Network Environmental Performance Report

2023/24

Water Services Authority
Taumata Arowai

Te Whakatauākī a Taumata Arowai
Ko te wai ahau, ko ahau te wai
He whakaaturanga tātou nō te wai
Ko te ora te wai, ko te ora o te tangata
He taonga te wai me tiaki
Ko wai tātou
Ko wai tātou

I am water, water is me
We are reflections of our water
The health of the water is the health of the people
Water is a treasure that must be protected
We are water
Water is us

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Executive Summary and Recommendations

About this report

This report summarises information provided to the Water Services Authority – Taumata Arowai (the Authority) from network operators on the environmental performance of their public drinking water, wastewater and stormwater networks (the water networks). The report shines a light on how network operators are performing, provides insights into best practice, and highlights areas for improvement.

A well-performing drinking water network takes less water from the sources that supply the drinking water network, can cope with droughts, and is less likely to leak. Well-performing wastewater and stormwater networks are designed to cope with flooding without damaging property or spilling harmful discharges into the environment such as swimming beaches.

While our water networks are everywhere, they are often out of sight and under-appreciated. This means we may not notice them until something goes wrong. This lack of awareness can mean upgrades are postponed until failures occur, increasing costs and risks to public health and the environment.

Understanding water networks – through better information – is the first step to improving their performance, managing risks to the environment and public health, and being ready to respond to future challenges.

Key findings

There is a clearer picture of the performance of networks this year

To evaluate environmental performance, we rely on good-quality data from network operators. Our first environmental performance report last year suggested that network operators do not hold good information about their drinking water networks. This year operators have reported on more drinking water and wastewater measures, and we have better information – with some data (on water loss and asset condition) being externally reviewed to give us greater confidence in the results.

We can see that **network operators are improving their knowledge of their networks and practices**. For example, compared to last year, operators reported that 26% more pipes have been graded across the country to determine their condition, 14% more network operators have assessed risks to their critical assets, and 7% more network operators have a water conservation programme in place.

Some network operators lack reliable information on key measures like water use, water loss and network condition

Too **few operators were able to provide us reliable data on important measures for environmental performance**. Only 76% of network operators provided information on the amount of water they supply to the network and less than 60% reported on their residential water use, water pressure and water loss. Good data on these key measures is essential for drinking water network operators, to assure them they have sufficient and safe availability of water to meet demand and are not taking more water than is needed from the environment.

Understanding the volume of water used, supplied or lost, as well as water pressure requires network operators to have monitoring equipment (e.g. water meters) or systems in place to measure it. The lower response to these measures, particularly from smaller rural or provincial councils, suggests some may not have sufficient infrastructure, capability, or capacity to report on these measures.

Our external review also found that the quality of data on asset condition and water loss varied significantly across network operators – finding problems with around half the data reported. Some, generally smaller councils had an inconsistent or unclear understanding of their networks' condition, water loss or how to assess these measures.

If network operators do not have a good understanding of their water networks, including where the condition of the network is poor, or where water loss is occurring, it will be much harder to:

- prioritise funding for upgrades
- ensure networks are managed efficiently and provide consistent and reliable services
- manage risks to the environment
- ensure drinking water is kept safe for consumers after it leaves the treatment plant.

26%

more pipes graded

14%

more network operators have assessed risks to their critical assets

7%

more network operators have a water conservation programme

Water use has increased in some parts of the country

Around 59% of network operators reported taking a greater volume of water this year for their drinking water networks – contributing to around 12% greater volume being taken than the 2022/23 year overall. One big driver of this increase in water use across years is likely to be exceptional to 2023/24, as the flooding from Cyclone Gabrielle led to Wairoa increasing its water use by more than 11 times.

In addition, new data reported this year suggests that 11% of 'water-take' consents for drinking water did not always meet their consent conditions – indicating some network operators have extracted more water or at a higher rate than they are allowed.

With increasing challenges being faced by network operators such as ageing networks, climate change, and increasing demands for water – **ensuring sufficient availability of supply will be essential as consents come up for renewal**. In the next 10 years, 44% of drinking water-take consents are reported to expire (including 9% already expired) and will either need to be re-consented by regional councils or a new source of water will need to be found.

Poorly maintained networks are wasteful and pose an increased risk of harmful contaminants getting into the network

Networks in poorer condition can result in more leaks, lead to higher water use, disrupt water supplies, and mean there is a higher risk of contaminants entering drinking water. There are also increased costs to the operators as well as to consumers.

Water loss or leaks, and the associated costs, are a significant issue in rural and metro councils, such as Grey District and Wellington. Overseas, it has been estimated that up to 30% of outbreaks from waterborne diseases may be associated with poorly managed or maintained drinking water networks, such as leaking pipes, breaks in mains, or low water pressure.[1]

Of the pipes that were graded, we found that 16% were in poor condition. Further, **32% of network operators had at least one network with the worst available rating for water loss** according to the Infrastructure Leakage Index[2] – indicating an inefficient network with poor maintenance and asset condition. We also found that 35 networks are operating their pressures below the level set in the Fire and Emergency NZ (FENZ) code of practice and 11% of network operators are operating at below their own reference levels for pressure (affecting 12,600 properties).

44%

of drinking water-take consents reported to expire in the next 10 years

32%

of network operators had at least one network with the worst available rating for water loss

1 Source: National Research Council (2006). Drinking Water Distribution Systems: Assessing and Reducing Risks. Washington, DC: The National Academies Press. https://doi.org/10.17226/11728. pg. 108

2 Infrastructure Leakage Index developed by the International Water Association (IWA) identifies different levels of response. An ILI range greater than 8 is the worst rating – meaning very inefficient use of resources, indicative of poor maintenance and system condition. This suggests that reducing leakage is imperative and a high priority.

As physical assets represent the majority of costs in providing public water supplies it is critical for operators to understand their condition and ensure they are adequately investing in them. Our findings confirm **the critical nature of the infrastructure challenge we face in New Zealand**. In addition to the immediate financial and environmental costs of treating and pumping water that never reaches customers, excessive water loss, combined with increasing demand, could represent a strategic risk to water security as well as public health.

As climate change intensifies, alongside risks of water shortages, high water loss may also affect the ability for regions to develop and grow. The longer operators take to invest in improving the networks, the more these costs and risks may compound over time. Better monitoring of networks – to understand their condition – is essential for operators to prioritise and fund maintenance and renewal where it is needed most.

Inconsistent standards of wastewater treatment increase risks to the environment and public health and drive higher costs for infrastructure

This is the first time we have reported on data received from network operators on wastewater treatment. We found that the standard of **wastewater treatment varies greatly across the country**. Just 40% of rural and provincial wastewater receive the highest levels of treatment compared to 75% in urban areas. Different standards of treatment can be due to differences in council plans and consent conditions.

Overflows of untreated wastewater directly into the environment commonly occur across New Zealand, affecting waterways such as beaches making it unsafe to swim or gather seafood. Overflows can occur when demand on the network exceeds the capacity of the system can cope with, such as periods of high rainfall resulting in the network being overwhelmed by stormwater, particularly in situations where stormwater and wastewater pipes are connected. Despite this risk, many overflows are insufficiently monitored or managed. Thirty percent of councils rely only on verbal reports, limiting the ability to detect, verify or act on overflow events. Monitoring overflows is important so appropriate action can be taken to reduce harm to public health and the environment.

The differences in wastewater treatment highlight a fundamental tension in our regulatory system – between the desire for locally appropriate solutions and the need for consistent national outcomes for communities. The Authority has recently consulted on **proposed wastewater environmental performance standards** under the Water Services Act 2021 to help bring consistency to how wastewater discharges and overflows are managed.

With 20% of wastewater treatment plants operating under expired resource consents, and 52% requiring reconsenting in the next decade, the proposed standards come at a critical juncture. With increasing public expectations around water quality and costs on network operators, there is a clear need for change. As well as reducing the impacts of wastewater treatment on the environment, the proposed standards are expected to deliver significant cost savings and greater certainty for network operators. Over time, we expect these proposed changes will increase consistency in resource consenting and lead to a material improvement for New Zealand.

Network operators need to plan and budget to maintain and improve their networks over the long term

Operators need to plan and budget both for ongoing operating and maintenance to make improvements where necessary, meet anticipated population growth and ensure the resilience of their networks over the long term. New data reported to us suggests that rural councils spend more than twice as much per person on their operational costs for their drinking water infrastructure than councils servicing the main centres (given the low populations living in rural areas). New Zealand's highly dispersed population, over difficult terrain, can mean that **maintaining networks in lower populated areas can be particularly costly for network operators as they will typically receive a lower income through rates**.

The stark difference in resourcing and capability between urban and rural networks points to a key challenge across New Zealand's water sector. Without addressing this fundamental disparity, we risk smaller communities facing increasingly unreliable, more expensive water services as well as poorer environmental outcomes. Network operators that move beyond addressing problems on a case-by-case basis towards more strategic and collaborative approaches based on good information can benefit from improved efficiency and greater resilience over the long term. New legislative tools and requirements under Local Water Done Well are expected to stimulate more financially sustainable approaches to infrastructure investment.

Looking forward

We will continue to improve our own systems and processes

As a regulator, there is more we can do to improve our guidance and processes for reporting to ensure it is clear, efficient and understood by operators.

We will continue to build our programme of reporting – to expand from covering drinking water and wastewater to also include stormwater in the coming years. Being able to look across drinking water, wastewater and stormwater together will provide a more complete and integrated view of the system – reflecting the shared role of these networks in sustaining environmental and public health.

Through legislative changes made as part of the government's Local Water Done Well policy programme, the Commerce Commission will be the new economic regulator for water services. With new measures coming in and the Commerce Commission taking on functions for 'information disclosure', we will be working closely with them to ensure reporting is as efficient and clear as possible.

Over time we anticipate a shift towards improved monitoring and performance of networks

Over the next decade, the Authority expects to see a step change in how water services are managed across New Zealand. We want to see better monitored, better maintained and more reliable networks that protect health and the environment. The insights from this report will guide where we focus our effort, including where we build capability, or inform other tools to drive change (e.g. environmental performance standards or targets). Our reporting will also help inform our regulatory priorities for the next three years through our **revised Compliance, Monitoring and Enforcement Strategy, to be published in July 2025**, as we increase the intensity of compliance and enforcement activities.

Over time we expect that network operators will increasingly adopt smart monitoring technologies and strengthen their capability. We intend to support operators to regularly assess their performance, learn from results, and act on areas that need fixing. The most effective responses will be those grounded in good evidence and a shared commitment to safe, sustainable water for all.

Recommendations

We recommend that governors and senior management in network operator organisations take steps to:

1. **Improve their understanding of their assets and key risks to their networks,** for example by:
   - investing in monitoring equipment, detailed records of operations, maintenance management systems and physical inspections to better understand water supplied to the network, water use, water loss and network condition. This could include investing in pressure monitoring, flow metering, and establishing district metered areas (DMAs) for networks serving more than 5,000 connections
   - ensure operations staff have sufficient capability and capacity (including training) to manage asset and operational data collection and storage.
2. **Reduce water lost** from the network (e.g. by developing comprehensive water loss strategies and targets for reducing loss over time). For operators with Infrastructure Leakage Index ratings above 8, we recommend developing specific action plans for those networks with annual improvement targets.
3. **Strategically plan to ensure a resilient water supply and develop or enhance existing water conservation programmes.** For example, by integrating climate projections into infrastructure planning and design processes, with particular attention to drought resilience for drinking water networks and inflow/infiltration management for wastewater networks, and considering 'demand-management' for high consumptive areas.
4. **Provide assurance on the quality of information** provided to regulators (e.g. through processes to review and verify the data to ensure it is as accurate as possible).

For **regional councils,** we recommend:

1. **Developing or introducing consistent monitoring and reporting for wastewater overflows**, consistent with the direction of the proposed wastewater network environmental performance standards, to reduce risks to the environment and public health.
2. Ensure that **future resource consent processes** for water takes explicitly consider climate projections, competing water demands and ecosystem health.

The Authority commits to:

1. **Improving our data collection processes and guidance on measures** (such as holding information sessions on our guidance).
2. **Explore sharing information reported to us on water take exceedances** and expired water-take consents with relevant regulators, to ensure that as a system we are aware of the consequences for the environment and the ongoing availability of public supplies.
3. **Working closely with the Commerce Commission**: As part of the Local Water Done Well reforms, some performance reporting responsibilities will shift to the Commerce Commission where it aligns with their economic regulator role. We will work closely with the Commission to:
   - ensure a comprehensive data reporting regime minimises any duplicate reporting
   - lift performance of the sector to ensure New Zealanders have a resilient, safe and cost-effective water system.

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Part one: Introduction

This report is a step towards better understanding of water networks

This report summarises data and information reported by network operators on the environmental performance of public water networks for the year ending June 2024.[3]

Under ss 141 and 147 of the Water Services Act 2021, the Authority is required to monitor and report annually on the environmental performance of water networks and network operators. The purpose of the report is to:

- Improve transparency on how different networks or operators are performing and complying with environmental standards or consents
- Enable people to understand and compare the environmental performance of networks and operators across the country
- Share and encourage best practice, including recommending where networks could improve.

This report incorporates more data on drinking water than last year (see Part Three: Drinking water), and data collected on wastewater for the first time (see Part Four: Wastewater). The report also provides some high-level insights and case studies on stormwater in this report (see Part Five: Stormwater). We are intending to start developing measures on stormwater from 2026.

More information on the data collected is available on our website.

Well-maintained networks are important for the health and wellbeing of communities and the environment

Environmental performance relates to the effects of networks, including the operation of infrastructure and processes, on the environment. The performance of the networks impacts the environment and public health, for example by:

- Depleting or placing stress on water sources to supply drinking water networks where there is increasing demand from a wide range of uses
- Damage to drinking water networks can allow contaminants to enter and consequently present a risk to public health (e.g. through breaks and leaks in pipes)
- Discharge of stormwater and untreated wastewater into the environment, which can result in bacteria, viruses, chemicals or other contaminants entering waterbodies that are hazardous to the health of water, human health, animals and the environment
- Poorly managed, designed or maintained stormwater networks, which can result in flooding of streets and properties and affect the health of waterbodies.[4]

Well-performing networks are also resilient to environmental change over time, such as the increasing frequency of droughts and flooding caused by climate change.

Better information is essential to improve the performance of the sector

Unlike many other sectors, there has never been a comprehensive national picture of drinking water, wastewater and stormwater networks.[5] Compliance, monitoring and enforcement is patchy and often hidden from view. The historic lack of transparency means it is difficult to understand how the system is performing.

Building a clearer picture of how networks are performing is critical for network operators to know that their systems are operating properly and to reduce risks to the environment and public health. Better data can help operators to identify when there are problems that need to be addressed, and inform more strategic planning that can lead to efficiencies, reduce costs and help improve services for communities.

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3 The report fulfils requirements under s 141 and s 147 of the Water Services Act 2021 (see Appendix 1).

4 Booth, Derek B., Allison H. Roy, Benjamin Smith and Krista A. Capps. "Global perspectives on the urban stream syndrome." *Freshwater Science* 35, no. 1 (2016): 412-420. https://doi.org/10.1086/684940

5 Until recently, monitoring and reporting on water networks' environmental performance was voluntary – coordinated through Water New Zealand's 'National Performance Reviews' produced annually until 2021.

We have developed outcomes for network operators to report against

The data and information provided to us from network operators in this report relate to a set of measures we have developed across outcomes for the environmental performance of the water networks. The definition of 'environmental performance' is broad and includes direct and indirect impacts on the environment (as shown in Figure 1 below).[6]

Considering broader factors of performance (reliability, resilience, efficiency and economic sustainability) is important because a poorly maintained network or one that is not ready for future growth may be more likely to fail and ultimately impact on the environment and public health.

Understanding impacts on cultural values is also part of our definition of environmental performance.

The partnership between iwi Māori and the Crown under the Treaty of Waitangi/Te Tiriti o Waitangi has enduring implications for the performance of our water networks within the regulatory framework. The Authority's role includes partnering and engaging early and meaningfully with Māori. We also have specific obligations under Treaty settlement legislation, including in relation to the Waikato, Upper Waipā and Whanganui River catchments. We are also considering what other obligations may exist regarding Māori rights and interests in freshwater or under specific articles of the Treaty of Waitangi/Te Tiriti o Waitangi.[7]

The quality of data has improved but is still poor for some network operators

To evaluate environmental performance, we rely on good-quality data from network operators. While network operators' overall response to reporting requirements was good, the quality of the data provided was mixed. For example, some network operators:

- responded to some measures but not others (meaning we have incomplete data in places)
- used different methods or made different assumptions to determine their responses (meaning we have inconsistent data in places)
- may have misunderstood a measure or unit or made mistakes with their calculations (meaning there are some inaccuracies in the data).

Some of the problems with the data provided to us reflect the need for network operators to become familiar with new reporting requirements, and others indicate that greater clarity on the measures is needed. For some network operators, it may be due to having insufficient resources to assess their networks. As this is only the second year of reporting, it is still too early to present any strong trends over time.

To improve the quality of data this year, we:

- **Improved the way we collected data** through clearer guidance in our spreadsheet to clarify what data was needed and in what format.[8]

Figure 1: Outcomes for environmental performance that underpin the measures programme

6 'Environment' in this report takes its meaning from the definition of that term in the Resource Management Act 1991. Environmental performance consequently includes consideration of a network's effects on:

a. ecosystems

b. natural and physical resources, including their innate mauri and mana

c. people and communities, including the ability of mana whenua to exercise kaitiakitanga

d. social, economic, aesthetic and cultural conditions that affect (a) to (c), including mātauranga Māori and tikanga Māori.

7 Under the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, the Ngāti Tūwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010, and the Te Awa Tupua (Whanganui River Claims Settlement) Act 2017.

8 For example, we provided units and notes for each measure to explain what was required. We also set upper limits for each measure to prevent inaccurate data being entered.

- **Commissioned an external review** to verify the data analysis, including a deeper review of data provision against four measures on the condition of assets and water loss across 20 network operators.[9]
- **Manually checked data with network operators and updated likely inaccurate data** by identifying 'outliers' (i.e. where the data was either far below or far higher than most network operators).[10] For each of the outliers, we contacted operators to check and update the data where it was incorrect.
- **Unless indicated, used 'median' results rather than 'average' results** – as the median (i.e. the mid-point of the data range) is less skewed by data extremes.

The external review process run this year identified problems with the data submitted. As a result, network operators involved in the review were provided the opportunity to resubmit data to correct inaccuracies that were identified. Due to inaccurate data 45% of operators updated the initial data they provided for asset condition, and 50% for water loss.

The Authority's Network Environmental Performance Measures and Guide is available here[11]

This guide provides detail about how to assess each measure. Network operators should ensure they are familiar with this material. The external review highlighted that not all operators provided information in line with the guidance and that the guidance could be clearer in places.

Given the problems identified through the review, we provided the same opportunity for all councils to check and update their data for the same four measures reviewed. After prompting, 31% resubmitted some of their data – improving the overall quality of data for these measures.

When we compared the data between the reviewed group of councils and non-reviewed group for one measure infrastructure leakage index (ILI) we found that the range of data in the reviewed group reduced across five out of six population densities (with the range of data for the "medium urban" sized population densities reducing the most – by about half). The reduced range shows the benefits of the review process in helping to correct inaccuracies (that may be well above or below the normal range of data).

See Appendix 1 Key methodological matters or choices and Appendix 2 Analysis of data quality.

Our reporting will continue to improve alongside other government reporting

We acknowledge the Authority could provide better guidance or clarity on some measures. For the next reporting year (2024/25), we have updated our guidance to make technical corrections and provide more clarity on measures.

There are also some wider changes in reporting coming due to legislative changes being made as part of the Government's Local Water Done Well policy programme and the proposed wastewater environmental performance standards,[12] including:

- the Commerce Commission becoming the economic regulator for water services
- clarity of oversight roles and responsibilities around stormwater and wastewater.

With the Commerce Commission taking on new responsibilities for economic regulation, and network operators already reporting to the Department of Internal Affairs,[13] we are working to create more efficient and coherent reporting regime for network operators (e.g. through reducing any duplicate reporting requirements). Some of our current reporting requirements, such as those relating to expenditure, are likely to transfer to the Commerce Commission. The Commission will also have powers to require providers to carry out assurance processes to validate the data they report.

From next year, we intend to start developing new measures for stormwater, as well as refining measures for wastewater to support our oversight role.

9 These measures were selected as they were highlighted in the Network Environmental Performance Report 2023 as key measures where reporting needed to improve. While not all operators were able to be reviewed due to funding constraints, 20 were selected that represented a broader range of network operators.

10 We applied a standard filter (or formula) to identify these outliers (see Appendix 2 for more information).

11 https://www.taumataarowai.govt.nz/for-water-suppliers/network-environmental-performance-measures/

12 See https://korero.taumataarowai.govt.nz/regulatory/wastewater-standards/

13 The Department of Internal Affairs have required council network operators to report on mandatory 'non-financial performance measures' since 2014 under s 261B of the Local Government Act 2002: Non-Financial Performance Measures Rules 2013. This information is reported through councils' long-term plans and annual reports.

Part two:
About the networks

In this part, we provide overarching information about New Zealand's drinking and wastewater networks together. Local councils are the main operators of drinking and wastewater networks in New Zealand. Compared to other countries, the scale of the networks is large relative to the size of the population – as they need to cover a large area to service a small, dispersed population, especially in rural areas. This means that network operators in smaller rural or provincial areas typically have a smaller rate base of communities to fund the operation and upkeep of the networks.

Water networks operate as an integrated system

While often thought of separately, our drinking water, wastewater and stormwater networks are inherently interconnected. The drinking water network distributes water to people, households or businesses, while the wastewater and stormwater systems moves water (and waste) away.

Considering drinking water, stormwater and wastewater together is helpful because these networks can impact on each other. For example, too much stormwater can cause wastewater systems to overflow into the environment or pollution from wastewater and stormwater can affect the quality of drinking water sources.

As we are in our early phases of reporting, this chapter covers drinking water and wastewater together. Once we start collecting information on stormwater, we intend to report across these networks in a more integrated way. For now, some contextual information on stormwater can be found in Part Five.

Local councils are the primary network operators

Seventy out of 71 network operators submitted data for this report.[14] Of these network operators, Table 1 shows that local government is the largest supplier and operator serving the greatest population. There are also more drinking water networks than wastewater networks.

Table 1: Network operators that reported and the networks/populations they service

Network operator	Number responded	Drinking water		Wastewater	
		Total networks	Population servicing	Total networks	Population servicing
City and district councils (including council-controlled organisations)	64	425	4,505,000	322	4,883,000
Government departments	3	118	30,000	3	1,260
New Zealand Defence Force	1	8	11,600	3	N/A
Regional councils	2	17	6,500	0	0

14 Rangitikei District Council was unable to report this year due to the timing of changes in shared servicing arrangements affecting their ability to respond. Auckland has three separate submissions which have been factored in as follows: Auckland Council – Regional, Watercare – CCO, and Veolia – Papakura contractor.

Government operators generally run local drinking water networks where they treat and distribute water within a single property. For example, Department of Conservation | Te Papa Atawhai supplies water on their conservation land such as to campgrounds and huts. The Ministry of Education (MOE) reported for the first time this year. MOE reported they operate 113 networks – making up most of the 118 networks run by government departments. Note we understand some of the 113 networks reported may be self-supplied and not connected to a network.

Regional council operators generally operate the water supplies that provide water in regional parks, serving visitors to their parks and campground facilities.

Our water networks are large and dispersed

To meet the needs of this country's dispersed population over difficult terrain, New Zealand public drinking water supplies have a high number of reservoirs, pump stations and water treatment plants. For example, compared to Scotland, which has a similar population size but a higher density of people, New Zealand has more than double the number of drinking water treatment plants.[15]

Table 2 shows there are more drinking water networks compared to wastewater networks servicing a similar number of homes or businesses. Longer pipes are also needed to get drinking water further distances from sometimes multiple water sources in remote locations, compared to pipes to wastewater treatment plants that are often closer to population centres.

What is the definition of a network?

A network is a distinct drinking or wastewater system (e.g. for drinking water, it is usually made up of the equipment to abstract water from the drinking water source, treatment plant and storage facilities, and pipes to consumer properties). For wastewater, it includes the public drains, treatment plant, and discharge infrastructure.

To be subject to reporting requirements under the Water Services Act 2021, a 'network' must also be operated by or for a local council, a CCO, a department or ministry, or the New Zealand Defence Force. These organisations are 'network operators'. Many network operators will have more than one network. For example, on average network operators service eight networks per operator. However, this range varies from the Selwyn and Taupō District Councils, which operate 26 networks, to councils that have only one network servicing their whole population.[16]

Table 2: Scale of drinking and wastewater infrastructure in New Zealand[17]

Type of water	# networks	# treatment plants	Length of pipes	Pump stations	# residential connections	# non-residential connections
Drinking water	568	682	53,000km	1,008	1,410,000	134,000
Wastewater	328	320	33,000km	6,000	1,510,000	130,000

15 Scotland has 229 plants and a population of 5.5 million people compared to 576 in New Zealand. See Scottish Water 2023. Annual Report and Accounts 2022-23, Stirling: Water Industry Commission for Scotland. https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Annual-Reports/SWAnnualReport2023.pdf (Accessed 3 June 2025)

16 Where we refer specifically to councils (rather than 'network operators' as a whole) in the report, we are focusing on council data only because the measure may be is most relevant to them.

17 Note there is a small difference in the number of wastewater treatment plants identified in the Wastewater Standards Discussion document which identified 334 publicly owned wastewater treatment plants. This is likely to be due to the way a wastewater treatment plant is defined in the Network Environmental Performance Measures Guidance.

As shown in Figure 2, treatment plants for metropolitan urban areas service many more people than they do in rural areas. This means that network operators supplying urban areas will have costs spread over a larger number of ratepayers than those in provincial or rural areas. However, assets in rural areas are likely to be of a smaller scale and less complex as well.

Figure 2: Number of people per drinking or wastewater treatment plants across rural, provincial or metropolitan urban areas[18]

	Metro	Provincial	Rural
Drinking water	Average one treatment plant per **27,000** people	Average one treatment plant per **4,200** people	Average one treatment plant per **1,400** people
Wastewater	Average one treatment plant per **40,000** people	Average one treatment plant per **6,100** people	Average one treatment plant per **1,800** people

Knowledge of our networks varies across councils and is generally lower for smaller population sizes

How well an operator responded across the range of relevant measures helps to tell us how well they know their networks.

While the response to some measures was high (i.e. more than 90% of councils responded to more than half of the measures), the response to some measures was as low as 44%.

The average number of network operators that responded to each drinking water measures was 72%. For wastewater, the average response was higher (at 92%), possibly due to there being fewer and more basic measures for wastewater. For councils, the response rate varied across population densities with urban councils able to respond to more measures than provincial or rural councils (see Figure 3).

Figure 3: Average response across drinking water and wastewater measures by population density

	Metro	Provincial	Rural
Average % response to drinking water measures	80%	73%	72%
Average % response to wastewater measures	95%	88%	88%

18 Metropolitan, provincial and rural categories are based on the list of councils by Local Government New Zealand (metropolitan – 90,000 or more, provincial 20,000-90,000 and rural less than 20,000).

In some cases, network operators may not respond to measures because a measure may not be relevant to them, the measure may be unclear, or the operator may not hold the right information, expertise or tools to report.

The measures where less than 60% of network operators provided data include some important measures relevant to all operators, including water loss, household water consumption and water pressure. Just 76% of network operators were able to provide information on the volume of water supplied to their networks. Each of these measures requires councils to have sufficient monitoring equipment such as flow meters, district metered areas,[19] or pressure gauges to monitor their network performance.

Across all operators, government departments generally reported against fewer measures than councils as not all measures are relevant to them. The Ministry of Education provided the lowest response of all government departments. More about the performance of the Ministry of Education in relation to drinking water can be found in the Drinking Water Regulation Report 2024 (see Part One: Drinking Water Safety).

External review – capability across councils

To support our analysis, we commissioned an external review by Morphum Environmental Ltd of network operator-supplied data on measures for asset condition and water loss. This review found that capability to report on the measures varies across councils. Most of the metropolitan urban councils that took part in the review (Watercare, Wellington Water, Christchurch City Council) used the most detailed or sophisticated methods to conduct their assessments – and had fewer problems with the data than some other councils that took part.

The review suggested that problems with reporting can often come down to insufficient resources, funding and capacity to carry out assessments, including knowledge not being retained from staff that have left.

19 **District metered areas** are specialised **zones** within a water distribution network that are closely monitored for flow and pressure.

Part three:
Drinking water

In this part, we profile New Zealand's public drinking water networks based on data reported by network operators against our environmental performance measures. This part expands on the data we reported on last year – as the number of measures reported to us from network operators has almost doubled.

Data reported to us this year suggests that 59% of network operators increased the volume of water they supplied to their drinking water networks compared to last year. We also found that 9% of water-take consents are currently expired and 11% of drinking water-take consents for drinking water were not always complied with (i.e. consent holders were at times either taking more water, or at a faster rate, than allowed through their consents). Compared to last year, we have seen more days where network operators have restricted water use to manage supply – indicating that managing supply or demand may be a problem for some network operators.

Ageing and leaking pipes can mean more water is being taken than necessary, which increases contaminants entering drinking water, and places ongoing costs on network operators to fix them. Data reported to us suggests that 32% of network operators had at least one network with the worst available rating for water loss (according to the Infrastructure Leakage Index) – with loss per person higher in rural compared to urban areas.

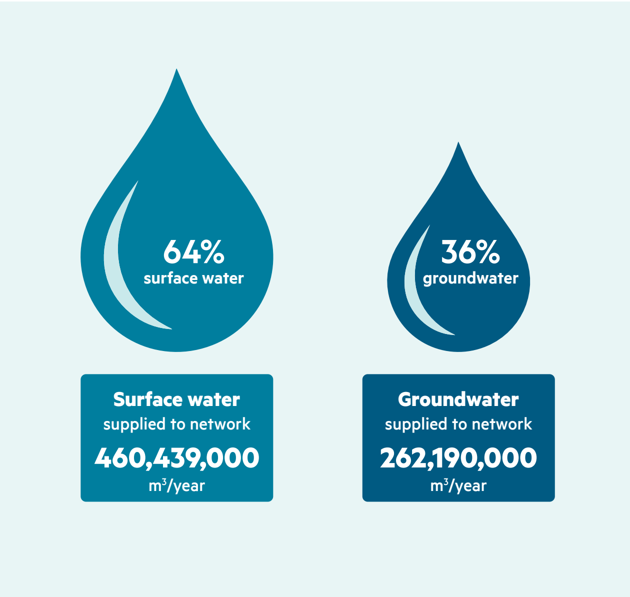
This year network operators have reported they graded the condition of 22% more pipes compared to last year, but the amount in poor condition is 16%. New data reported this year shows that rural councils spend more per person on their water networks than larger urban centres.

Outcome: Environmental and public health is protected

Most of our drinking water is sourced from 'surface water'

Only 76% of network operators reported the amount of water they supplied to their networks. Of these network operators, 728,000,000m^3 of water was reported as supplied over the 2023/24 year.

Figure 4: Volume of water and abstraction points sourced from surface or groundwater



As shown in Figure 4 surface water, sourced from rivers, lakes, creeks and streams, provides most of our drinking water across the country. The water used to supply Auckland makes up a large portion of the total surface water take, accounting for 35% of all surface water volumes (or 22% of all water abstracted).

While most of the volume of our water comes from surface water, around 71% of networks source their water from groundwater (i.e. from bores and springs).

In general, water taken from surface water is more exposed to contaminants than groundwater. For example, from human activities that pollute the water like stormwater runoff from roads, farm effluent discharge, wastewater overflows, or events like algal blooms. The Drinking Water Regulation Report covers risks from water sources for people and the environment in more detail.

While supplying drinking water networks is essential, drinking water is just one reason water may be taken from freshwater sources. The largest share of water taken from water sources in New Zealand is for irrigation. Water specifically for irrigation is often taken separately from the drinking water supply – and where this is the case, these water takes are outside the scope of this report.[20] In 2018, the total volume of water consented to supply irrigation made up around 58% of all freshwater takes – compared to around 17% for drinking water.[21]

20 Some 'mixed-use rural' supplies use water for both irrigation and drinking water. These supplies are within the scope of this report.

21 https://www.stats.govt.nz/indicators/consented-freshwater-takes/

Figure 5: Distribution of source water types across New Zealand

The map above shows the different water sources for drinking water for registered drinking water supplies and how they are distributed around the country.

Network operators generally require consents from regional councils to take and use water

Water taken from a freshwater body to supply drinking water, alongside other uses, can affect the quality of the water, the water temperature, the habitat and ability of the waterbody to sustain life.[22]

To manage the impacts of running the drinking water network on people and the environment, network operators must generally hold resource consents for their activities. Regional councils are responsible for issuing, monitoring and enforcing these consents.

Most consents (61%) held for drinking water networks are 'water-take' consents for extracting water from ground or surface water sources. Often the main purpose of water-take consents is to set requirements for the volume and rate of water that can be taken – to protect the ecosystem, water flow and future availability of that water source. The National Policy Statement for Freshwater Management (NPS-FM) requires regional councils to set limits for the volume of water taken from freshwater bodies to ensure that the level of flow in the water and ecosystem is protected.[23]

We added up the maximum volume of water allowed (or consented) to be taken from waterbodies across all network operators' resource consents at 1,590,000,000 m^3/year – around double the total amount actually supplied to the drinking water network.[24] Some reasons for this difference include:

- some water being used for other activities in the treatment process (such as backwash water)
- extra water being built into consents as a contingency to allow for drier seasons or years (meaning consent holders may not need to take water to the maximum volume consented)
- not all operators providing data, or understanding, the water supplied to the network.[25]

In some places, the understanding of the actual volume taken from water sources may be low due to a lack of data collection or monitoring. Network operators reported that around 80% (864) of the 1,071 abstraction points are metered – and 97% of the metered points have telemetry systems in place that ensure automatic daily transfer of data to councils.[26]

The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 set particular requirements for measuring and reporting water takes, including to install devices or meters, typically dataloggers or telemetric units. (For more information see Measurement and reporting of water takes amendment regulations | Ministry for the Environment.)[27] When calculating the water take flow rates, we determined that 106 abstraction points may be non-compliant with this regulation.

As pressure on freshwater increases, accurate data on the volume of water supplied to networks (through water metering) is critical to informing decisions around water take and ensuring sufficient water is available for essential drinking water.

More information about other types of consents held by network operators is provided in Appendix 4.

Some operators have not met their consent conditions for the rate or volume of water taken or are working under expired consents

Of the water take consents, 27 network operators reported that they had not always met their consent conditions for the rate or volume of water abstracted for 11% of all water-take consents. Therefore, these operators are at times taking either more water than is permitted or at a faster rate, or both. However, we do not have consistently reported data on the degree, or how often, consents have been exceeded.

We also found that around 9% of water-take consents reported to us were expired, including one that have been expired for more than 20 years (Thames Coromandel District Council). Consent holders can continue to operate through expired consents under s 124 of the RMA, which allows an operator to continue their activities while applying for a new consent.

22 Issue 3: Changing water flows affect our freshwater | Ministry for the Environment.

23 Note different regional councils are at different stages in their process of implementing the NPS-FM. The NPS-FM is also being reviewed as part of the resource management reform programme, and government has extended the timeframe for regional councils to notify new planning instruments under the current version.

24 There was also some difficulty in calculating total volume due to differences in the way network operators supplied their data. For example, where a resource consent covers multiple abstraction points, the water-take volume limit may have been repeatedly reported for each abstraction point (these were corrected where possible). Latest national water statistics from 2019 found that total consented takes for drinking water were 2,164,000,000. See https://environment.govt.nz/assets/Publications/Files/national-water-allocation-statistics.pdf (Accessed 3 June 2025)

25 Only 76% of network operators provided the total volume of water supplied to the drinking water network.

26 Telemetry is the automatic collection and transfer of data, including the logger that counts the pulses in each period, and the communication device that sends the stored data.

27 See https://environment.govt.nz/acts-and-regulations/regulations/measurement-reporting-water-takes-regulations/

Over the next 10 years, 44% of water-take consents are due to expire (including those already expired), and will either need to be renewed by regional councils or replaced by alternative water sources. As these consents come up for renewal, forward planning for future water use becomes increasingly important in the context of climate change, population growth and intensifying pressure on freshwater sources.

As consenting is the responsibility of regional councils, we will explore how we best share information with them to track consent expiry, and ensure exceeded water-take consents are reported in a consistent way. Ensuring that long-expired or exceeded consents do not become a long-term feature of network operation supports our broader oversight of water source resilience and reliability (see 'Outcome – Services are resilient').

Outcome: Services are efficient

More water has been taken to supply drinking water than last year

The total the volume of water reported as supplied to the drinking water network (728,000,000m^3) was around 12% higher than the year ending 2022/23.[28] Across all network operators, we found that 59% reported a greater amount of water supply this year and 33% of network operators reported they reduced their consumption (but by a much smaller amount overall). Two councils reported particularly large volumes that are driving this total increase:

- Wairoa District Council contributed to approximately 66% of the total volumetric difference between years across all suppliers (a volume of 67,190,939m^3 which is 11 times greater than what was submitted the year before)
- Watercare (Auckland) contributed to approximately 14% of the difference between years (a volume of 163,732,445m^3 which was 14% higher than the volume they submitted in the previous reporting period).

The excess water use for Wairoa District Council was reported to be due to damage from Cyclone Gabrielle that resulted in breakages to the mains and large amounts of water needed for the clean-up – so is likely to be particular to the circumstances of 2023/24 rather than an ongoing trend.

28 To ensure an accurate estimate, this figure excludes councils that submitted this year but did not submit last year (Far North District Council, Masterton District Council, Tararua District Council). If we include these councils, the volume increase would be around 14%.

Figure 6: Total volume of water supplied to the network compared to total water used by residential and non-residential connections per person per year[29]

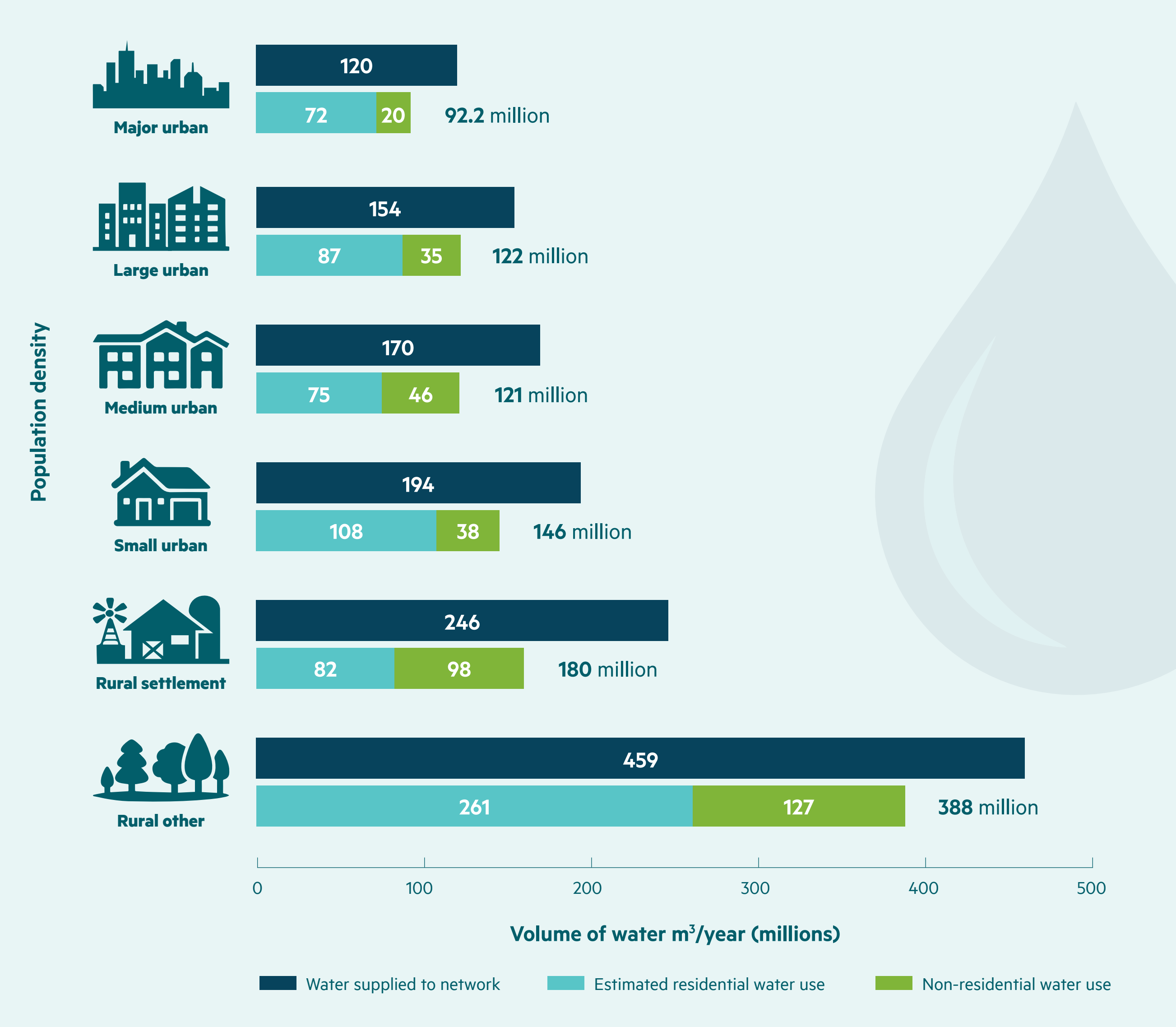
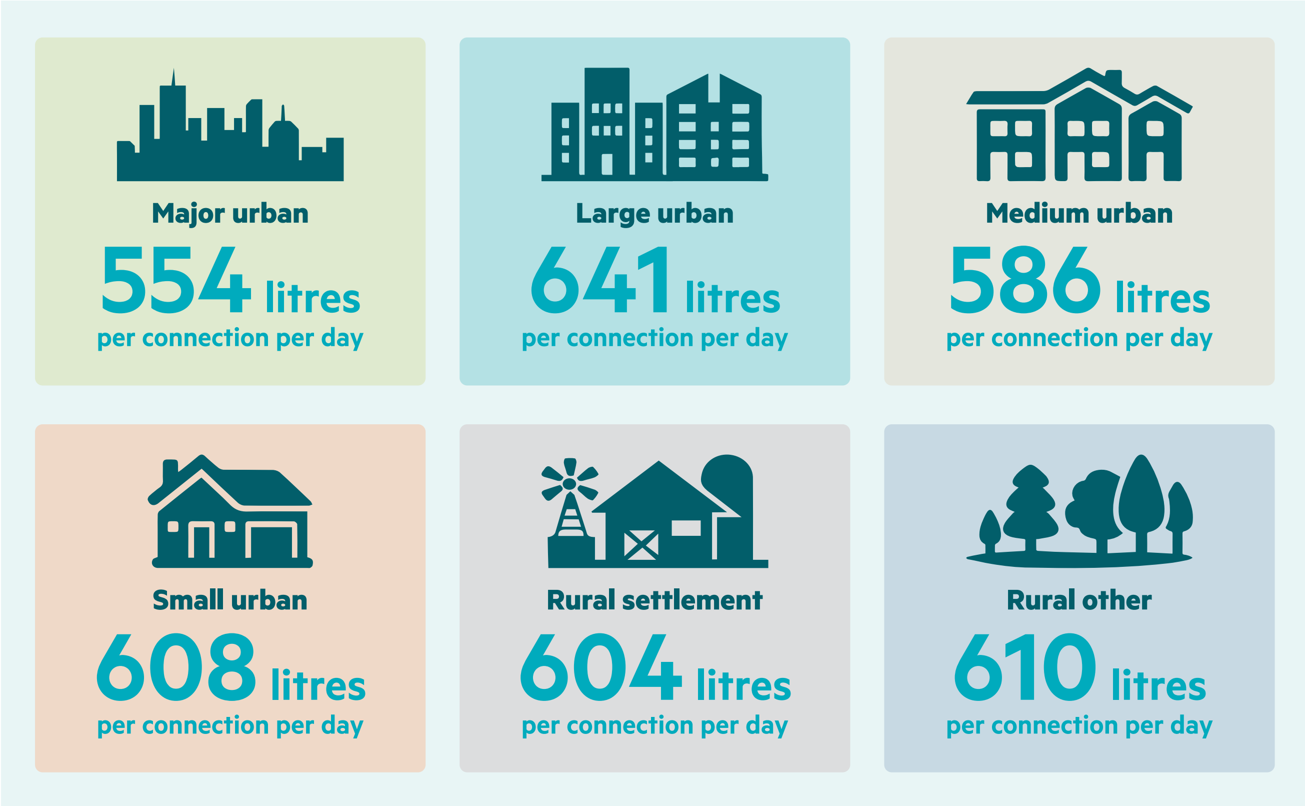


Figure 6 compares the water supply across different population densities to estimated demand (residential and non-residential). As shown in Figure 6, some of the highest water supply per person is in smaller rural areas where there is a lower density of people and a higher proportion of non-residential use. In some rural areas, some drinking water supply may be used for other activities, such as irrigation. Figure 6 also highlights that actual demand from consumers is considerably lower than the water supplied to the network (see 'Some water is being wasted or lost through our network' on the following page).

Some councils have a much higher supply per connection than others (see Appendix 6 for a break down by council of their water supply and use). For some councils, higher water supply may be due to using some of their water supply for agricultural use.

29 The graph estimates the residential water use per person by taking the total water supplied and subtracting the total water loss and non-residential use.

Figure 7: Median residential water use by population density



When just looking at household water use, median water use across New Zealand is 604 litres per connection per day compared to 758 litres per connection per day in 2022/23. However, only 59% of network operators provided data on residential water use and more data across years would be needed to understand if this was a trend. As shown in Figure 7, reported household water use per connection stayed fairly consistent across different population types – though connections to the water supply in urban areas will have more people per connection than in rural (e.g. in apartments).

The median residential water use across major urban areas was 554 litres per day per connection in New Zealand – comparable to water use in some major urban areas in Australia. For example, Sydney at 495 litres per connection per day or Melbourne 393 litres per connection per day, and a drier city like Darwin is much higher at 1,063 litres per connection per day.[30]

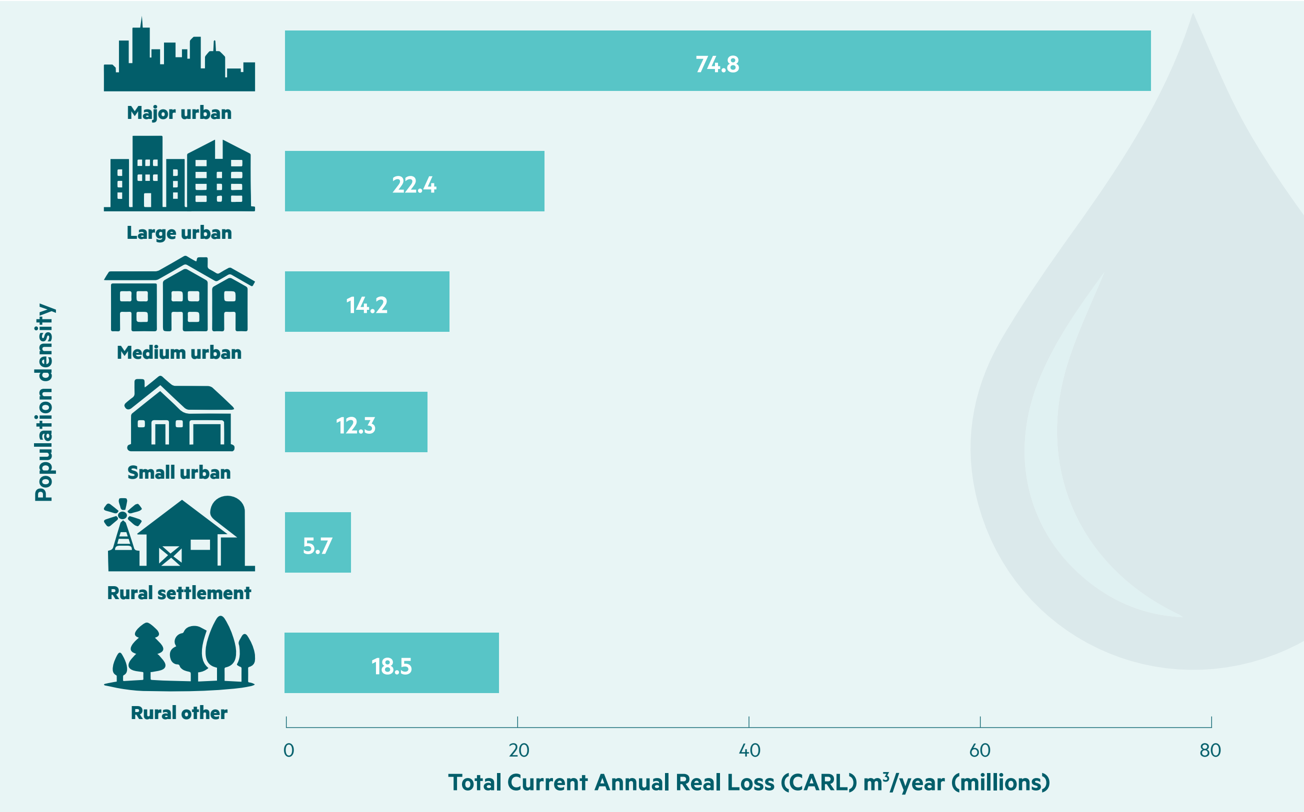
Some water is being wasted or lost through our networks

Minimising the amount of water lost from our drinking water networks can help reduce the total amount of water taken from rivers, lakes or aquifers, to protect ecosystems and ensure the sustainability of freshwater sources. Ensuring we take no more water than is necessary reduces the cost associated with maintaining and operating the networks. Water being lost in the system also highlights where networks may be in poor condition. Addressing leaks can save costs for network operators by reducing water use or delaying the need to establish more water sources or develop new infrastructure.[31]

30 See Australian Government Bureau of Meterology. National performance report 2023–24 NPR_2023-24_02-Major-urban-centres.pdf (Accessed 3 June 2025) Note in Darwin water use was reported to increase in the last year driven by hot weather, increased demands and higher groundwater extraction following chlorine disinfection.

31 See https://www.phcc.org.nz/briefing/money-down-drain-high-cost-leaking-water-pipes; https://www.waternz.org.nz/documents/other/101029_tauranga_on_metering.pdf

Figure 8: Total Current Annual Real Loss by population density



Leaking drinking water networks in New Zealand poses a risk to public health due to more opportunities for contaminants to enter the network (e.g. through ruptures or breaks). International studies have estimated that up to 30% of outbreaks from waterborne diseases were associated with deficiencies in drinking water networks (e.g. from including leaking pipes, breaks in mains, or low water pressure). (Also see '**Managing pressure is important for maintaining water networks and protecting against illness**'.)[32] For example, water main breaks or pressure losses were the reason for 67.5% of boil water notices in Canada in 2023.[33]

Across New Zealand a total water loss was reported at 162,000,000m^3 last year – 29% of the total water supplied by the network operators who responded to this measure.[34] Comparing the percentage of water loss should be treated with care as estimating water loss can be complex and will vary depending on different factors (such as the amount of water used).[35] Our external review found that different network operators take different approaches to calculating water loss. Further, councils without sufficient equipment, such as household water meters or district metered areas may struggle to provide reliable information (see Box: **External review of water loss measures**).

Some water loss is unavoidable – no network is perfect so some seepage of water will occur through service connections and valves (this is known as 'unavoidable annual real loss').[36] For loss that is not unavoidable, 'Current Annual Real Loss' measures the leakage from the network due to failures in the network like broken mains, leaking valves or overflows from reservoirs.

Median Current Annual Real Loss was found to be 185 litres per connection per day compared to 206 last year across New Zealand. This loss compares to Scotland at 163 litres per connection per day.[37]

Figure 8 and Figure 9 show that loss per connection is generally higher in rural than urban areas, but urban areas experience the greatest total amount of loss given the much larger size of their networks. As rural areas are much less dense there will be a greater length of pipes per connection resulting in a greater potential for water loss

32 See https://www.phcc.org.nz/briefing/money-down-drain-high-cost-leaking-water-pipes; https://www.waternz.org.nz/documents/other/101029_tauranga_on_metering.pdf

33 Environment and Climate Change Canada (2025). Canadian Environmental Sustainability Indicators: Boil water advisories. Consulted on month, day, year. See www.canada.ca/en/environment-climate-change/services/environmental-indicators/boil-wateradvisories.htm

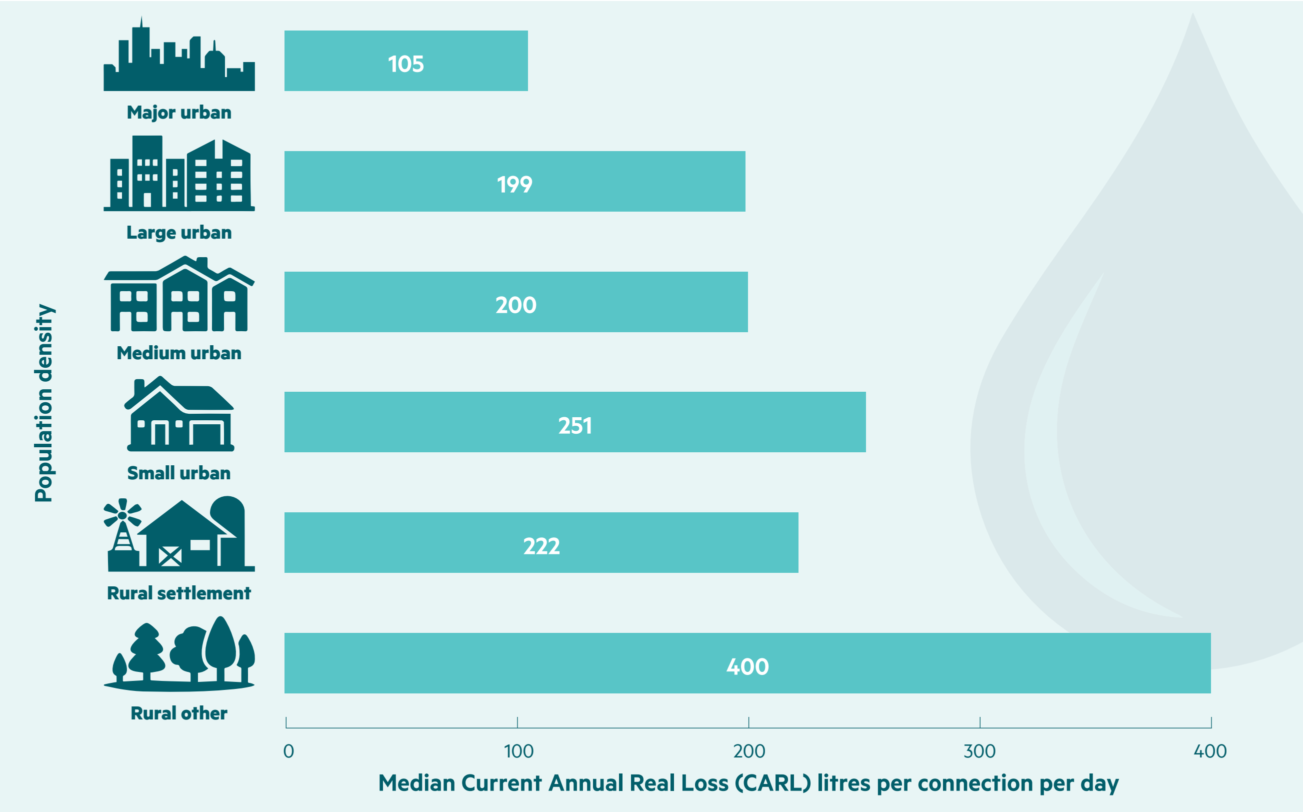
34 Only 67% of network operators provided an estimate of their total water loss.

35 For example, last summer was a bit wetter than normal, so percentage lost may be a greater proportion if the amount used was less.

36 Unavoidable annual real loss is a theoretical loss based the lowest limit of leakage that would exist in a distribution network if the best water loss control technology was successfully applied.

37 See Scottish Water (2023). Annual Report and Accounts 2022-23, Stirling: Water Industry Commission for Scotland. https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Annual-Reports/SWAnnualReport2023.pdf (Accessed 3 June 2025)

Figure 9: Median Current Annual Real Loss by population density per connection (litres per connection per day)



to occur. Greater loss in rural areas may also occur if the network is in a poorer condition, or due to fewer resources and capacity of network operators.

A break down of Current Annual Real Loss council by council is provided in Appendix 4.

A better way for comparing water loss across councils is the infrastructure leakage index (ILI) developed by the International Water Association. The reason is because this measure takes into account characteristics of infrastructure that can affect water loss like the number of connections, the length of pipeline and operating pressures[38] (see Appendix 1: Methods for assessing water loss).

While this is a better measure, we are less confident with the data reported to us as it is a new index to calculate for many councils. As shown in Figure 10, 32% of network operators had at least one network with the **worst water loss rating of above 8** – indicating an inefficient network with poor maintenance and asset condition. Eight percent of network operators had at least one network with a **condition rating of less than 0.5 or above 40** that is likely to indicate an error (e.g. both Southland and Ōtorohanga District Council reported ILI values in the thousands). We hope to report more confidently on ILI in future years.

External review of water loss measures

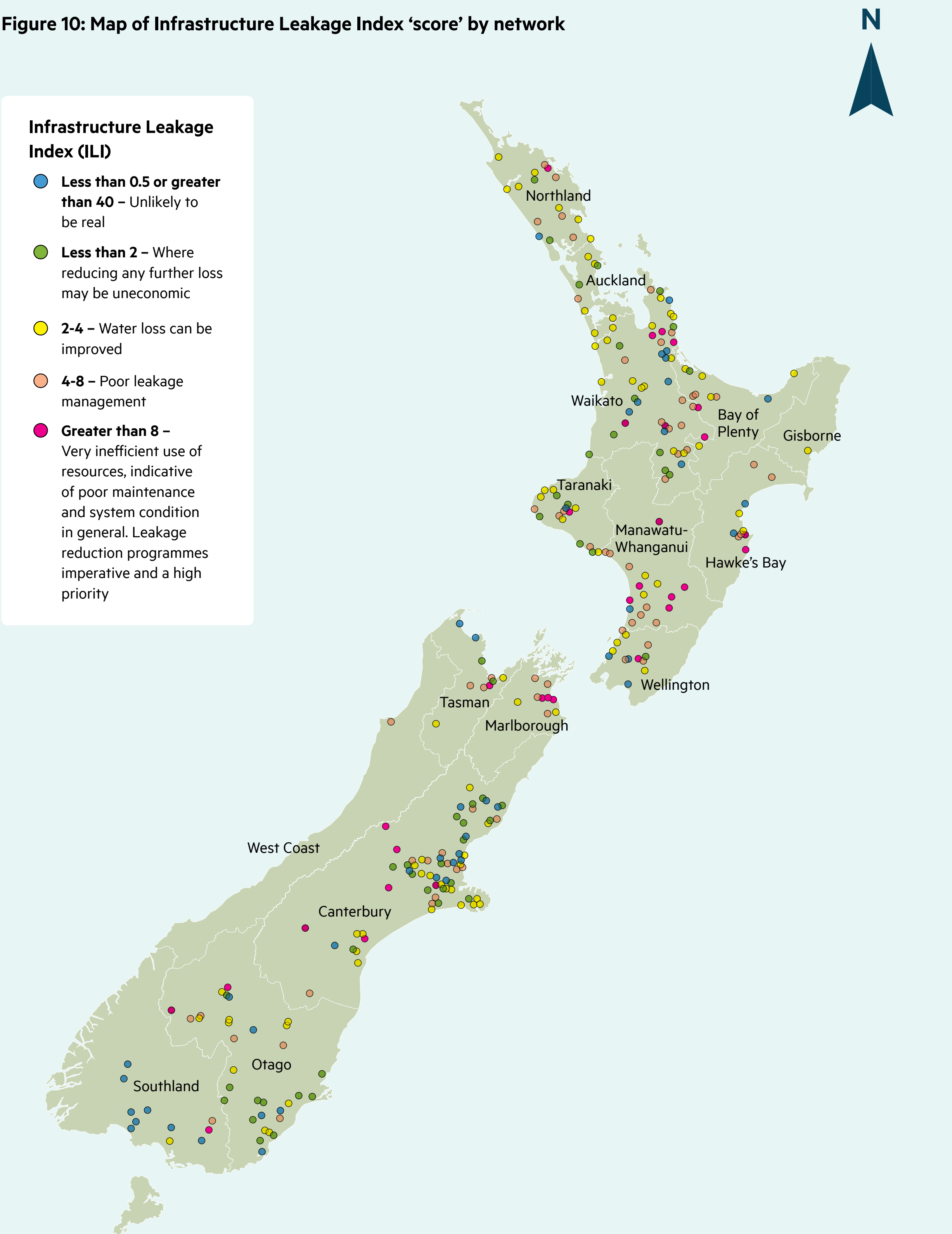
Our external review showed that councils used a variety of methods to base their analysis of water loss. Where regions have meters on individual connections, calculating water loss is more straightforward. However, where there are no meters councils may use other methods that range from estimates based on judgement to industry averages provided in the water loss guidelines or approaches like the minimum night flow method that assess loss in some specific areas (e.g. DMAs).[39]

Across the 20 selected suppliers whose data was examined as part of the external review, 50% of respondents updated their responses to present the data in correct units or to fill in missing information. Problems reported included minimal metering in some parts of the districts or lacking understanding of water loss measures. The external reviewers also suggested only around 40% of the network operators should consider their data as 'reliable' or 'very reliable'.

38 The ILI compares the current loss (CARL) with the 'Unavoidable Annual Real Loss' (UARL). UARL is the proportion of the loss considered to be unavoidable. Water loss considered unavoidable is included in the calculation because it recognises there will always be some level of loss due to water moving through the network under pressure, even in a well-maintained and good-quality network. The ratio of the current loss (CARL) to unavoidable loss (UARL) is used to calculate the ILI.

39 Minimum night flow method looks at losses across a part of a network DMA assuming minimal use will occur at night. In some regions of New Zealand, water loss methods do not account for losses after it reaches a consumer's property – so represent a smaller extent of their network. Regions that use the Minimum Night Flow Method may account for a greater amount of loss than other networks (e.g. Wellington uses this method).

Figure 10: Map of Infrastructure Leakage Index 'score' by network



Best practice for calculating and managing water loss is outlined in Water Loss Guidelines: Water New Zealand,[40] including tools to help calculate water loss.

Water meters can help operators better understand the amount of water being used

Water meters are a useful tool when managing a network. By having a more accurate measure of the water supplied or consumed, network operators can better manage demand, monitor the performance of a network and better understand where and how much water loss is occurring.

Around two-thirds of the residential connections in New Zealand are reported to be metered. However, this number is heavily influenced by Auckland which has meters for all households – accounting for around a third of New Zealand's population. For non-residential properties, 88% of connections were reported to be metered. Councils will often meter non-residential connections for commercial or industrial use due to the greater amount of water supplied for these premises. Table 3 shows that water meters are much more common in urban than rural or provincial areas.

Table 3: Number of water meters in residential or non-residential properties

Population density	Residential meters	Non-residential meters
Rural	44% (35,200)	51% (6,910)
Provincial	44% (214,000)	74% (39,000)
Metropolitan (urban)	80% (684,000)	109%[41] (73,700)

Introducing water metering allows households to better understand their water use and identify where leaks are occurring. Some councils then charge for water based on the volume of water use to provide an incentive to reduce use (note we did not collect data on volumetric charging). Some examples of the benefits from councils that have introduced metering and volumetric charges are:

- In Tauranga, peak demand for water was reduced by 30% – allowing the Waiāri Water Supply Scheme to be deferred by more than 10 years, saving an estimated $53 million[42]
- In Kāpiti introducing water metering and charging lead to 443 leaks being found – and a 26% decrease in water consumption across the district (from 590 litres per person per day in 2012/13 to 437 in 2014/15)[43]
- In Carterton, more timely detection of leaks meant water loss was reduced from 38% in 2021 to 16% in 2024.[44]

As well as helping operators identify leaks and manage demand, metered networks can help councils to determine and justify how much investment is needed in their networks, track performance, and ensure sufficient availability of water supply to meet demand.

Outcome: Services are reliable

Network operators do not have a consistent understanding of the condition of their network

'Asset condition' is the physical state of the network, including the pipes that are generally below ground, as well as assets that are above ground like treatment plants, reservoirs and pump stations. A network in good condition is more likely to perform well and less likely to leak or fail. Understanding the condition of a network is important to identify risks to the network, such as where more water loss or contaminants entering the network may occur, and plan when assets should be renewed.

Understanding the condition of assets is not always easy (e.g. it can be difficult and costly to assess pipes below ground.[45]) Different network operators will take different approaches to assessing the condition of their assets that will vary depending on their funding and capability, as well as the state of their assets. For example, our external review identified nine different approaches to assessing condition – ranging from desktop research or modelling to physical inspections – with the best assessments combining all these methods.

40 https://www.waternz.org.nz/Article?Action=View&Article_id=2542

41 Note the number of non-residential water meters reported to us was greater than the number of non-residential connections provided. Some errors may be due to:

- some non-residential properties having two or more connections with meters
- network operators providing data for either the number of connections or the metered connections (but not both) – resulting in the non-residential meters exceeding the total number of meters.

42 See Sternberg. J. and Bahrs, P. Water Metering – The Tauranga Journey. https://www.waternz.org.nz/documents/other/101029_tauranga_on_metering.pdf

43 Water NZ, Tariff Setting and Charges. The Kāpiti Experience ; Current data submitted from Kāpiti District Council have their consumption ranging between 285 to 537 litres per day per connection between their four networks.

44 Wellington. Scoop » Sorting out private leaks – 42% water loss in South Wairarapa

45 For this reason, desktop methods, using a combination of factors such as age and material type are commonly employed for non-critical assets.

Our external review found few condition ratings were likely to be reliable

Of the sample reviewed, 25% of those involved had not reported their condition grades, or reported the grades of few of their pipes, mostly due to not understanding that a desktop assessment was allowed. The reviewers also found that 40% of assessments were either inconsistent or unclear, for example:

- relying on historic data or previous staff where the methods were not understood
- there was a lack of clarity about how they graded different bands.

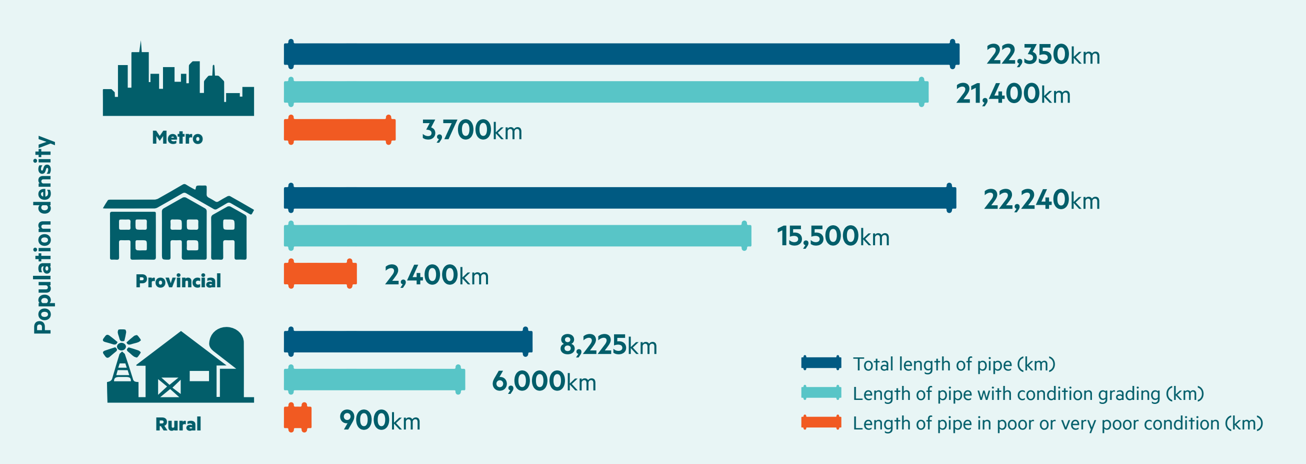
Following the review, 45% of operators involved in it review updated their data due to errors or inconsistent methods. Only 25% of condition ratings for pipes were considered by the reviewers to be either 'reliable' or 'very reliable'. Some of the largest operators (e.g. Watercare and Christchurch City Council), with more staff and funding, assessed asset condition in a more detailed way (i.e. using multiple methods) than some of the smaller councils.

Figure 11 shows the differences across different types of network operators in the proportion of pipes they have been able to assign condition grades to, compared to the proportion they consider are in 'poor condition'. Compared to last year, councils reported that the total length of pipes that have had their condition graded has gone up significantly from 55% to 81%. This increase in grading is encouraging as grading will help network operators better target investment, prevent network failures and forecast their costs for renewing the network. Figure 11 shows that network operators responsible for larger metro populations generally have assigned condition grade to more of their pipes (around 95%) – compared to rural or provincial areas (around 70%).

Across all councils, 16% of pipes supplying drinking water that were graded were reported to be in poor or very poor condition.

While the extent of pipes in poor condition was reported to be worse in urban (metropolitan) areas (at 17% of pipes in poor condition) than provincial (11%) or rural (11%), we do not know whether this will be a true difference or due to the different ways network operators have assessed their pipes or the greater extent of pipes graded in urban areas. This is particularly so given our external review found that larger councils generally provided more detailed and likely more reliable assessments.

Figure 11: Length of pipes in poor condition compared to pipes assessed and total length of pipes



Reliable condition assessments are essential for long-term planning

Best practice is to perform a full condition assessment of all assets every three years, creating a trend for each asset's condition over time. We expect network operators need to plan and budget for condition assessments so that they can identify when renewals of the network should occur and inform their investment strategies or long-term plans. Some guidance is provided assessments is provided in our Network Environmental Performance Measures Guide[46] and in the Institute of Public Works Engineering Australasia's International Infrastructure Management Manual[47] from which we base our definitions.

Water New Zealand also has a range of guidance available.[48]

46 https://www.taumataarowai.govt.nz/for-water-suppliers/network-environmental-performance-measures/

47 https://www.ipwea.org/home

48 https://www.waternz.org.nz/Article?Action=View&Article_id=3062; https://www.waternz.org.nz/Article?Action=View&Article_id=30

Table 4 shows that most central government network operators have graded the condition of their water supply pipes except the Ministry of Education. However, the extent of pipes in poor condition is high for both the Department of Conservation's network for Whakapapa and New Zealand Defence Force, which may be related to the older average pipe age of pipes for government departments in general (at around 60 years compared to the overall average of 26 years – see Appendix 4).

Table 4: Condition grading for pipelines run by government operators

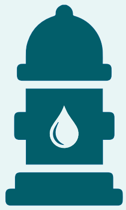
Organisation	% of water supply pipelines with a condition grading	% of graded water pipelines in poor or very poor condition
Department of Conservation	75%	95%
Department of Corrections	100%	5%
Ministry of Education	0%	Not reported
New Zealand Defence Force	99%	57%

Across all network operators, a higher portion of pipes had been graded compared to their above-ground assets. On average, only 65% of above ground assets had been assessed compared to 76% below ground (i.e. pipes). Fewer assets were reported to be in poor condition above ground than below ground – as faults that occur above ground may be more obvious to address. The median of above ground assets reported to be in poor condition is 5% – down from 13% last year.

Managing pressure is important for maintaining water networks and protecting against illness

Some network operators may not be adequately monitoring the pressure in their networks – as only around 60% of network operators reported across the measures related to pressure.

Understanding pressure is important as sufficient pressure must be maintained in the network to ensure that safe drinking water can be supplied to the consumer. If the pressure is too high, it can lead to bursts in the network. Equally, if pressure is too low, it can lead to water or contaminants coming in (or infiltrating) the network and reduced levels of service. Low pressure in drinking water networks has been linked with outbreaks and illness overseas.[49] Managing pressure is also important for managing water loss, as this will increase or decrease in line with amount of pressure applied.



38%

median number of fire hydrants tested in the last five years by network operators

Average pressure across networks was reported to be a median of 450kPa – with generally higher pressure reported in urban areas compared to more rural population densities. Sixty-seven percent of operators reported they have adopted the Fire and Emergency NZ (FENZ) code of practice (the Code) for water supply,[50] which has a minimum running pressure design threshold of 100kPa. We found that 35 networks are operating below this level – with the vast majority of these networks being in rural areas. 100kPa is lower than the United States recommended minimum pressure (at 138kPa) for protecting drinking water from contamination within a water network.[51] We also found that 11% of network operators are operating at below their own reference levels[52] for pressure (set at a median of 200kPa), affecting around 12,600 properties. Over half of these properties were concentrated in Wellington, Hawera and Invercargill.

There are some operators reporting very high pressure that can lead to more bursts in the network, especially for older infrastructure. The networks that reported the highest pressure were West Taieri in Dunedin City and Lumsden/Balfour in Southland District (with an average system pressure of 1,000kPa).

The Code states that fire hydrants should be tested every five years – though **network operators had only tested a median of 38% of their fire hydrants in the last five years** (ranging from 14 councils that had tested all their hydrants to 12 who had tested none).

Best practice and research on understanding pressure can be found on Water NZ's website:

- New Zealand Pressure Pipe Inspection Manual: Water New Zealand
- Impact of Pressure Management on Pipe Burst Rates: Water New Zealand

49 For example, see Säve-Söderbergh M, Bylund J, Malm A, Simonsson M. and Toljander J. Gastrointestinal illness linked to incidents in drinking water distribution networks in Sweden. Water Res. 2017 Oct 1; 122:503-511. doi: 10.1016/j.watres.2017.06.013. Epub 2017 Jun 5. PMID: 28624733

50 SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice.

51 Source: National Research Council (2006). Drinking Water Distribution Systems: Assessing and Reducing Risks. Washington, DC: The National Academies Press. https://doi.org/10.17226/11728. pg. 217.

52 Just over half (55%) of network operators reported they have identified their own reference level for the level of pressure expected in their networks. Operators may set reference levels for the network to customer levels of service, to prevent backflow, or to meet firefighting requirements. 200kPa generally aligns with international best practice. For example, it is required by law to be at least 200kPa in Greece. Pressure Regulation vs. Water Ageing in Water Distribution Networks.

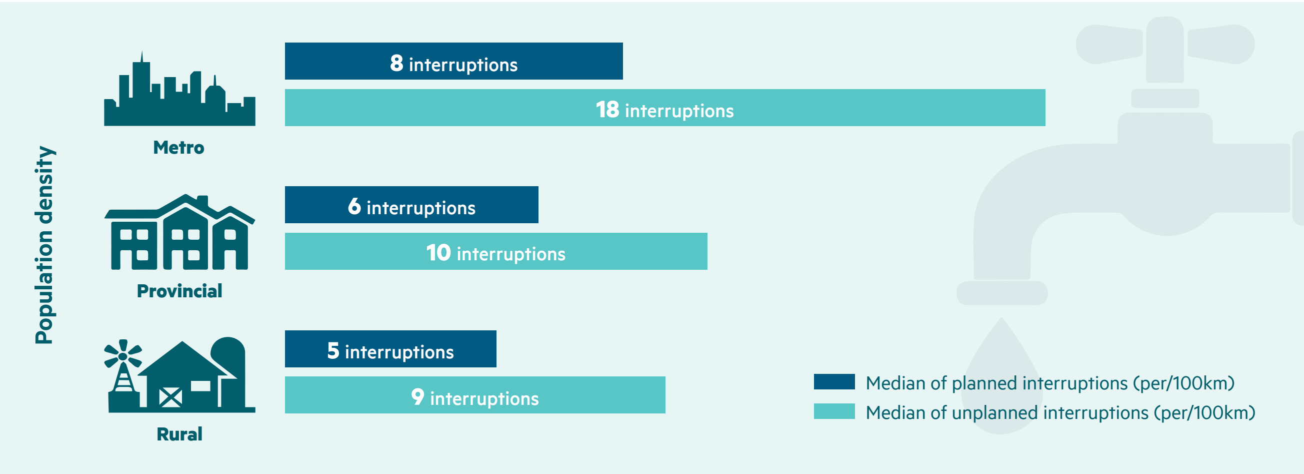
Larger urban populations experience more interruptions to their network

'Interruptions' to a network can occur that require the operator to temporarily stop supply in certain areas (e.g. when there are faults, maintenance, or pipes are upgraded). We collected data on the number of planned and unplanned interruptions, to help us understand the amount of work occurring on the networks that is either reactive or planned.

There is almost twice as much work going on for unplanned interruptions (10,695 in total across New Zealand or a median of 44 per council) as planned interruptions (6,014 total or 23 median per council). The median planned interruptions occurring is down from 65 last year – indicating less planned work is occurring.[53] Unplanned repairs to networks which can be more costly than planned renewals.

As shown in Figure 12, larger metropolitan areas have more interruptions happening per length of pipe than in rural areas. The higher rate of interruptions in larger areas are likely due to the larger networks they look after, including greater housing development in these areas resulting in interruptions.

Figure 12: Supply pipe interruptions by population density per 100km of pipe



Some of the planned and unplanned supply interruptions are highly concentrated in certain areas. For example, almost a third of the planned interruptions are from Wellington Water alone (with 1,973 interruptions) – representing the large amount of work going on in this region.[54] Over a third of the unplanned interruptions occurred in Auckland (with 3,930 unplanned interruptions).[55] Hurunui had the largest number for a rural area (993) and Timaru for a provincial area (399).

Two councils suggested they had no planned interruptions (these were both rural councils – Chatham Island Council and Kaikōura District Council). An absence of planned interruptions indicates that there were no renewals occurring on the network (these councils also reported low or zero dollars in capital expenditure). Southland District Council also reported no unplanned interruptions.

See Appendix 4 for information about the time involved in responding to faults in networks.

53 Note we did not collect data on unplanned interruptions this year.

54 Other councils with many planned interruptions occurring were Christchurch (603) and Invercargill (554).

55 Other councils with a large number of unplanned interruptions occurring were Hurunui District Council (993) and Tauranga (513).

Outcome: Services are economically sustainable

Most network operators spend more on operational compared to capital expenditure, particularly in rural areas

Network operators need to budget for ongoing costs to maintain networks, make improvements where necessary and meet demand from anticipated growth for their drinking water networks. Infrastructure assets must be maintained, renewed and repaired to ensure that they continue to provide benefits to society – and do not result in larger costs later down the track.[56]

Figure 13: Total operational and capital expenditure

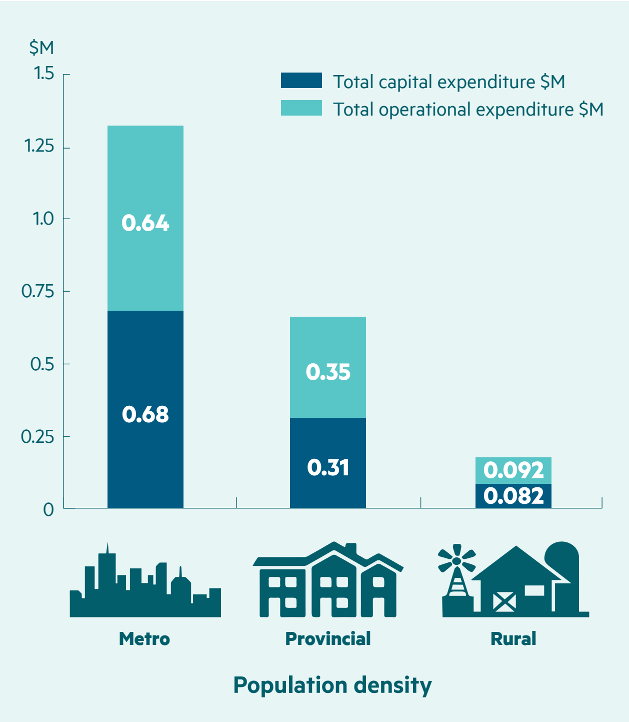


Figure 14: Median operational and capital expenditure per person

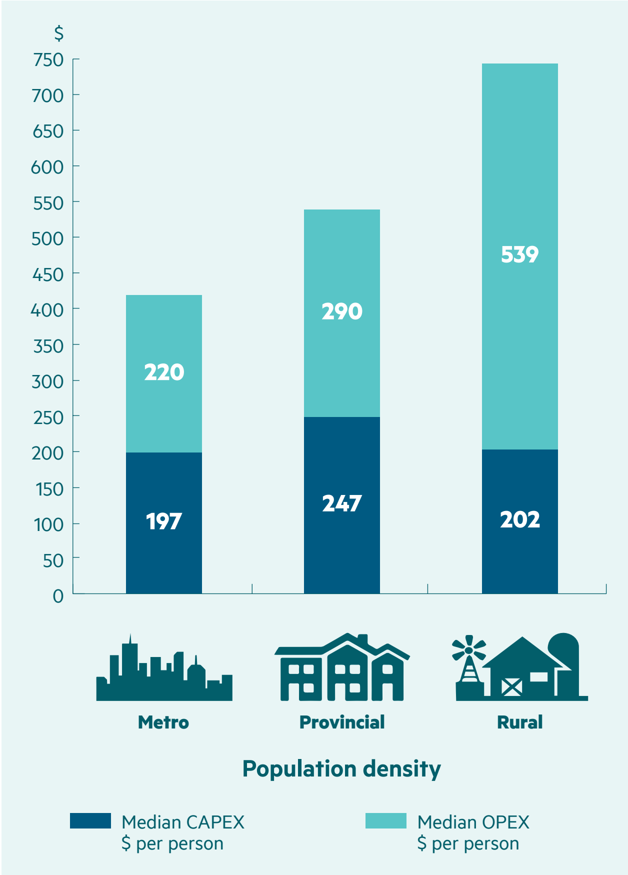


Figure 13 and 14 shows that while overall spend is higher for metropolitan urban areas, rural councils have spent much higher per person given the low populations living in these areas. Looking just at operational costs, rural councils are spending more than double per person than large metropolitan councils. This means that maintaining water infrastructure will generally be a greater burden for smaller councils.

Overall councils are spending more on 'operational expenditure' (such as to fix leaks, make repairs or carry out regular maintenance) than 'capital expenditure' (to meet new demand or renewing or replace existing infrastructure). Broken down by network operator, we found that 55% of network operators are spending more on **operational** compared to capital expenditure over the past year. Also 35% of network operators spent more on **capital** compared to operational costs.

Spending on operational and capital expenditure can vary year to year and be driven by different factors. For example, older infrastructure (see more on pipe age in Appendix 4) may require more operational maintenance or repair while fast-growing areas may need more capital to respond to growth. Unsurprisingly, the councils that spent the most on operational costs were large network operators, Wellington Water and Watercare. However, per person Wellington Water spent five times more than Watercare ($454/person compared to $90/person).

56 Build or maintain? | Research & insights | Te Waihanga.

As shown in Table 5, 74% of capital expenditure across councils is going to renewing or replacing existing assets compared to 26% that is targeted at meeting additional demand. The amount spent on new infrastructure to meet additional demand is much lower in rural areas in particular. The Infrastructure Commission | Te Waihanga advise that around 60% of investment needs to be going towards renewing existing assets rather than building more.[57]

Table 5: Comparison of total capital and operational expenditure across all councils

	Capital expenditure	Operational expenditure
Total	$1,100 million, made up of: • 26% going to new infrastructure to meet additional demand: $290 million • 74% going to replacing existing assets or improving level of service: $810 million	$1,600 million

For a break down of capital and operational expenditure council by council see Appendix 6.

Some network operators spent more on their operational expenditure than they received in revenue

The major source of revenue for water services is through council rates or volumetric charges to fund operational costs. In total, network operators reported they receive $1,132,915,000 in revenue related to their drinking water supply. When comparing the revenue with operational costs, around half of councils spent more on operations than they received in revenue for drinking water services. Since councils balance their budgets across all departments, they may be funding the deficit in drinking water revenue from another source (including for example from development contributions).

See Appendix 4 for more information on council expenditure.

Outcome: Services are resilient

Water conservation is becoming increasingly important

Compared with many other countries, New Zealand is often considered to have plentiful water. But a general abundance hides a more complex reality where the availability of water will vary from year to year, region to region, and season to season.[58] In some areas, we can have too much water (e.g. floods) and others we can have too little (droughts/water shortages) at different times.

Regional and seasonal patterns are also changing due to climate change. In future, we can expect the country to get warmer and drier with climate change, and more prone to climate extremes (floods and droughts).[59]

The number of days a drinking water network is affected by water restrictions helps to indicate whether a water supply is resilient to such water shortages. 'Water restrictions' occur when a network operators places limits on the amount of water consumers can use. This can range from limiting outdoor use to total water bans. The threshold when water restrictions may apply will differ across networks, as do the types of restrictions themselves.

Water restrictions may be caused by factors outside the control of a network operator, such as when a drought, natural hazard or emergency occurs. Water restrictions can be good practice when used proactively to minimise water use at times of stress or defer the need for a new water source. However, water restrictions may also occur when networks are poorly maintained and there are high rates of leakage or a supply has limited storage capacity.

In total, network operators reported a combined total of 4,799 days with water restrictions in the 2023/24 year, with a median of 113 days a year per network operator. The number of days was up more than three times from 2022-23 (1,334 total or a median of 38) in 2022/23, which was a particularly wet summer in some regions of New Zealand.

The number of restrictions varies greatly between districts. For example, 29 network operators reported no days of water restrictions, while five network operators reported a full year of water restrictions (Thames Coromandel, Ashburton District Council, South Wairarapa District Council, Tauranga City Council and Wellington Water).[60] Table 6 shows that water restrictions are more common in provincial areas but more customers are affected in metropolitan urban areas.

57 See New Zealand Infrastructure Commission (2024). Build or Maintain? New Zealand's Infrastructure asset value, investment, and depreciation, 1990-2022. Wellington: New Zealand Infrastructure Commission: Te Waihanga. https://media.umbraco.io/te-waihanga-30-year-strategy/djkmtwj4/build-or-maintain.pdf (Accessed 3 June 2025)

58 Ministry for Primary Industries (2021). Water Availability and Security in New Zealand: Supporting the sustainability, productivity, and resilience of the food and fibre sector. https://www.mpi.govt.nz/dmsdocument/47770-Water-Availability-and-Security-in-Aotearoa-New-Zealand (Accessed 3 June 2025)

59 Ministry for the Environment (2020). National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū. https://environment.govt.nz/assets/Publications/Files/national-climate-change-risk-assessment-main-report.pdf (Accessed 3 June 2025)

60 Note including one supplier reporting 425 days of water restrictions, which was a sum of days across all networks. This operator should have provided the total days in the year (rather than days across all networks).

Table 6: Number of water restrictions and affected connections by population density

Population density	Total number of days with water restrictions	Median	Average proportions of affected connections	Total connections affected
Rural	1,164	120	43%	44,430
Provincial	2,839	92	34%	207,399
Metro	647	122	18%	229,390

Sixty-five percent of network operators reported they have a water conservation programme in place, up from 58% last year. Increasing demand on water from population growth, or for irrigation, places pressure on drinking water supply in certain areas. A national assessment of water availability and security in New Zealand found that water in a significant number of catchments across the country are either close to or fully 'allocated' (i.e. there is limited water that can be allocated to any further use).[61] With the increasing risks of climate change and more challenges protecting ecological and cultural health of water sources, conserving water is becoming increasingly important.

One way to address the difference between the available freshwater resources and increasing water demand is to supplement supply with recycled or reused wastewater or stormwater. This alternative brings its own challenges, including managing risks particularly for potable (drinkable) water supplies, and potential cultural and public concerns about reusing treated wastewater. In New Zealand, we have low use of recycled water[62] compared to other countries. Only Watercare reported they supply 7,729,340m^3/year of recycled water to non-residential customers for non-potable use (i.e. not for drinking).[63]

Watercare – recycled water

Anticipating the need for a new major drinking water source by the 2040s, Watercare initiated a recycled water programme aimed at ensuring purified recycled water was a viable future option as a water source if needed.

As part of this initiative, Watercare built a small-scale advanced water treatment plant to test reuse technologies for potable drinking water, gather data to support regulatory conversations, and provide a venue to engage with communities and stakeholders. Piloting is expected to commence late 2025.

The Central Interceptor tunnelling project, a $1.6 billion tunnel designed to carry wastewater and stormwater to the Māngere Wastewater Treatment Plant, provided an opportunity to explore recycled water for beneficial non-potable uses (i.e. not for drinking). Instead of having to use the regular drinking water supply, approximately 9 million litres of construction-grade recycled water was supplied to the project. With the project moving into a new phase of work, the recycled water plant is in the process of being repurposed to allow the water to be used onsite at the Māngere Wastewater Treatment Plant.

Watercare is exploring other beneficial reuse opportunities – though barriers like cost, absence of nationally consistent standards and guidelines, and public perception remain.

61 Ministry for Primary Industries (2021). Water Availability and Security in New Zealand: Supporting the sustainability, productivity, and resilience of the food and fibre sector. https://www.mpi.govt.nz/dmsdocument/47770-Water-Availability-and-Security-in-Aotearoa-New-Zealand (Accessed 3 June 2025)

62 'Recycled water' in this context means treated wastewater reused for purposes such as irrigation of parks and recreation areas, or industrial dust suppression etc.

63 Note there may be other users of recycled water outside of the drinking water network so they have not reported on these measures. For example, we know of land irrigated with wastewater is being used such as for golf courses.

We asked network operators whether they had assessed their critical assets, as well as other types of emergency, business or strategic plans they have in place. Overall, we found that the significant majority of network operators have both assessed their 'critical assets' and have some kind of planning in place. This year 92% had assessed their critical assets up from 78% last year. While many of these operators are keeping these plans up to date a few plans are quite out of date (see Appendix 4: Assessments or plans in place by network operators).

A case study on Dunedin City Council shows how good information to inform long-term strategic planning across their whole water network allowed them to move from a more reactive to a proactive approach.

We need to plan ahead to address future risks to our water infrastructure

Planning to respond to future growth and risks (like natural disasters) is important to safeguard a reliable water supply in future or in times of need. With reported data showing that 44% of water take consents will expire within the next 10 years, understanding and forecasting future water needs will be increasingly important.

Water operators are facing a growing number of challenges that are increasingly placing pressure on service delivery. Such challenges include climate change, extreme weather events, population growth, increased demand and pollutants/contaminants while needing to ensure a sufficient and reliable water supply.

Cyclone Gabrielle in February 2023 caused extensive damage to the water supply pipe into Gisborne, breaking it in 10 places. It took 45 days to repair and reconnect the pipeline which meant water restrictions for the population of nearly 40,000 people. Napier had only 10 hours of drinking water left after Cyclone Gabrielle hit the Hawke's Bay region – cutting power to the city's bore sites. In Napier, generators were connected to the bores to allow water supply to continue within 14 hours.[64] Another example where an emergency resulted in insufficient drinking water supply was in Roxburgh earlier in 2025 where residents were asked to conserve water when firefighters needed most of the town's water supply to fight a fire in the town hall.[65]

To inform planning, network operators need to understand their 'critical assets' (i.e. if assets were to fail there would be significant consequences – either in the ability to provide services to customers or in effects on the environment).

Integrated Systems Planning – Dunedin City Council

Dunedin City Council's Integrated System Planning (ISP) programme is a strategic project that seeks to identify the future investment required across its whole all its three water networks (i.e. drinking, waste and stormwater) over the next 50 years.

The project was initiated by the council back in 2018, as they were increasingly recognising that much of the planning work on their three waters infrastructure was reactive, piecemeal or inefficient. A case was made to build a more joined-up, long-term and proactive view.

The council worked closely with mana whenua, regional council and other stakeholders across the project. Key stages of the work include:

- **Stage 1: Baselining performance:** assessing the current performance of the infrastructure
- **Stage 2: Objective setting:** determining the levels of service expected in the future
- **Stage 3: Strategic responses:** developing strategic 'responses' to address gaps between current performance and the required future state
- **Stage 4: Adaptive pathway planning:** selecting preferred responses to form a 'core pathway' of future investments required to reach the future state.

Building the baseline of information was an essential step to building awareness of the problems, their relative impacts and securing support for the project. Good information, and insight from mana whenua and stakeholders, helped build the perspective that while short-term problems were more immediately pressing, it was the longer-term problems that were critical to address for the region's future.

64 See Public Health Communication Centre Aotearoa (2023). Water infrastructure failures from Cyclone Gabrielle show low resilience to climate change. https://www.phcc.org.nz/briefing/water-infrastructure-failures-cyclone-gabrielle-show-low-resilience-climate-change (Accessed 3 June 2025)

65 See https://www.thepress.co.nz/nz-news/360572403/smoke-billows-fire-otagos-roxburgh-town-hall

For example, work on the project highlighted that many water-take consents would be expiring in the early 2040s and it is likely that allowable takes from the water sources would be significantly reduced at this time. This allowed the council to prioritise improving water efficiency now and to investigate alternative water sources and raw water storage to ensure they are adequately prepared for the change in water-take consents. The adaptable nature of the project also means that there is no one set answer as to how this problem will be resolved, but there is a process and plan for ensuring that it will. Ongoing monitoring of the adaptive plan – alongside the broader environmental, political, social or economic circumstances means there is flexibility for the council to change and reorientate their attention over time. For example, monitoring signals, such as how close water demand gets to availability, will then trigger next actions in the 'core pathway' or require moving into an alternative pathway if necessary (e.g. sourcing water through desalination of sea water).

Considering drinking, wastewater and stormwater together has also helped the council identify and understand the inter-relationships between each of the networks and how 'responses' for one water can positively or negatively impact the other networks. For example, they found improving efficiency in the drinking water network would see the overall demand for water reduce. Reduced demand can then reduce the volume of water entering the wastewater system – reducing energy demand and operating costs, as well as creating more capacity in the wastewater network to accommodate growth.

Ultimately, this project has helped the council secure more funding for their three waters infrastructure into their long-term planning process. It also means that instead of mainly reacting to problems they now take a more long-term, strategic approach.

Part four:
Wastewater

In this part, we profile the environmental performance of New Zealand's public wastewater networks based on data reported to us by network operators against our first set of wastewater performance measures. Next year we will have more measures on wastewater to report against.

Data reported to us this year showed that the level of treatment for wastewater is highly varied across the country. Urban areas generally have a higher proportion of wastewater plants that treat wastewater to a higher standard compared to rural areas. Around 20% of wastewater treatment plants are also operating under an expired resource consent, which increases risks the environment and public health.

Overflows of wastewater directly into the environment without treatment are a common risk to the environment and public health across New Zealand. However, there is inconsistent monitoring and reporting on them across network operators.

Effective treatment of wastewater is crucial to reduce impacts on the environment and human health

The wastewater system plays a crucial role in moving and treating wastewater from our homes and workplaces so that harmful contaminants and pathogens are removed. Without this system, human waste would pose serious risks to the environment and human health, including by spreading disease, polluting waterways and damaging ecosystems.

Over time, inadequately treated wastewater discharges into freshwater and coastal water have contributed to polluting and degrading the environment, affecting freshwater quality and the ability for all to enjoy and use water safely. Due to the potential impact on people and the environment, it is culturally abhorrent for Māori to mix wastewater with fresh and coastal waters. Loss of ability to gather kaimoana/seafood for many Māori has affected their identity, the ability to exercise tikanga (cultural protocols or practices), and contributed to a loss of local mātauranga/knowledge.

A recent case-study report provides insights into iwi and hapū values and perspectives relating to wastewater treatment.[66] In this chapter, we look into one of the case studies – on the Porirua Wastewater Treatment Plant and the experience of Ngāti Toa Rangatira (Ngāti Toa).

Wastewater treatment varies widely across the country

There are three main steps that a wastewater treatment plant can go through to treat wastewater, after an initial screening (or pre-treatment) to remove large debris and grit:

a) Primary treatment: usually involves the settling of particles and the floating of material such as fats, oils and greases to the surface.

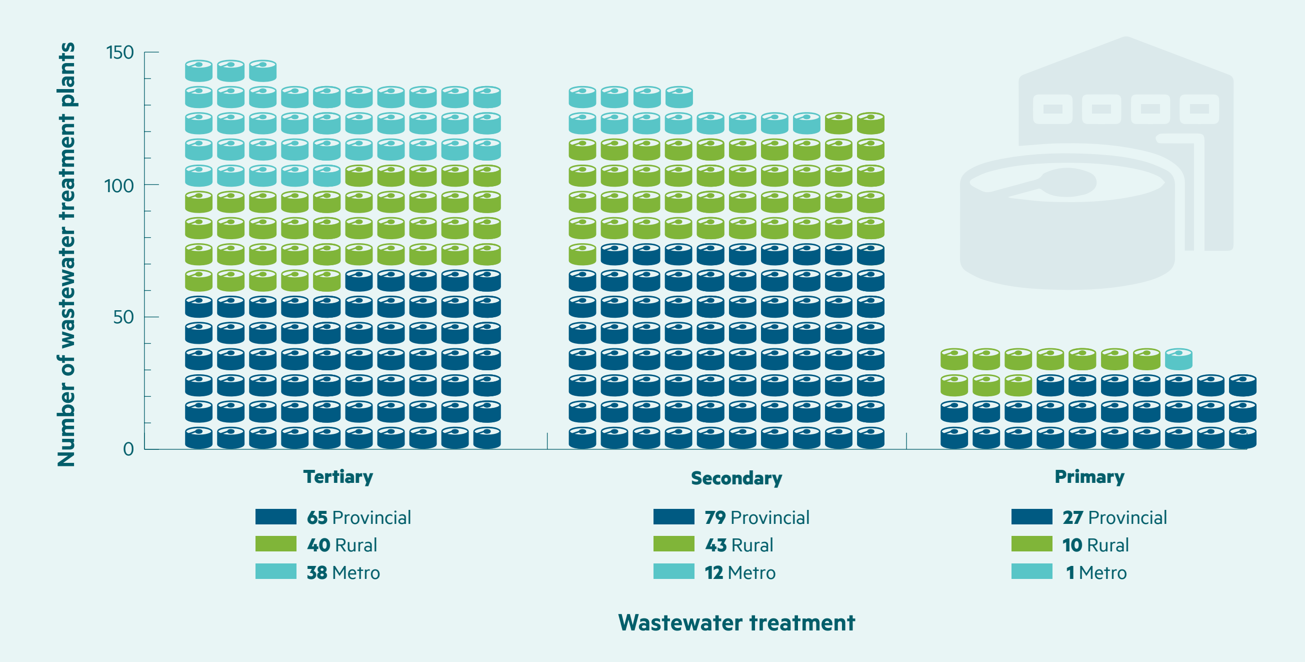
b) Secondary treatment: is usually a biological treatment process (that allows microorganisms to break down waste). This treatment usually takes place in an aeration basin (i.e. a tank where air is diffused into wastewater) or oxidation pond (large, shallow pond designed to treat wastewater).

c) Tertiary treatment usually involves the removal of any remaining nutrients, pathogens, or heavy metals and chemicals (e.g. through further filtration or disinfection through ultraviolet light).

Not all wastewater treatment plants involve all levels of treatment. As shown in Figure 15, metropolitan urban areas generally reported higher levels of treatment (i.e. only secondary or tertiary plants), given the larger amount of waste to treat in urban areas and larger populations exposed to wastewater-related health risks. For example, in urban areas around 75% have at least a tertiary level of treatment – whereas in rural and provincial areas around 40% receive a tertiary level of treatment. Small-scale treatment plants in rural areas that serve smaller populations are often oxidation ponds that rely on natural processes, as they are simpler to operate and cheaper to run.

66 This case study report was developed to inform consultation on proposed national wastewater environmental performance standards and can be found here: https://www.taumataarowai.govt.nz/assets/Uploads/Wastewater-consultation/Case-studies-report-final.pdf?vid=4

Figure 15: Highest level of wastewater treatment across different population densities



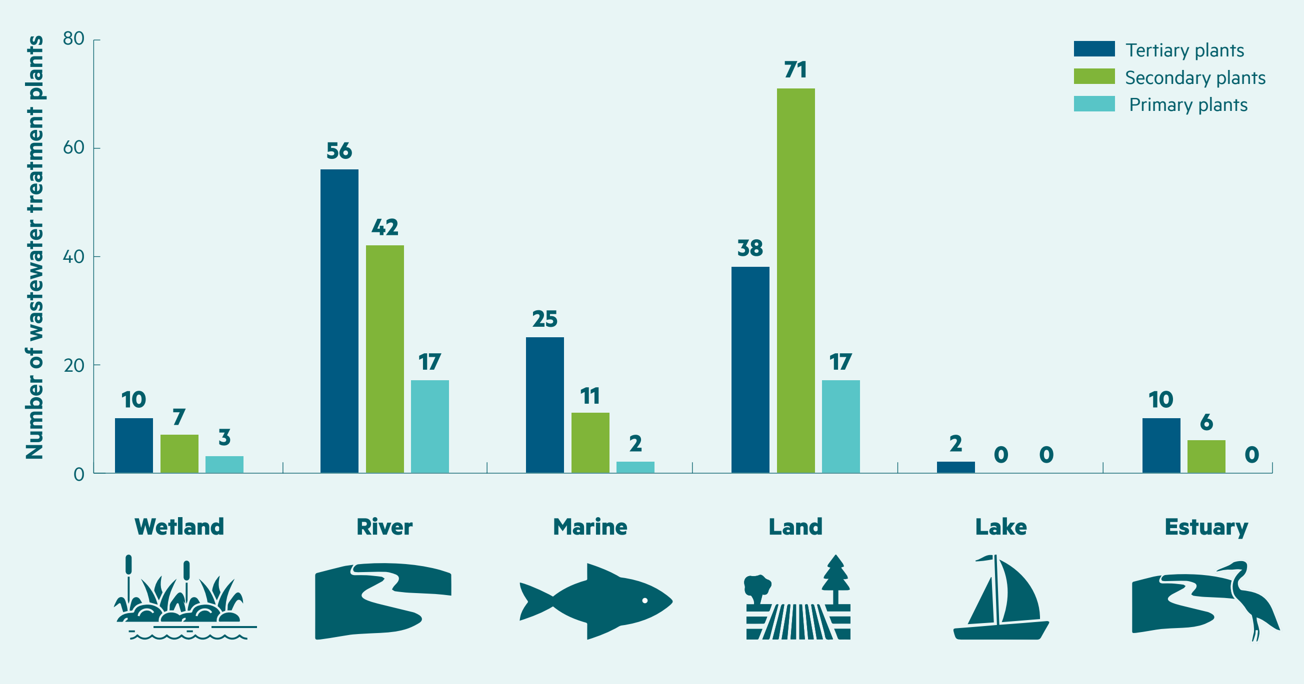
Regional councils set limits on wastewater being discharged into the environment

Regional councils are the main regulators for wastewater. Consequently, the standard of wastewater treatment across the country varies because different regional councils have different rules in place (i.e. that set bespoke requirements for different plants).

Under the RMA, contaminants cannot be discharged into the environment (including via wastewater or stormwater) unless it is allowed by a national environmental standard or other regulations, a rule in a regional plan (or proposed regional plan), or a resource consent (also known as a discharge permit). The quality and quantity of treated wastewater discharged to the environment is managed locally through the resource consent process, where regional councils will consider the specific impact to their local environment and community.

Figure 16 shows that land and rivers are the main environments for wastewater discharges.

Figure 16: Number of wastewater treatment plants discharging into different environments – by their treatment type



Proposed Wastewater Environmental Performance Standards

The proposed standards set requirements for:

discharges to water: Setting limits for the main contaminants discharged from a treatment plant – depending on the receiving environment.

discharges to land: Identifying suitable land and treatment requirements.

beneficial use of biosolids: processing biosolids from wastewater treatment plants.

wastewater network overflow and bypass arrangements: planning, monitoring and reporting and consents for all existing overflow points.

monitoring and reporting requirements: will apply across all the standards.

From February to April 2025, the Authority consulted on proposals for environmental performance standards for wastewater networks, to help bring consistency and certainty to network operators and the public about the standards that wastewater treatment must meet across the country.

As the effects of wastewater discharges will depend on the receiving environment that the water is discharged to, the proposed standards set limits depending on where treated wastewater eventually goes – with higher standards for environments more vulnerable to pollution (e.g. where there is low flow like lakes and smaller rivers). There is also a small plant standard to acknowledge that around 50% of wastewater treatment plants serve communities of less than 1,000 people.

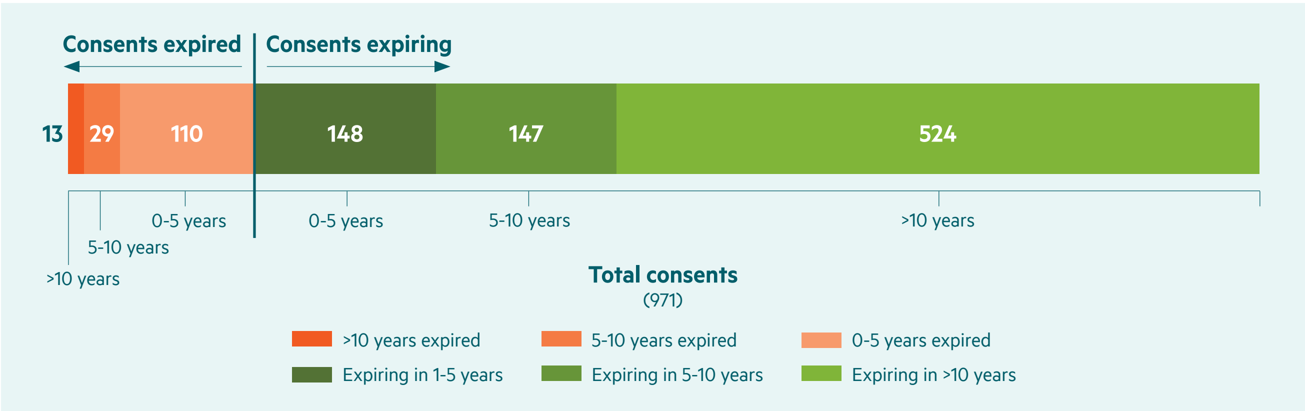
Many wastewater consents have expired or are due to in the next 10 years

Across the country, resource consents are developed, renewed and monitored largely on a case-by-case basis by regional councils. This can mean resource consenting processes are challenging, costly and lengthy for network operators, communities and iwi/hapū.

In total, network operators provided data on 1,060 consents held for wastewater treatment plants. The most common consents for wastewater treatment plants are for discharges to land or water. For discharge consents to land and water – we anticipate that 52% will require reconsenting in the next decade (including the 19.5% that are already expired).[67] See Appendix 5 for more information across all consent types.

67 Note these numbers are different to those presented in our discussion document on the wastewater performance standards that suggested 20% are currently operating on expired consents and 57% are either expired or due to expire in the next 10 years. The figures for the discussion document were based on primary discharge consents.

Figure 17: Wastewater consents expiry timeframes for discharge to land and water consents[68]



As illustrated by Figure 17, of those consents reported to be expired approximately 26% have been expired for more than five years. Ruapehu District Council has a discharge to water consent that expired in 2005 and is currently operating under s 124 of the RMA and Grey District Council has one that has been operating under s 124 for 18 years. Where plants have been operating on expired consents for a long time, this could lead to greater risks to public health or environment.

Consent holders can continue to operate through expired consents under s 124 of the RMA, which allows an operator to continue their activities while applying for a new consent (until a new consent is granted). Rural and provincial councils have a higher proportion of consents that are expired or operating under s 124. As most wastewater treatment plants are located in these smaller areas, it can be challenging for these smaller councils to fund the re-consenting process and upgrades to plants.

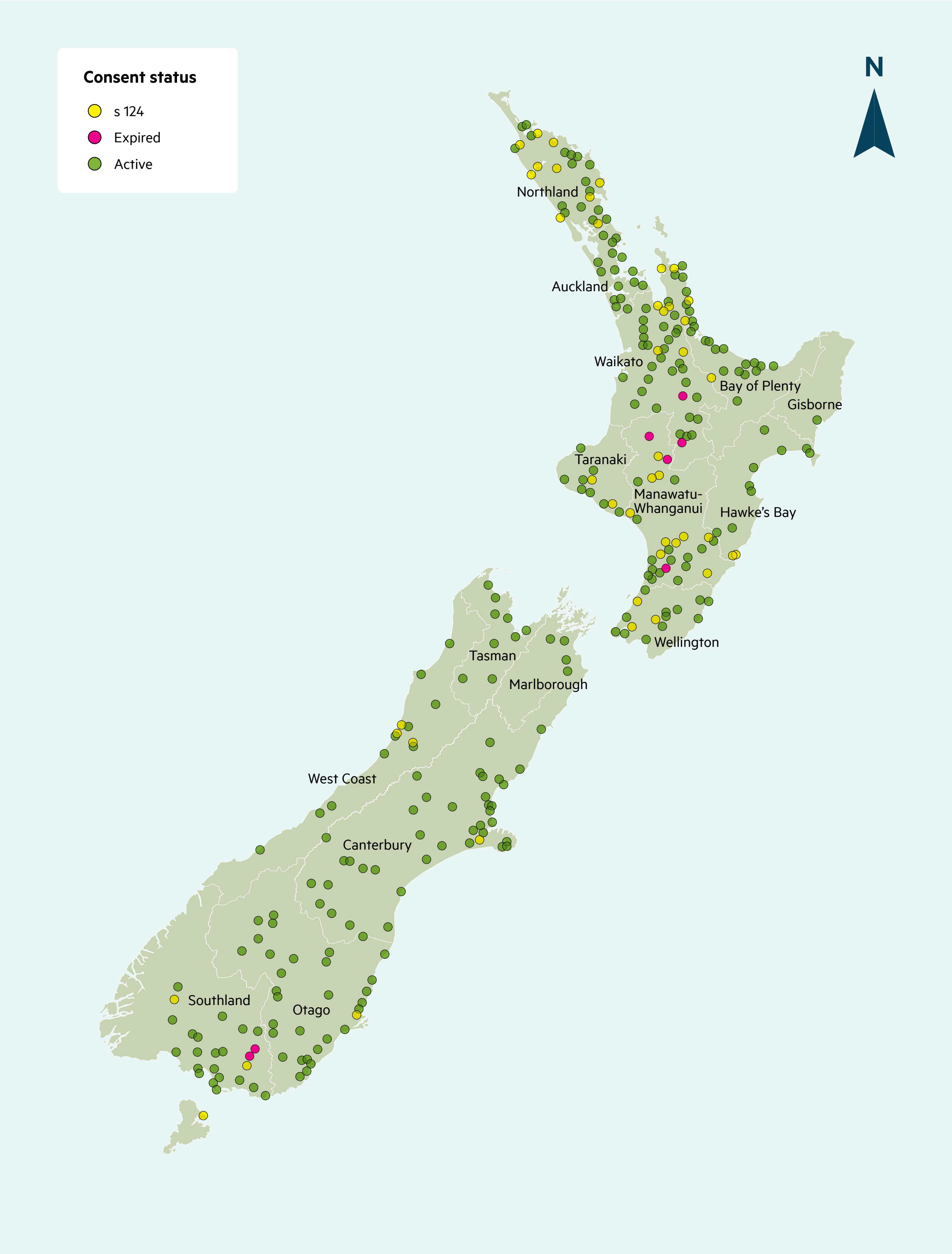
Figure 18 shows where councils are operating under active, expired consents or under s 124. Figure 18 shows that there are a few councils that have reported expired consents that are not operating under s 124. Where an expired consent is not operating under s 124, it may be because the plant has not yet applied for a new consent or is no longer operating at all.

The intent of the wastewater performance standards is to reduce some of the cost and time in applying for resource consents. Changes proposed in the Local Government (Water Services) Bill and the wastewater environmental performance standards would also allow a time limit to be set for how long a wastewater treatment plant can operate on an expired consent under s 124 (proposed at two years).[69]

68 Note for 33 discharge to land and water consents, we were not provided information about their specific consent status (and when they expire) and so these consents are not included in this analysis. Both Grey District Council and Watercare each made up a third of these consents with missing information.

69 This wastewater performance standards also propose a lead-in time for this time limit, to ensure network operators using expired consents have time to plan and fund the necessary upgrades.

Figure 18: Number of consents active, expired or operating under s 124 (under different population densities)[70]



70 We were only able to map consent information to networks where we had coordinates available from our existing wastewater register, so some consents may not be included on this map.

Overflows of untreated wastewater are unfortunately frequent, posing a hazard to the environment and public health

A wastewater overflow is when wastewater flows out of pipes, manholes, pump stations or engineered overflow points and into waterways or the sea before being treated.[71] Overflows are a risk to public health and can result in communities not being able to swim or collect seafood in particular areas.

Overflows can be caused by a range of factors:

- **Heavy rainfall** when there is more water than pipes can carry, wastewater can overflow, particularly when stormwater pipes are connected to wastewater pipes
- **Blockages** such as build-up of fat and oil, tree roots or incorrectly marketed products (e.g. flushable wipes) can prevent wastewater from flowing properly
- **Plant or equipment failures** or inadequate maintenance such as broken pipes or pump break down
- **Design** for example untreated wastewater is often designed to **bypass** the treatment plant during high flows and discharge directly into waterbodies
- **Population growth** can result in wastewater pipes with insufficient capacity – increasing the rate and frequency of overflows due to demand on the network.

Historically, in some parts of New Zealand, wastewater and stormwater have been designed to go through the same pipes. Combined sewers were designed on purpose to overflow into waterways during heavy rainfall. This can mean that some beaches or waterways, adjacent to this infrastructure, need to close for swimming or shellfish collection following storm events or periods of significant rain. We found that 8% of all wastewater pipes were reported to be combined with stormwater pipes where there is a higher risk of wastewater overflow (with the greatest length of combined pipes being reported in Napier and Waikato).[72]

The more water that can get into the wastewater system, the higher likelihood that an overflow may occur. One way to assess the risk of overflows is to look at the 'peak to nominal flow ratio'. This measure helps us understand the likely level of 'inflow' and 'infiltration' of water into the wastewater system (e.g. through damage to the network).

Generally, peak to nominal flow ratios below 5 are less likely to risk overflow.[73] Data reported to us suggests that the ratio of peak to nominal flow is between 2-6 for most network operators. However, there are over 20 network operators that have a ratio of above 10 where periods of rain would be much more likely to cause overflows.[74] See Appendix 5: Inflow and Infiltration.

Table 7: Length of combined stormwater and wastewater pipes by councils who reported them

Network operator	Length (km) of combined stormwater and wastewater pipe
Napier City Council	637
Waikato District Council	556
Grey District Council	316
Clutha District Council	285
Watercare	194
Ōpōtiki District Council	115
Tararua District Council	125
Kawerau District Council	95
Waitomo District Council	94
Ōtorohanga District Council	78
Gore District Council	44
Buller District Council	17
Chatham Islands Council	10
Whanganui District Council	4

Inflow is generally where stormwater gets into the wastewater network from illegal roof connections, low gully traps or cross-connected stormwater systems.

Infiltration occurs when water from saturated surrounding soil enters the wastewater network through defects in pipe joints, damaged pipes, private laterals in poor condition and/or offset manhole risers.

71 Overflows can also occur within the network, impacting connected properties and contaminating land and buildings.

72 Note this number is higher than expected so it may be that network operators are reporting when pipes are connected rather than fully combined.

73 Design criteria for sewers 'peak to nominal flow ratio' vary around the country. The Australian New Zealand Standard for Land Development and Subdivision Infrastructure provides a basis for design for several councils. This recommends design parameters that allow for dry weather diurnal peaking factors of 2.5, and an infiltration factor of 2 for wet weather.

74 Note higher population growth can also lead to a higher ratio – so a higher ratio is just a general indicator, rather than a determining factor.

Many wastewater overflows are likely to be unconsented and unmonitored

The approach to managing wastewater overflows varies significantly across New Zealand.

Regional councils set objectives, policies and rules in their regional plans to manage wastewater overflows and their impacts on environmental and public health. We asked network operators whether overflows in their district were permitted, controlled, (restricted) discretionary, or prohibited activities and if a resource consent is required, but none was held.

As shown in Figure 19, the most common response was that overflows are a prohibited activity, meaning consents are not needed for overflows. This data aligns with a stocktake of regional plans: around half of regional councils prohibit network overflows or consider them emergency discharges under s 330 of the RMA.[75] As overflows are inevitable, managing them as a prohibited or permitted activity means that there is limited or no monitoring or reporting, or requirements, to manage the impact of an overflow.

Figure 19: Number of different types of overflow consents

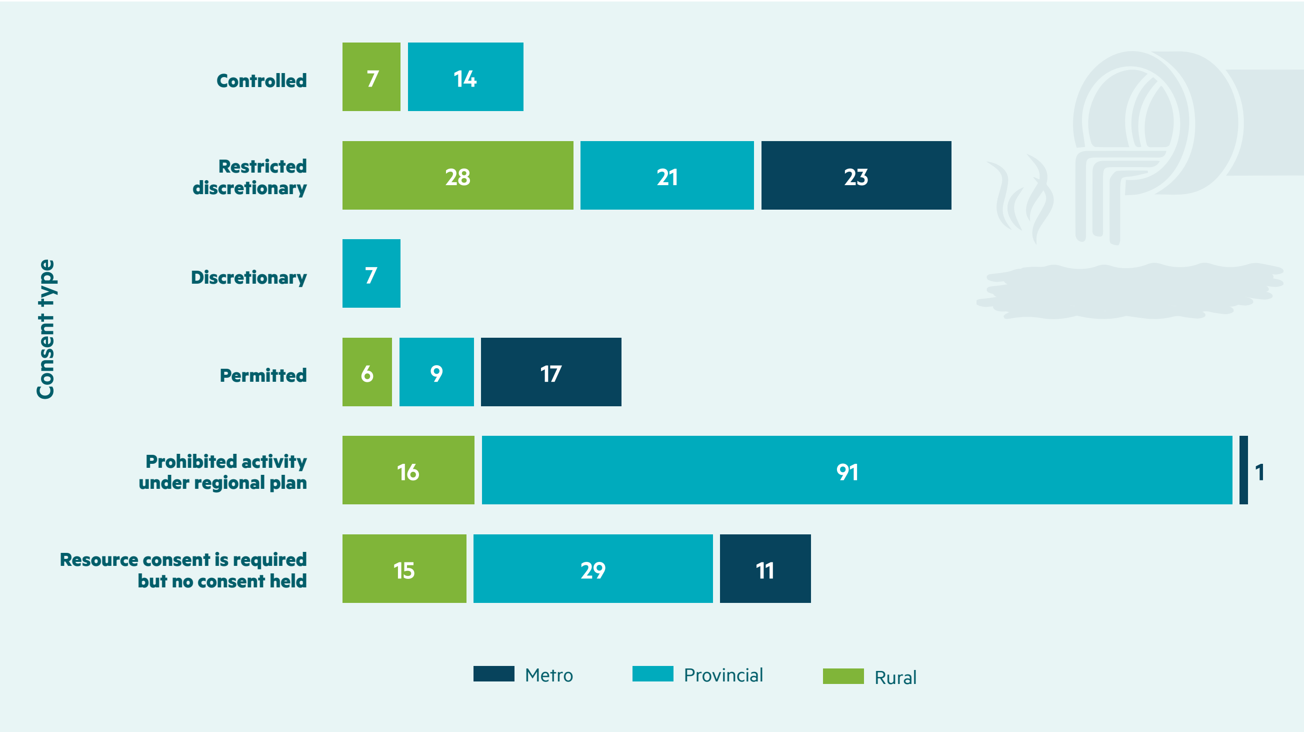


Figure 19 shows that in some cases consents are required, but not actually held, for overflows.

In total, we found there were 119 overflow consents across 49 networks (i.e. 15% of all wastewater networks) – meaning most wastewater networks do not have a consent for overflows.

As proposed, the wastewater network environmental performance standards would require all wastewater overflow and bypasses to be a controlled activity under the RMA, and therefore would need consenting which will allow better monitoring and reporting.

75 See Discussion-document-National-wastewater-environmental-performance-standards-FINAL.pdf

Monitoring overflows is important to know risks to the environment and human health

Right now, the approach to reporting on wastewater overflows varies significantly across the country. Inconsistent and poor-quality data also makes it difficult to understand the extent of overflows occurring nationally. An important first step toward reducing overflows is to have better data about when and where overflows occur.

Ngāti Toa – Cultural Monitoring Programme

The role and place of Ngāti Toa as kaitiaki is deeply embedded and passed on as part of their history of responsibility to the taiao/natural environment. With significant overflow issues in Porirua, a lack of up-to-date monitoring information inhibits the ability of some authorities to understand the issue and respond.

This case study highlighted the importance of investing in monitoring of overflows to inform people when there may be risks to the environment and public health. Wellington Water has installed network overflow monitors at different sites. These monitors provide updates to Ngāti Toa during network overflow events via phone alert.

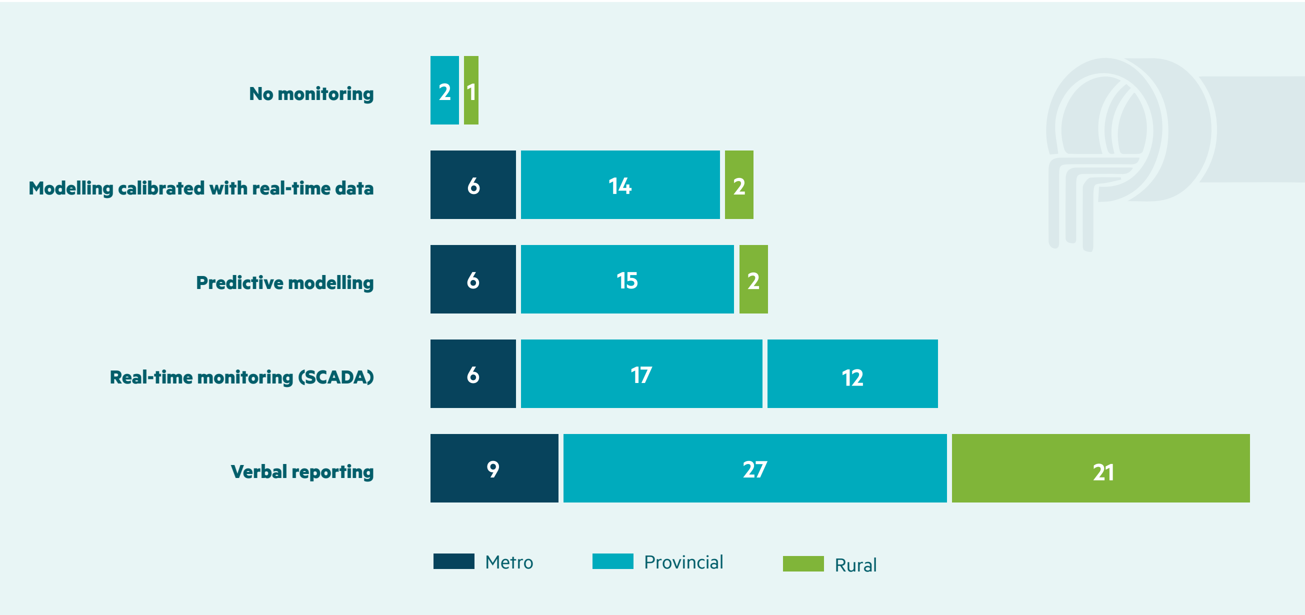
To increase their own ability to understand and monitor what's going on in the harbour, Ngāti Toa have partnered with Victoria University and the Institute of Environmental Science and Research (ESR) to develop and undertake a cultural monitoring programme within the Porirua Catchment. This programme is completely mana whenua led. The cultural health monitoring data has been instrumental to drive change through various channels such as the Porirua Harbour Accord.

Seven cultural monitoring sites have been set up in Te Awarua o Porirua. For the first time there will be cultural health data available for paua, kina, karengo (seaweed), temperature rise and microplastics. Results so far have not been good, including the presence of *E. coli* bacteria and heavy metals in the harbour.

Ngāti Toa are also involved in monitoring and sampling which is an effective way of reconnecting mana whenua with the harbour and environment. Sampling sites are in traditional mahinga kai (food gathering) areas to provide iwi with data relevant to their aspirations.

The accuracy of wastewater overflow reporting depends on the type of monitoring that takes place. We asked network operators to tell us whether and how they monitor and record overflow events.

Figure 20: Number of different types of monitoring approaches for overflows across different population densities



Requirements for monitoring are provided in regional plans or through consent conditions. Our data shows that verbal reports are the most common method of monitoring overflows. For 30% of councils verbal reports were the only type of monitoring.

As different types of monitoring can have different advantages or disadvantages, best practice combines all types of monitoring. Real-time monitoring with a telemetry system (i.e. SCADA)[76] is only practical to be installed on known (generally engineered) overflows so does not always capture all wet-weather overflow events[77] – while models can help predict overflows ahead of time.

Depending on whether wastewater network environmental performance standards are made as proposed, they would help to improve and standardise the type of monitoring of overflows, including reporting immediate risks to the public and requiring real-time monitoring at certain sites.

Long-term planning is important to ensure wastewater networks are resilient

Wastewater networks are particularly vulnerable to the impacts of climate change. Increasingly, severe weather events are likely to exacerbate the frequency and impact of overflows, and rising groundwater tables will increase the ingress of water into sewers. Wastewater treatment plants are often located at the lowest point in the network near a body of water. This means treatment plans can be vulnerable to flooding and sea level rise.

Long-term, integrated strategic planning and infrastructure investment can help operators address network issues, accommodate future urban development and growth, and respond to increased pressures from climate change and extreme weather events.

To plan effectively, network operators need to understand their main risks and constraints (see Appendix 5: Critical Assets). For example, in the last couple of years growth has been limited in Wairarapa towns of Greytown and Martinborough due to their wastewater treatment plants reaching capacity and failing to meet performance and compliance standards.[78] This meant that no more consents for wastewater connections can be granted. Network operators face challenges as populations grow and the effects of climate change are becoming more pronounced.

Next year's report will include more measures on wastewater

This chapter covered our first set of wastewater measures. Network operators have already started monitoring for the second set of wastewater measures that will be reported on next year (2024/25). The second set are more quantitative and will require continuous monitoring throughout the year, including on:

- The number and causes of wastewater overflows
- Condition of wastewater assets, number of faults as well as interruptions to the network
- Energy efficiency and emissions.

Relevant guidance in relation to wastewater measures includes:

- Good Practice Guide for Addressing Wet Weather Wastewater Network Overflow Performance[79]
- Pressure Sewer National Guidelines, 2020, Water New Zealand[80]

76 Supervisory control and data acquisition – is a system of software and hardware that allows organisations to monitor and control processes using real-time data – either locally or at remote locations.

77 For example, those that would occur from uncontrolled points in the network such as manhole covers.

78 For further information see https://swdc.govt.nz/martinborough-wwtp/ and https://swdc.govt.nz/greytown-wwtp/.

79 https://www.waternz.org.nz/Article?Action=View&Article_id=2303

80 https://www.waternz.org.nz/Article?Action=View&Article_id=1846

Part five:
Stormwater

In this part, we provide high-level context of the extent of stormwater systems in New Zealand.

There are a wide range of different organisations that own or manage stormwater networks including councils, NZ Transport Authority Waka Kotahi, Kiwi Rail and private owners, which can mean that stormwater is managed in an ad-hoc or fragmented way. Examples of good practice in stormwater management help to reduce the impact of high rainfall by using natural features or porous surfaces for land to absorb rainwater (reducing stormwater) – and taking a 'whole-of-catchment' approach.

Overall, we have limited national information about our stormwater networks. The lack of standardised reporting makes it hard to assess whether operators are ready for climate-related events. The Authority is working to develop an initial set of stormwater measures which will help increase understanding of and reporting on this essential infrastructure at a national level.

Stormwater is the runoff of water from rainfall or occasionally snow on hard (or impervious) surfaces. For the purposes of the Water Services Act 2021, stormwater networks cover the infrastructure and processes that relate to stormwater in urban areas. In a natural environment, this runoff would be absorbed into the soil, flow into natural waterways or recharge aquifers and eventually flow to sea.

In our cities and towns, stormwater is managed by networks of waterways, pipes or paths that direct water away from people or property and discharge it to land, sea or large waterbodies. Unlike drinking water and wastewater, which are typically contained entirely within piped networks, stormwater networks can also include natural waterways such as creeks, streams, rivers, wetlands, ponds and other open channels such as kerbs, drains and swales that drain roads.[81]

Stormwater can impact the environment as:

- **Stormwater picks up contaminants** such as heavy metals from roads and chemicals from industrial areas, as it flows through urban areas, before being discharged into the environment
- **Large flows of water can result in flooding,** particularly where there are a lot of hard (impervious) surfaces, and no area for water to go (or be stored), or soak naturally into the ground.

In Te Ao Māori, rainwater is a treasured gift that gives life to te taiao (the environment). Even running through our stormwater networks, Māori view water as an indivisible whole that should not be separated and defined by specific uses. The mauri (life force) of polluted water can be restored by soaking into or passing over the whenua (land), essentially allowing it to run its natural course before it is released into receiving environments. Urban living and changes to the environment have disrupted the cycle of water – meaning that the stormwater in many urban environments is not able to be soaked or cleansed by the land to the same extent before being released into the receiving environment.

This chapter includes case studies that aim to restore natural stormwater processes and reduce impacts on the environment and Māori cultural values.

81 Under the Water Services Act 2021 a 'stormwater network'– (a) means the infrastructure and processes that – (i) are used to collect, treat, drain, store, reuse, or discharge stormwater in an urban area; and (ii) are owned or operated by, for, or on behalf of one of the following: (A) a local authority, council-controlled organisation, or subsidiary of a council-controlled organisation: (B) a department: (C) the New Zealand Defence Force; and (b) includes – (i) an overland flow path: (ii) green water services infrastructure that delivers stormwater services: (iii) watercourses that are part of, or related to, the infrastructure described in paragraph (a).

Many people and organisations have a role to play in managing stormwater

Various parts of our stormwater systems are owned, managed or operated by different people or organisations – all with a different role to play. For example:

a) **District, city and unitary councils** are responsible for maintaining an urban stormwater network and control land use (e.g. subdivision), as well as building consents that can impact on stormwater

b) **Regional and unitary councils** are the main regulators responsible for consenting discharges to waterbodies and manage flood risk from major waterways

c) **NZ Transport Agency Waka Kotahi** is responsible for drainage from state highways

d) **KiwiRail** is responsible for drainage from state rail corridors

e) **Private property owners** may be responsible where there are small or intermittent watercourses on private property with structures that could affect water flow, such as culverts or bridges.

The fragmented nature of roles for stormwater can mean that it can be unclear who is responsible for specific outcomes, especially in flood-prone areas. For stormwater, the Authority's role is oversight of the regulation, management and environmental performance of stormwater networks in urban areas that are operated by councils, council-controlled organisations, government departments and the New Zealand Defence Force.[82]

Urban development can increase runoff and pollution through the stormwater network

As stormwater networks combine a wide variety of constructed infrastructure (such as pipes, channels and pump stations) alongside natural features or 'blue-green infrastructure', understanding their full extent can be more difficult than for other water networks.

In urban areas, where there are more sealed (impervious) surfaces (such as paved streets and parking lots) the amount of runoff is generally higher, leading to more contaminants entering our waterways. Large amounts of impervious surfaces in urban environments can also sever the connection between surface and groundwater, reducing the amount of rainfall that soaks into the ground or changing its flow into urban streams.[83]

Aside from preventing contaminants being picked up by water in the first place, rainwater being absorbed through green spaces, redirected or treated is the main way to prevent pollutants from entering waterways. Green spaces such as wetlands can act like giant sponges, slowing the flow of rainwater and trapping and filtering pollutants. Other stormwater infrastructure can include treatment devices, permeable paving (i.e. porous paving that allows rainwater to run through), and water detention ponds.

Most stormwater is discharged into the environment without being treated first. Installing stormwater treatment devices prior to stormwater entering the receiving environment is best practice and reduces contaminants entering natural waterways. Awareness of stormwater treatment devices (see Box: **What are stormwater treatment devices?**) has been growing among network operators and devices are now usually installed as networks are upgraded or when new development occurs. Table 8 shows the number of stormwater treatment devices installed by councils according to data collected by the Department of Internal Affairs.[84] While the data on treatment devices is currently limited, we expect the development of our stormwater performance measures will provide greater clarity as to the level of treatment across the country.

82 An urban area means an area identified in a territorial authority's district plan or proposed district plan as being primarily zoned for residential, industrial, or commercial activities, together with adjoining special-purpose and open-space zones.

83 Parliamentary Commissioner for the Environment (2023). Are we building harder, hotter cities?: The vital importance of urban green spaces. https://pce.parliament.nz/media/tetah53z/report-are-we-building-harder-hotter-cities-the-vital-importance-of-urban-green-spaces.pdf (Accessed 3 June 2026)

84 The National Transition Unit (NTU) at the Department of Internal Affairs worked to standardise some of the GIS data from local councils across the country on stormwater. While this data helps indicate the extent of the networks, there are large gaps in the data depending on what information has been submitted to the NTU and is attributable to a particular council.

Table 8: Number of treatment devices by council

Council	Number of treatment devices
Auckland	6,310
Christchurch	245
Selwyn	187
Porirua	172
Taupō	52
Queenstown Lakes	49
Tauranga	45
Gisborne	29
Ashburton	20
Hastings	11
Waimakariri	9
Waikato	6
Nelson	2
Timaru	1
TOTAL	**7,138**

What are stormwater treatment devices?

Stormwater treatment devices are best practice to reduce the reduce contaminants, particularly in sensitive receiving environments.

The types of treatment devices counted in Table 8 includes debris, oil and traps, oil and silt traps, silt traps, detention ponds, rain gardens and soakage chambers.

Stormwater infrastructure must be designed to respond to population growth and climate change

When large volumes of rain fall on built-up areas, stormwater can become a risk to people and property. In times of high rainfall, demand on the stormwater network can exceed what the network was initially designed to manage in areas dominated by impervious surfaces (e.g. roads, carparks and buildings) – causing flooding. Consequently, stormwater systems need to be designed to reduce the impact of increased intensity of rain events that will result from climate change,[85] as well as more intense development. Droughts can also cause problems – as without a regular flow of water through the network soil can harden (increasing runoff) and blockages can occur during periods of heavy rain. Retrofitting the stormwater network to allow more capacity in urban areas as a population grows and urban areas get denser (with more impervious surfaces) is challenging, but needed to reduce the hazard risk from intensive rain events.

85 https://deepsouthchallenge.co.nz/wp-content/uploads/2021/01/Stormwater-wastewater-and-climate-change-Impacts-on-our-economy-environment-culture-and-society.pdf

Te Ara Awataha – A greenway for Northcote, Auckland

These photos show images on the day of the floods and the day after at Greenslade reserve in Northcote – showing how quickly the water was able to drain – diverting and managing the extreme amounts of rainwater and preventing the extent of flooding they had seen in the past.

During the Auckland anniversary weekend floods in January 2023, in those areas where there had been an effort to retrofit 'blue-green' stormwater infrastructure (i.e. more open channels and green spaces) it had made a big difference in the floods.

In Northcote, two projects had recently been completed as part of Te Ara Awataha. Te Ara Awataha means 'the path of the Awataha' and reflects the deep significance of the water source and cultural connection to mana whenua. Te Ara Awataha is a programme for 'new greenway' of 1.5km network of existing and new reserves:

- Ngutu Kōtare – a stormwater pipe was opened up (or 'daylighted') into a stream running alongside Onepoto Primary School and Northcote Intermediate School
- Te Kaitaka, Greenslade Reserve was transformed into a stormwater detention park, with a planted urban wetland.

Bringing the Awataha Stream to the surface allowed flood water to be channelled along the stream bed, rather than through private property, with the open channel providing much greater capacity than the older piped network. The stormwater detention park allowed stormwater to be held temporarily before releasing it slowly. The increased capacity and better delivery of stormwater management in Northcote has enabled the redevelopment of the town centre and surrounding residential area without requiring additional interventions, as these areas were previously in flood-prone zones.

Te Ara Awataha greenway network links existing and new reserves, providing areas for recreation and conservation. When not in flood, the returned stream bed will improve water quality and create habitat for manu (birds), ngāngara (insects) and tuna (eels) once more. The paths alongside the stream have rapidly become a valuable means of connection – both to local areas and to nature.

The project was developed working closely with mana whenua and the community, including design workshops with local schools. Mana whenua gifted a project name to Northcote's greenway and permanent names to all the spaces within this 1.5km project. The delivery of the project is being done in parts by Auckland Council Healthy Waters, Kāinga Ora and Eke Panuku Development, with all parties collaborating to deliver on the masterplan of the project.

A holistic approach to stormwater management can bring multiple benefits

Stormwater activities are generally permitted within regional plans, meaning a resource consent from a regional council may not be required. Resource consents are sometimes required where stormwater is discharged into a sensitive environment.

International best practice for stormwater networks generally takes a whole-of-catchment view of the network (i.e. identifying and managing key risks by looking right across the district or catchment rather than at a property-by-property basis).

Traditionally, stormwater has largely been managed in New Zealand in an ad-hoc way, with a focus on piped reticulation systems. More councils are working to take more of a system view and recognising the wider benefits that integrated water management, water sensitive design and improving green spaces can bring. Making room for flooding (i.e. allowing the water space to move and pond, designing our cities around water (and other natural features) rather than trying to fight against it) can bring wider benefits (see Box: **Te Kuru – Christchurch – Partnership and Community Approach in Practice**).

Te Kuru – Christchurch – Partnership and Community Approach in Practice

The stormwater project 'Te Kuru' in the upper Ōpāwaho Heathcote River catchment started in 2012 and was opened to the public in October 2024.

This 100ha area in southwest Christchurch was originally a raupō wetland prior to being drained for farming in the 19th century. Identified for decades as a key area for stormwater management, there was an opportunity post-earthquake to purchase land to develop a large multi-value for flood management and treatment of stormwater runoff. The area can store over one million cubic metres of flood water, protecting houses downstream from severe flooding. Stormwater treatment is provided for both urban and rural runoff through multiple wetland basins.

Alongside flood and stormwater management, opportunities to enhance and restore the ecosystems have been taken at every opportunity that goes beyond just stormwater infrastructure. Working in close collaboration with mātauranga Māori advisors and stream care groups the project team has restored over 3km of stream, wetland and protected springs, including through planting over 150,000 native trees and 650,000 native plants.

Part of the project involved restoring the Cashmere Stream and directly involving mana whenua through subcontracting an expert (rongoā tohunga), to ensure the rongoā gardens and mahinga kai areas were developed within tikanga values and in line with mana whenua aspirations.

Alongside the rongoā garden, the project has included social research and approximately 14km of recreational paths for pedestrians and cyclists. Paths have helped connect the community to the local environment, the history of the area (e.g. through signs telling the story of the area) and enhanced the well-being of those who visit.

The Ōpāwaho Heathcote River Network (OHRN) and Cashmere Stream Care Group (CSCG) have been key in engaging the community. A 'Nature Agents' school group has been funded to allow students to take part in citizen science.

New measures and plans for stormwater are coming

Recent changes proposed as part of the Local Government (Water Services) Bill will require network operators to develop risk management plans for stormwater networks so that operators identify and manage their critical infrastructure, as well as hazards and risks in their networks. We will be also starting to develop new measures for stormwater this year. Both initiatives will help us work towards better information on stormwater, to ensure cities and towns are better prepared for climate events in years to come.

Glossary

Technical terms

Term	Definition
Act, the Act	The Water Services Act 2021
Backwash	Water from the filtration and contaminant removal processes at a drinking water treatment plant.
Current Annual Real Losses (CARL)	The total amount of water lost through all types of network leaks, bursts and overflows, up to the point of measurement, estimation or consumer consumption.
Department level	Applies to reporting by central government departments or the New Zealand Defence Force | Te Ope Kātua o Aotearoa. Some measures are to be reported at a 'department level', which means data should be aggregated and reported for all water services operated by the department.
District level	Applies to reporting by councils or council-controlled organisations. Some measures are to be reported at a district level, which means data should be aggregated and reported for all water services operated by the local council and council-controlled organisation or regional council.
Drinking water network	For guidance purposes in this report, means a drinking water supply (operated by, for, or on behalf of a drinking water network operator), with elements comprising a system used to abstract, store, treat, transmit or transport drinking water for supply. Defined in s 140 of the Act.
Greywater	Liquid waste from domestic sources, including sinks, basins, baths, showers and similar fixtures, but does not include sewage, or industrial and trade waste.
Infrastructure Leakage Index (ILI)	ILI is the ratio of Current Annual Real Losses (CARL) to Unavoidable Annual Real Losses (UARL).
Level of service	Service parameters or requirements for a particular activity or service area (e.g. provision of drinking water, wastewater or stormwater network services) against which performance may be measured. Such service levels can relate to dimensions of, for example, quality, quantity, reliability, responsiveness, environmental acceptability and cost.
Municipal	Belonging to a town or city, or its governing body.
National Performance Review (NPR)	An annual report published by Water New Zealand from 2008 to 2022 on the performance of council drinking water, wastewater and stormwater services.
Network	The infrastructure and processes associated with drinking water networks, stormwater networks or wastewater networks, as defined in the Act.
Network environmental performance measure (measure)	For guidance purposes here, this means indicators used to monitor certain key aspects of the environmental performance of networks that we are interested in. Provided for in s 145 of the Act. A list of the current measures, data points and detailed definitions can be found on our website.
Network level	Some measures are to be reported at an individual network level, which means that data should be collated and reported for all connections relating to each network.
Network operator	Defined in relation to stormwater networks, wastewater networks, and drinking water networks in ss 5 and 140 of the Act. Also see Part One: Introduction. For guidance purposes here, this means an organisation that operates a network, being a council, council-controlled organisation, government department or the New Zealand Defence Force | Te Ope Kātua o Aotearoa.
Overflow	Instances where untreated or partially treated wastewater spills, surcharges, discharges or otherwise escapes from a wastewater network to the external environment.

Term	Definition
Regional council	Defined in s 5 of the Local Government Act 2002, including unitary authorities to the extent they exercise regional council responsibilities, duties and powers. In the context of this report, regional councils are the primary regulators of the environment under the RMA, although in this report three regional councils also reported data as drinking water network operators.
Resilient	Able to withstand or recover quickly from difficult conditions.
RMA	Resource Management Act 1991.
Sewage	Human excrement and urine.
Stormwater network	For this report, means an urban stormwater system (operated by, for or on behalf of a stormwater network operator) with elements comprising a system used to collect, store, transmit through reticulation, treat and discharge stormwater. Defined in s 5 of the Act.
Swale	Swales, also known as bioretention, filter or infiltration strips, are broad, grass channels used to treat stormwater runoff. They direct and slow stormwater across grass or similar ground cover and through the soil.
Territorial authority	City and district councils, including unitary authorities (that are territorial authorities that have regional council responsibilities, duties, and powers conferred on them). In the context of this report, all territorial authorities are network operators.
Trade waste	Defined in s 5 of the Act as: Any waste that is: a. produced for an industrial or a trade purpose, or a related purpose, and b. discharged into a wastewater network. Also defined in the National Planning Standards as: industrial and trade waste means liquid waste, with or without matter in suspension, from the receipt, manufacture or processing of materials as part of a commercial industrial or trade process, but excludes sewage or greywater.
Treated wastewater	In the context of this report, means treated wastewater leaving a wastewater treatment plant ready for discharge into the receiving environment. In other documents, the term 'effluent' is sometimes used interchangeably with 'treated wastewater' and effluent may also be used to refer to livestock liquid waste (e.g. dairy effluent). To avoid any confusion, we use the term 'treated wastewater'. Also see 'wastewater'.
Unavoidable Annual Real Loss (UARL)	A simplified equation to estimate the volume of water that is expected to be lost (m^3/year) even in a water supply of good condition with intensive active leakage control. It is based on the length of main, number of service connections, length of service connection pipes and the average operating pressure.
Urban area	For guidance purposes here, means an area identified in a district plan or proposed district plan as being primarily zoned for residential, industrial, or commercial activities, but not including areas zoned primarily for rural or rural-residential activities. Defined in s 5 of the Act.
Wastewater	Any combination of two or more of the following wastes: sewage, greywater or industrial and trade waste.
Wastewater network	Defined in s 5 of the Act. For guidance purposes in this report, means a wastewater system (operated by, for, or on behalf of a wastewater network operator), with elements comprising a system used to collect, store, transmit through reticulation, treat and discharge wastewater, including: • distribution system (including a piped network and storage) • wastewater treatment plant.
Water networks	The infrastructure and processes associated with drinking water networks, stormwater networks and wastewater networks.
Water New Zealand	A water industry body representing water management professionals and organisations.

Kupu Māori

Term	Definition
Hapū	Kinship group, tribe.
Iwi	Extended kinship group, tribe.
Kaitiakitanga	Guardianship and stewardship. The obligation of tangata whenua to preserve, restore, enhance and sustainably use freshwater for the benefit of present and future generations.
Kaimoana	Seafood or shellfish.
Mātauranga	Mātauranga is broadly defined as a body of knowledge, experience, values and philosophy of Māori. it includes the unique knowledge and understanding Māori have of the taiao/the environment.
Mahinga kai	Means kai (food) is safe to harvest and eat, generally referring to freshwater species. It can also mean customary resources are available for use, customary practices are able to be exercised, and tikanga and preferred methods are able to be practised.
Mana	Prestige, authority, control, power.
Mana whenua	Customary authority exercised by an iwi or hapū in an identified area.
Mauri	Life principle, life force, vital essence, special nature, a material symbol of a life principle, source of emotions – the essential quality and vitality of a being or entity.
Tangata	People, persons, human beings.
Tangata whenua	People of the land. In relation to a particular area means the iwi, or hapū, that holds mana whenua over that area.
Taiao	Natural world, environment.
Te Mana o Te Wai	At its core, Te Mana o te Wai is about restoring and preserving the balance and wellbeing between the wellbeing of water, the environment and our communities. Also see Part One: Introduction and s 14(1) of the Act.
Te Ao Māori	Te ao Māori (literally 'the Māori world') is a phrase often used to indicate the knowledge, understandings, and practices that have arisen from the distinct and Indigenous cultural context of New Zealand.
Te Puna	The Authority's Māori advisory group, established by s 14 of the Taumata Arowai – the Water Services Regulator Act 2020.
Tikanga	The customary system of values and practices that have developed over time and are deeply embedded in the social context.
Wai	Water.

Appendix 1:
Key methodological matters and choices

This appendix summarises some of the key methodological choices, matters or approaches that underpinned the analysis of data provided by network operators. This appendix is broken into three sections:

- Key choices or approaches made by the Authority
- Key choices or approaches made by network operators
- Key choices or assumptions for processing National Transition Unit data on stormwater.

Key choices or approaches made by the Authority

Reporting on data confidence

Network operators were required to provide a confidence level for the data entered in each measure of their submission. The confidence intervals used are as follows:

- Highly reliable/audited.
- Reliable/verified.
- Less reliable.
- Uncertain.
- Very uncertain.

The external review found that operators have a very low understanding of how to rate the confidence of their data in a way that aligns with the network environmental performance measures guide. For example, more than one operator provided their confidence as 'highly reliable' even though they were certain that they did not know. In such cases, their confidence rating should have been 'very uncertain'. There were also situations where suppliers did not provide a value for the measure but provided a confidence rating due to not knowing the information. This should have been left blank.

Overall, 80% of operators who were part of the external review were advised to change at least one of their confidence ratings (usually to a lower level of confidence).

Given their low reliability, in this report we do not use the confidence ratings as much as we did last year. We chose to exclude confidence ratings from final performance scores due to their inconsistent application across operators.

Number of public networks included in the report

For the purposes of reporting against our measures, network operators were asked to exclude any drinking water network with a peak population of less than 100 people or any network that sources drinking water solely from rainwater collection tanks.

Two network operators entered a total of three networks that were under 100 people. Also, eight networks submitted by the Ministry of Education were solely from rainwater collection. As information submitted for these networks was minimal it was still included in the analysis.

There are more networks this year (576) than last year (458) likely largely due to the Ministry of Education submitting data this year that includes 113 networks. We also found a discrepancy between the total number of networks reported for measure D-A1 (576) and the number of list of networks collated for the network level measures (550).

How network operators determine number of connections in a network

Different network operators may calculate the number of 'connections' (i.e. to households or businesses) in the network differently. This is important because differences in the number of connections can affect analysis of other measures (e.g. looking at data on a 'per connection' basis). The different ways they can estimate connections are:

- Having water meters on every connection in a network (most accurate option)
- Estimating the connections based on the number of properties into a distribution zone – (errors can occur where properties can have multiple connections (i.e. an apartment building or large industrial facility)
- Estimating the number of connections based on population in the network (errors can occur as the number of people per connection will vary).

This variation affects any per-connection metrics (like leakage or cost) and may bias comparisons between councils that have a more accurate measure of connections.

Analysis by population

To enable comparisons between similar operators and networks we grouped the data submitted by network operators using the following categories of population. We have primarily used the lists of councils by Local Government New Zealand based on the following categories:

- Metropolitan – 90,000 or more
- Provincial – 20,000-90,000
- Rural – less than 20,000.

Sometimes the data was collected at the level of each network (we call this 'network level') – and at other times it is collected for the district or department as a whole ('district' or 'department level'). Some of the data is analysed differently, depending on what level it was collected at (e.g. we use different categories of population when it is collected at the network level compared to organisation – (see below).

When looking at data at a more granular level (i.e. by each individual network, we needed to break down the population density analysis further using the following categories by Stats NZ (based on densities that share common urban or rural characteristics)).

- Major urban area – 100,000 or more residents
- Large urban area – 30,000-99,999 residents
- Medium urban area – 10,000-29,999 residents
- Small urban area – 1,000-9,999 residents
- Rural settlement – 200-999 residents
- Rural other.

Choices by network operators

Methodologies for assessing asset condition

There are a variety of methods to assess the condition of assets. The simplest method is to conduct a visual inspection. This works well for above ground assets, but for below ground assets other strategies are required.

Our external review identified nine different approaches to assess condition, including:

- Benchtop review of historical data such as asset reports, asset age, asset faults and maintenance records to derive the condition.
- Physical/visual inspections that could be a combination of destructive or non-destructive methods. In some cases, this may require excavating and testing of asset materials to determine a condition (e.g. in a lab). In other cases, non-destructive tests using methods such as pipe penetrating radar, and electromagnetic testing can be used.
- Knowledge-based exercise involving experienced operators generating estimations of conditions and comparisons of current asset life against theoretical values. This is another form of benchtop review.

The best assessments combine all these methodologies.

Our guidance[86] emphasises that all pipes and associated equipment that have received a condition grade should be reported through the measures, regardless of how the condition was assessed. For example, not only pipes assessed using direct inspection methods should be reported, but also those that have received a condition grading based on the interpolation of age or other factors.

Our guidance also highlights that the definitions of poor, and very poor condition, should align with the definitions provided in the Institute of Public Works Engineering Australia's International Infrastructure Management Manual:[87]

- poor condition – consider renewal
- very poor condition – approaching unserviceable.

Methods for assessing water loss

Water that is lost from the network can be broken into two categories:

- **Current Annual Real Loss:** when there is leakage from the network due to failures in the network like broken mains, leaking valves or overflows from reservoirs.
- **Unavoidable Annual Real Loss:** captures the minor seepage that would occur through service connections and valves (because no network is perfect). This value is usually estimated based on the length of the network, number of connections and pressure.

The amount of water loss relates to the amount of water supplied and water used as shown below.

<table>
<tr><td rowspan="4">Water supplied to drinking water network (D-EH4)</td><td colspan="2">Non-residential water use (D-EH7)</td></tr>
<tr><td colspan="2">Median Residential Water Consumption (D-RE4)</td></tr>
<tr><td rowspan="2">Estimated Total Water Network Loss (D-RE1</td><td>Current Annual Real Loss (CARL) (D-RE2)</td></tr>
<tr><td>Unavoidable Annual Real Loss (UARL) (D-RE2b)</td></tr>
</table>

86 Water Services Authority – Taumata Arowai (2024). Network-Environmental-Performance-Measures-and-Guide-2024 (12).pdf (Accessed 3 June 2025)

87 See Institute of Public Works Engineering Australia. https://www.ipwea.org/resourcesnew/bookshop/iimm (Accessed 3 June 2025)

Another measure for understanding water loss is the 'Infrastructure Leakage Index' (ILI) developed by the International Water Association (IWA). This method uses the ratio of Current Annual Real Loss and Unavoidable Annual Real Loss to take into account characteristics of the network that affect water loss like the number of connections, the length of pipeline and operating pressures to allow compares between networks. The ranges of the ILI can identify different levels of response:

a. ILI range of less than 2: Where reducing any further loss may be uneconomic unless there are shortages. Careful analysis is needed to identify cost-effective leakage management

b. ILI range between 2-4: Where there may be possibilities for further improvement, such as pressure management, better active leakage control and better maintenance

c. ILI range between 4-8: Where there is poor leakage management, tolerable only if plentiful cheap resources – even then, analyse level and nature of leakage and intensify reduction efforts.

d. ILI range greater than 8: Very inefficient use of resources, indicative of poor maintenance and system condition in general. Leakage reduction programmes imperative and a high priority.

Choices or assumptions on processing stormwater data

The Department of Internal Affairs National Transition Unit (NTU) (now disestablished) provided the Authority GIS data of local council stormwater assets. The data received contained a mix of NTU derived and original council data fields. For the purposes of this report, where possible the NTU data fields were used to filter for the assets of interest. In some instances, due to a lack of complete fields (e.g. blank cells) the information presented is not the full picture of stormwater assets across the country. Given the limited data available, we only summarised information from stormwater treatment devices in this report.

Appendix 2:
Analysis of data quality

This appendix assesses the quality of data against some key factors.

Accuracy

Accuracy of the data depends on the data supplied to us by network operators. While there were problems with some of data provided, the accuracy improved from last year. Some of the actions we took to improve data accuracy this year were:

- Taking a staged approach to introducing new measures to avoid too many new factors being introduced at the same time (leading to more inaccuracies)
- Improving the data collection spreadsheet by:
  - » Making it clearer where network operators should submit their data
  - » Clarifying the units for each measure
  - » Providing guidance notes within each measure of the spreadsheet
  - » Setting upper limits for each measure to prevent inaccurate data being submitted (in some cases the limits were set too low and we needed to modify the template).
- Checking outliers that were above or below the normal range by contacting councils and updating the data where it was inaccurate. We determined if data was an outlier by:
  - » Setting the lower bound as 25th quartile – 1.5 x (75th quartile – 25th quartile)
  - » Setting the upper bound as 75th quartile + 1.5 x (75th quartile – 25th quartile)
  - » Applying this filter to all the numerical measures and designate all the data that is outside of the target range. We also analysed the effect of removing outliers on the range of data.
- To mitigate problems with the wide range of data where possible we used 'median' rather than 'average' – as medians are less likely to be influenced by some of the more extreme data. This was done to reduce the effect of outliers, which can distort averages and mask true performance.
  - » For example, as shown in Figure 22 we looked at the effect of removing outliers on the range of data reported on the ILI for councils that were not part of the external review. Removing the outliers reduced the range of data by more than half for the 'rural other' category. This shows the large effect removing outliers can have (e.g. on averages).

Completeness

Seventy out of 71 network operators submitted data in response to the measures. However, the completeness of the response from network operators varied significantly depending on the measure – with almost all network operators responding to some measures, and only a few responding to others. Some measures may be less relevant for operators, or may be more difficult for some operators to respond to if they do not have the correct infrastructure, technology (e.g. meters) or systems in place to measure them.

Drinking water measures received less complete responses from operators, likely due to a greater number of more complex measures compared to wastewater. The average response rate for the drinking water measures was 74% – higher than in 2022/23 (at 71%) but lower than wastewater measures at 92%. The wastewater measures have a higher response rate than the drinking water measures, likely due to there being more drinking water measures and the measures themselves being more complex. For example, the measures for wastewater were quantitative (i.e. number of assets, resource consents, as opposed to drinking water where there was more operational data (i.e. volumes, pressures, response rates).

Consistency

There are inconsistencies in the data due to the different methodologies used by suppliers to determine their response. This inconsistency makes it difficult to compare performance across councils or track national trends over time. For example, when reviewing the data for a number of residential connections, suppliers listed three different methods of determining this value. The consultant performing the third-party review of 20 suppliers noted that the pipe condition data used nine different methodologies to arrive at a value.

Without consistency in the data, it may be difficult to make accurate comparisons between various suppliers. In future, we intend to provide further guidance to ensure similar methodologies are used by network operators to determine the values for the various measures.

Validity

To improve the validity of the data for the 2023/24 period, we commissioned an independent review on four drinking water measures for asset management and water loss. Because of budget and time constraints, only 20 network operators were reviewed – covering a range of different types of councils. (Note government suppliers were not included in the review as most government operators do not have assets that are comparable in scale to councils.)

Because of the problems with data encountered in the review (and the opportunity they were given to resubmit their data), we provided the same opportunity for all suppliers to resubmit on the four measures. This was opened up to all suppliers to ensure validity of the data and 31% took up this opportunity.

We compared the range of data between both the reviewed and non-reviewed groups to understand what effect the review had had on the overall range of data for one measure (ILI). We found that the range across five out of six population densities, reducing most significantly in medium urban (see Figure 21 below).

Timeliness

The data is for the year ending June 2024 – so is relatively recent and will be updated annually. There were some challenges with the timeliness of the data. Data was to be submitted on 30 September 2024:

- Several suppliers missed the deadline (an additional two weeks were given to them)
- Delays in the submission resulted in shortened timeframes for drafting the report.

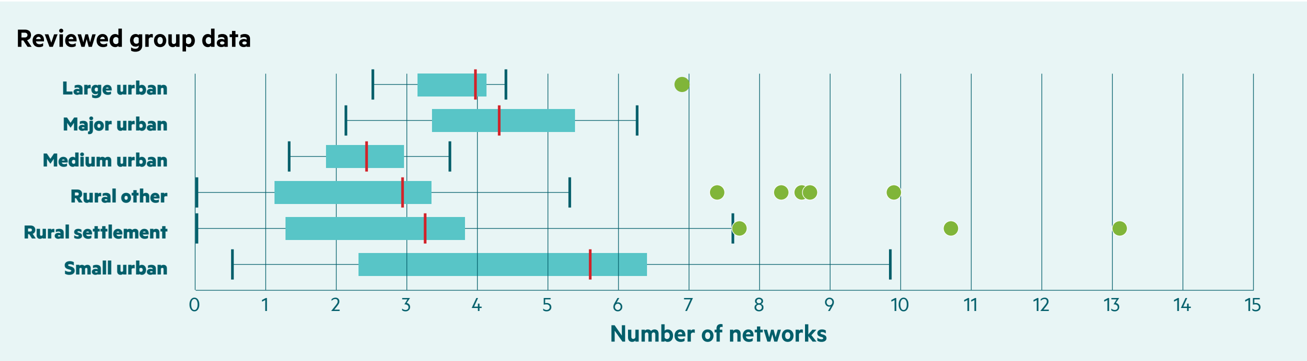
Uniqueness

For a few measures, there were some issues with network operators duplicating information, where a manual review of consents was needed to remove duplicates. For example, water-take limits were repeated since consents apply to multiple abstraction points

Integrity

Integrity of the data can be measured by the data confidence. We required operators to report on the confidence was to measure the auditability of the data. However, the external review found that there was a poor understanding of how to assess data confidence (see Appendix 1 for more on data confidence).

Figure 21: Comparing the range of data between the councils that have been externally reviewed with those who were not reviewed (the dots on the plot represent outliers)



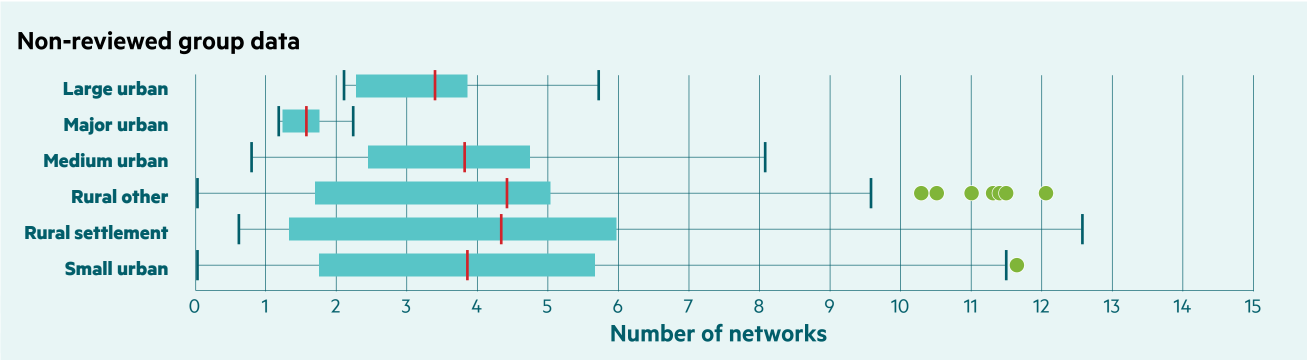
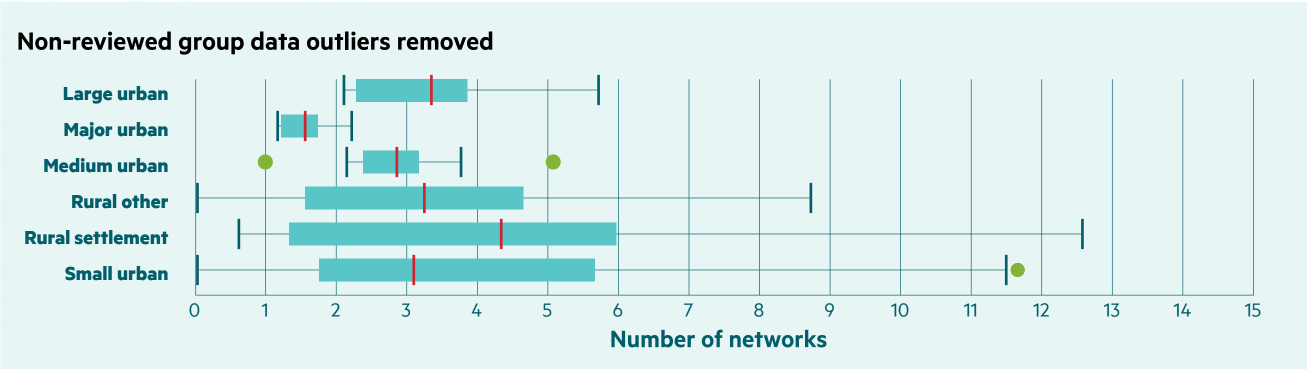


Figure 22: Non-reviewed group data for infrastructure leakage index with outliers removed



Appendix 3:
Overview of findings on key measures

Drinking water measures summary

Table 9: Summary of drinking water measures (highlighted blue = new measure)

Outcome	Measure	Summary	Average response rate
Environmental and Public Health	**Volume abstracted**	In total, network operators reported that they supplied 728,000,000m^3 of water over the 2023/24 year – 12 % higher than last year. Most water volume comes from surface water, which is typically more vulnerable to contaminants than groundwater.	76%
	Resource consent compliance	11 % reported their 'water-take' consents did not always meet their consent conditions for rate or volume of water take (9% of water-take consents are expired). In the next 10 years, 44% of water-take consents will expire and may need to be reconsented by regional councils or a new source found (including for 9% of consents that have already expired).	77%
	Drinking water treatment byproducts	The total amount of backwash water reported to us from filtering and removing contaminants at drinking water treatment plants is 15,400,000 (m^3 per year) and sludge was 35,600 tonnes per year.	51%
	Fish passage and screening	One hundred and fifty-one sources were reported to have been assessed[88] and 110 had not. However, this measure includes sources that do not actually need an assessment (e.g. around a third of those that had been assessed were related to bores).	48%
Resources are used efficiently	**Drinking water network losses**	Across Aotearoa New Zealand the total amount of water loss was reported at least 165,000,000m^3 last year. The median Current Annual Real Loss was 185 per connection/day compared to 206 last year. Most water loss occurs in urban areas – but when taking into account population size there is a higher amount of loss per connection per day rural areas.	57%
	Use of water resources	Median residential water use per day was 604 litres per connection per day compared to 758 last year. But only 59% of operators responded to the measure on residential water use so it is difficult to understand if this change represents a trend. Most abstraction points have meters installed, but some do not and may not be complying with regulations that require their use.[89] Metering to better understand water use is more common in urban (80% residential) rather than rural areas (44%) and for businesses (77%), compared to residential (66%). Sixty-five percent of network operators stated they have a water conservation programme in place, up from 58% last year.	89% average across measures (but lower specifically for household water consumption 59%)

88 Note around one-third of the responses were relating to bores that would not need to have been assessed for fish passage.

89 Resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020. https://environment.govt.nz/acts-and-regulations/regulations/measurement-reporting-water-takes-regulations/

Outcome	Measure	Summary	Average response rate
Resources are used efficiently	**Energy efficiency**	241,000,000kWh/year of electricity was used for our water supply last year. The median use per network operator was 1,600,000kWh/year. Rural areas are generally more efficient than urban areas. (Note data between years shows quite different results indicating comparing them may be misleading.)	77%
	Alternative water use	Only one council stated they had a recycled water programme in place (Watercare), indicating using recycled water may not be a priority for many councils and/or there are barriers to using it as a water source.	87%
Services are reliable	**Fault attendance**	Median time to attend and resolve urgent faults was 0.9 hours and three hours respectively – more than three times lower than last year (five and 11 hours). Median time for attending and resolving a non-urgent fault is higher overall at 12 and 24 hours respectively, also much lower than last year (32 and 69 hours). Attending urgent faults is consistent across population densities, but median time taken to attend a non-urgent fault is much shorter in rural areas (four hours) compared to 18 hours in metropolitan urban areas. We would like to see more data across years to determine whether this change is due to better data reported or a real change.	93%
	Systems interruption	Almost twice as much work was reported to be going for unplanned interruptions (10,695 in total or 44 median) as planned interruptions (6,014 in total or 23 median). Most interruptions occur in urban areas. Median planned interruptions were down from 65 last year.	90%
	Asset condition	Compared to last year, councils reported that the total length of pipes that have had their condition graded has gone up significantly from 55% to 81%. Across all councils 16% of pipes supplying drinking water that were graded were reported to be in poor or very poor condition. Condition of pipes is reported to be worse in urban (metropolitan) areas (at 17% of pipes reported to be in poor condition) than provincial (11%) or rural (11 %). However, this difference may be due to a better ability to assess pipes in urban areas.	93%
	Water pressure	Median water pressure was reported at 442kPa. Of the networks that have set a reference level for the pressure in their network, 12% operate at pressures lower than this level, affecting 12,594 properties.	60%
	Water restriction days	In total, there were 4,799 total number of days with water restrictions in the 2023/24 year compared to 1,334 last year. The median per operator was 113 days a year per network operator compared to 38 last year. Provincial areas are most affected by water restrictions but more customers are affected in metro areas.	92%
	Sufficient firefighting water is available	Sixty-seven percent of operators have adopted the Fire and Emergency NZ (FENZ) code of practice for water supply, which has a running pressure limit set at 100kPa (up from 58% last year).	93%
Services are resilient	**Critical assets**	92% assessed their critical assets – up from 80% last year	97%
	Emergency response planning and preparedness	81% with an emergency response plan in place 70% with a business continuity plan in place	82%
	Water security	83% with a strategic plan in place	97%

Outcome	Measure	Summary	Average response rate
Services are economically sustainable	**Actual expenditure**	Rural councils are spending more than double per person on their operational spend to maintain and improve their networks than urban areas. Most councils are spending more on their operational expenditure to fix leaks, make repairs, or carry out maintenance (39 councils) than their capital expenditure.	93%
	Forecast expenditure	When reviewing the forecasted capital expenditure, 51 of the suppliers have increased the funding for next year. The forecasting for operational expenditure follows the same trends as the capital expenditure. Forty-two of the suppliers have increased operational funding for the next year.	94%
	Revenue	In total, $1,132,915,000 was received in revenue from network operators related to their drinking water supply. Generally, operational costs are funded from the revenue a council receives. However, 35 councils spent more on their operational costs than they received in revenue.	90%

Wastewater measures summary

Table 10: Summary of wastewater measures

Outcome	Measure	Summary	Average response rate
Environmental and Public Health	**Wastewater treatment**	More populated areas generally have a higher level of treatment than rural areas. For example, in urban areas around 75% have at least a tertiary level of treatment– whereas in rural areas just 40% receive a tertiary level of treatment.	93%
	Resource consent compliance	In the next 10 years, 52% of discharge to water or land consents will be up for renewal – including 19.5% of consents that already expired. The most common way regional plans manage overflows is to make them a prohibited activity – meaning there is limited or no monitoring or reporting requirements on overflows.	97%
	Wastewater overflows	Verbal reports are the most common way that overflows are monitored (89% councils). Fifty-five percent of councils use real-time monitoring to record wastewater. Less use predictive modelling (around a third). Twenty-nine percent of network operators only use verbal reports to monitor overflows.	94%
	Inflow and infiltration	The level of inflow and infiltration into a wastewater network is important because it can increase the volume of sewage, reducing treatment plant efficacy and increasing the risk of sewage overflow. The ratio of peak to nominal flow is between 2-6 for most network operators. However, there are over 20 network operators that have a ratio of above 10 where periods of rain would be much more likely to cause overflows.	82%
	Trade waste	There are a large number of trade-waste consents around the country (total 13,192), with a median of 49 per operator.	90%
Services are resilient	**Critical assets**	Sixty-six network operators suggested they had assessed their ‘critical assets’ (i.e. identified where failure would have significant consequences – (only three operators said they had not)).	93%

Appendix 4:
Additional information on drinking water measures

This appendix provides more analysis on some of the measures not covered in the main report.

Volume of water imported and exported from other suppliers

Some network operators either import or export water from or to another district or network operator. Table 11 shows the network operators who either import or export water and the overall amount.

Consents held for drinking water treatment plants

Across the country network operators reported they are working under a total of 1,309 resource consents for their drinking water network – an average of 19 consents per operator. One council (Chatham Islands) had no consents. The large number of consents demonstrates how complex the consenting arrangements can be for different network operators. These consents can cover:

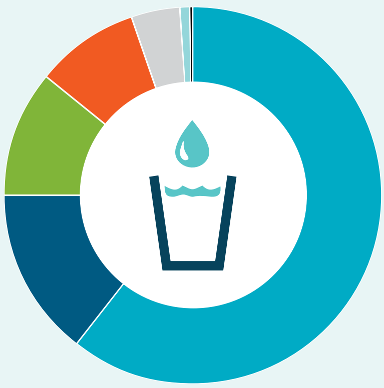
- taking and using water
- discharging water or contaminants
- constructing and maintaining structures in the beds of water bodies.

The break down on different types of consents held by network operators is shown in Figure 23.

Table 11: Volume of water imported and exported from other suppliers

	Water imported from other operators to the network	Water exported to other operators to the network
Total volume	10,400,000m^3 a year	10,800,000m^3 a year
Network operators	Papakura (Veolia)	Watercare
	Waikato District Council	Hamilton City Council
	Carterton District Council	Tasman District Council
	Nelson City Council	Queenstown Lakes District Council
	South Waikato District Council	Christchurch City Council
	Auckland Council	Horowhenua District Council
	Waimate District Council	Gore District Council
	Western Bay of Plenty District Council	Waipā District Council
	Kaipara District Council	

Figure 23: Break down of different types of consents held for drinking water networks



Across all drinking water consents, 29 network operators reported that they are working under one or more expired consents. Forty-four percent of consents will need reconsenting in the next 10 years (including those that are already expired). Some of the operators with expired consents may be operating under s 124 of the RMA, which allows an operator to continue their activities while applying for a new consent.

Fish passage

Fish need to move up and down waterways to feed, breed, and migrate between the sea and freshwater to complete their life cycle.

We asked network operators if they had assessed whether their water takes from these water sources could impede fish passage. We received responses from 48% of network operators – though for some of these network operators fish passage assessments will not be relevant if they do not use surface water sources.

Maintaining or improving fish passage is an important aspect of the NPS-FM and the National Environmental Standards for Freshwater 2020.[90] We found that 151 sources were reported to have been assessed and 110 hadn't – though over a third of those that had been assessed were bores where a fish passage assessment wasn't needed (i.e. for groundwater sources).

Drinking water treatment by-products

Treatment of drinking water generates waste or 'by-products', as suspended solids and other substances are removed from the raw water. It is difficult to reduce the volume of by-products because they are a direct result of the quality of the source water. However, by-products must be safely disposed of.

Just over 50% of network operators responded to the measures on the amount of sludge and backwash water. The total amount of backwash water reported to us from filtering and removing contaminants at drinking water treatment plants is 15,400,000 (m^3/year) and sludge was 35,600 tonnes/year.[91]

Energy use and efficiency

Energy is used to both treat and move water through the pipes to the consumer. The amount of energy needed for treating water depends on the water source and volume, the topography (e.g. whether being pumped across flat or large areas) as well as the condition of the infrastructure. For example, as electrical equipment ages, or with more leaks in a network, additional energy will be required to perform the same task.

In total, network operators reported they used around 241,000,000kWh/year of electricity for the water supplied to the drinking water network last year. The median use per network operator was 1,600,000kWh/year.[92] The amount varies greatly around the country depending on whether the network is servicing more populated areas. For example, our large cities had the highest energy use given they supply more water. Thirteen operators could not provide data regarding energy use. A common reason was the inability to separate their use between all the utilities operated by the organisation.

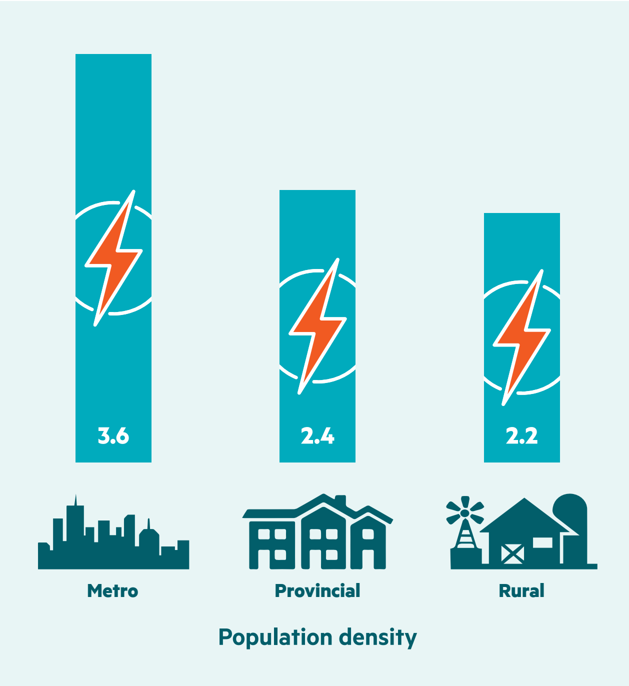
Energy efficiency (i.e. the volume of water supplied by 1kWh) can be a better measure to account for differences in population sizes. However, differences in terrain, network age, and operational models mean comparisons between councils should be interpreted cautiously. Figure 24 shows that data reported to us suggests that urban and provincial populations are less efficient than rural areas. Urban areas need to treat larger volumes of water to supply the population in the network with more complex networks (more treatment processes, longer lengths of pipe and many connections).

90 See section 3.26 NPSFM-amended-october-2024.pdf; Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (LI 2020/174) (as at 01 January 2025) 62 Requirement for all activities: information about structures and passage of fish – New Zealand Legislation

91 Note we also received data on where the waste was disposed, but the way the data was collected meant we could not distinguish which waste stream went to which disposal location. Therefore, we intend to modify the measure for future reports to better capture the data.

92 Note data between years shows quite different results indicating comparing them may be misleading.

Figure 24: Median energy efficiency (m^3/kWh/year) by population density



Pipe age

One way to understand the reliability of pipes is to consider their age. As pipes age, they are more likely to corrode, leak, or degrade, which can reduce their efficiency and increase the chance that a water supply may be disrupted.

We found that pipes around the country have an average age of 36 years. The average age of pipes will hide a much wider range in the age of pipes across the country and within districts – given pipes are continually being added or renewed for new developments. The network operator with the lowest on average pipe age for councils was Queenstown-Lakes District Council at 18 years and the highest average age was Invercargill City Council with an average age of 56 years.

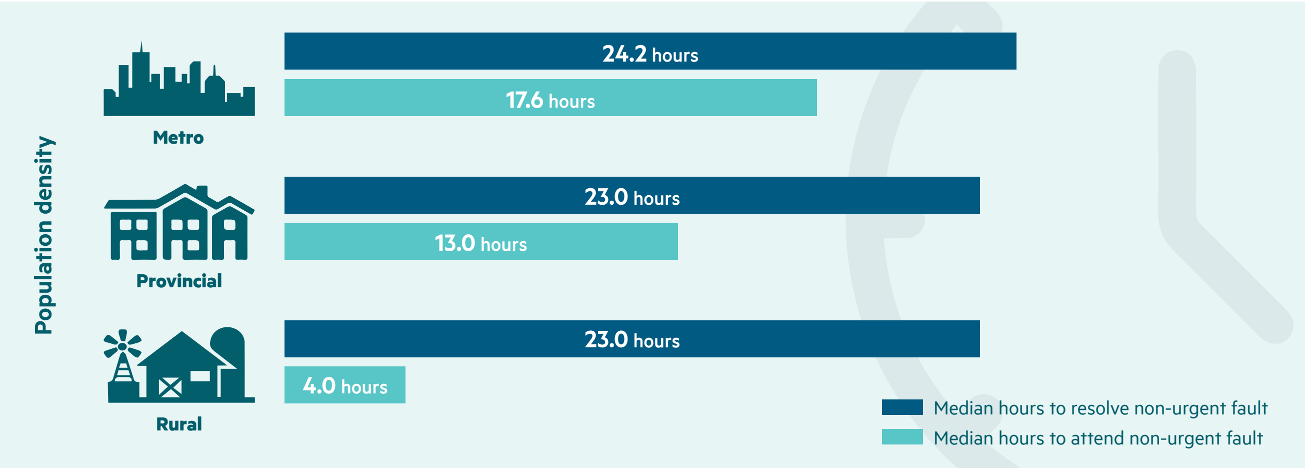
Three government departments had the highest average pipe age across all network operators: New Zealand Defence Force (61 years); Department of Conservation (60 years); Department of Corrections (58 years). The Ministry of Education did not provide an average age of its pipes. Pipe age does not necessarily provide a good understanding of when assets need to be replaced. The pipe material, size, location underground, operating pressures and the chemical properties of the water can all affect the lifespan of the network, along with broader environmental factors like flooding and seismic activity.

Time to attend and resolve faults

Across all councils, the reported median number of hours to attend an urgent fault was 0.9 hours and three hours to resolve urgent fault – down significantly from last year (where attending and resolving urgent faults were reported at five and 11 hours respectively). The amount of time it takes to attend and resolve a fault is important, because it can mean that residents are going without water for that period of time.

Figure 25: Median hours to attend and resolve urgent faults

Figure 26: Median hours to attend and resolve non-urgent faults



Time taken to both attend and resolve urgent faults was fairly consistent across metro, rural and regional population densities (as shown in Figure 25). However, the reported median time taken to attend and resolve non-urgent fault varies more significantly across different population densities from just four hours to attend a non-urgent in rural areas compared to 18 hours in metropolitan urban areas (see Figure 26). Longer times to attend faults may be partly due to larger urban councils having more faults to attend to in general but will also be influenced by some councils with particularly long attendance times (such as Wellington Water see below). Reported time to resolve non-urgent faults is more consistent across population densities at around 23-24 hours.

Time taken to attend faults varies widely by individual councils (see council by council graph in Appendix 6). Time to resolve faults was also much higher in some councils, with Wellington Water taking a median of 642 hours to resolve a non-urgent fault, Ōtorohanga 404 hours and Whanganui District Council 334 hours. Other councils took a median of one hour (Far North District Council, Waipā District Council, Kaikōura District Council, Selwyn District Council, Wairoa District Council). For some geographically dispersed councils, travel time may impact on response times.

In total, 2,815 connections experienced an unplanned interruption for longer than eight hours.

Forecasted expenditure

When reviewing forecasted capital expenditure, 72% of the network operators have increased their funding for next year. Of the suppliers that did increase funding, the increases ranged from 2% (Watercare) to 1,641% (Wairoa District Council – likely related to cyclone damage).

As we have only one year of expenditure, and forecast expenditure, it is difficult to know whether variations in spending are likely to represent a particular context in a single year or a trend. For example, in the case of Wairoa District Council, it was hit with significant flooding events resulting in extensive damage to their water assets that needed to be replaced.

The forecasting for operational spending follows the same trends for capital expenditures. Fifty-nine percent of network operators have increased operational funding for the next year. The range of increases was not as large for capital expenditure – being between 1% (six operators) and 163% (Buller District Council). Under good asset management protocols, operational costs will slowly increase for an asset until it reaches its lifespan and needs to be replaced. High variability in operational expenditure from year to year may be due to assets failing before the expected lifespan or insufficient asset management practices.

Assessments or plans in place by network operators

Table 12: Assessments or plans in place by network operator and when they were last reviewed

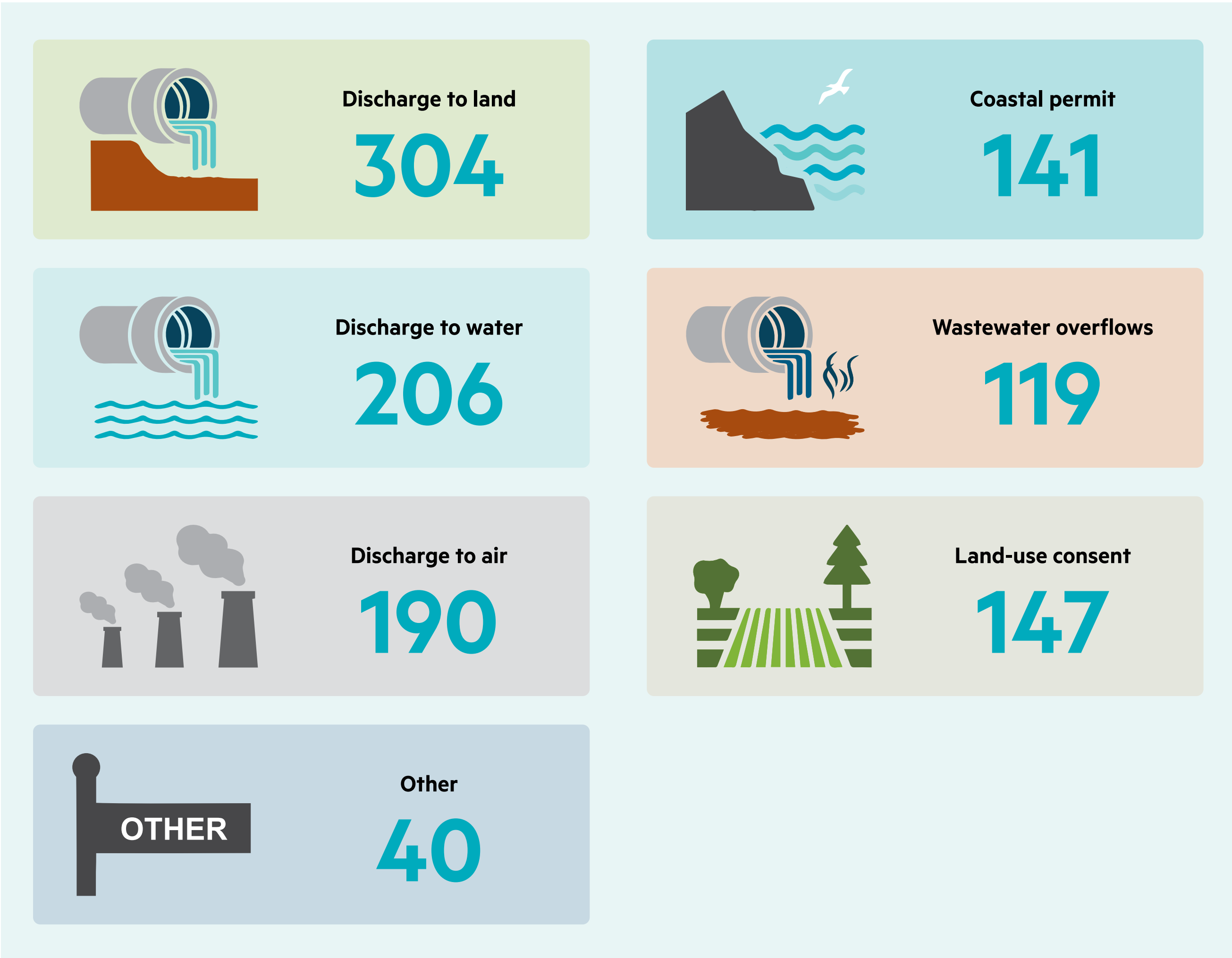
Type of assessment or plan	% operators with plan in place	Median date last reviewed	Median date a response exercise last conducted
Assessment of critical assets	92%	N/A	N/A
Emergency response plan	81%	11/01/2024 (note one operator last reviewed their plan in 2002)	8/3/2024 (Note one operator last reviewed their plan in 2000)
Business continuity plan	70%	20/7/2023 (note one operator last reviewed their plan in 2000)	11/7/2023 (note one operator last reviewed their plan in 2000)
Strategic plan	83%	N/A	N/A

Appendix 5:
Additional information on wastewater measures

Resource consent types for wastewater treatment plants

Figure 27 below shows the main types of consents that network operators reported they hold. Different wastewater treatment arrangements have different types and numbers of consents depending on relevant rules in regional plans. Consents are typically held for the plant (e.g. land-use or discharge to air consents) to discharge treated wastewater (to land or water) or for the broader wastewater network. In some cases, different types of consents are consolidated into one; in other situations, individual consents are held.

Figure 27: Number of different type of consents for wastewater treatment plants[93]

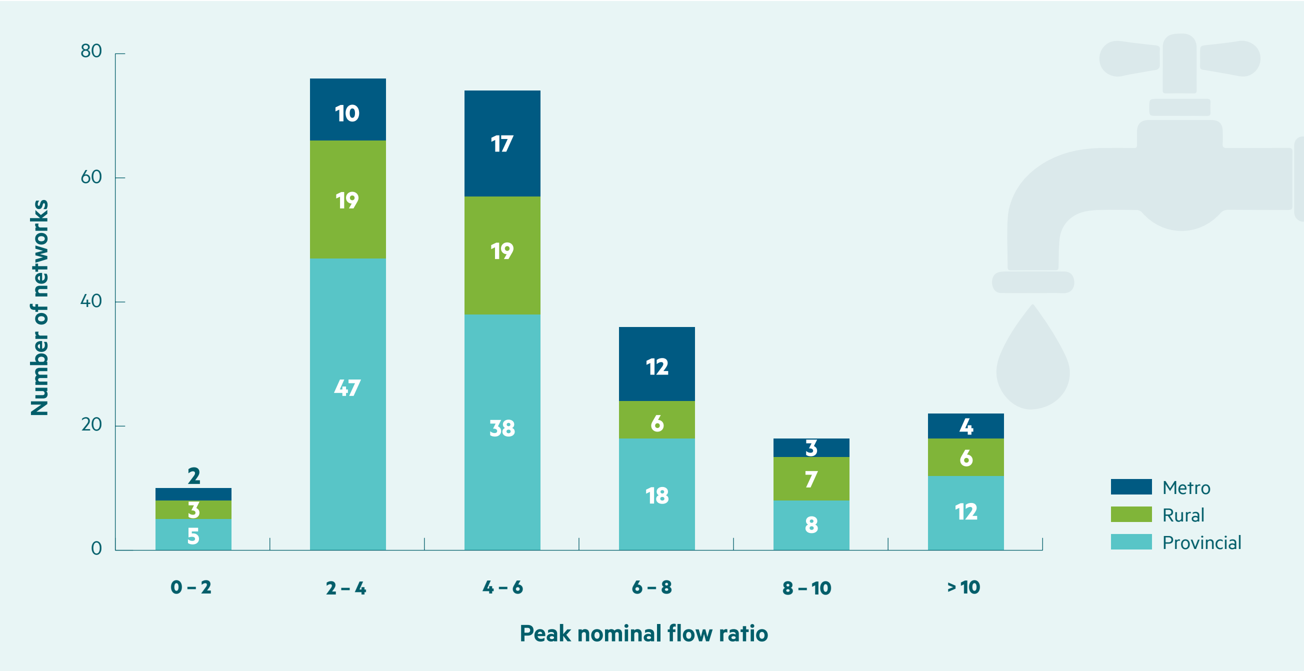


Of all the consents related to treatment plants, data reported to us suggests 45% will require reconsenting in the next decade (including 15% that are already expired). This represents a significant compliance and infrastructure risk, especially for smaller operators with limited resources to renew consents. Most land-use consents have very long expiry dates (towards 35 years, which is the maximum available consent term).

93 Note if overflows are permitted or prohibited activities in regional plans – resource consents may not be required.

Inflow and infiltration by population density

Figure 28: Peak to nominal flow ratio for network operators broken down by population density



'Peak to nominal flow ratio' helps us understand the likely level of 'inflow' and 'infiltration' of water into the wastewater system (e.g. through damage to the network).

Generally, peak to nominal flow ratios below 5 are less likely to risk overflow.[94] As shown in Figure 26, data reported to us suggests that the ratio of peak to nominal flow is between 2-6 for most network operators. However, there are over 20 network operators that have a ratio of above 10 where periods of rain would be much more likely to cause overflows.

Critical assets

We found that 66 network operators suggested they had assessed their 'critical assets' for wastewater that (i.e. where failure would have significant consequences, only three operators said they had not).[95]

Trade waste

There are a large number of trade-waste consents around the country (total 13,192), with a median of 49 per operator.

94 Design criteria for sewers 'peak to nominal flow ratio' vary around the country. The Australian New Zealand Standard for Land Development and Subdivision Infrastructure provides a basis for design for several councils. This recommends design parameters that allow for dry weather diurnal peaking factors of 2.5, and an infiltration factor of 2 for wet weather.

95 Ōpōtiki District Council did not provide an answer. Buller District Council, Far North District Council and Horowhenua District Council all said that it was in progress.

Appendix 6:
Individual council performance on key measures

The following graphs provide an overview of data for each council, or council-controlled organisation, for some key measures. The graphs do not include government or regional council operators as these operators supply water for different purposes and are not directly comparable.

Water supplied to network per connection

Note Wairoa reported an extremely high water supply at 80909 l/connection a day, more than double the next highest operator (Taupō) and more than 20 times most operators (i.e. due to cyclone recovery activity). As this figure is so large we removed it from Figure 29 because it makes it hard to review other network operators.

Figure 29: Water supplied to the network per connection per year by council

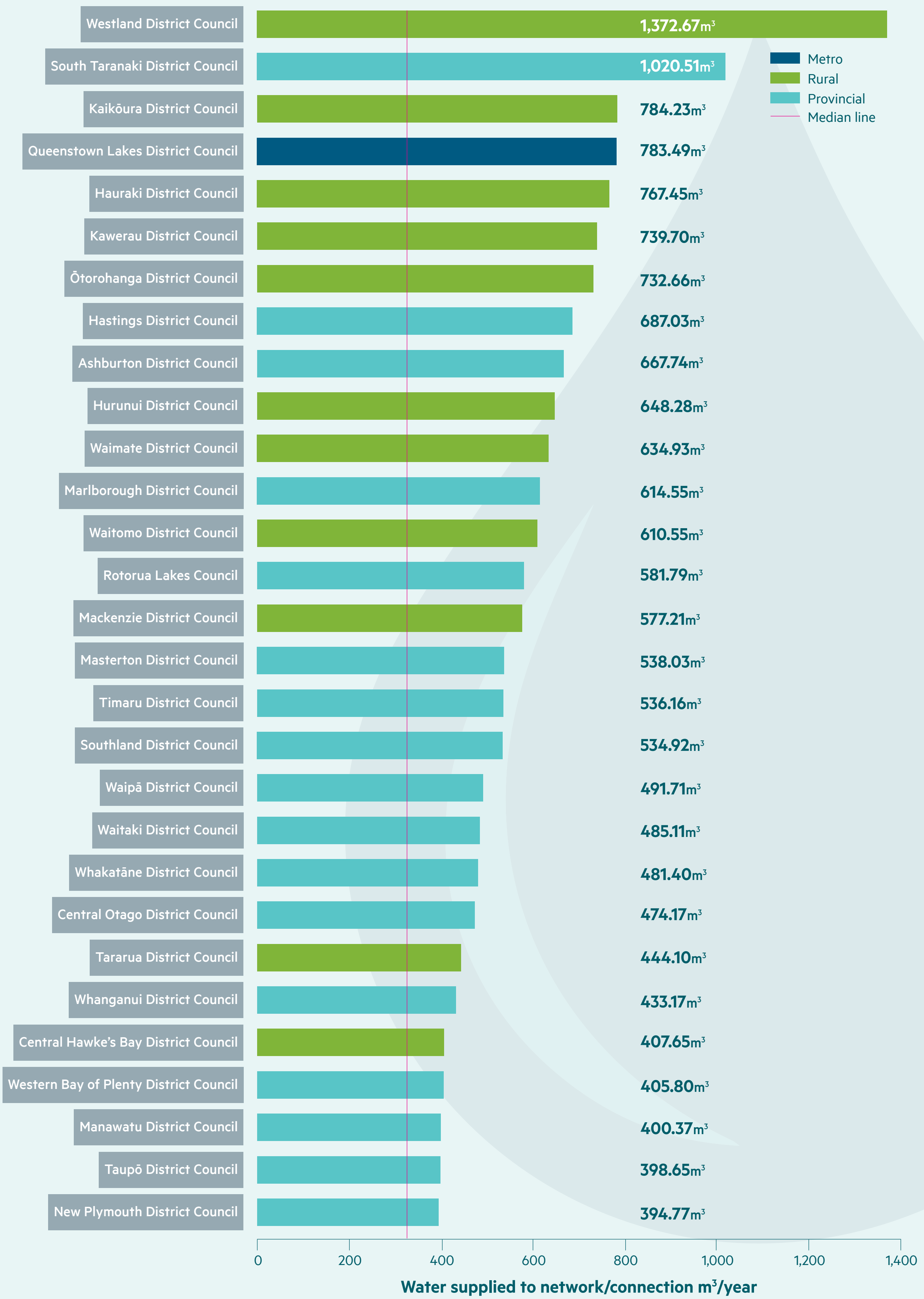
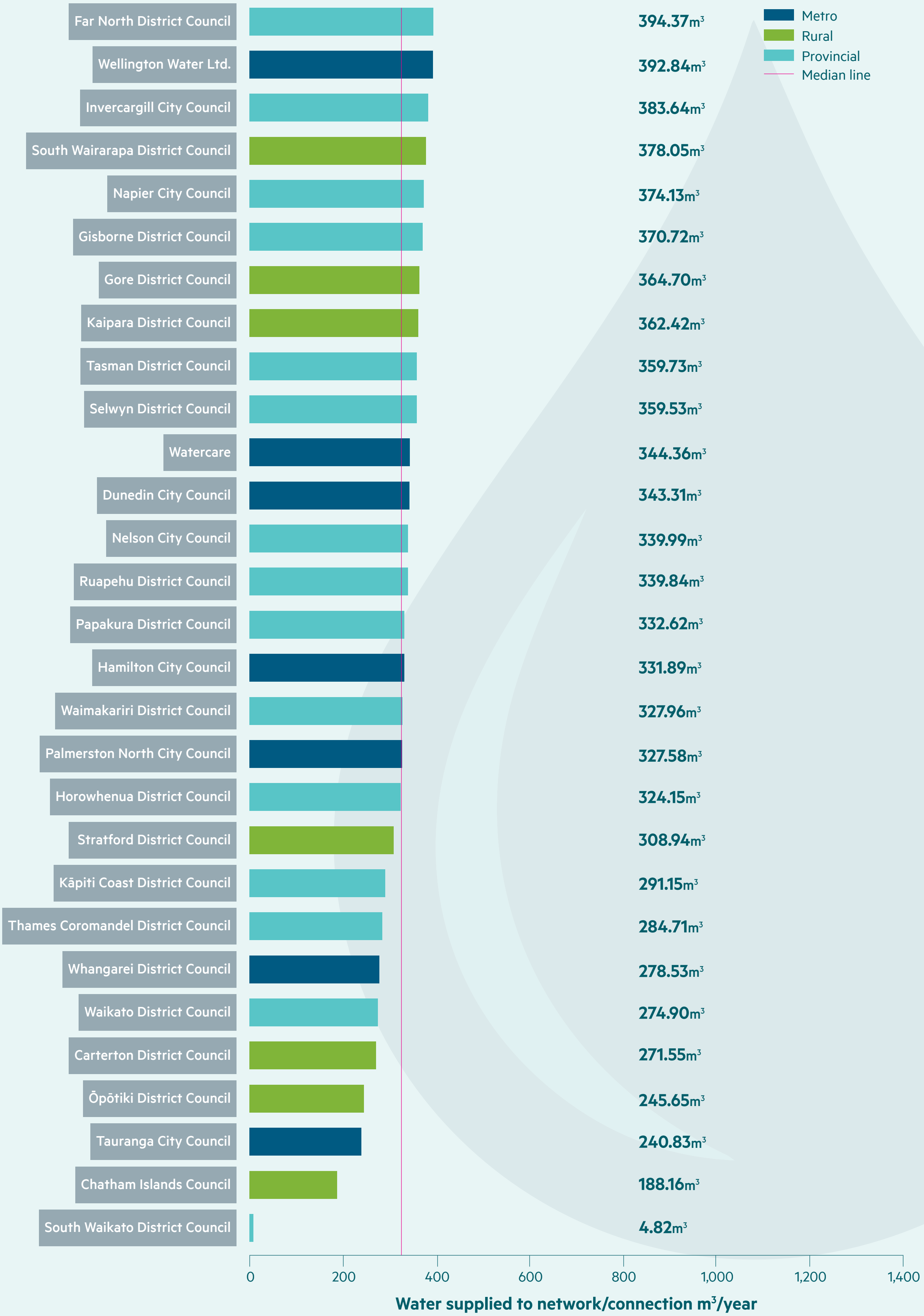


Figure 29: Water supplied to the network per connection per year by council



Household water use

Figure 30: Residential water consumption per connection per day (litres per connection per day)

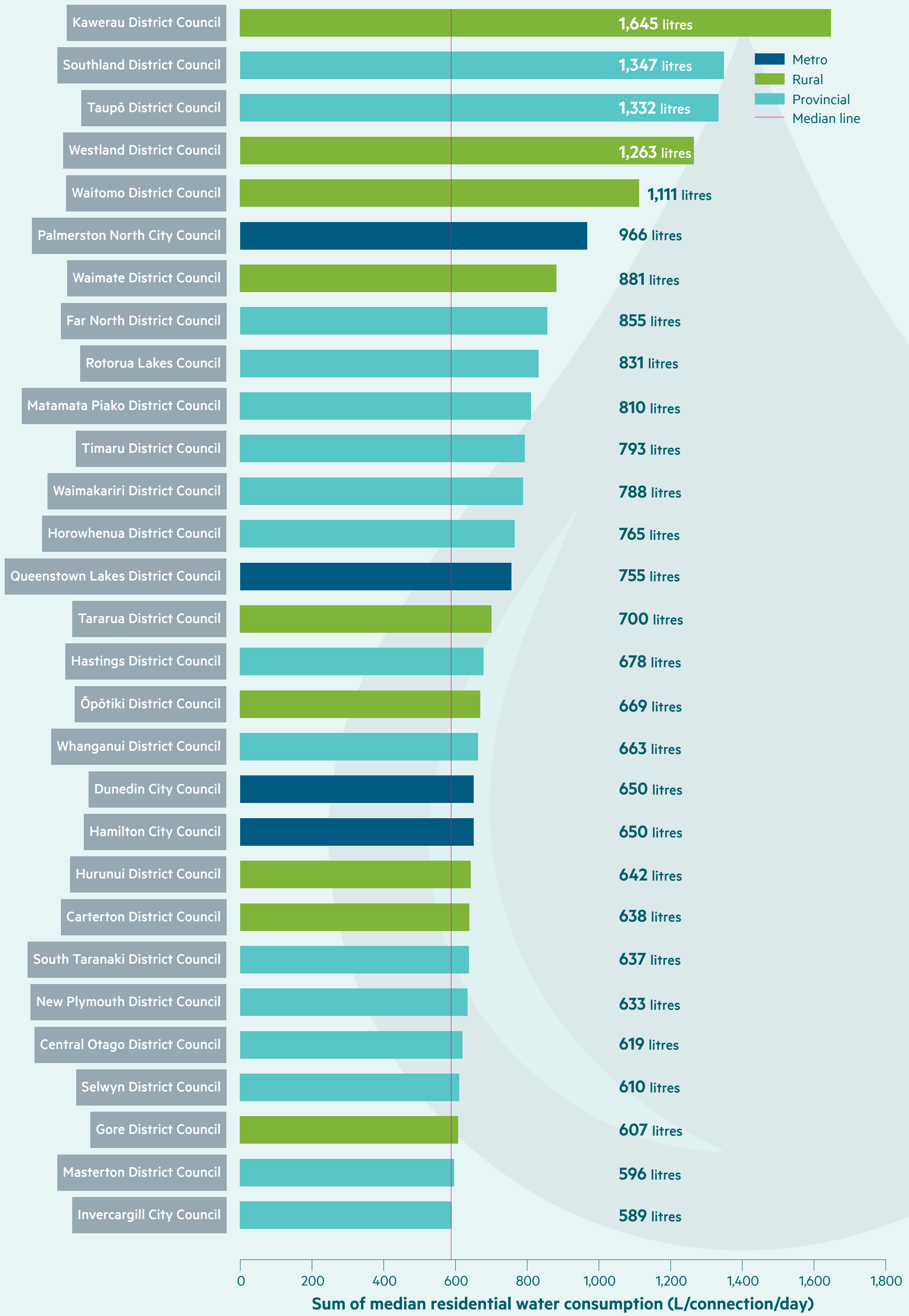
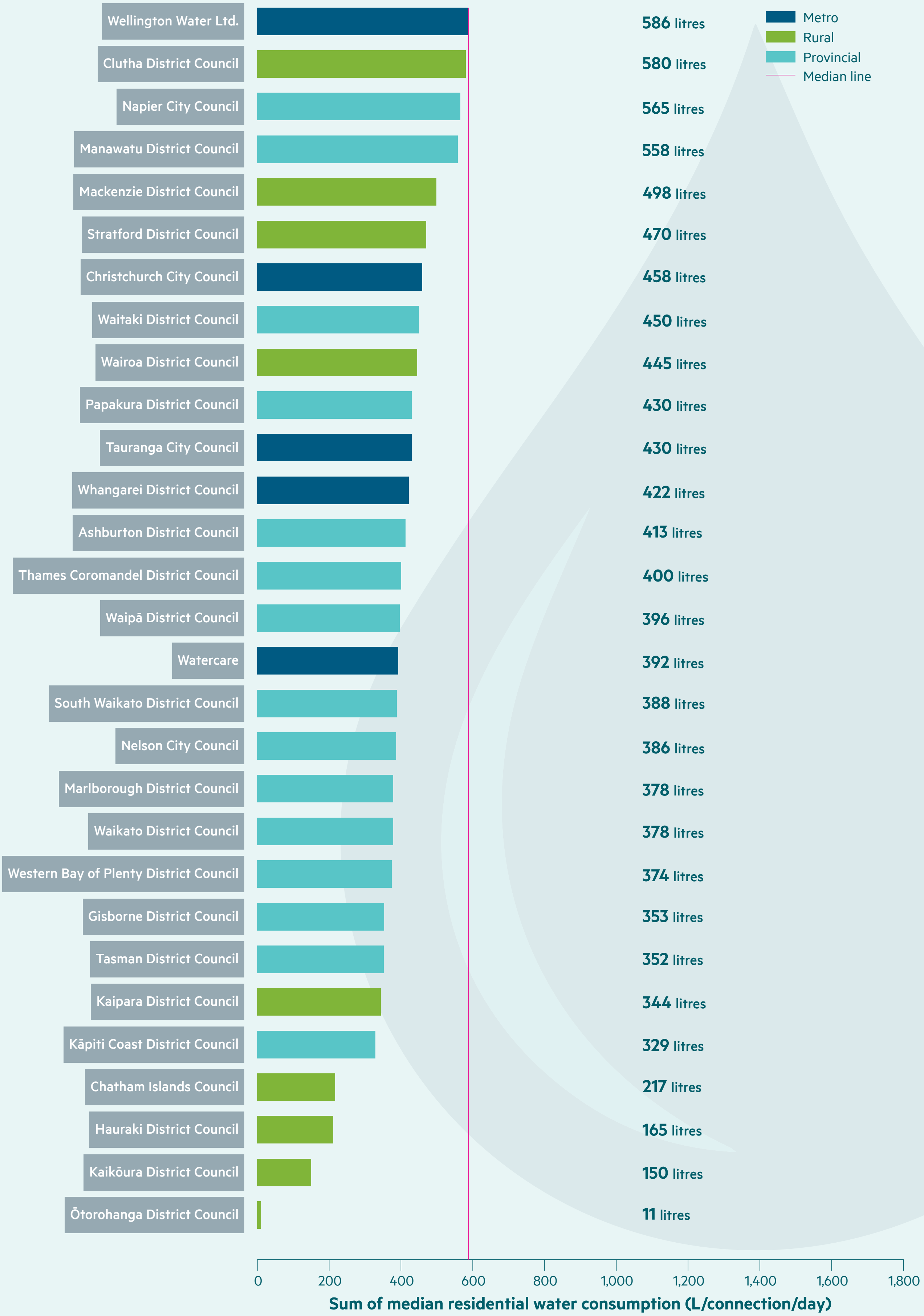


Figure 30: Residential water consumption per connection per day (litres per connection per day)



Water loss from drinking water networks

Figure 31: Current Annual Real Loss Litres per connection per day by council

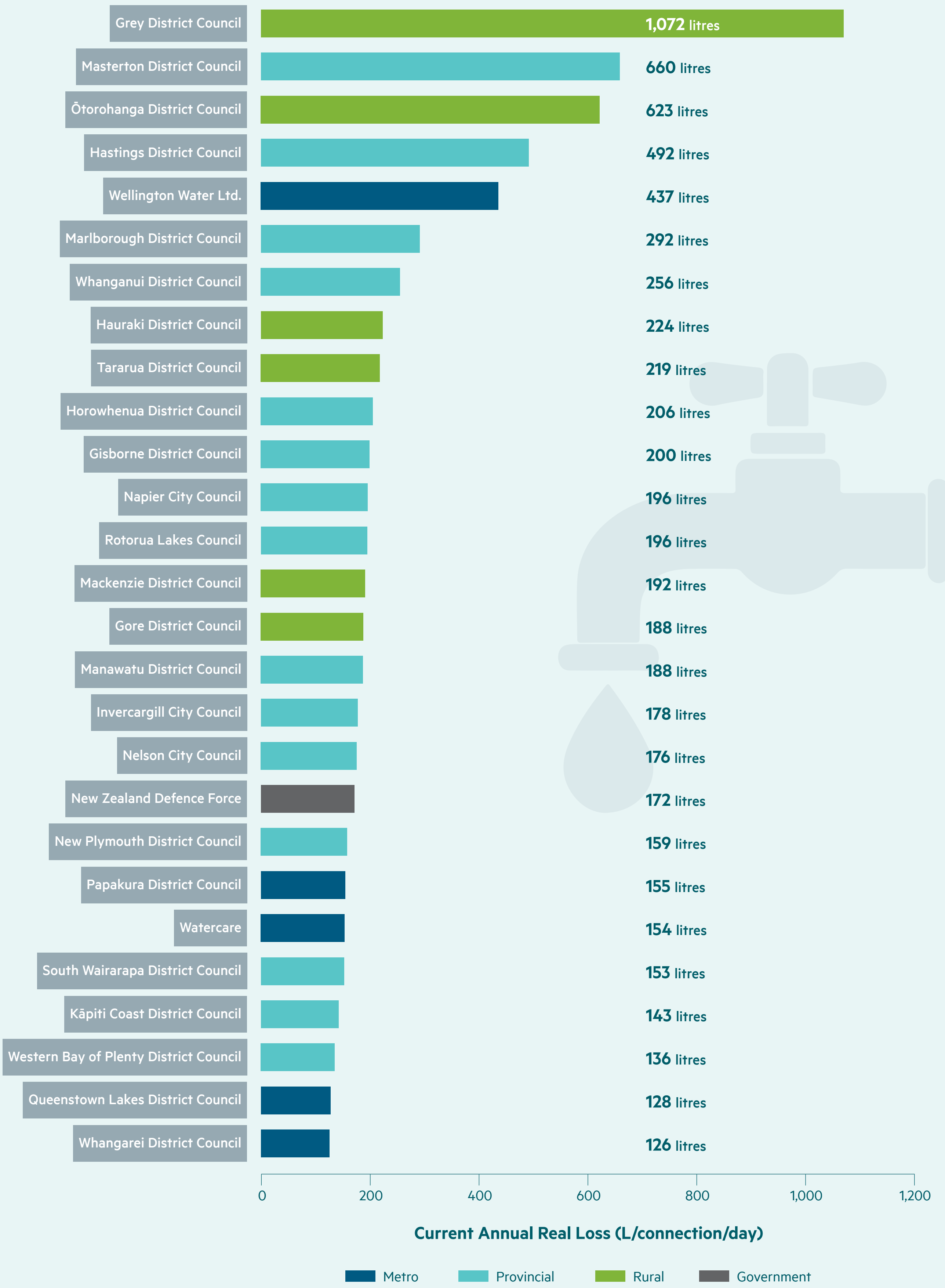
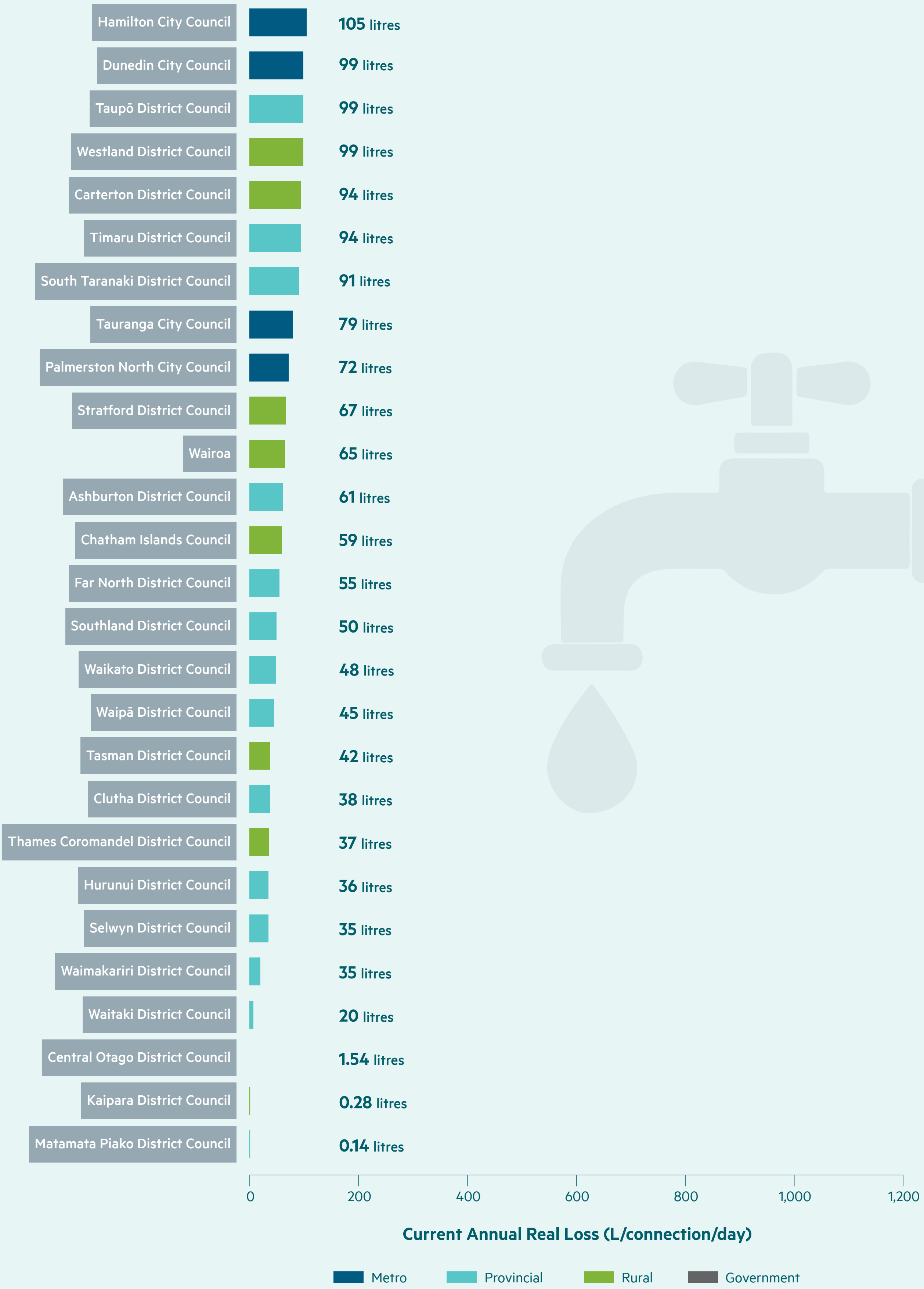


Figure 31: Current Annual Real Loss Litres per connection per day by council



Council expenditure on drinking water services

Figure 32: Capital (CAPEX) and Operational (OPEX) spend per connection per year

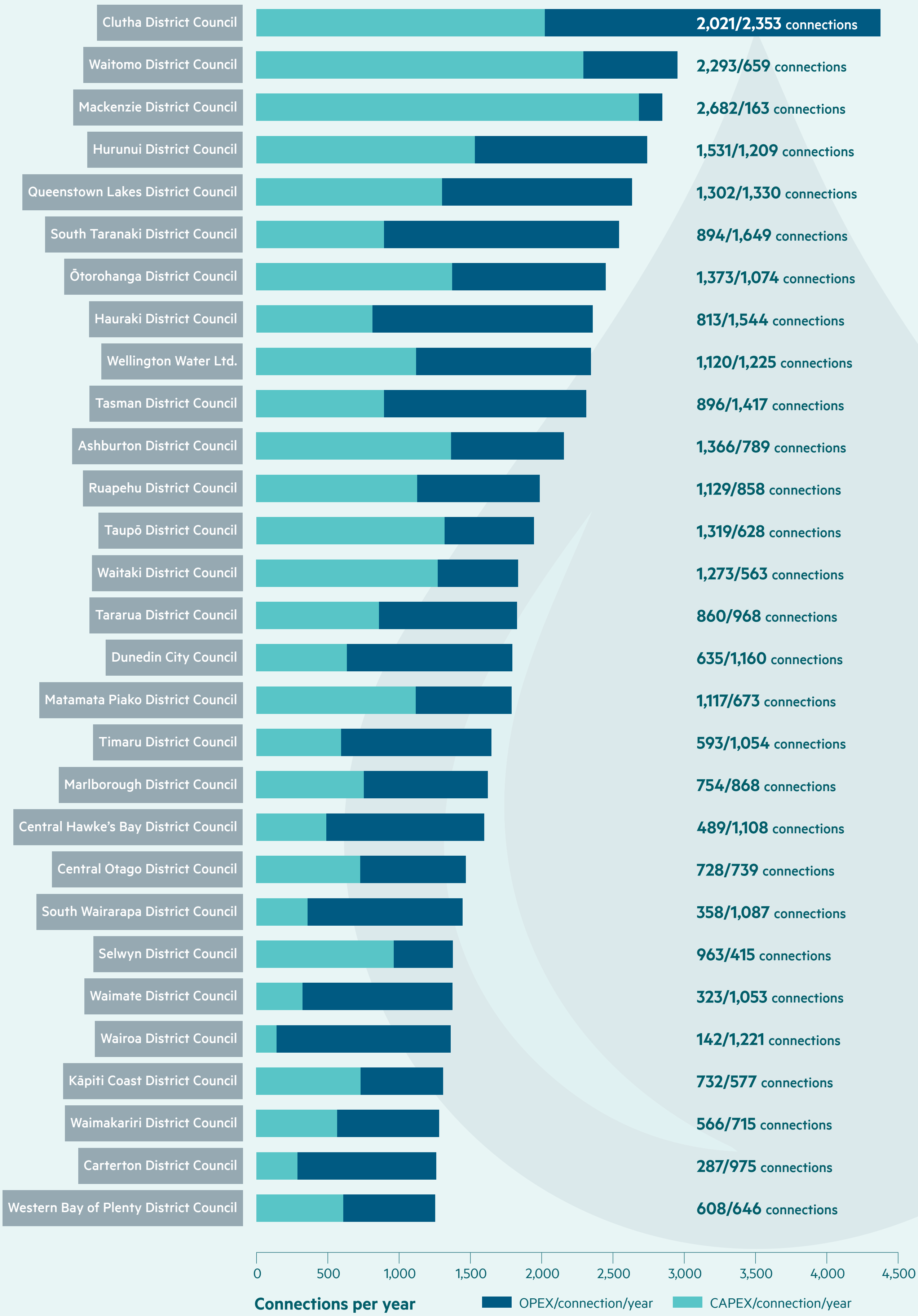
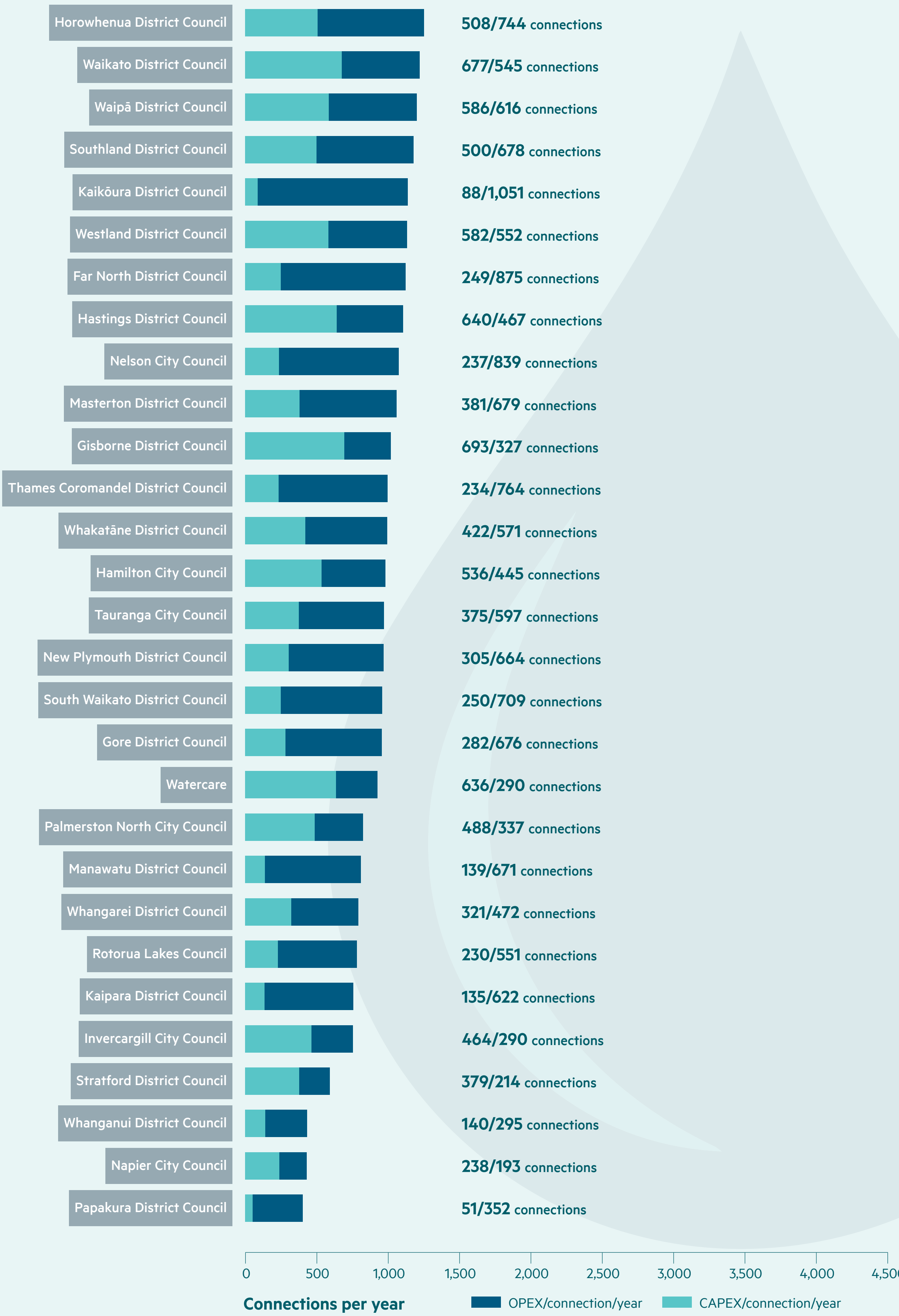


Figure 32: Capital (CAPEX) and Operational (OPEX) spend per connection per year



Water Services Authority

Taumata Arowai

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