costs and subcategory. These will be further refined and broken down as part of the consultation process with councils, regulators, and mana whenua and incorporated into stage 4.

Watercare/Healthy Waters methodology to determine operational investment.

As part of the reform programme the Ministers of Local Government and Commerce and Consumer Affairs agreed that the development of an asset management plan and funding and pricing plan (FPP) for our entity should undergo independent external scrutiny. This ensures that our decisions regarding proposed investments, efficiency initiatives, borrowing, and pricing during the transitional period are as robust as possible.

To align with the directive the following activities were undertaken by Watercare and Healthy Waters:

- **Development of a Methodology -** PwC developed a methodology for preparing forecast operational expenditure information that was suitable for responding to information requests and external scrutiny.
- **Application of the Methodology** - the methodology was applied to derive an operational expenditure profile for Watercare and Healthy Waters across the planning period.

Methodology

A Base-Step-Trend methodology was used to provide a top-down forecast that incorporated a normalised base, and trends in output growth, productivity, and input costs. The approach is appropriate for operational expenditure because activities tend to recur, and trends are influenced by factors that can be identified and forecast.

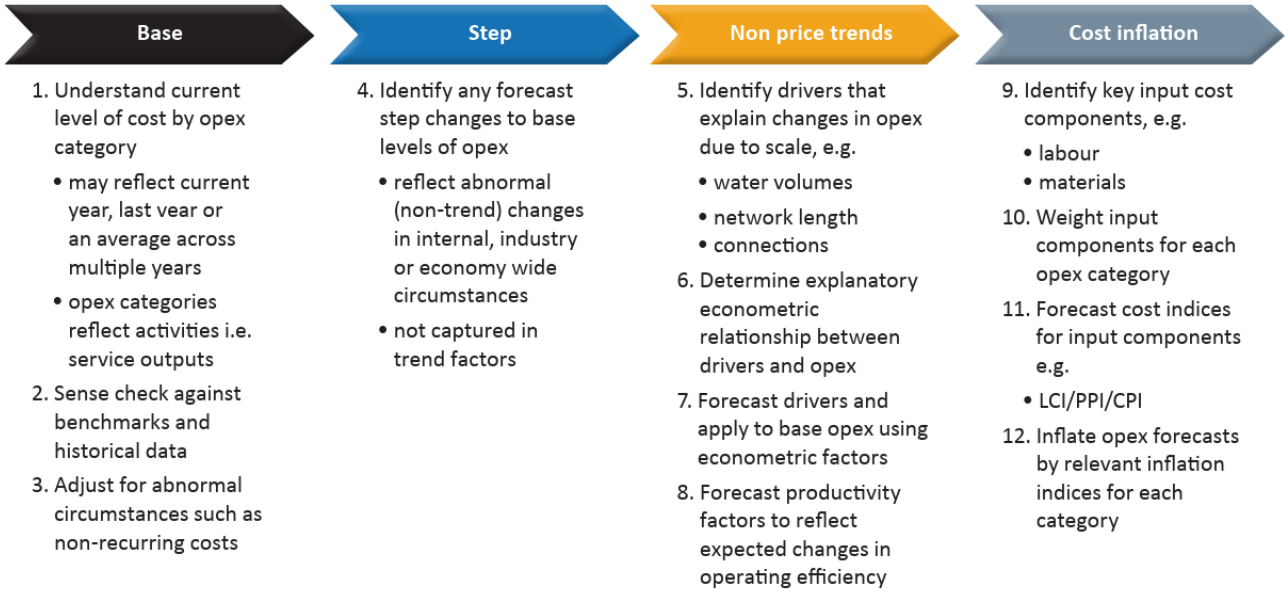


Figure 65 –Base-Step-Trend (BST) methodology

Approach

Base-step-trend methodology is not a project-specific, or individual line item specific, forecasting method. It explicitly avoids a need to forecast the operational expenditure required for individual line items or projects. It implicitly includes allowances for project-level increases and decreases within the top-down base, step, and trend elements. It does this by leveraging information about historical trends and drivers, on the basis that operational expenditure reflects recurring activities. It is also able to incentivise utilities to seek operational efficiency gains.

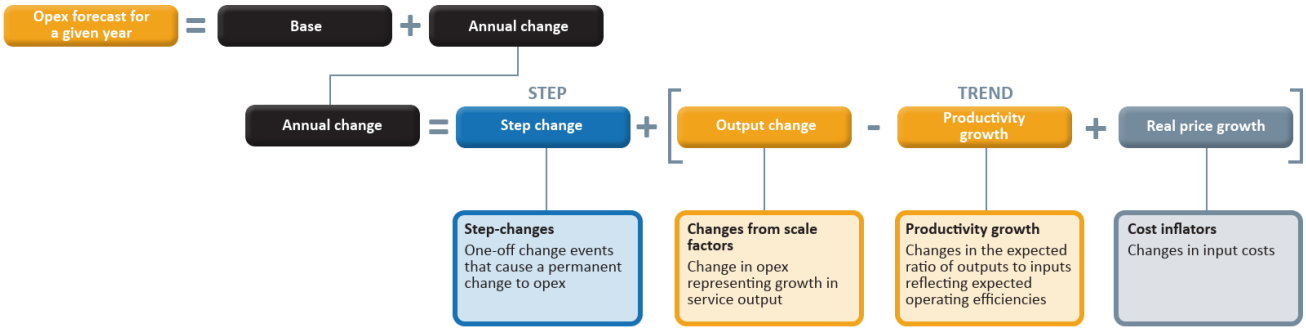


Figure 66 –Base-Step-Trend (BST) development

Operational expenditure categories

The Base-step-trend forecasting method is applied to operational expenditure activities. The activities used in the forecast are shown in the highlighted boxes below. These categories reflect key service activities (layer 1), and the sub-activities which may have different cost drivers (layer 2 and layer 3). Because drivers are similar at the layer 2 and 3 levels, there is no need for further disaggregation.

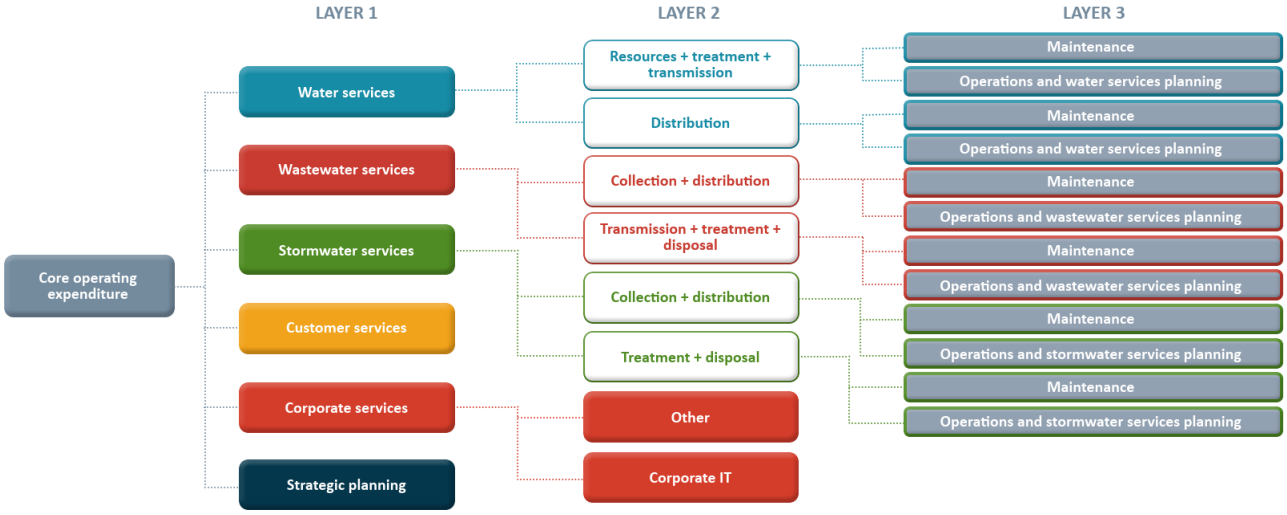


Figure 67 –Base-step-trend forecasting method and layers.

12 Our Investment Forecasts

Sustainable, long-term financial forecasts enable an extended perspective on how assets will be managed, the associated costs, and the potential need for additional funding to meet expected service levels. These forecasts are determined by considering various factors discussed in the Plan, such as the desired level of service, growth and renewal requirements, and strategic outcomes tied to the Te Mana o te Wai focus areas and obligations. Investment forecasts primarily focus on achieving these strategic outcomes and its associated performance targets. The figure below illustrates the investment range for each strategic investment outcome, transitioning from the 2021 Long-Term Plan budgets to the needs-based capital investment forecast. Further details regarding these capital forecasts are provided in the following section.

The most significant outcomes-based investment areas for Wai Tāmaki ki Te Hiku are:

- Effective infrastructure and service delivery through renewals and improving levels of service, and
- Integrated growth and demand planning through the traditional investment profile of growth

Regarding the focus areas of healthy water ecosystems, our current understanding of how to enhance and restore these ecosystems is still in its early stages. However, with the continuous expansion of skills, knowledge, and experience, we can anticipate significant improvements over time.

Investments related to public health encompass water provisions for health, well-being, and recreational purposes. Furthermore, ensuring resilience to climate change and natural hazards is essential for maintaining future levels of service.

Te Wai Ora and Empowered Communities primarily emphasise operational and cultural aspects. Therefore, these focus areas do not have dedicated capital investments specifically allocated to them.

Collectively, the contributing councils within Wai Tāmaki ki Te Hiku have estimated a total investment ranging from $11.8 billion to $20.8 billion over the next 10 years to achieve the desired outcomes.

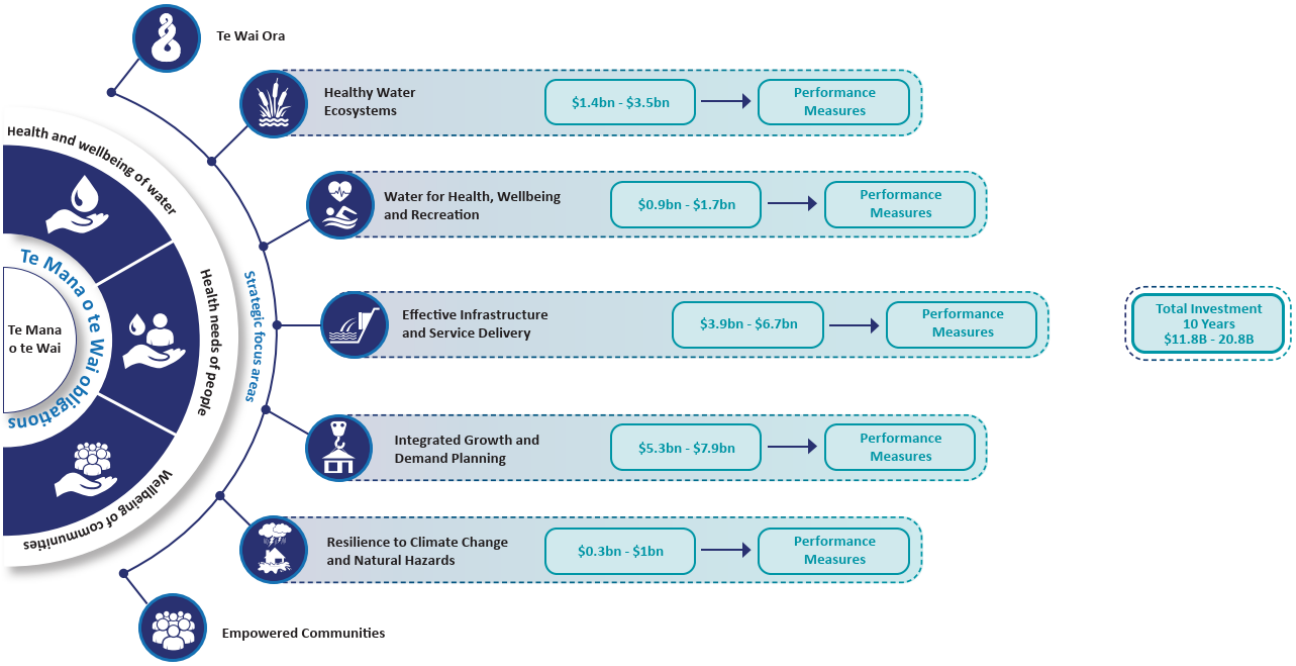


Figure 68 – Linking strategic focus areas to investment outcomes and performance.

The outcomes on the left of the figure above have been developed by a national industry working group. It is expected that each entity will refine and engage with the community on these outcomes for the 2027 Asset Management Plan.

Refer to *Section 5*: Future Levels of Service and Performance Measures for proposed performance measures associated with each of the strategic focus areas, which provides a further indication of targeted outcomes.

12.1 Capital Investment

While the Funding and Pricing Plan follows a top-down approach, the following assessment has taken a bottom-up approach for capital and used a base-step-trend methodology for operational costs as outlined in *Section 11*. The results of the assessments are discussed in this section, together with current capital and operational cost forecasts.

Two capital investment profiles have been developed and are further explored in this subsection. They are:

- A *needs-based* capital investment forecast – detailing capital projects, costs, and timings without any constraints of funding and deliverability.
- A *prioritised* capital investment forecast – taking into consideration affordability and deliverability.

12.1.1 Our Needs-Based Capital Investment Forecast

A needs-based investment forecast has been developed to identify the long-term requirements and demands for water infrastructure and services based on various factors such as population growth, aging infrastructure, environmental considerations, and future needs. It helps in understanding the scale and scope of investment required to meet these needs but does not consider the financial implications, implementation capabilities and prioritisation focus as explained in *Section 11*.

The forecast is derived from information provided by the councils using the national initial decision-making framework detailed in *Section 11*, apart from information from Auckland (Watercare) where they have undergone additional rigour and scrutiny through external reviews and has subsequently been incorporated in the forecast.

Three Waters

Using the information provided by the councils a total needs-based investment of $20.7 billion was identified for the next 10 years to meet current and anticipated future levels of service, cater for expected growth and renewal of assets for improved resilience. Our wastewater activity is driving the largest investment at 46%, followed by water (36%) and stormwater (18%).

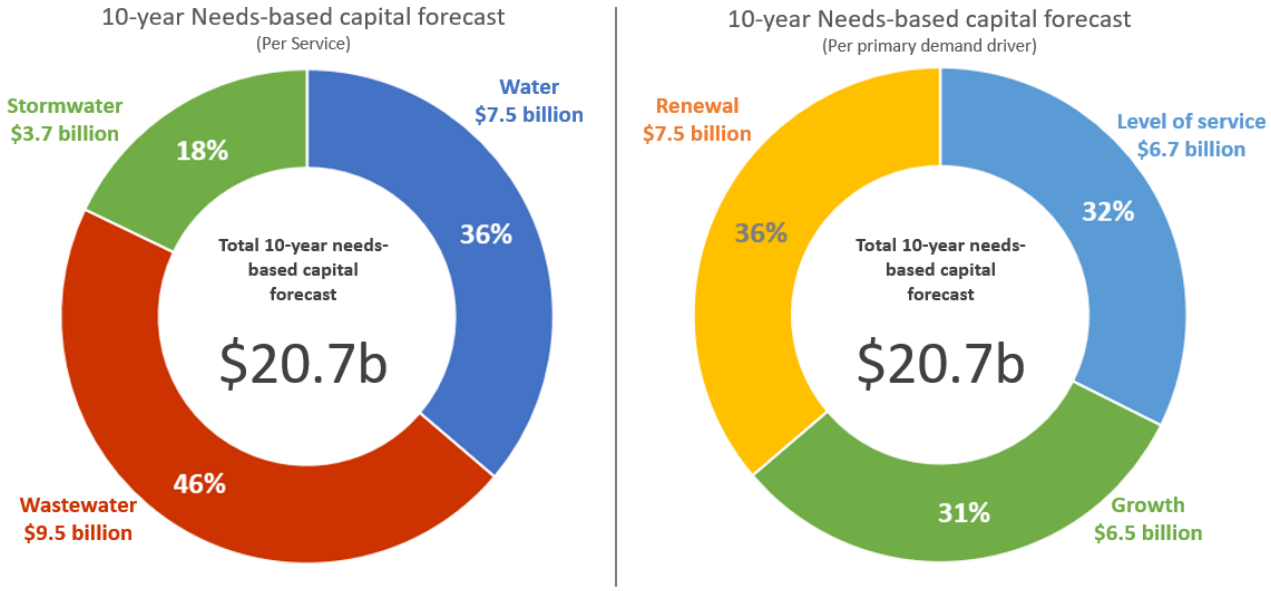


Figure 69 –10-year needs-based capital forecast (real dollars 2023 – excluding inflation adjustment and efficiencies)

The drivers for investment are relatively balanced across renewals, levels of service and growth.

At a regional investment level, the main region was Auckland at 90% with the remaining 10% split evenly across the Northland regions, being Far North region at 4% and Whangarei and Kaipara at 3% each.

In terms of the outcome-based mapping of projected needs-based investment the majority is allocated to effective infrastructure and service delivery (37 %) and integrated growth and demand planning (31 %), which also offers the highest potential for prioritisation and re-scheduling. Investment targeted to outcomes for healthy water ecosystems are forecasted to need 15% of capital investment, similar to water for health, wellbeing and recreation at 13%, followed by resilience to climate change and natural hazards at 5%.

12.1.2 Our Prioritised Capital Investment Forecast

The shift from a needs-based forecast to a prioritised capital forecast further evaluates the investment required by programmes and projects using the prioritisation categories (P1 to P5) by applying the lenses of deliverability, timing and affordability as essential aspects of the transitional decision-making framework. It aims to address the challenges of ensuring sustainable and accessible water services while considering the financial constraints and practical feasibility as well as timing of implementing necessary improvements.

By combining needs, deliverability, timing and affordability considerations, the prioritised forecast enabled our decision-makers to allocate resources efficiently, ensuring that the most critical projects are addressed first. This approach promotes a balanced and agile approach to water sector planning and investment, ultimately leading to improved water services and infrastructure that align with the financial capacity and practical limitations of the targeted outcomes and infrastructure programmes involved.

This is an iterative process and the 10-year prioritised capital investment forecast profiles outlined here have been developed with foremost consideration of affordability (as determined by the Funding and Pricing Plan) and deliverability. The initial review has been undertaken at a high level looking at the impact by service, demand driver and primary prioritisation category with a focus on high value projects and programmes. There was also a focus on delivering all the priority 1 to 3 (P1 to P3) projects in the Northland regions, where possible, to support upgrades, renewals, and growth, thereby improving the level of service and overall resilience.

The next step will be the confirmation of the draft capital investment forecast following review by councils, mana whenua and the Commerce Commission. This will include a detailed plan at a programme level, indicating programmes by year for the planning period while considering the potential risks associated with rescheduling.

Three Waters

Our prioritised capital investment forecast is $14.35 billion over the next 10 years. Through this process of prioritisation of deliverability and affordability the needs-based forecast has therefore been reduced by approximately $6.35 billion over the initial 10-year planning period. It's worth noting that the projects and programmes affected by this prioritisation process has been rescheduled to be implemented beyond the initial 10-year period, and these will be captured and continuously assessed as part of the entity's 30-year infrastructure strategy that will be developed during the initial years after establishment. The proportion of investment for the three services is shown below. Our wastewater activity will require the largest proportion of investment (45%), followed by water (41%) and stormwater (14%). It is noted that our forecasted investment in stormwater is the lowest of the three waters despite it having the largest asset valuation in the entity. This is because a large proportion of stormwater assets included in its valuation are in fact natural assets, open canals, streams, wetlands, and others which comprise a large amount of land which is included in its valuation, but these assets do not require the same level of investment as built assets, which is the case for water and wastewater.

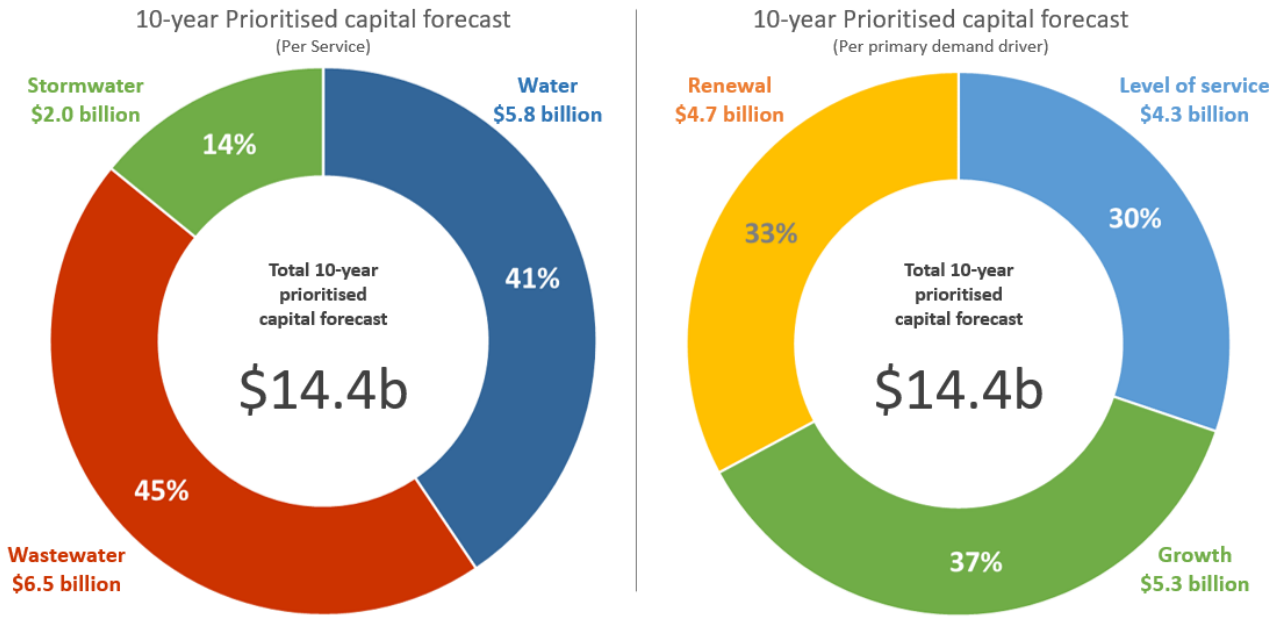


Figure 70 –10-year needs-based capital forecast (real dollars 2023 – excluding inflation adjustment and efficiencies)

At a region investment level, the split has changed a little with Auckland at 88% with the remaining 12% split evenly across the Northland regions, being Far North region at 5% and Whangarei and Kaipara at 4% and 3% respectively.

The breakdown of investment will enable us to:

- **Meet current and future levels of service -** our customers and stakeholders have expectations that:
  - Current levels of service are achieved and maintained whilst investment activities adequately support future level of service needs.
  - Over the next 10 years the prioritised forecast has identified investment of $4.3 billion in our systems and assets to achieve such level of service needs.
- **Cater for growth -** our customers will have safe, guaranteed services into the future as population, business and industry continues to grow:
  - Over the next 10 years, our population is expected to grow by approximately 11%, adding approximately another 200,000 people to our current population of almost 1.9 million.
  - Over this time the prioritised needs-based forecast has identified investment of $5.3 billion to provide additional water, wastewater, and stormwater capacity to meet this growth.
- **Provide renewal for improved resilience tomorrow -** our customers expect safe and reliable services every day. This means:
  - Investing sufficiently so our water, wastewater and stormwater networks can withstand disruptions and meet growth.
  - To build a resilient, water, wastewater, and stormwater system, and ensure reliability of service the forecast identified investment of about $4.7 billion in renewing and upgrading critical assets over the next 10 years. This maintains the focused ringfenced investment of Priority 3 (P3) projects in the Northland councils.

The programme of investment for the prioritised capital forecast from July 2024 to June 2034 shows a gradual increase in capital investment to support the effective transition and establishment of our organisation in line with the objectives of the water reform, as indicated below. Overall, the annual capital investment is forecasted to increase from approximately $1.3 billion in 2024/25 to $1.6 billion in 2033/34, providing a 26% increase to achieve our transition, targeted outcomes, and strategic goals.

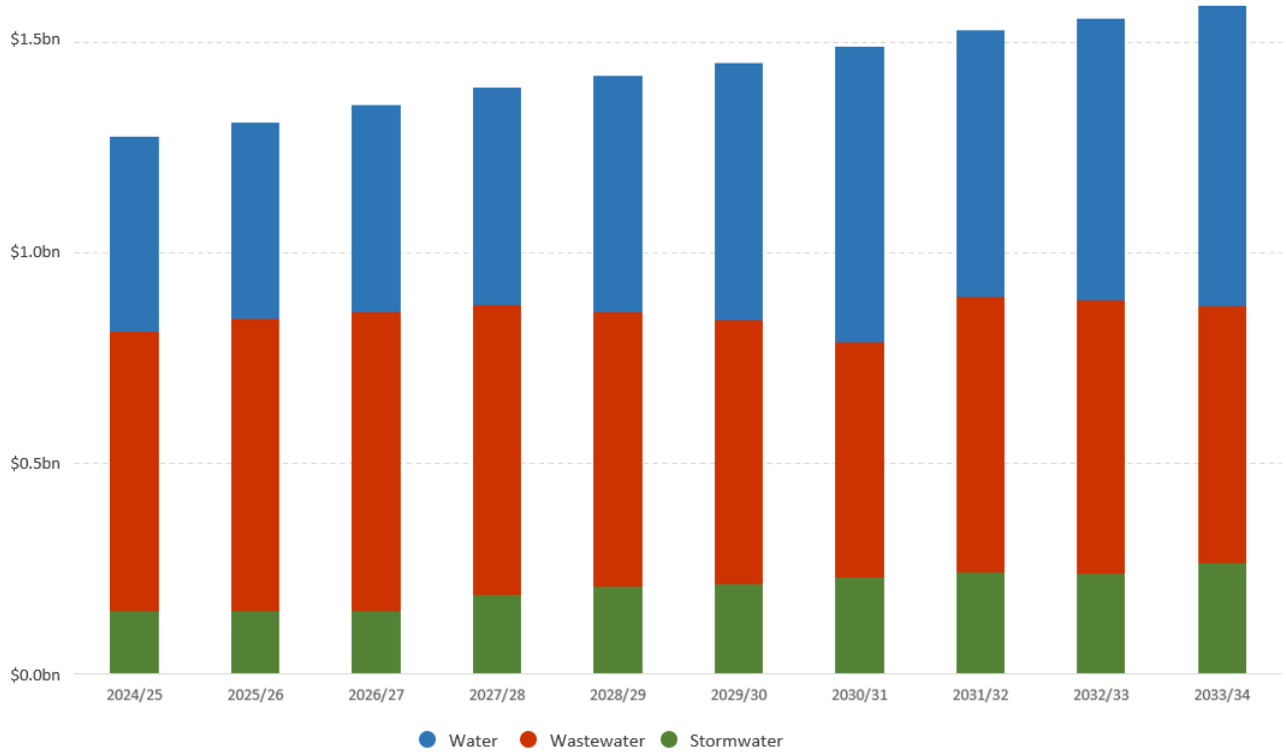


Figure 71 –10-year prioritised capital forecast profile (real dollars 2023, excluding efficiencies)

While the profile above indicates a mostly linear increase in forecasted capital expenditure across all three water services, at a programme and project level there may be fluctuations and adjustments required on an annual basis at these sub-levels to suit specific requirements or address risks. To this effect an ongoing risk-based agile approach will be followed which will be transparently applied while remaining within the overall capital envelope.

Further to the above, to ensure continuity of the capital programme delivery during the initial 2 years of our entity, the capital forecast for 2024/25 to 2025/26, totalling approximately $ 2.58 billion is aligned to current Long-Term Plan objectives within each of the entity's councils to support continued delivery during the initial transition period. Some of the major projects and programmes already underway or planned for 2024/25 to 2025/26 include the following. Also refer to *Appendix C and D* for more details.

Water: Waikato A raw water intake; Purchase of the Ponsonby reservoir site; Onehunga WTP process improvements; North Harbour water main replacements and ongoing renewals programmes.

Wastewater: Central interceptor; Erin Tunnel; the new Clarks Beach WWTP; Hingaia pump station upgrades; Wairua Valley diversion; Army Bay WWTP upgrade; Rosedale WWTP sludge conditioning and ongoing renewals programmes and catchment improvement works.

Stormwater: Western Isthmus, Urban Auckland environmental projects, flood control projects across the region and various critical stormwater asset renewals projects as well as containment management and water quality planning.

The diagram below provides our overview of the investment aligned to our strategic focus areas, which are underpinned by Te Mana o te Wai principles. By mapping our investment to outcomes, we can highlight the how we aim to address challenges and opportunities faced by the entity and realise opportunities of the Water Reform to benefit our communities.

Future performance measures of these targeted outcomes are mentioned in *Section 5*, which will support the achievement of Te Mana o te Wai principles with will be further developed in parallel to a baseline for the entity with appropriate performance metrics against which the effectiveness of capital expenditure can be assessed. In the future our investment plans will be develop further with prioritised, outcome-driven focus and utilising investment mapping at a programme level which is aligned with our objectives and the requirements of our regulators and performance metrics.

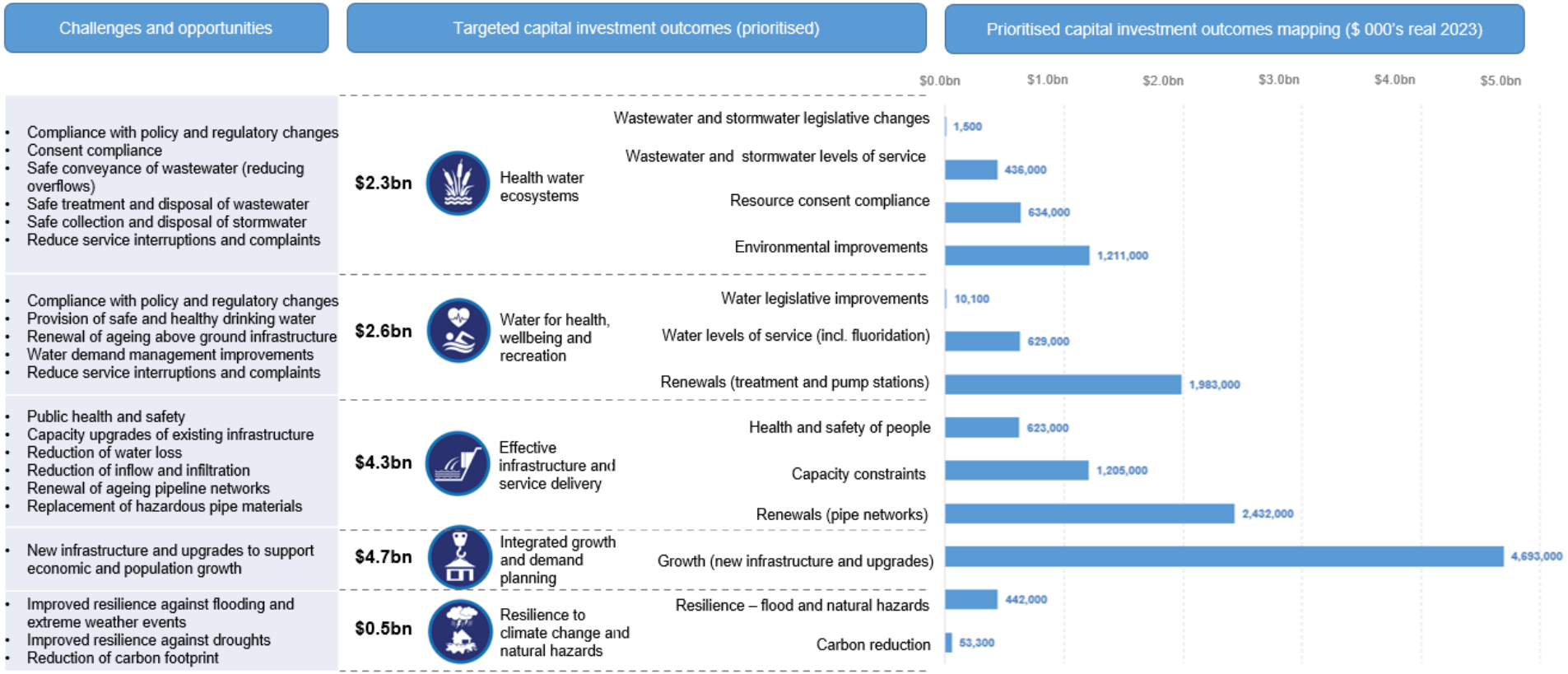


Figure 72 –Prioritised capital forecast outcomes-based mapping (real dollars 2023, excluding efficiencies)

Water

The prioritised water capital investment is predominately driven by renewals (48%) and growth (37%), followed by level of service (15%), making up the $5.82 billion investment. The investment profile for water targets a steady and lower growth from 2024/25 to 2027/28 followed by a three-year period of rapid growth to deliver major projects such as the Huia WTP upgrade, Waikato A Stage 1, Upper Nihotupu raw water main replacement and others. With planned completion of the Waikato A Stage 1 project by end of 2030/31, the profile returns to a more sustained levels of investment trend, with an increase in 2033/34 due to the start of implementation of the Operate Ardmore at high flow 350 to 480 MLD project.

The Huia Water Treatment Plant upgrade, the new Local Network Watermain Renewals strategy (renewals) and North Harbour water mains duplication (southern and northern) for Auckland accounts for $1.73 billion (30%) of the total water capital forecast over the 10-year period. Other major projects in this part of our region are indicated in the tables below.

In the Northland region the main investment driver for water is renewal at 40% of the total water service forecast of $630 million for the Northland regions. This is followed by level of service at 35% and growth focused investment at 25%. Major projects in this part of our region are indicated in the tables below.

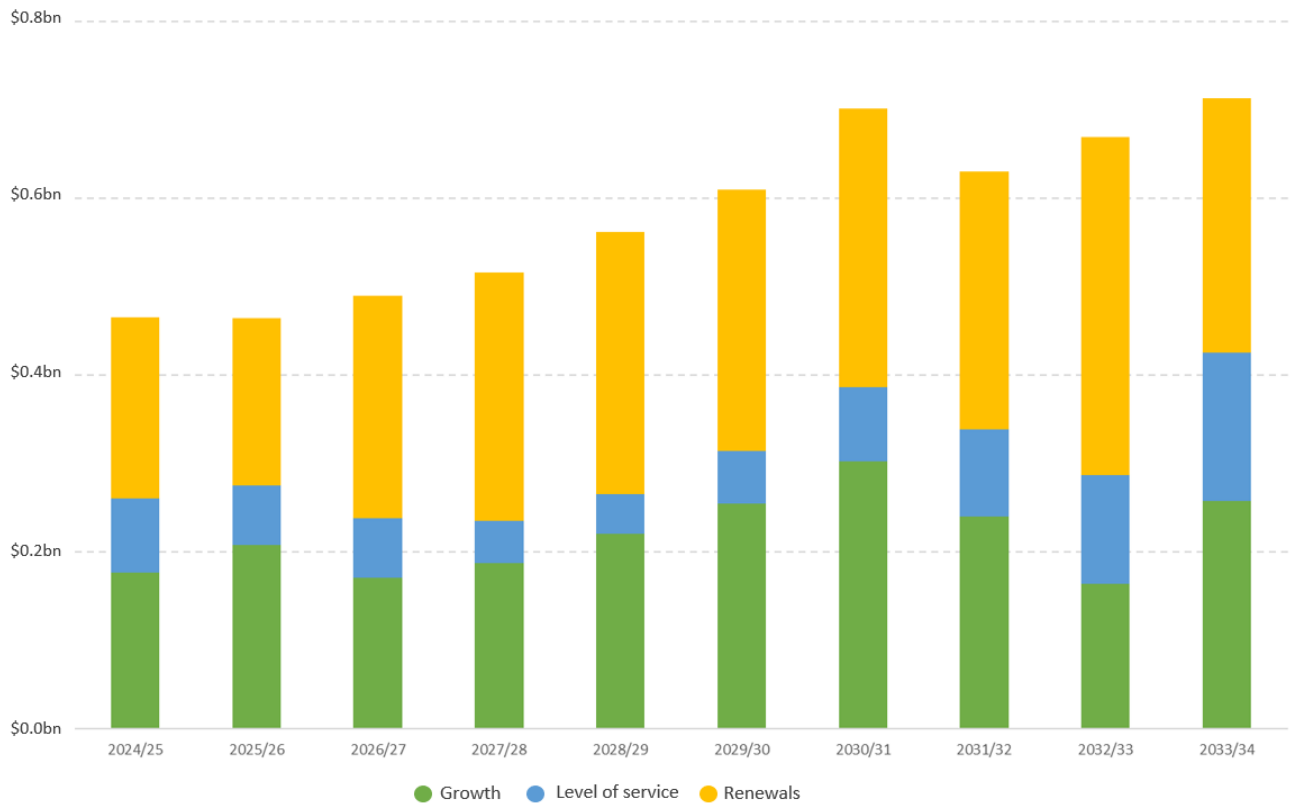


Figure 73 –Prioritised capital projections for water (per primary demand driver – real dollars 2023, excluding efficiencies)

The tables below list the high value projects and programmes for the water service by region over the next 10 years. Future updates to our asset management plan will reflect details at a programme level, with linkages to show how they deliver the entity's strategic outcomes. Details of projects under each of the programmes will be available under a separate project schedule which may be updated more frequently but remain within relevant ringfenced budgets and the overall 10-year capital envelope.

Table 25 – Major water projects planned.

Auckland

Project/Programme	Drivers	Forecast ($ 000's)	Description
Huia WTP Upgrade (Planning)	Renewal	741,954	An assessment of the Huia Water Treatment Plant has been undertaken and identified the assets were at the end of their economic life and are not currently meeting storage, safety, environmental or workplace standards.
Local Network Watermain Renewals (new strategy)	Renewal	510,000	To ensure continued supply of water to our customers that meets the level of service and quality requirements and reduce water loss through a proactive renewal model.
North Harbour WM Duplication - Southern	Growth	249,692	Approximately 23 km in length. 1200mm nominal diameter water main between the Titirangi No. 3 (Manuka Road) reservoir and the Swanson watermain (10 km). 910mm nominal diameter between the Swanson watermain and the Upper Harbour Crossing (13 km). to provide 87MLD of water.
North Harbour WM Duplication - Northern	Growth	225,604	New 900mm diameter watermain from eastern end of Upper Harbour crossing to Albany Reservoirs. Purpose to increase water supply to North Shore.
Waikato A Stage 1 - to 225 MLD	Growth	223,962	This project will enable growth across the region by increasing the availability of the Waikato River as a water source in alignment with the water take consent granted in 2020. Stage 1 involves the construction of a new 75 MLD WTP, to accompany the existing 150MLD taking total capacity to 225MLD.
Water service connections and meters	Growth	170,000	Replacement and new connections of water infrastructure and water meters for customers.
Operate Ardmore at high flows 350 to 480MLD	Level of service	159,552	Due to climate change impacts, the turndown, and the ability to start the process from the low flow and ramp up to the high flow quickly will become important, especially in the events of outage at Waikato WTPs. This project enables Ardmore to operate at peak flows of 480 from current 350 MLD.
Waikato 2 Watermain	Growth	140,681	This investment installs a new, 225MLD capacity watermain 'Waikato 2', to provide for the full expansion of Waikato WTP to 300 MLD, while providing critical redundancy to Waikato 1 watermain.
Transmission Watermain Renewals	Renewal	130,000	To ensure continued supply of water to our customers that meets the level of service and quality requirements and reduce water loss through a proactive renewal model.
Upper Nihotupu Raw Watermain Replacement	Renewal	120,758	The primary need for this investment is to renew the aging Nihotopu Raw Watermain as it approaches end of useful life ~2037 to ensure it can continue to supply the Huia WTP – our third largest treatment plant.

Kaipara

Project/Programme	Drivers	Forecast ($ 000's)	Description
Reticulated water supply scheme in Mangawhai	Level of Service	25,000	Provision of reticulated water supply networks in Mangawhai to ensure current and future levels of service can be met.

Systems Renewals - reticulation	Renewal	23,000	To ensure continued supply of water to our customers that meets the level of service and quality requirements and reduce water loss through a proactive renewal model.
Maungaturoto WTP Upgrade	Growth	9,000	Refurbishment works are required to return the Maungaturoto WTP to full design capacity.

Whangarei

Project/Programme	Drivers	Forecast ($ 000's)	Description
Upgrade of Poroti WTP	Growth	40,000	Developing a new water source, raw water main and treatment capacity for the future demands of the Whangarei Water Supply Area over a 50-year period and to build drought resilience.
Reticulation Renewals (30-years horizon)	Renewal	35,900	The water reticulation programme involves the replacement and upsizing of reticulation pipeline assets. The purpose of this programme of works is that the network is managed
Reticulation Renewals	Renewal	27,000	To ensure continued supply of water to our customers that meets the level of service and quality requirements and reduce water loss through a proactive renewal model.

Far North

Project/Programme	Drivers	Forecast ($ 000's)	Description
Kawakawa network renewals and WTP upgrade	Renewal	29,300	Renew the water treatment plant addressing some growth, changing water standards and land stability issues and planned renewal of network assets that have reached the end of their useful life
Paihia Water Treatment Plant Replacement	Renewal	16,782	The Paihia Water Treatment Plant struggles to meet demand in peak season. The current treatment plant site is cramped and prone to flooding. A new water treatment plant on a new site is the preferred solution. The Waitangi River will continue to be the plant's source, but an infiltration gallery will be installed as part of the upgrade in order to improve the plant's resilience to storm events.
Kaitaia Water Network Planned Renewals	Level of Service	12,500	To ensure continued supply of water to our customers that meets the level of service and quality requirements and reduce water loss through a proactive renewal model.

Wastewater

For wastewater the prioritised capital investment by demand driver and is dominated by level of service (42%) and growth (37%), followed by renewals (21%) making up the $6.5 billion investment. The forecasted investment profile for wastewater starts with continuation of several major projects from 2024/25 to 2028/29, such as the new Clarks Beach Wastewater Treatment Plan, sludge conditioning upgrades at Mangere and Rosedale WWTPs, Hingaia pump station upgrades, Wairau Valley diversion, Erin Tunnel and ongoing renewal programmes and catchment improvement works. From 2029/30 to 2030/31 investment levels decline due to completion of most of these projects, followed by a return to sustained investment levels from 2031/32 onwards. It should be noted the lower proportion of renewals in the capital forecast are mainly due to prioritisation and re-scheduling of some of these programmes to outside the 10-year planning period, while prioritising projects such as upgrades to treatment plants and new treatment plants to protect receiving environments.

Major projects and programmes in Auckland include the proactive Wastewater network renewals programme of $460 million (renewals), Mangere Wastewater Treatment Plant sludge conditioning upgrades of $253 million (level of service), the Hingaia pump station and rising main upgrade of $235 million (growth) and the new Clarks Beach Wastewater Treat Plant of $205 million (level of service). Other major projects in this part of our region are indicated in the tables below.

In the Northland region the investment drivers for wastewater are growth at 42%, followed by level of service at 33% and renewals at 25% of the total wastewater forecast of $852 million for the Northland regions. Major projects in this part of our region are indicated in the tables below.

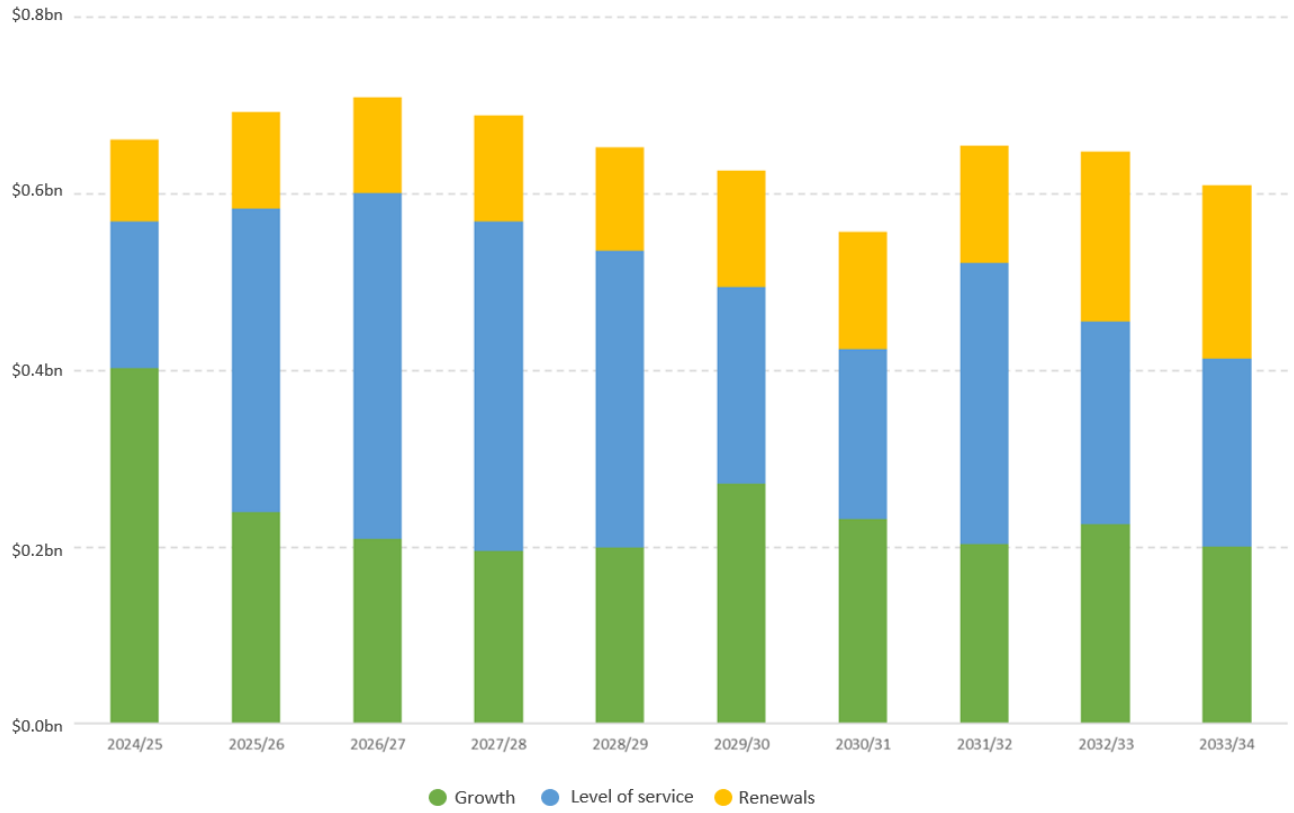


Figure 74 –Capital projections for wastewater (per primary demand driver– real dollars 2023, excluding efficiencies)

Major projects

The tables below list the high value projects and programmes for the wastewater service by region over the next 10 years. Future updates to our asset management plan will reflect details at a programme level, with linkages to show how they deliver the entity's strategic outcomes. Details of projects under each of the programmes will be available under a separate project schedule which may be updated more frequently but remain within relevant ringfenced budgets and the overall 10-year capital envelope.

Table 26 – Major wastewater projects planned.

Auckland

Project/Programme	Drivers	Forecast ($ 000's)	Description
Local Wastewater Network Renewals	Renewal	460,000	A large portion of our existing wastewater networks are approaching end of life and to mitigate the risk of customer impacts, overflows, and other environmental and health impacts we will assess and proactively renew key assets.
Mangere WWTP Sludge Conditioning	Level of service	253,248	This investment is needed as a key step towards reducing biosolids to landfill. The project will increase the capacity of the existing Mangere digesters, reduce loading on downstream

Project/Programme	Drivers	Forecast ($ 000's)	Description
			equipment, improve energy removal from sludge, reduce solids removal volumes, create a less odourous result and a product that may not need lime for increased shear stress.
Hingaia PS upgrade and RM to Manurewa	Growth	235,830	This project is ultimately the construction of a future Hingaia Pump Station with a peak flow 1230 L/s capacity, and a new DN1000 rising main connecting to Manurewa South Pump Station.
Clarks Beach New WWTP	Level of service	205,015	A new discharge consent for the Southwest WWTP's will need to be activated following expiration of the existing - the condition of this consent is that a new WWTP will be built to replace the existing three operational WWTP's. This WWTP will further service projected growth in the region, from 12,000 to 20,000 population equivalent (PE) up to 2032.
Rosedale Sludge Conditioning	Level of service	183,608	This project is driven by the need to increase the Rosedale WWTP processing capacity following Northern Interceptor integration and additional flow diversion to Rosedale in 2033, which will increase the demand on the plant from a population of 320,000 to 450,000. Specifically, the project will increase the capacity of the existing digesters, reduce loading on downstream equipment, improved energy removal from sludge, reduced solids removal volumes and create a pasteurised product that could be available for public use (nutrient recovery).
WIWQIP Motions WW Catchment Improvement Works	Level of service	168,530	The improvements are needed to comply with service standards (target of <2 overflows p.a., and 80% reduction in stormwater overflow volume based on existing levels) in addition to 2028 mandates issued by Auckland Council.
WWTP upgrades stage 1 - Beachlands	Level of service	166,655	This stage 1 investment is to improve current performance of the WWTP while adding capacity to provide for +4,000 population equivalent (PE), taking total capacity to 14,000. This capacity will be enough to service the population increase from the Formosa development, providing up to 2039.
Erin Tunnel	Growth	164,249	An extension of the central interceptor to the Point Erin tunnel is required due to the complexity of the stormwater separation project in Herne Bay and St Mary's Bay catchments. This will reduce total wastewater overflow volume in the catchment by approximately 80%.
Wairau Valley Diversion	Level of service	162,252	The Wairau branch sewer is currently capacity constrained and will need to be upgraded to continue servicing existing communities and accommodate for future demand. Providing conveyance through a storage tunnel directly to the Rosedale WWTP provides the ability to attenuate peak flows and reduce peak flow management and capacity at the WWTP.
Transmission Sewer Renewal	Renewal	139,700	Ongoing renewal of wastewater network to mitigate the risk of customer impacts, overflows, and other environmental and health impacts.

Kaipara

Project/Programme	Drivers	Forecast ($ 000's)	Description
Dargaville WWTP Upgrade and disposal (Irrigation)	Growth	64,000	Based on the condition and capacity of the WWTP, there is a need for a new plant to be progressively constructed to replace the existing plant to also support future growth.
Capacity Upgrade 5,000 connections	Growth	49,500	5,000 new wastewater connections to accommodate growth in the region
System Renewals - reticulation	Renewal	31,500	Ongoing renewal of wastewater network to mitigate the risk of customer impacts, overflows, and other environmental and health impacts.

Whangarei

Project/Programme	Drivers	Forecast ($ 000's)	Description
Ruakaka effluent disposal investigation and upgrade	Level of service	60,000	Upgrade to the system of disposal for treated effluent at Ruakaka to improve level of service and environmental impact.
Wastewater Network Renewals - best for asset-critical assets	Renewal	31,400	Ongoing renewal of wastewater network to mitigate the risk of customer impacts, overflows, and other environmental and health impacts.
Wastewater Network Renewals	Renewal	24,700	Ongoing renewal of wastewater network to mitigate the risk of customer impacts, overflows, and other environmental and health impacts.

Far North

Project/Programme	Drivers	Forecast ($ 000's)	Description
Kerikeri Wastewater Treatment and Network Scheme Expansion (Stage 2 and 3 (KK/Waipapa))	Growth	45,138	Both residential and commercial growth is exploding in the wider Kerikeri area and the new plant, completed in 2020, was expected to meet forecast demand until FY28. Upgrade of the plant earlier than planned along with an increased network scheme is triggered by increased demand due to approved recent and future developments.
Kaikohe Wastewater Treatment Plant upgrade	Level of service	31,250	Plant upgrade required including mechanical plant upgrades for improved treatment in addition to existing pond system
Kaitaia Wastewater Network Scheduled Renewals	Renewal	21,300	Much of the wastewater network comprises AC pipe that was installed in the early 1960's. Typical expected life of AC pipe is 60 years, so many of these pipes have reached the end of their useful life. Approximately 35km is due for renewal to ensure the network continues to meet levels of service and growth/demand.

Stormwater

The figure below illustrates the prioritised stormwater capital investment by demand driver which is largely driven by growth (37%), level of service (35%) and renewal (29%) making up the $2.03 billion investment. The investment profile for stormwater gradually increases from 2024/25 up to 2031/32 from where a sustained level of investment is expected going forward.

Major projects and programmes in Auckland include the Western Isthmus programme of $308 million (growth), Urban Auckland programme of $281 million (growth) and Urban flood control projects $223 million (level of service). Other major projects in this part of our region are indicated in the tables below.

In the Northland region the investment drivers are level of service at 55%, renewal at 30% and growth at 15% of the total wastewater forecast of $286 million for the Northland regions. Major projects in this part of our region are indicated in the tables below.

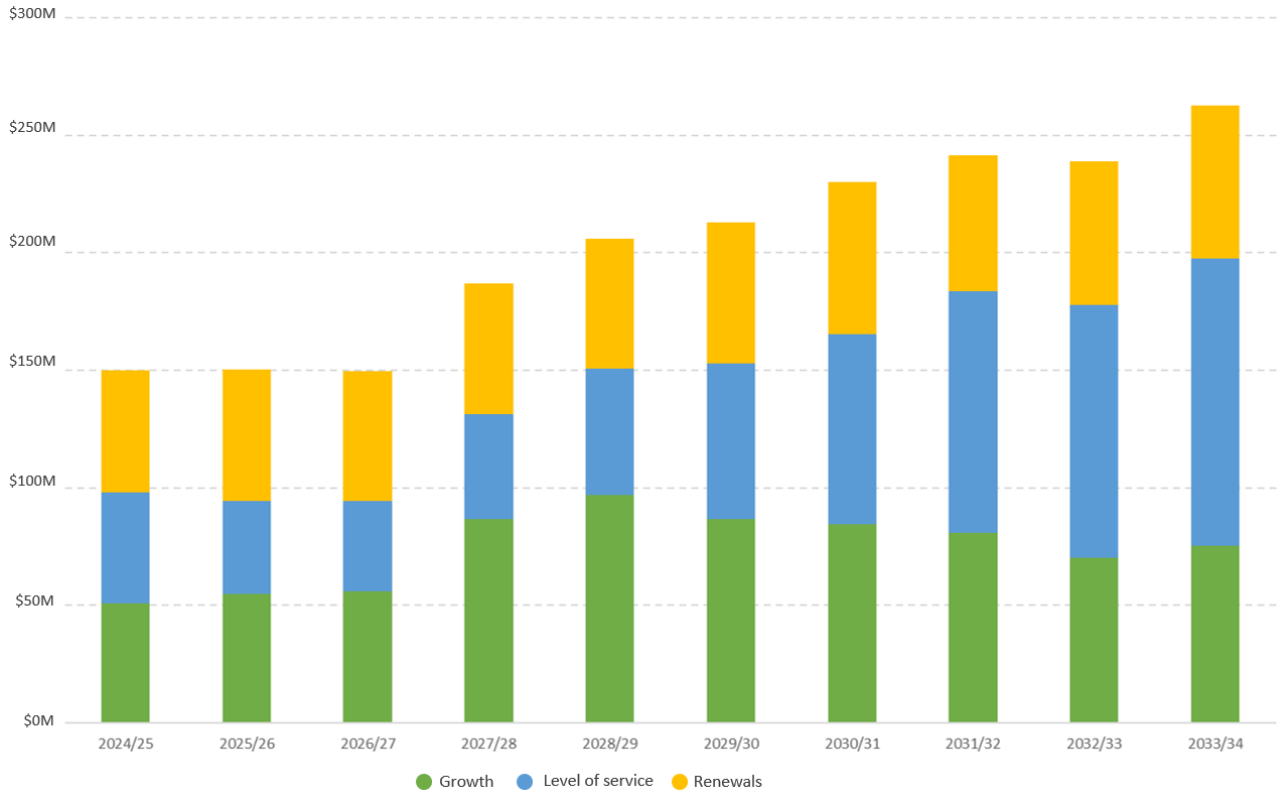


Figure 75 –Capital projections for stormwater (per primary demand driver– real dollars 2023, excluding efficiencies)

Major projects

The tables below list the high value projects and programmes for wastewater by region over the next 10 years. Future updates to our asset management plan will reflect details at a programme level, with linkages to show how they deliver the entity's strategic outcomes. Details of projects under each of the programmes will be available under a separate project schedule which may be updated more frequently but remain within relevant ringfenced budgets and the overall 10-year capital envelope.

Table 27 – Major stormwater projects planned.

Auckland

Project/Programme	Drivers	Forecast ($ 000's)	Description
Western Isthmus programme	Growth	308,319	Major stormwater upgrades to maintain current and future levels of service and improve resilience and risk mitigation. Part of a programme for separation of combined sewers in the Western Isthmus.
Urban Auckland programme	Growth	280,874	Providing stormwater infrastructure to enable growth in urban growth priority areas.
Urban Flood Control Projects	Level of Service	222,663	Initiatives to provide flood protection within the urban areas, where there is modelled and observed significant flooding of properties or important infrastructure due to lack of capacity in the public stormwater system. Includes high risk high priority projects
Eastern Isthmus programme	Level of service	166,321	Major stormwater upgrades to maintain current and future levels of service and improve resilience and risk mitigation. Part of a programme for separation of combined sewers in the Eastern Isthmus.
Major renewal programmes	Renewal	159,334	Asset renewals of infrastructure in poor condition and medium criticality, vulnerable materials, etc.
Critical asset renewals	Renewal	128,284	Ongoing stormwater renewal programmes to eradicate backlogs, mitigate the risk of customer impacts and improve resilience and performance.
Catchment planning programme	Level of service	107,379	Catchment planning and overall improvement of levels of service.
Other Renewals and Upgrades	Renewal	97,453	Renewals of non-critical assets needed to mitigate the risk of customer impacts and improve resilience and performance.
Pond Renewal/Rehabilitation	Renewal	48,361	Pond rehabilitation to maintain treatment capacity. Include opportunity for pond configuration optimisation.
Inner West Triangle infrastructure	Growth	45,337	Providing stormwater infrastructure to enable growth in urban growth priority areas
Manukau infrastructure	Growth	23,035	Providing stormwater infrastructure to enable growth in urban growth priority areas

Kaipara

Project/Programme	Drivers	Forecast ($ 000's)	Description
Wood and upper Robert Street flood prevention	Level of service	20,120	Wood Street and Robert Street in Mangwhai are vulnerable to flood even in moderate rain events. Investment is needed to provide adequate stormwater level of service, preventing habitable floor inundation, and maintaining residential and commercial access.
Upgrade stormwater system in Dargaville	Level of service	18,000	Upgrade of existing stormwater network in Dargaville to maintain current and future levels of service
Extension of stormwater network in Mangawhai (Growth projects	Growth	15,200	Extension of the stormwater network in Mangawhai to accommodate growth.

Whangarei

Project/Programme	Drivers	Forecast ($ 000's)	Description
Stormwater reticulation renewals	Renewal	22,156	Ongoing renewal of stormwater network to mitigate the risk of customer impacts, improve resilience and eradicate backlogs.
CBD flood hazard mitigation OPEX business case	Level of service	20,000	This project is for Climate Change dynamic adaption pathway specifically for flood events combined with sea level rise in the Whangarei CBD area as identified.
Catchment flood mitigation programme	Level of service	14,000	A project to provide general stormwater capacity upgrades in Morningside. This project is the development of area-based flood hazard mitigation.
Stream Improvements / Blue Green network - required	Level of service	10,196	Stream Improvements and part of the Blue Green network Strategy adopted by Council in 2019. The blue green network is a programme to interconnect cycleways and walkways throughout Whangarei utilising the urban stream corridors. Benefits include reduced risk of flooding, enhanced ecological corridors and riparian margins, improved water quality, increased amenity and sense of place, better connectivity, extended walkways/cycleways/shared use paths, increased tourism and migration, and protection of cultural and spiritual values of Māori.

Far North

Project/Programme	Drivers	Forecast ($ 000's)	Description
District Wide Stormwater Network Renewals – Kaikohe and Kaitaia	Level of service	18,100	Current renewal models indicate that an estimated minimum of 10km of stormwater pipe throughout the district that needs to be replaced within the next 10 years with the majority of this in Kaikohe and Kaitaia.
District Wide Stormwater Network Improvements	Level of service	11,750	District wide upgrades to stormwater networks to improve level of service and resilience.
Kaikohe Stormwater Network Improvements, Station Road	Level of service	5,000	Network serving the Lake Road and Williams Street catchment area requires renewal and/or upgrade based on condition, proximity to buildings, capacity and flood risk issues.

12.1.3 Considerations and implications of capital prioritisation

Further to the prioritisation of our capital forecast we have assessed the timing and duration of projects and programmes based on their criticality, interdependencies, and some risk-based assessments. This additional level of prioritisation was applied to ensure deliverability and optimise affordability over the planning period while maintaining the necessary levels of investment to achieve most of our strategic outcomes. This included a specific focus on priority 3 (P3) projects within the Auckland region.

The diagram below provides an overview of the impact of our capital prioritisation from the initial needs-based to prioritised capital forecast against each of our strategic outcomes.

This shows our prioritised investment maintains a strong focus on achieving outcomes for health and safety of people, resource consent compliance, to maintain and improve levels of service, renewals to ensure water for health, wellbeing, and recreation, and addressing capacity constraints.

Most prioritisation adjustments and subsequent re-scheduling have been applied to projects and programmes related to growth (new infrastructure and upgrades) and renewals of pipeline networks with the timing of some of the wastewater and stormwater pipeline replacements being shifted out.

It is also noted that prioritisation of investment in resilience to climate change and natural hazards, and environmental improvements have shifted some of the forecasted investment to outside the 10-year planning period, but a significant portion of critical projects needed to achieve these outcomes may also be addressed sooner under disaster recovery programmes currently underway. The impact of these recovery programmes is not reflected in our current initial draft of the asset management plan.

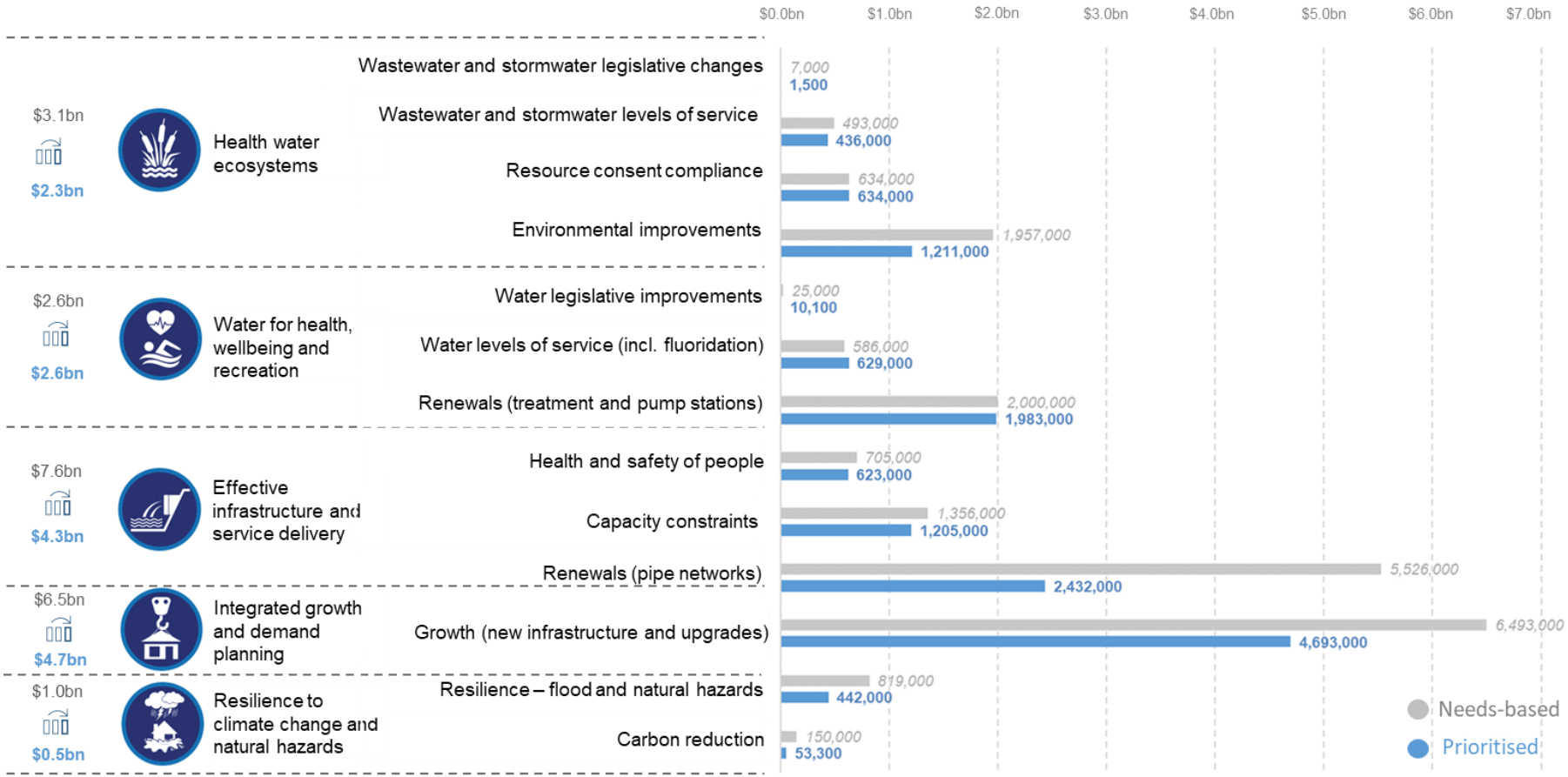


Figure 76 –Impact of prioritisation from initial needs-based to prioritised capital forecast shown against strategic outcomes (real dollars 2023, excluding efficiencies)

We will continue to monitor and manage the risks associated with prioritised adjustments and the impacted projects and programmes as part of the managing risk and resilience governance model that will be outlined in the final asset management plan.

12.1.4 Capital Expenditure Efficiencies

A component of the reform programme is the expected efficiencies to be gained through the amalgamation of services through the new entities. Estimates of targeted capital expenditure efficiencies are currently ongoing as par to the Funding and Pricing Plan. Delivery of potential efficiencies include several improvement areas identified for further analysis, these are currently being validated and will be outlined in the final initial asset management plan. Key areas for consideration include the following.

- **Strategic asset management** - saving money by having common policy agreements in place for the replacement of assets, e.g., critical assets follow a time-based replacement cycle, while noncritical are replaced on failure. Both have significant opportunity to defer planned expenditure.
- **Supply chain integration and coordination** - saving money by creating work packages to be delivered, e.g., geographic location, asset upgrades to maximise supply chain productivity and capacity.
- **Asset standardisation** - significant quick wins can be achieved by looking at opportunities to standardise assets across the portfolio making use of uniform information and operational technologies, achieving improved cost benefits due to increased order of scale (in terms of equipment) and applying modular and optimised standard design approaches as far as possible.
- **Innovation** - by review the way we work there are many opportunities to improve the way our People, Processes and Technology operate across the asset lifecycle, e.g., the development of common governance frameworks will reduce the delays currently experienced in project approvals.

12.2 Operational Investment

This section provides an overview of our operational expenditure profiles for our key operational services, including both direct and indirect costs, along with their sub-activities. The purpose of this overview is to present the operational investment forecast which are shown in real dollars (2023) and excluding any efficiency gains. It's important to note that the operational investment forecast presented below is currently based on a Base-Step-Trend (BST) methodology.

The BST methodology was utilised to generate a top-down forecast, which considers a normalised base and trends in factors such as output growth, productivity, and input costs (as described in *Section 11*). It's worth mentioning that this process is iterative, and the outputs presented here are at a high-level overview, highlighting the operational costs by service, categorising them as either direct or indirect, and providing subcategories.

These outputs will undergo further refinement and breakdown during the consultation process with councils, regulators, and mana whenua. Their valuable input will be incorporated into the final asset management plan. Additionally, Wai Tāmaki ki Te Hiku will undertake a more detailed analysis, prioritisation, and efficiency development of operational expenditure. This will involve considering historical trends, operational drivers, best practices, and technologies. The insights gained from this analysis will contribute to the further enhancement of the final asset management plan.

12.2.1 Our Prioritised Operational Investment Forecast

The total operational forecast for the next 10 years equals approximately $5 billion.

A breakdown of the total operational expenditure over the planning period across the key services is indicated in the chart below. Water accounts for $1.2 billion (24%), wastewater $1.5 billion (30%) and stormwater 0.7 billion (13%). The shared services covering corporate services, customer services and strategic planning account for $1.6 billion.

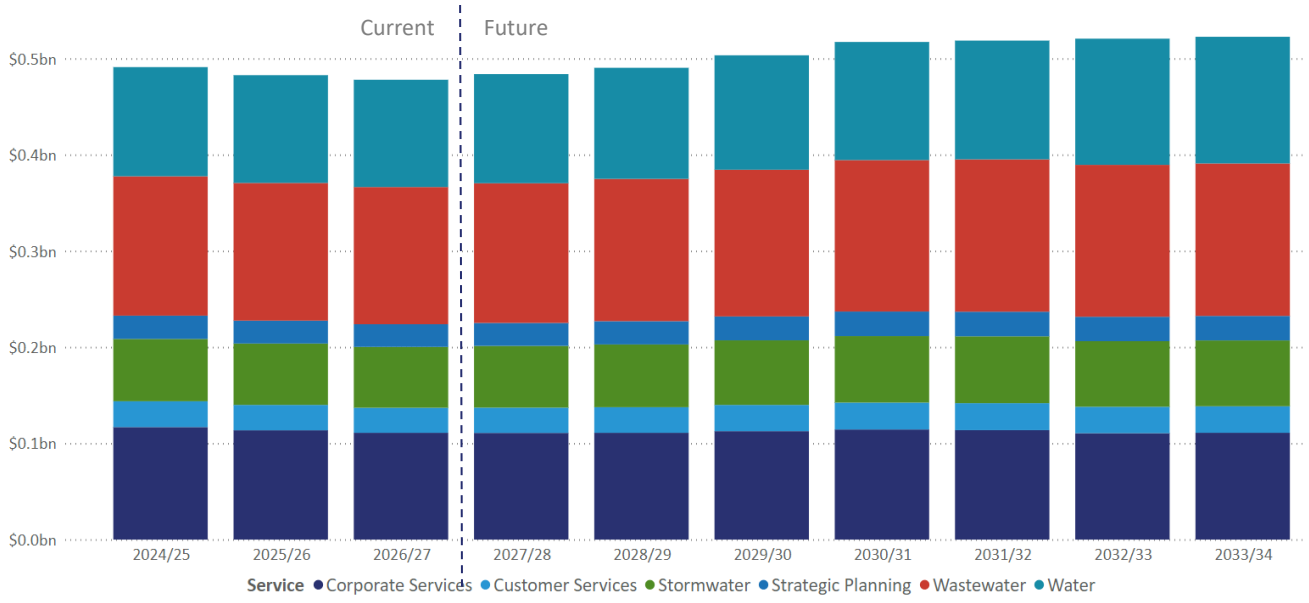


Figure 77 –Operational expenditure forecast (real dollars 2023, excluding efficiencies)

Breakdown by direct/indirect operational costs

Direct costs, including maintenance, operations, and services planning, make up $3.36 billion (67%) of the operational forecast. The indirect cost, including customer services, corporate costs, and strategic planning, make up $1.64 billion (33%).

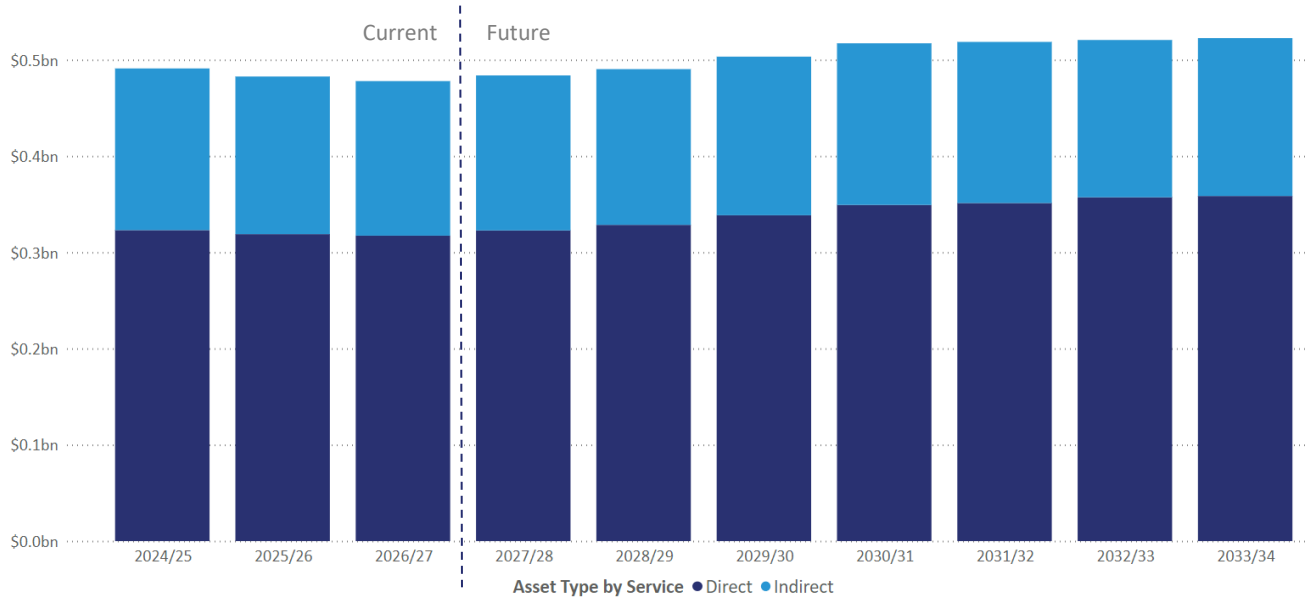


Figure 78 –Projected direct and indirect operational costs (real dollars 2023, excluding efficiencies)

Direct operational cost forecast

The direct operational costs include all costs required for operations and maintenance to ensure the level of service for all three waters' services are maintained on a day-to-day basis. The projected direct operational costs for each of the three waters' services are indicated below.

Water

Maintenance costs remain steady at around $250 million per annum for the duration of the planning period. Operations and water services planning activities account for nearly 80% of the water services' direct costs.

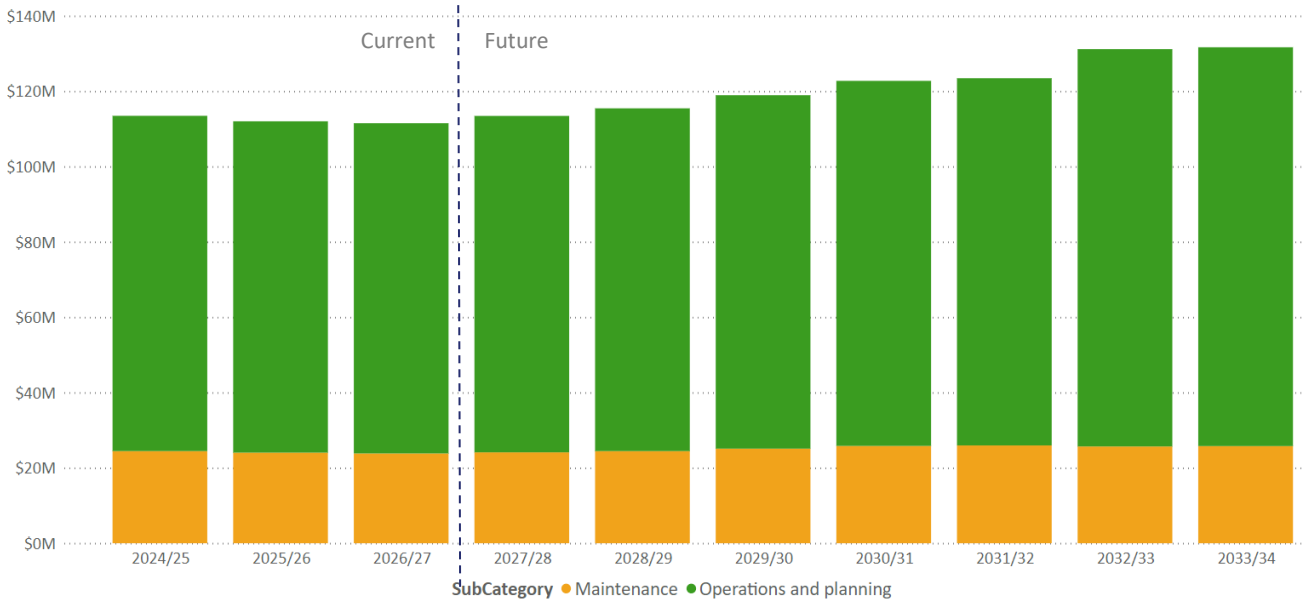


Figure 79 –Projected direct operational costs for water (real dollars 2023, excluding efficiencies)

Wastewater

Maintenance costs remain steady at around $400 million per annum for the duration of the planning period. Operations and water services planning activities account for nearly 72% of the wastewater services' direct costs.

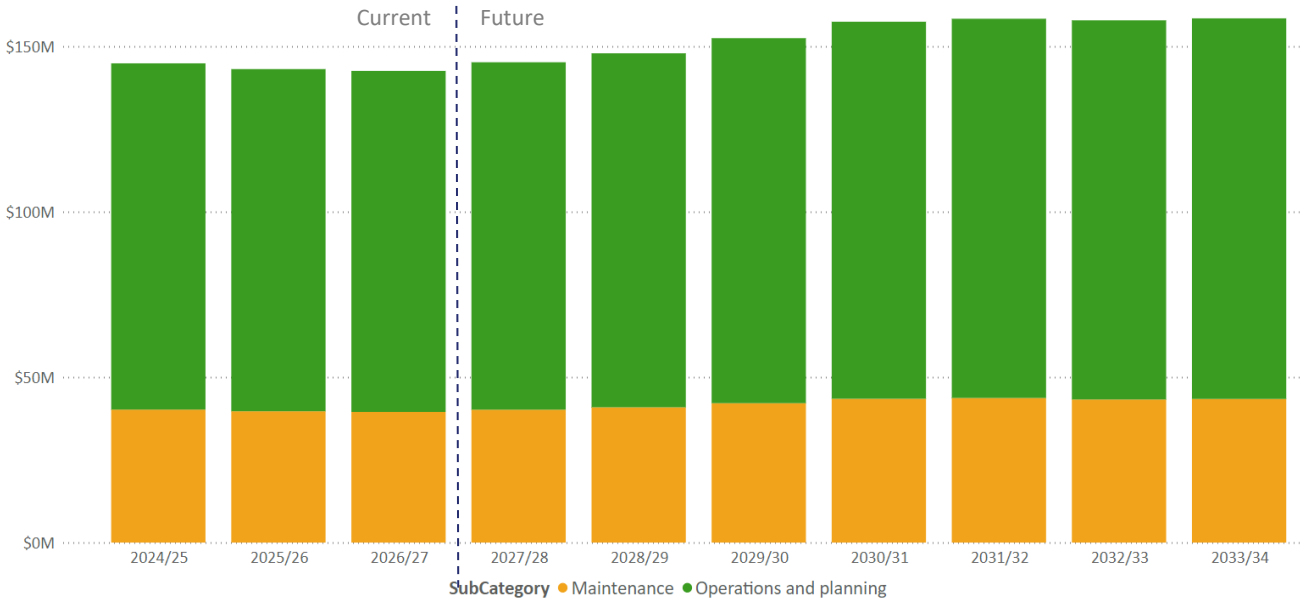


Figure 80 –Projected direct operational costs for wastewater (real dollars 2023, excluding efficiencies)

Stormwater

Maintenance costs remain steady at around $280 million per annum for the duration of the planning period. Operations and water services planning activities account for nearly 59% of the stormwater services direct costs which is considerably lower than the water and wastewater services.

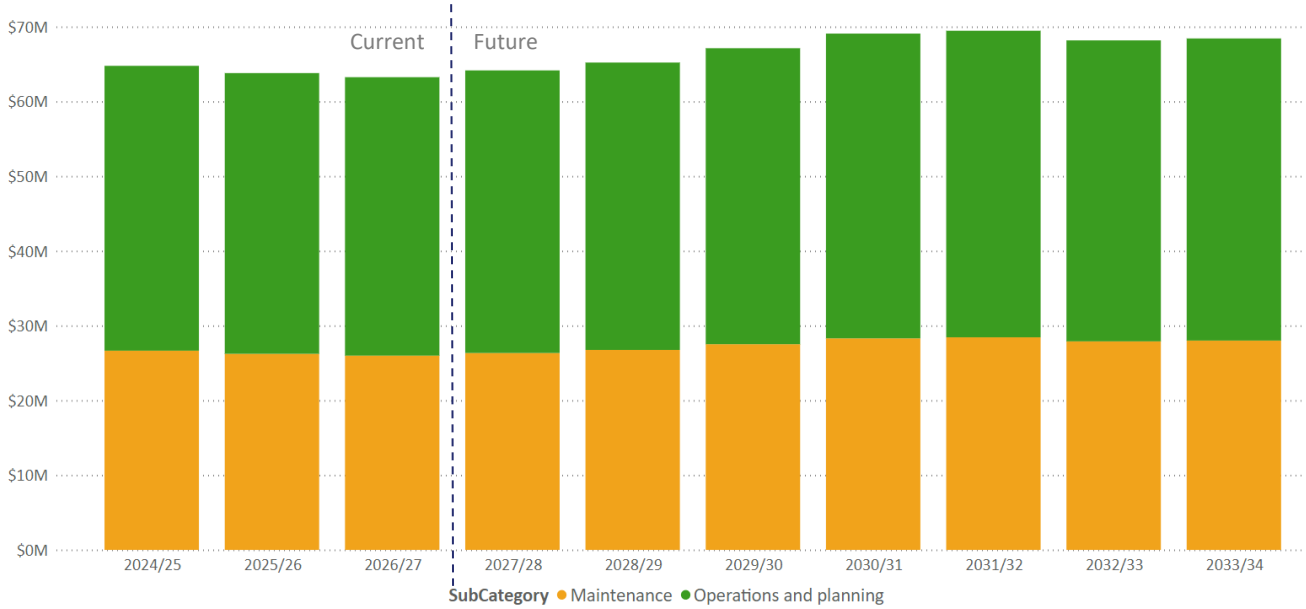


Figure 81 –Projected direct operational costs for stormwater (real dollars 2023, excluding efficiencies)

Indirect operational cost forecast

The indirect operational costs include all other costs which cannot directly be attributed to day-to-day operations and maintenance, such as general management and administration, information and operational technology and systems, corporate and customer services, strategic planning, etc. The projected overall indirect operational costs are indicated below. The main cost is corporate services which are 43% ($708 million) of the total of $1.64 billion over the planning period. Corporate IT costs remain flat across the planning period at around $41 million per annum.

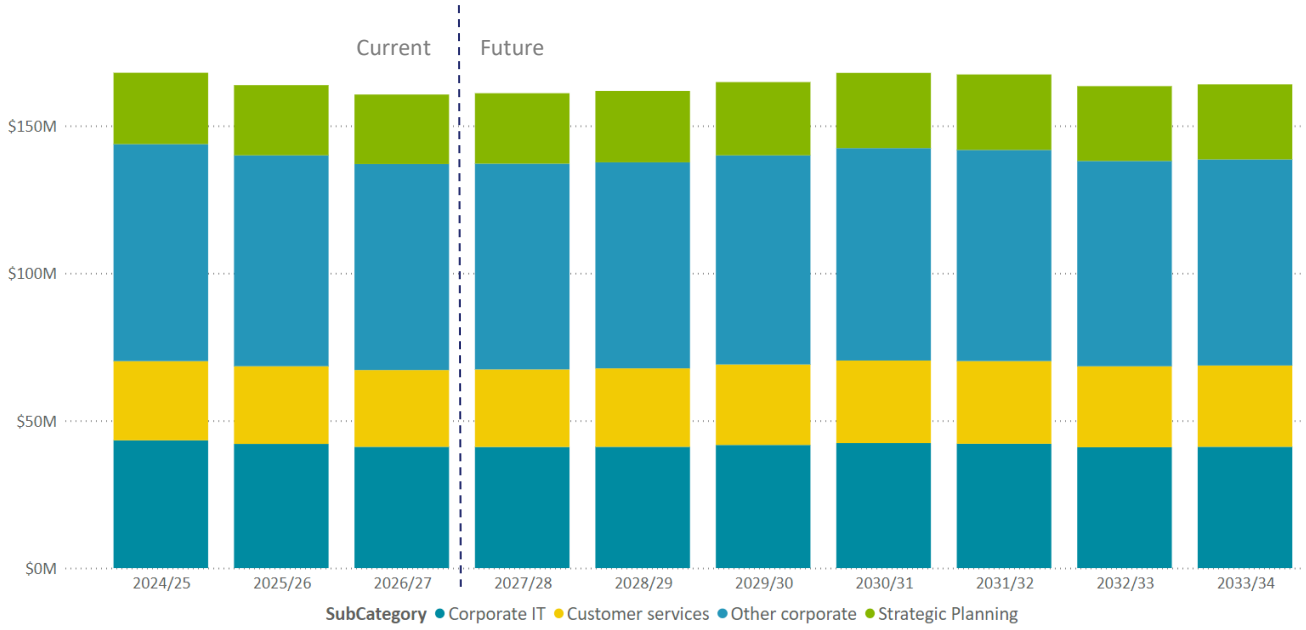


Figure 82 –Projected indirect operational costs (real dollars 2023, excluding efficiencies)

12.2.2 Operational Expenditure Efficiencies

We are committed to further developing our asset management capability to meet internationally accepted good practices. In addition, we continue to make improvements in business support activities, including improved Digital IT capability and predictive data-driven solutions. These improvements will support future efficiency gains from improved work coordination, increased delivery productivity, and better operational decision making. We aim to work hard to drive efficiency into our design, procurement, and delivery to make sure that we maximise the value we provide to customers. We plan to make material capability and capacity improvements over the asset management plan planning period. We expect that efficiencies will result from these planned business improvements. Reflecting this we have applied specific efficiency adjustment factors to relevant portfolios.

Estimates of targeted operational expenditure efficiencies are currently ongoing as part to the Funding and Pricing Plan. Delivery of potential efficiencies include several improvement areas identified for further analysis, these are currently being validated and will be outlined in the final initial asset management plan. Key areas for consideration include the following.

- **Maintenance** – the ongoing day to day work required to keep assets operating at required service levels, e.g., repairs and minor replacements.
- **Operations** – operational activities which have no effect on asset condition but are necessary to keep the asset utilised appropriately, e.g., electricity, chemicals.
- **Compliance** – works required to ensure compliance with resource consents, drinking water, lab costs, health, and safety.
- **Operational planning and investigations** – works associated with long term planning, investigations, improvements, and modelling, e.g. hydraulic modelling, catchment management, sanitary assessments.

12.3 Investment Summary

This section sets out a summary of the capital and operational expenditure forecasts. It should be read in conjunction with *Section 11* Investment Decision Making.

The asset management plan includes our current best forecasts using available information provided by the councils. In subsequent updates, we expect profiles to be further refined as we gain access to improved asset information and our modelling approaches are enhanced.

12.3.1 Capital Investment

The capital investment forecast excluding efficiency gains for the planning period is presented in real dollars (without inflation) below. The impact of efficiency gains is reflected in our Funding and Pricing Plan.

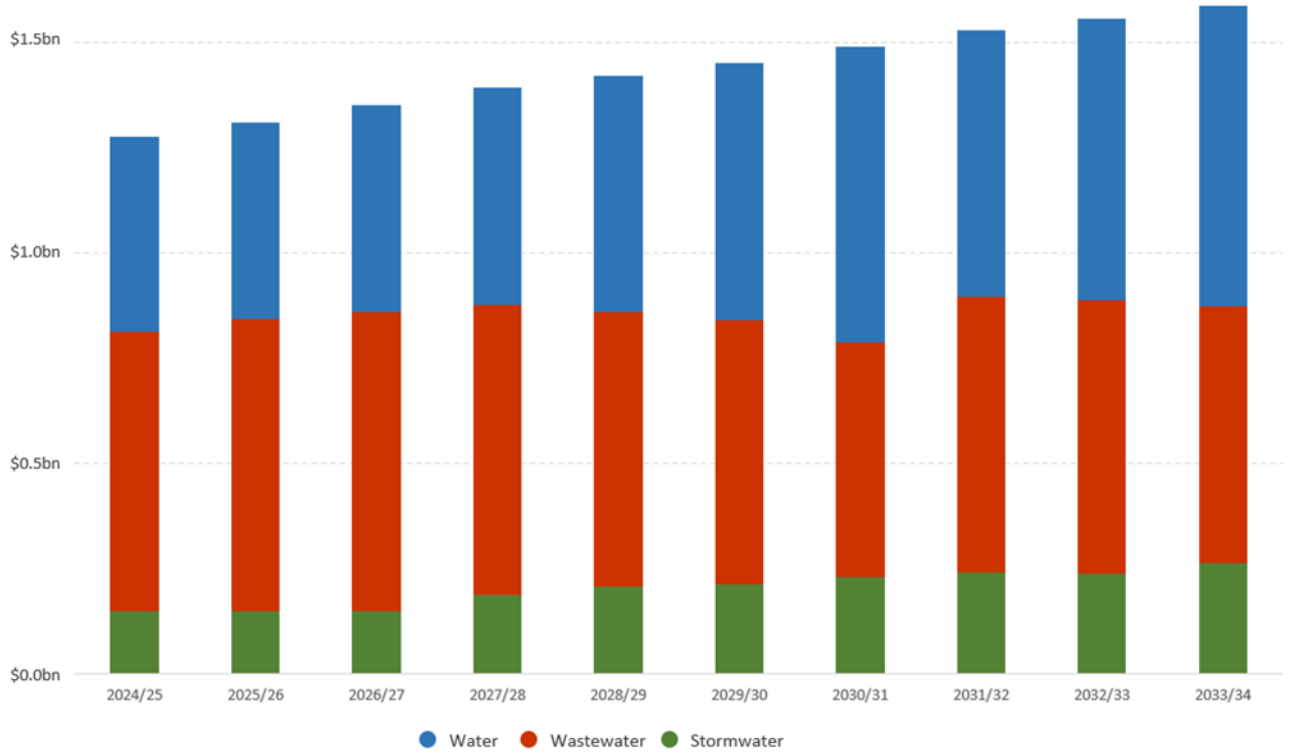


Figure 83 –10-year Capital expenditure forecast (real dollars 2023, excluding efficiencies)

The capital investment forecast excluding efficiency gains for the planning period is $14.353 billion (real) and $18 billion (nominal).

The diagram below summarises the capital investment mapping against our targeted strategic outcomes and the challenges and opportunities it addresses.

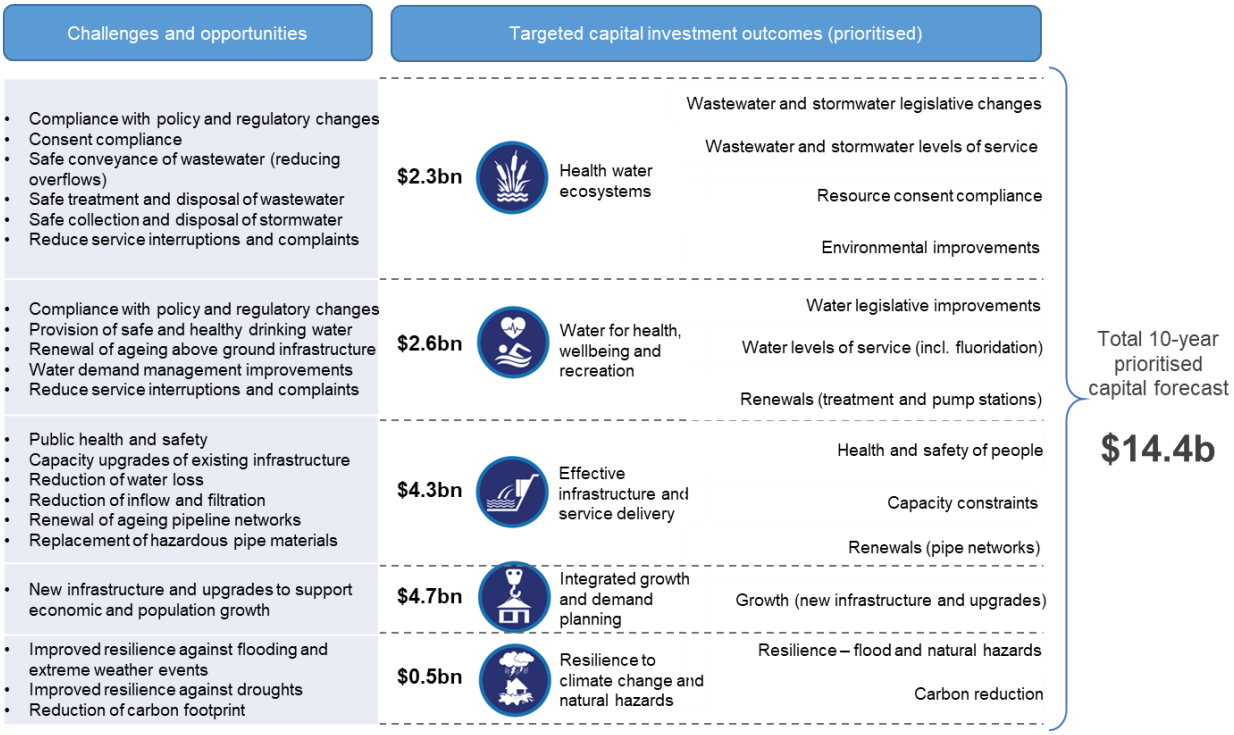


Figure 84 –Capital expenditure forecast.

12.3.2 Operational Investment

The operational investment forecast excluding efficiency gains for the planning period is presented in real dollars (without inflation) below. The impact of efficiency gains is reflected in our Funding and Pricing Plan.

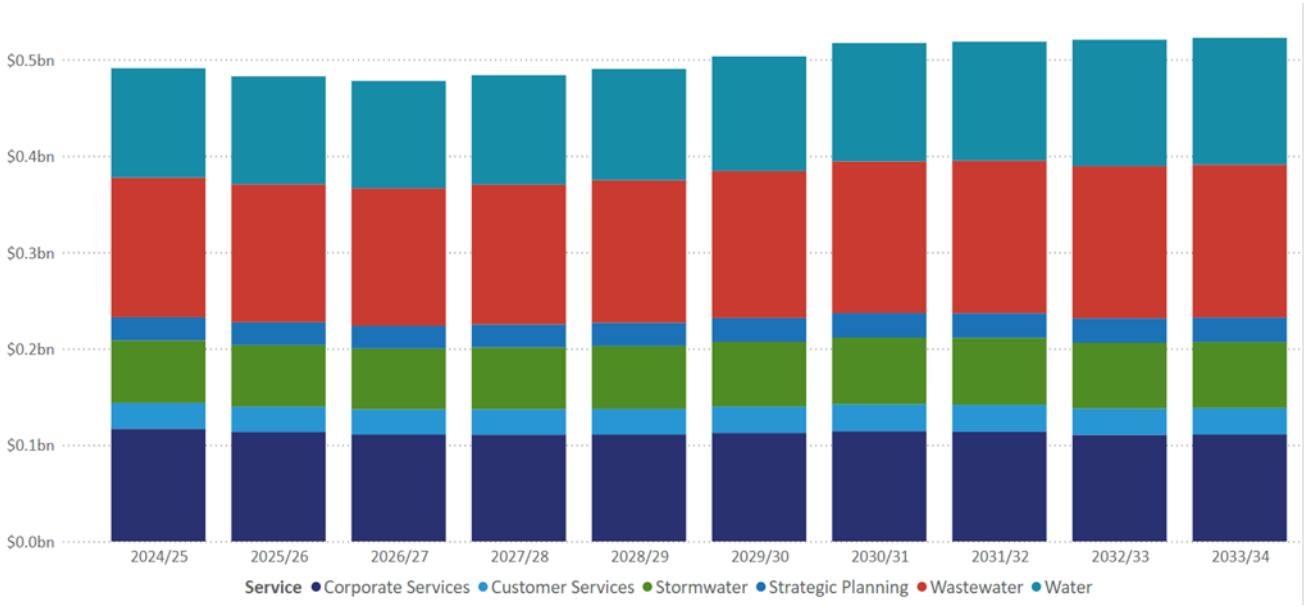


Figure 85 –10-year Operational expenditure forecast.

The operational investment forecast for the planning period is $4.265 billion (real) or $5.158 billion (nominal).

12.4 Data confidence and reliability

Different methodologies and grading systems are currently being used to define asset and financial data confidence and accuracy across our region; these methods will be consolidated over time to provide consistency across the database. The definitions and grading system provided in the International Infrastructure Management Manual (IIMM), as indicated below, have been used to assess the current data confidence and accuracy on a common basis.

Table 28 –Asset data confidence rating

Rating	Description
A – Very high	**Highly reliable (< 2% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented and recognised as the best method of assessment.
B - High	**Reliable (± 2 – 10% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C - Medium	**Reasonably reliable (± 10 – 25% uncertainty)** Data based on sound records, procedure, investigations, and analysis which is properly documented but has minor shortcomings for example the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
D - Low	**Uncertain (± 25 – 50% uncertainty)** Data based on uncertain records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from limited samples for which Grade A or B data is available.
E – Very low	**Very uncertain (> 50% uncertainty)** Data is based on unconfirmed verbal reports and/or cursory inspection and analysis.

All financial data used in the initial asset management plan has been provided by councils and accepted without further scrutiny on a 'high trust' basis. In cases where the data provided is lacking or limited it has been highlighted as far as possible and it will be a key focus to improve data quality and confidence in developing the final initial asset management plan and onwards versions.

Dataset	CAPEX forecast	OPEX forecast
Stormwater	C	C
Wastewater	C	C
Water	C	C

A - Very High | B - High | C - Medium | D- Low | E - Very Low

Figure 86 –Initial data confidence rating – financial forecasts.

The capital investment framework developed by Watercare have provided a high level of financial forecasting detail for water and wastewater projects and programmes in Auckland. The same level of detail in several of the other areas within the entity remains to be developed, specifically detailing some of the project and programme life cycles. Therefore, our current data confidence in capital (CAPEX) forecasts is medium (C).

Operational expenditure (OPEX) forecasts were done on an individual council basis, while combining these at an entity level may require further in-depth analysis and improvement, also warranting a medium grading (C) in data confidence.

Current project forecast details and data contains a mixture of project and programme level data, with project level detail not visible or available in all cases, due to the nature of these programmes. These will be consolidated into a uniform programme level structure, with supporting project level details. The investment decisions and financial forecasting will be finalised through the engagement process for this plan to refine and finalise the investment profile. Consistency in financial forecasting methodologies and assumptions will be a future improvement focus area.

12.5 Opportunities for improvement

- Cost estimation accuracy and cost intelligence requires improvement, especially for projects from 2026/27 onwards. Improving financial planning accuracy is important to confirm the baseline for both capital and operational investment forecasts and how these will be updated in future.
- The methodology for financial forecasting, assumptions, and validation of capital and operational expenditure requires standardisation across the entity.
- Consistency in terms of the methodology applied to programmes and project structures are required and how these are updated, reported, and managed. This may require inputs from the economic regulator in future to align with their requirements.
- Risk identification and assessment needs to be integrated as part of the financial planning framework.
- Flexible project scheduling should be considered across the region to adapt to changes in readiness and risks to deliverability but remaining with in ringfenced budget allocations. This should be part of the capital project delivery approach to be developed going forward.

13 People, Processes and Systems

13.1 People and Capabilities

Assessing our staffing levels and capabilities, identifying capability gaps, and addressing them is crucial for the successful operation of Wai Tāmaki ki Te Hiku. Assessing these within our combine entity is a process that will be completed prior to our establishment and continue during the initial transition period. Such an assessment process may include the following aspects, amongst others.

- **Understand the Entity's Goals and Objectives** - Before assessing staffing levels, it's essential to have a clear understanding of the entity's mission, vision, and objectives. This will help in aligning the workforce with the utility's strategic goals.
- **Determine Regulatory Requirements** - Research and understand the regulatory requirements and standards applicable to our entity in the region and how these may change in future. Compliance is critical, and staffing levels should reflect these requirements.
- **Conduct a Workforce Assessment and Gap Analysis** - Review the current workforce's roles, responsibilities, and qualifications. Identify the existing skill sets, experience levels, and certifications of employees. Compare the current workforce's capabilities with the requirements to fulfil Wai Tāmaki ki te Hiku's mission and meet regulatory standards. Identify gaps in terms of skills, knowledge, and expertise. This should also take into consideration growth plans and future projects and an estimation the workforce needs based on anticipated demand and expansion plans.
- **Recruitment and hiring** - If there are significant capability gaps that cannot be filled through training and development, we'll start a recruitment process to hire new talent. Ensure that job postings are clear about the required qualifications and skills.
- **Define Job Roles, Responsibilities and implement performance management** - We will clearly define the roles and responsibilities for each position within the entity. This should include job descriptions and performance expectations. A performance management system will be implemented that provides regular feedback, sets performance goals, and evaluates employees based on their job roles and responsibilities.
- **Identify Training and Development Needs, Cross-Training and Succession Planning** - Based on the gap analysis, we'll determine the specific training and development needs for current staff to bridge the capability gaps. This might include technical training, certifications, or leadership development programs. A cross-training program can be implemented to enhance employees' versatility and prepare them for potential role changes or promotions. This should include succession planning to ensure that critical positions have qualified backups.
- **Continual Monitoring and Adjustments** - We will regularly review staffing levels and capabilities to ensure they align with changing circumstances, technology advancements, and evolving regulations, and adjust workforce strategies as needed.
- **Technology and Automation** – We will consider how technology and automation can augment the workforce, making operations more efficient. This might reduce the need for certain roles while creating new ones that require different skills.

The above will be further developed and improved to systematically assess staffing levels and capabilities, identify capability gaps, and take action to address them, ensuring efficient and compliant operations and day one readiness.

13.2 Processes

As part of the establishment of Wai Tāmaki ki Te Hiku, critical business processes will be established or adjusted to ensure efficient operations. These key processes that are deemed crucial to successful business operations from day one is indicated below. Regular reviews and updates of these processes will be continuous to support the long-term success of the entity.

- **Governance and Leadership** - The governance structure will be fully established with clearly defined roles and responsibilities, including the board of directors or advisory committees, as well as leadership positions and clear lines of authority.
- **Strategic Planning** - A comprehensive strategic plan that outlines the entity's mission, vision, goals, and objectives will be available. This plan should guide decision-making and resource allocation.
- **Transfer of operations** - A well-structured and programmed transfer of operations, starting with critical infrastructure will take place during the establishment period of Wai Tāmaki ki Te Hiku. This will include clear communication to the workforce, stakeholders, partners, and customers on procedures to follow during the transition period.
- **Workforce Integration** - Staffing roles and responsibilities will be clear from day one. Workforce processes will be streamlined, including human resources support, payroll, and training, to accommodate the transition. This includes change management processes to guide employees through the transition, ensuring clarity, communication, and support for adapting to new roles and processes.
- **Technology and systems Integration** - The entity will merge and optimise technology infrastructure, including, Information Technology (IT) systems, SCADA systems, GIS, and metering equipment, to enhance operational efficiency and data management.
- **Data Integration and Management** - Data sources and data management processes will be integrated, including data sharing, reporting, and analytics, to support decision-making and accommodate the transition needs.
- **Asset Management and Inventory** - Asset management processes to maintain, upgrade, and track the condition of infrastructure will be consolidated. This will include a comprehensive inventory of assets and prioritised maintenance and capital projects.
- **Financial Integration** - Financial systems, budgets, and accounting processes will be established to create a unified financial framework. This includes revenue collection, expense management, and financial reporting.
- **Community Engagement and Public Relations** - Develop a community engagement plan to inform and involve stakeholders, addressing any concerns and building positive relationships with the public.
- **Customer Service and Billing** - Integrated customer service processes, billing systems, and meter reading methods to ensure accurate and timely billing and customer support.
- **Procurement and Vendor Management** - Consolidated procurement processes for acquiring equipment, materials, and services, including management of novated vendor contracts and agreements to ensure consistency.
- **Risk Management and Insurance** - Risk management strategies and plan will be developed including a review and implementation of insurance policies to ensure coverage for potential liabilities.
- **Legal and Regulatory Compliance** - We will ensure compliance with all relevant legal, regulatory, and permitting requirements and address any issues related to licensing, environmental regulations, and quality standards. This will include maintaining relationships with legal and regulatory authorities to address any issues or questions that may arise during and after the transition.
- **Emergency Response and Continuity Planning** - This will involve development of emergency response and business continuity plans that address potential disruptions to services, natural disasters, and other crises, especially for critical assets during the transition period.

13.3 Systems and Data

The successful transfer of data and establishment of uniform systems across Wai Tāmaki ki Te Hiku is crucial to our day one readiness and ongoing successful business operations. The following key aspects will be considered for a successful consolidation of data and systems, enabling efficient operations and informed decision-making from the start.

- Inventory and assessment of data sources.
- Standardised data formats and conventions.
- Integration of data from various sources including accurate migration of historical data.
- Cleansing and continuous improvement of data quality. This includes standardised data capture and processing methods, data structures and processes to support automated systems.
- Integration of Geographic Information Systems (GIS), modelling and other relevant systems.
- Decommission of redundant legacy systems.
- Enabling data access and reporting tools, data backups and recovery.
- Provision of appropriate training and change management support.
- Establishment of data governance and security as part of a Master Data Management Plan. This includes data integrity being continuously tested and validated.
- Ensure compliance checks and auditing of data.

Further to the above, the entity will develop, integrate, and implement the most effective asset management systems and technologies to manage and make use of asset and lifecycle data throughout the organisation. This remains a work in progress.

14 Continual Improvement

Continual improvement is crucial to Wai Tāmaki ki Te Hiku because it ensures we can sustain our commitment to improve and maintain the health of water and our ecosystems, safeguard public health, and support the socio-economic and cultural needs of our communities while adapting to the risks posed by climate change, natural hazards and address our future challenges. The following provide our initial review of the continual improvements needed during our initial years of transition and transformation.

Highlights – Continual improvement

High priority improvements

As part of the current capital investment forecast Wai Tāmaki ki Te Hiku have specifically allocated approximately $20 million to support initial priority improvements under a programme named 'Productivity, Innovation and Sustainability (spend-to-save)' during the initial 10-year period. Additionally, a digital transfer programme of approximately $100 million over the initial 10-years have been budgeted for digital transfer costs and digital improvements to enhance and support priority improvements across the region. The following have been initially identified as some of the high priority improvements required. Priority of improvements will be assessed in more detail as part of the initial Improvement Plan to be developed.

- Overall data quality improvement and a data management plan. This will include an Asset data strategy (good quality data improves decision making, efficiencies in relation to asset data management and reporting) which includes data from iwi engagements.
- Asset condition assessment programmes (optimisation efficiency, plus opportunity for entity-wide specialist inspection contracts).
- Demand / supply forecasting for improved resilience planning (management of increased climate change and natural hazard risks – drought/flood). This includes mandatory assessments of communities currently not serviced.
- Assessment of consent compliance status and confirmation of planned renewals and improvements to meet regulatory requirements.
- Full review of capital and operational investment forecasting, database and assumptions and establishment of capital delivery programme and structure (challenge the evidence base, seek efficiencies in larger programmes of work, etc). This will also support development of a more accurate capital and operational expenditure baseline.
- Establishment and implementation of an initial risk management framework
- Stakeholder and partners engagement and communication planning
- Integration and development of Te Mana o te Wai principles
- A review, risk assessment and planning for transition readiness.
- Competency framework and assessment, identification of asset management skills and resource gaps.
- A change management plan to support transition and initial years of business operations.

14.1 Current and Desired Maturity State

14.1.1 Maturity Framework

Asset Management (AM) Maturity Assessments are a mechanism for monitoring the maturity (quality and effectiveness) of AM practices using a structured framework; and then identifying improvements where maturity gaps are identified. Various frameworks are in use globally and in the NZ water sector, but for the development of the first entity Asset Management Plans (AMPs), the framework in the International Infrastructure Management Manual (IIMM) was chosen as it is the most widely used by existing water authorities. The framework evaluates 16 asset management functions, as shown in the figure below.

Figure 87 –Asset Management Maturity Functions

14.1.2 Gap Analysis

The figure below shows the maturity results of the existing authorities in Wai Tāmaki ki Te Hiku. As expected, asset management maturity is generally in line with the size and resourcing of each organisation, with Watercare and Healthy Waters scoring highest, Whangarei District Council in the middle and Kaipara and Far North District Councils at lower levels of maturity.

An initial target of '80' (high intermediate) has been adopted, though this will be reviewed as part of the development of the Asset Management Policy and Strategic Management Plan' in Year 1.

Assessing the gaps between current and appropriate practice identifies that Watercare and Healthy Waters are near or at target maturity for most functions and the priority will be extending the best current practices across all parts of the entity. Other key points include:

- The largest gap is for 'Strategic Asset Management Plan' (SAMP) is expected to be addressed in the 2024/25 year with the adoption of the first Wai Tāmaki ki Te Hiku SAMP. It is noted that the strategic direction of the entity is currently unknown, and we have generally taken direction from the relevant councils' strategic direction to inform this initial asset management plan.

- Improvements identified as part of this initial asset management plan is expected to inform further asset management maturity improvements in the areas of Levels of Service, Capital Planning, Financial Management, Asset Data and Information Systems and Improvement Planning.

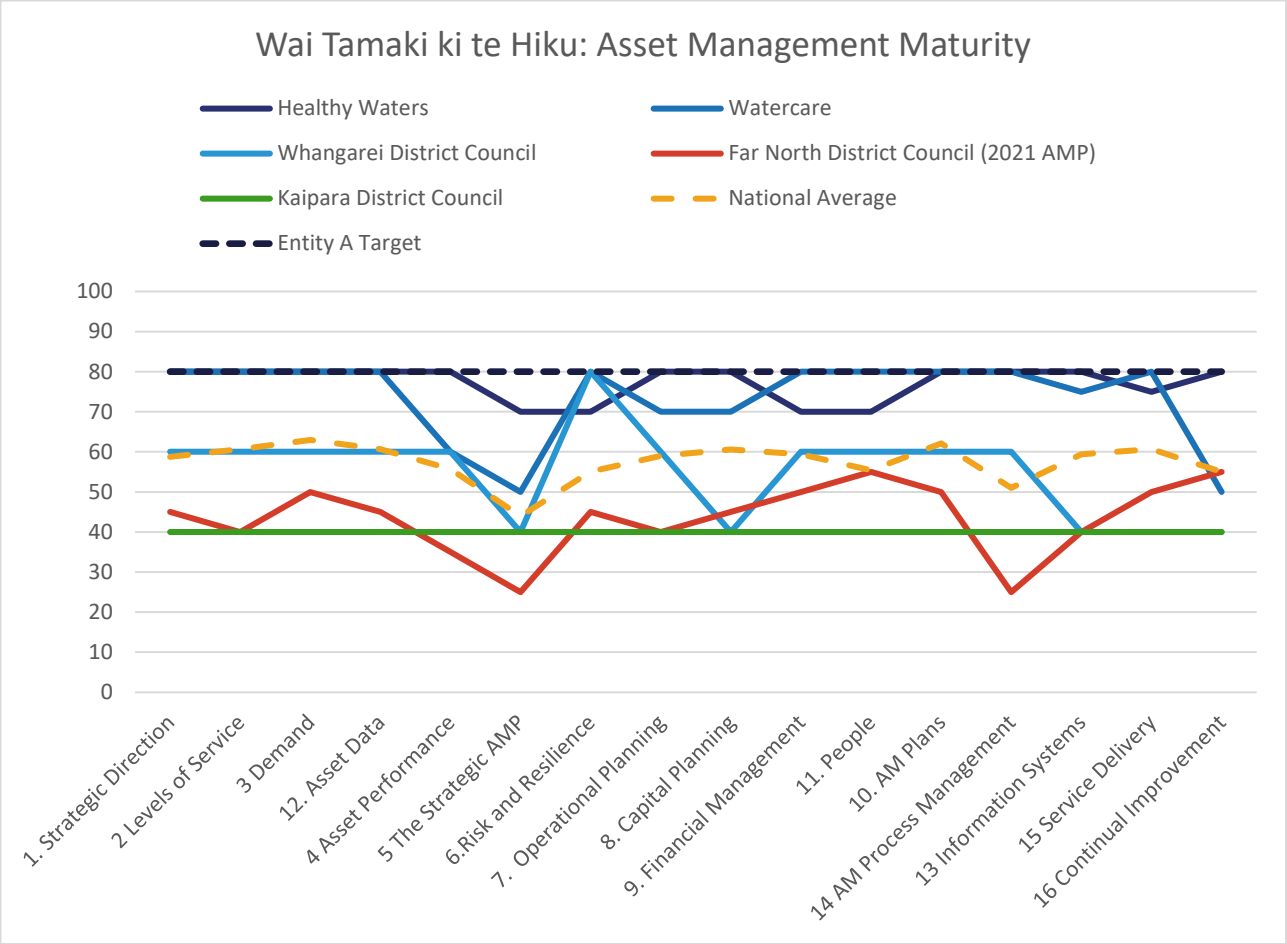


Figure 88 –Wai Tāmaki ki Te Hiku Asset Management Maturity Gap Analysis

14.2 Top priority improvements

Based on our initial assessment, we anticipate the following top five priority improvement focus areas in our entity.

- Asset condition assessment programmes (optimisation efficiency, plus opportunity for entity-wide specialist inspection contracts).
- Demand / supply forecasting (management of increased climate change risks – drought/flood).
- Full review of capital projects database (challenge the evidence base, seek efficiencies in larger programmes of work).
- Asset data strategy (good quality data improves decision making, efficiencies in relation to asset data management and reporting).
- Competency framework and assessment, identification of asset management skills and resource gaps.

14.3 Improvement Plan

To address the gaps identified, the following improvements have been identified with the overall goal of achieving improve asset management maturity within the first three years of our entity's operation. Funding to progress these improvements has been included in the operational expenditure forecasts.

A priority is to develop necessary project briefs for each of the proposed improvement initiatives, including objectives/expected benefits, resources (people, contractors, budgets), methodology, milestone deliverables. A full business case may be required for larger initiatives. During scoping of these initiatives, we will consider the full range of opportunities for efficiencies.

The below initiatives and their deliverables and timelines will be compiled into a detailed *Improvement Plan* during the establishment period, with milestones to support monitoring.

Wai Tāmaki ki Te Hiku has identified the initiatives marked with an asterisk (*) as being suitable for a national project or approach. Below follows a list of initial improvement initiatives identified from each of the relevant foregoing sections of this draft document. These will be combined and further assessed to support efficient deliver and prioritise most important improvements first.

Table 29 –Improvement Tasks

AMP section/ function	**Targeted improvements from 2024/25 to 2026/27**	
	Likely improvements in Year 1 (*or earlier*)	Likely improvements in Year 2 onwards
Transition readiness	Workforce transition Data transfer and management Operations stocktake and operational takeover. Contracts and procurement review and novation. Early establishment of a Project Management Office. Change management support	Ongoing change management support while people, systems and processes are aligned and consolidated.
General improvements and strategic direction	Asset Management (AM) Policy and Strategic Asset Management Plan (SAMP) approved. AM Policy, SAMP, AMP to be aligned to Statement of Intent and Te Mana o te Wai statements. AM Policy, SAMP, AMP aligned to confirmed focus areas and outcomes. Implement National Engineering Standards Finalise initial AMP 2024/25. Establish processes for engagement and approval of AMP.	Integration of Te Mana o te Wai principles across planning and business operations. Review of relevant decision-making criteria to be aligned to the above. Develop an iwi co-design framework for AMP 2026/27 High level mapping / optimisation of key AM processes (e.g. condition assessment to renewal project). Quality management strategy
Section 2: Our stakeholders	Follow a transition stakeholder engagement and communication plan will be aligned with the various consultation mechanisms and legislative requirements	Develop a formal stakeholder engagement and communication plan aligned to business operations and regulatory requirements.
Sections 3 and 4: Asset condition and performance	Review existing practices, develop Asset Condition and Performance Monitoring Strategy. Assessment of consent compliance, renewal and compliance with regulatory requirements	Condition and performance monitoring programmes reviewed (and implemented) based on asset criticality and risk. Implement processes for capturing condition / performance data into Asset Management Information System (AMIS)*. Continuous consent compliance and renewal monitoring programme.
Section 5: Levels of Service	Development of the Levels of Service Framework, described in Section 5. Reporting and trend analysis against priority (mandatory) measures on Day 1.	Establish performance targets (initially for 'priority' measures, then roll-out for all). Establish reporting against all performance measures. Implement customer and iwi engagement programme. Alignment with requirements of regulators.

AMP section/ function	Targeted improvements from 2024/25 to 2026/27	
	Likely improvements in Year 1 (*or earlier*)	Likely improvements in Year 2 onwards
	Develop customer engagement strategy (including targeted input for levels of service/AMP).	
Section 6: Demand and planning for the future	Compilation of demand / supply analysis by scheme to be included in future AMP. Review status of all network models used for demand / capacity analysis. Identify model update programme and standardise where possible.	Align population forecasting methodology for all schemes*. Review / develop demand forecasts for all schemes using aligned approach and forecasting periods*. Development of demand management strategy including leakage, I and I, stormwater regulations. Network analysis to identify asset demand constraints. Network Model / Master Plan development programme, including calibration. Sanitary assessments – identification of demand for future schemes.
Section 7: Risk and resilience	Implement a uniform Risk Management Policy and System across the entity (detailed to analyse and address planning, management, delivery, and physical asset risks). Review and identify best asset risk / criticality approaches. Gap analysis of infrastructure resilience (vulnerability) assessments, including climate change and natural hazard assessments. Climate change risk assessment and risk awareness and preparedness maturity assessment. Natural hazards risk assessment and risk awareness and preparedness maturity assessment.	Asset criticality and risk assessment approach aligned and applied to all assets. Network vulnerability assessments carried out (prioritised programme of assessments based on hazard risk). Engage with Auckland and Northland Lifelines Group to agree work contributions during Years 1-3. Water scarcity and drought study, with link to groundwater prediction for the next 50–100 years. Develop work planning and procedures for recording and monitoring the impacts of climate change. Review various adaptation plans and strategies and compile in to one document. Develop an overarching Climate change strategy and policy. Carbon reduction roadmap Undertake a comprehensive natural hazard risk assessment for a range of asset types, vulnerability, and criticality. Develop a nationally consistent benchmarking regime based around a natural hazard risk maturity index for infrastructure*.
Section 8: Operations and maintenance (OandM)	Incident and Emergency Management Business Continuity Plans developed. Existing OandM scheduled and programmes compiled. Review existing OandM strategies and plans.	Implement National Incident and Emergency Management Framework (Taumata Arowai). Review OandM schedules based on outcomes of asset criticality and risk analysis. Develop OandM Strategy and Plans Planned maintenance and operational schedules in Asset Management Information System (AMIS). Develop operational efficiency plans and review investments required to achieve these.
Section 9: Asset renewals	Asset renewal planning to follow uniform approach and standardised modelling and data management.	Development of a common renewal forecasting model based on condition, performance, maintenance history. Employ predictive modelling techniques and standards.
Section 10: Asset disposal	Develop a structured approach for managing and documenting vested assets and disposal of assets.	Establish an Asset Disposal Policy to guide the responsible and transparent disposal of all assets, aligning with best practices for the management of public assets.
Section 12: Capital and	Capital Delivery Programme developed, including standardised approaches to financial	Develop a 30-year Infrastructure Strategy

AMP section/ function	Targeted improvements from 2024/25 to 2026/27	
	Likely improvements in Year 1 (*or earlier*)	Likely improvements in Year 2 onwards
operational investment planning	assumptions, estimation accuracy and planning methodology, etc. Capital programmes/projects' structure to be established. Initial capital projects database established. Entity establish Project Management Office, ready for Day 1 reporting.	Full review of Capital Projects database and underlying evidence and data. Development of common capital and operational forecasting models based as part of delivery programme methodologies. Improve cost estimation accuracy and reduce associated risks. Review of cost escalation / inflation assumptions for financial forecasts (national approach). Major capital project / programmes scoped three years out and in more detail. Integrate risk assessment framework as part of capital and operational delivery programmes.
Section 13: People, processes, and systems	Workforce integration and skills gap analysis Full implementation of Asset Management Information System (AMIS) across Entity. Establish a pan-organisation AM Governance Group to oversee AM Improvements. Data Improvement Programme Data Management Plan Existing databases consolidated into Asset Management System. AMIS operations and performance reporting functionality established to meet Day 1 needs.	Competency framework and assessment, identify gaps and capability development programme. Develop an entity-wide AM training programme targeted at different roles in organisation. Asset data needs analysis and strategy. Implement data and digital improvement programme. Asset data quality monitoring framework.
Section 14: Improvement	Develop improvement project briefs and a continual improvement monitoring programme.	Report on effectiveness of improvements. Review maturity assessment and re-scope improvement programme at end Year 1.

14.4 Monitoring Improvements

The Asset Management Improvement Plan will be monitored and reviewed as follows:

Table 30 –Improvement Plan Monitoring

Monitoring	By Whom
Monthly Progress Review	Review progress of improvement initiative at monthly meetings.
Quarterly Progress Report	Reporting on Improvement Plan achievements, risks of non-completion and any proposed major amendments to the programme.
Annual Maturity Review and Improvement Progress Report	Self-assessment review of maturity scores (optional external assessment), plus progress reporting as above.
Three Yearly Formal Assessment Audit	External audit.

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PwC Partners in Performance – Watercare Capital Forecasting

Glossary

Asset condition: A measure of the state of an asset in providing its intended function.

Asset criticality: A measure of the importance of an asset in relation to the overall performance of a system.

Asset data confidence: A measure of the quality, accuracy, and reliability of the data used in asset management processes, such as decision making, planning, and performance monitoring. High asset data confidence enables better-informed decisions, while poor data confidence can lead to suboptimal outcomes.

Asset lifecycle: The stages an asset goes through from creation or acquisition to disposal.

Asset management planning: The process of making informed decisions about the acquisition, operation, maintenance, renewal, and disposal of assets to provide the required level of service to customers at the lowest long-term cost.

Asset performance: The asset's ability to meet service objectives related to capacity, reliability, quality, efficiency, and/or utilisation.

Asset resilience planning: A proactive approach to asset management that focuses on enhancing the ability of assets and systems to withstand, adapt to, and recover from disruptions, failures, or extreme events, ensuring the continuity of essential services and minimising impacts on communities.

Asset valuation: A process used to determine the estimated value of an asset for financial planning, asset management planning, and financial reporting.

Closed-Circuit Television (CCTV) inspection: A method used to assess the condition of pipelines by inserting a camera into the pipe and recording video footage.

Coastal marine areas: The areas of land and sea located along the coastlines of oceans and seas.

Common data confidence and accuracy assessment. Assesses all asset groups and types in terms of quantity, age, condition, and performance. Understanding data confidence and accuracy benefits valuation, criticality, and auditing activities.

Condition grading: A method of rating the condition of an asset to inform future intervention decisions.

Critical assets: Are defined as those which have a high consequence of failure causing significant loss or reduction in service provision.

Data maturity: A measure of an organisation's ability to effectively collect, manage, and utilise data in its decision-making processes. Higher data maturity levels indicate a more advanced and efficient use of data, leading to better-informed decisions and improved organisational performance.

Dry weather overflows: Overflows in the wastewater system during dry weather, often caused by blockages or plant failures.

Failure mode: is the way in which assets can fail (such as cracks in pipes).

Freshwater bodies: Natural sources of water such as lakes, ponds, rivers, streams, and groundwater aquifers.

Infrastructure Asset Management Manual (IIMM): A guide to best practices in infrastructure asset management.

Infrastructure Leakage Index (ILI): A measure of water loss in a water supply network, used to identify areas where investment is needed to reduce water loss and improve network effectiveness.

Infrastructure strategies: Long-term planning documents that outline the strategic direction, priorities, and investment requirements for the development, maintenance, and renewal of infrastructure assets, such as water, wastewater, transportation, and energy systems. These strategies inform and support the development of Long-Term Plans (LTPs) and other asset management initiatives.

Inflow and infiltration: The entry of stormwater and groundwater into the wastewater system, often during rainfall events.

Level of service (LOS): The agreed outcomes that an organisation delivers for its customers based on performance measures and targets.

Lifelines assets: Critical infrastructure assets that provide essential services to communities, such as water, wastewater, electricity, transportation, and telecommunications systems. These assets are crucial for maintaining public health, safety, and overall functioning of communities during emergencies or disasters.

Mana whenua kaitiaki: Māori guardians responsible for protecting and managing the environment within their region.

Mauri: A Māori concept that refers to the vitality or essence that supports life.

Network assets: Infrastructure that enables the flow of water, wastewater, and stormwater, including pipes, laterals, and structures.

Natural water bodies: Fresh water sources that occur naturally in the environment and include lakes, groundwater aquifers, rivers and streams, wetlands, and ponds.

Nominal: dollar value that has been adjusted to include inflation

Open channels: Linear waterways, either natural or modified, that form part of a network.

Real: dollar value without any inflationary adjustments

Stations and sites: Locations serving as a water source, storage, and/or pumping functions.

Stormwater network services: The infrastructure and services related to the management and treatment of stormwater.

Mana whenua: The indigenous Māori people of a specific region in New Zealand.

Te Mana o te Wai: Refers to the vital importance of New Zealand's freshwater. When managing freshwater, it ensures the health and well-being of the water is protected and human health needs are provided for before enabling other uses of water.

Tikanga, kawa, and mātauranga-a-iwi: Māori customs, traditions, and protocols that influence the way they interact with the environment.

Treatment plants: Facilities that process and improve the quality of water or treat wastewater.

Wastewater network services: The infrastructure and services related to the collection and treatment of wastewater.

Wastewater Risk Abatement Plan: A strategic document outlining the potential risks associated with wastewater treatment plants (WWTP) and their associated infrastructure (e.g., pumping stations), and identifying strategies and actions to mitigate or manage these risks to protect public health and the environment.

Water New Zealand National Performance Review (NPR): An annual review of water and wastewater services in New Zealand.

Water Safety Plans (WSP): A comprehensive risk assessment and risk management approach that encompasses all steps in the water supply chain, from catchment to consumer, to ensure the safety and quality of drinking water.

Water Service Entity (WSE): An organisation responsible for managing and maintaining water, wastewater, and stormwater assets. An entity that covers a specific region within New Zealand.

Water supply network services: The infrastructure and services related to the provision of water supply.

Wet to dry weather flow ratio: A measure of inflow and infiltration in the wastewater system, calculated as the peak wet weather flow divided by the average dry weather flow.

Wetlands: Ecosystems that are saturated with water, either permanently or seasonally, and support a wide range of flora and fauna.

Appendix A – Summary Sheets from Individual Councils

Appendix B – Levels of Service and Performance Measures

Te Tari Taiwhenua
Internal Affairs

WS WATER SERVICES REFORM PROGRAMME

Appendix C – Detailed Financial Information

Appendix D – Detailed Project and Programme Information

Te Tari Taiwhenua
Internal Affairs

WS WATER SERVICES REFORM PROGRAMME