



TAUMATA
AROWAI

Drinking Water Regulation Report 2023

Published pursuant to sections 137(3) and 205(1)(c) of the Water Services Act 2021.

Presented to the House of Representatives pursuant to section 137(2) of the Water Services Act 2021.

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Drinking Water Regulation Report 2023

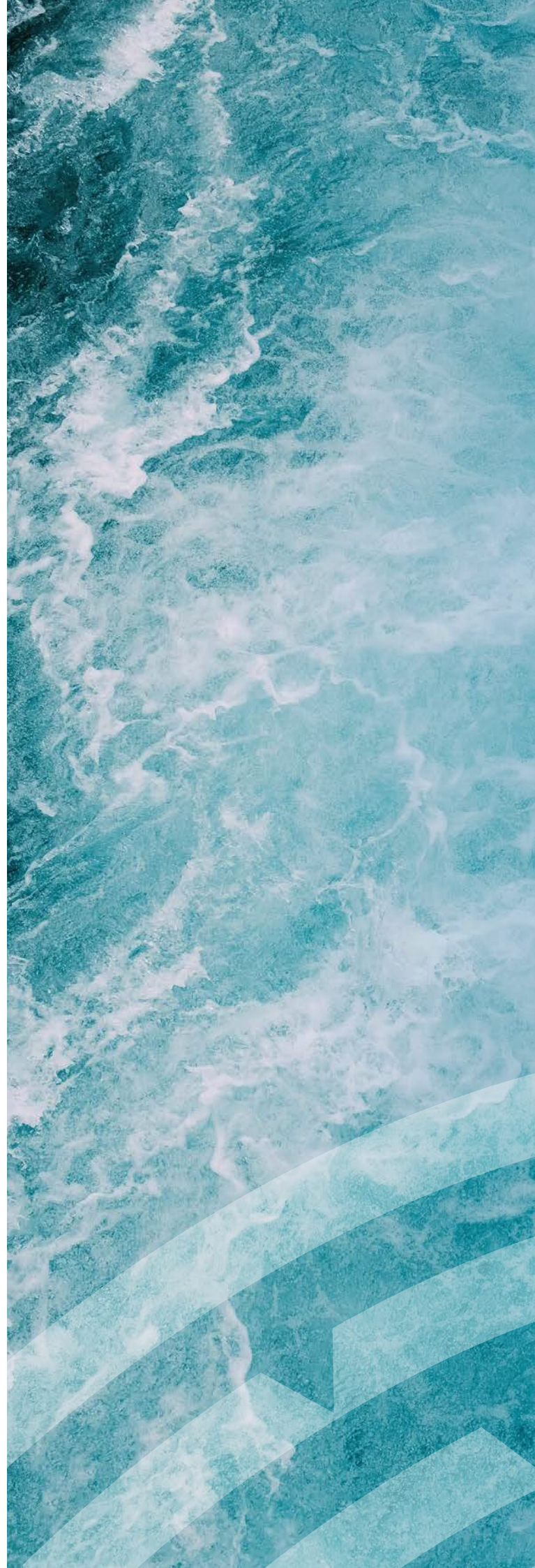
Date June 2024

ISSN: 2815-8857 (online)

ISSN: 2815-8849 (print)

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Te Whakatauhāki 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

Executive Summary

About this report

Taumata Arowai is the water services regulator for Aotearoa New Zealand, established in 2021. We are responsible for regulating drinking water supplies and for providing national oversight of the environmental performance of public drinking water, wastewater and stormwater networks.

This is our third Drinking Water Regulation Report (DWRR) and the second to cover a full calendar year, 1 January to 31 December 2023. It reflects data and information provided to us for registered drinking water supplies during this period.

This report complements the Network Environmental Performance Report (NEPR), which we have published for the first time in 2024. The NEPR focuses on the state of network infrastructure and its effects on the environment. The DWRR addresses the safety of drinking water provided by water suppliers. The two reports intersect because the way our water networks are maintained and operated directly affects water suppliers' ability to provide safe drinking water.

A note about the data

New drinking water standards and rules came into effect for drinking water suppliers in November 2022. This report therefore covers the first full year that suppliers have been required to monitor and report on their performance and compliance with the Drinking Water Quality Assurance Rules (the Rules). As a result, there is now richer information on the performance of the drinking water system than has ever been available to New Zealanders before. While the quality and completeness of what has been submitted by suppliers to us is variable, this will improve and become more consistent over time.

In this year's DWRR, we have extended our focus to cover drinking water safety measures, multi-barrier protections, notifications, and consumer advisories for all supplies that have confirmed their

registration details with us, including data for private and community supplies. For the first time too, we have reviewed Drinking Water Safety Plans (DWSPs) lodged by suppliers.

The challenges and risks facing larger supplies, and the large populations they serve, mean that we made a deliberate decision to focus on them first. We have limited information about the quality of the water that smaller suppliers supply and any associated health risks.

We have sought to produce this report in a timely fashion. This necessarily limits the opportunity to fully explore the options available for data analysis, interpretation of data analysis, and presentation. The format and presentation of future reports will therefore change over time.

Key findings

Below is a summary of key findings from the data, based on information provided to us by drinking water suppliers.

Most New Zealanders are regularly receiving safe drinking water. Water supplies owned or operated by or for local or central government are by far the largest providers of drinking water to New Zealanders. Councils collectively operate 529 supplies across the country, serving approximately 4.29 million people. Reporting to us confirms that the majority of New Zealanders regularly have access to safe drinking water.

- Most council-operated supplies serving most of the New Zealand population have a DWSP lodged where one is required. The number of DWSPs lodged increased from 451 supplies (90%) in 2022 to 494 supplies (98%) in 2023.
- Most council-operated supplies have protozoa and bacteria barriers in place as well as residual disinfection.

For some supplies there is room for improvement to ensure key risks are being appropriately managed.

We are concerned by the risks posed by pathogens and other contaminants in supplies. The number of *Escherichia coli* (*E. coli*) notifications we receive is especially concerning, given it indicates the presence of pathogens that have the potential to cause widespread illness. It also appears that some drinking water suppliers are using long-term consumer advisories as a risk mitigation strategy.

- Up to 489,000 New Zealanders are receiving water from a supply with no protozoa barrier and up to 25,000 people receive drinking water from supplies operated by councils that lack a bacteria barrier. Additionally, up to 146,000 people receive drinking water from supplies that have no or partial residual disinfection.
- High levels of *E. coli* have been reported in source water samples taken from surface water. There was also *E. coli* detected in some source water samples from groundwater abstracted at greater than 30m deep. This highlights the need for effective multi-barrier treatments.
- Notifications for aluminium, chlorate, disinfection by-products, lead, manganese, and chlorine have increased year on year since 2021.
- There were 118 temporary consumer advisories issued last year across all supplies, two thirds of which were two weeks or less.
- There were 59 new long-term consumer advisories initiated in 2023 and 53 long-term advisories as at 31 December 2022. Some 23 of these were closed, leaving 89 long-term consumer advisories active as at 31 December 2023.

Drinking water suppliers' compliance with the minimum requirements of the Rules was highly variable and needs to improve. Many councils are only reporting on some of the Rules and some are reporting that they are not meeting their

obligations. Drinking water suppliers need to markedly improve their compliance with the Rules to provide assurance to the public that they are taking an effective multi-barrier approach to drinking water safety.

Increased sector capability is urgently needed.

Drinking water infrastructure, including treatment plants and distribution networks, carries many safety risks if they're not operated properly. The water industry has identified a lack of capability among suppliers to manage drinking water issues, and this continues to be a concern. An improvement in capability across supplier types is required quickly, with some suppliers facing additional challenges relating to the size and type of their supplies.

Further discussion

Notifications¹

We received 109 notifications on average each month in 2023. Suppliers are generally submitting notifications as required by the Act and taking appropriate action to mitigate any public health risks. Most notifications relate to drinking water safety or Maximum Acceptable Value (MAV) exceedances as outlined in the Drinking Water Standards, with many of those relating to exceedances of *E. coli*.

The most likely reason for the increase in notifications for aluminium, chlorate, disinfection by-products, lead, manganese and chlorine from 2022 is the requirement in the Rules for suppliers to carry out mandatory testing of chemicals in their supplies. We expect to see an increase in notifications in the short term, as more suppliers come into the regime, and all registered suppliers become more familiar with their notification requirements under the Act.

¹ Under the Act, suppliers are required to notify us when certain things happen, such as a test result indicating that drinking water does not comply with drinking water standards.

Consumer advisories²

During 2023, 93 temporary 'boil water' advisories, 23 temporary 'do not drink' advisories and two temporary 'do not use' advisories were issued. By the end of the year, 107 of these temporary advisories were closed, with nearly two thirds in place for two weeks or less.

Some 59 new long-term consumer advisories³ were issued in 2023. This is in addition to the 53 long-term advisories that were in place before 2023. Twenty-three long term advisories were closed during 2023, leaving 89 long-term advisories still in force as at 31 December 2023.

It is not acceptable for any supplies to be on long-term consumer advisories. However, many supplies under long-term consumer advisories face challenges which may not be resolved quickly. We are working with suppliers to face these challenges and find appropriate pathways for them to meet their obligations under the Act.

Drinking Water Safety Plans⁴

Most council supplies serving most of the population have lodged DWSPs.

Preparing a DWSP is new for many private and community supplies. Our data confirms that most of the registered supplies that have not lodged a copy of their DWSP with us are government, private and community supplies serving populations of fewer than 500 people. These supplies were not required to prepare a DWSP under the previous Ministry of Health regime. Of those supplies that have not lodged a DWSP, many are yet to let us know their chosen compliance pathway (following the Rules and preparing a DWSP or adopting an acceptable solution).

We are progressing a programme of work to understand what support these suppliers need to lodge a DWSP with us to meet their obligations.

Our DWSP reviews are providing us with valuable

insights into risk management practices by council suppliers. While many suppliers are undertaking appropriate risk management practices, some are not. This shows the need to improve practice and raise awareness of the best way to manage risks to the provision of safe drinking water.

Many DWSPs that have been updated recently refer to Te Mana o te Wai outcomes. There is ongoing work needed to support the entire sector to consider Te Mana o te Wai outcomes in their DWSPs.

Effective multi-treatment barriers

A multi-barrier approach is the single most effective way to avoid people getting sick from their drinking water. It is therefore critically important that suppliers maintain an effective multi-barrier approach to treatment. The primary risks to drinking water supply are from microbiological pathogens such as bacteria, protozoa and viruses, which can cause widespread outbreaks of acute illness.

Analysis of the sector's performance has revealed gaps in the treatment that suppliers have in place to provide safe drinking water reliably to their communities. As at 31 December 2023, most council supplies have protozoa and bacteria barriers, and residual disinfection in place. Up to 489,000 people received drinking water from council supplies without a protozoa barrier in place where one should be in place. Up to 25,000 people received drinking water from supplies operated by councils that lacked a bacteria barrier. Up to 146,000 people receive drinking water from supplies that have no or partial residual disinfection. Some of these situations may include supplies with an emergency treatment plant without a barrier.

We are working to ensure that council suppliers not meeting these basic requirements provide a viable plan to install protozoa and bacteria barriers within a reasonable timeframe and proactively manage risks in the interim. This is a priority area for us.

² Suppliers issue consumer advisories if they identify issues with the drinking water they supply that significantly increases the risk to consumers. The advisory should stay in place until the water supply is again safe to drink.

³ There isn't any specific time threshold associated with a 'long-term' consumer advisory. We use the term to refer to advisories that remain in place for more than a transient period while steps are taken to address the underlying safety issue, depending on the circumstances affecting each supply.

⁴ Drinking water safety planning is essential to ensure that all hazards are identified and suitable barriers are in place to provide effective multi-barrier protection.

Drinking Water Quality Assurance Rules (the Rules)⁵

This year's report targets those Rules that demonstrate how suppliers are performing in their duty to take a multi-barrier approach to drinking water safety, and to identify hazards and manage risks.

Council suppliers reported on the Rules at a much higher rate (95%) than government, community and private suppliers (6%) – the exception was the Department of Corrections, which reported on all its supplies. This indicates that councils understand the importance of reporting to us and are committed to being transparent about the performance of their supplies. However, many councils only reported on some requirements. While most councils reported on the performance of their bacteria treatment and residual disinfection, there were significant gaps in reporting in other areas. These gaps included chemical monitoring, backflow prevention and protozoa treatment.

Of those who did report, many councils identified they did not meet requirements such as backflow prevention and drinking water storage in distribution zones. Many suppliers, including councils, may also be struggling to assess the cyanobacteria risk of their source waters. Cyanobacteria can produce cyanotoxins which pose a risk to drinking water that may have immediate and serious health risks. We intend to carry out more work to assist supplies to understand these requirements.

Source water

As part of a multi-barrier approach, protecting source water provides the first and best barrier against drinking water contamination and illness. Every source of drinking water has its own unique risks that need to be managed by suppliers.

We are currently reviewing source water risk management plans as part of a broader programme for the review of DWSPs.

The Rules require a minimum level of source water testing for some key determinands, such as *E. coli*, arsenic, nitrates, lead and manganese. In 2023, 55 suppliers reported at least one source water sample result to us for at least one of their supplies. In total, we received sample results for 333 supplies.

High levels of *E. coli* have been reported in source water samples from surface waters. These results reflect that surface water sources, like rivers, lakes, and streams, have more variability in their water quality and are more susceptible to faecal contamination. This reinforces the need for suppliers to have effective treatment barriers in place.

We are concerned that there were some reports of *E. coli* in groundwater abstracted from greater than 30 metres deep. We will monitor this trend closely.

We are also concerned by the results for arsenic levels above the MAV in source waters. Council suppliers that regularly notified us of arsenic MAV exceedances are either pursuing or have recently completed new treatment barriers to reduce these concentrations.

Conclusion

Many drinking water suppliers are doing things well. Nevertheless, there are critical gaps in the treatment that some suppliers have in place to provide reliably safe drinking water to communities, particularly those in more rural, isolated parts of the country.

The information we have gathered in this report provides us with an evidence base to shape up proactive, proportionate interventions that we or others can make and to inform the focus of our work with the sector. We are mindful of the challenges facing suppliers and we are committed to working collaboratively to build the resilience of their systems.

In future reports, we will show more year-on-year comparisons and trends that will help to highlight water services' performance. We expect to see improved reporting from suppliers on their supplies. We will also generate more monitoring and compliance information about drinking water supplies in future.

⁵ The Rules set out the minimum requirements for treatment and monitoring based on the type of supply and the population served. Many of the requirements in the Rules are not new for suppliers – for example, standards have set out the need for a protozoa barrier since 1995.

Ngā kaupapa

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Introduction

Everyone in Aotearoa New Zealand should be able to rely on safe and sufficient drinking water from drinking water suppliers..

Taumata Arowai was established in 2021 as the water services regulator for New Zealand.

We administer standards and make rules that drinking water suppliers must meet, so that all people and communities can confidently access safe drinking water.

New drinking water standards and rules came into effect in November 2022 and we have started to monitor and report on compliance with them. We have also developed and published three acceptable solutions, which provide ready-made options for certain supply categories that make complying with the Water Services Act 2021 (the Act) easier.

Our immediate focus is ensuring all registered drinking water supplies have multi-barrier treatment systems in place to make the water they drink safe even when a source or supply becomes contaminated. From a practical perspective, a multi-barrier approach is the single most effective way to keep consumers of drinking water safe.

We are increasing our understanding of the sector's performance and risks and have used this to target our work.

We are increasing our understanding of the state of the water services sector. As we gather information from drinking water suppliers and learn more, we can give an increasingly clear and comparative picture of how they are performing and identify risks to address.

Reporting on compliance, performance and monitoring data helps us:

- Provide transparency about drinking water quality and supplier performance to consumers, communities and the public.
- Enable comparisons between different sizes and types of supply and supplier to ensure the regulatory settings are fit for purpose.
- Encourage best practice across the sector.
- Raise awareness about key issues.
- Provide insight to inform where potential Taumata Arowai interventions should be targeted.
- Track drinking water supplier performance over time.

About this report

In this report, we focus on the 500 suppliers which own and operate 1,468 registered drinking water supplies that:

- were registered with the Ministry of Health (MoH) prior to 15 November 2021 – when the Act commenced – and have confirmed their registration details with us, or
- who have registered with us after 15 November 2021.

As part of the transfer of drinking water regulator responsibilities in 2021, we received the register of drinking water suppliers maintained by the MoH under the Health Act 1956. The supplies owned and operated by these suppliers automatically became registered under the Act. However, there were some gaps and inaccuracies in the registration information.

We carried out an extensive process to ensure council and government suppliers confirmed the details of their registered supplies with us. We also contacted many private and community registered supplies who then confirmed their details.

From this process, there were 621 supplies that either no longer exist, were unable to be contacted despite best efforts or were not required to be registered under the Act. While we still hold records for these supplies, they are not active within our system. These supplies have been excluded from this report since we have been unable to verify their details and they have never been included on our public register of drinking water supplies.

This report is split into four parts:



Part one: Discusses safe drinking water and looks at the safety of drinking water supplies in New Zealand.



Part two: Looks at drinking water supplier performance and sector capability.



Part three: Looks at the extent to which risks and hazards to source water are being identified, managed and monitored.



Part four: Considers our performance and the extent to which the Act is meeting its main purpose.

About drinking water suppliers and supplies

Drinking water supplies owned or operated by, or for, local or central government are the main providers of drinking water to people in New Zealand. This includes councils who contract companies to operate supplies on their behalf. In addition to these public suppliers, private and community suppliers (such as marae, papakāinga, kura and mixed-use rural

supplies) also own and operate drinking water supplies.

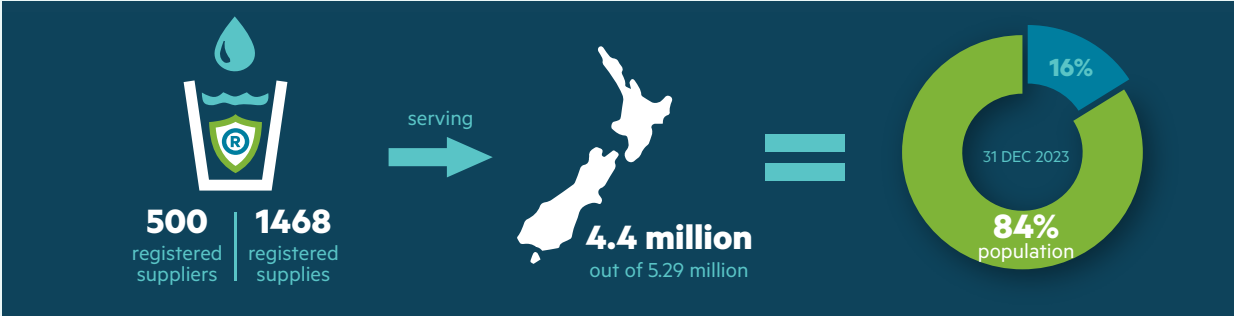
The following table gives a summary of the types of suppliers and the number of supplies in each category.

Supplier types and supplies	Description
Council suppliers (operating 529 registered supplies)	Territorial authorities, regional councils and unitary authorities.
Government suppliers (operating 467 registered supplies)	Ministry of Education - Te Tāhuhu o te Mātauranga (schools). Department of Conservation - Te Papa Atawhai – (campsites, huts and villages). Department of Corrections - Ara Poutama Aotearoa (prisons). New Zealand Defence Force - Te Ope Kātua o Aotearoa (facilities).
Private and community suppliers (operating 472 registered supplies)	Māori suppliers – this group includes iwi entities, kura supplies, kōhanga reo, marae, papakāinga and Māori community supplies.
	Facilities – such as universities, private schools, hospitals, airports and ski fields.
	Other – such as mixed-use rural supplies, residential and other private or community supplies not owned by councils.
	Water carriers – operators who transport drinking water without reticulation.
Unregistered suppliers	Suppliers who own or operate a supply that is not yet registered on the public register of supplies maintained by Taumata Arowai.
Not a drinking water supplier under the Water Services Act 2021	
Domestic self-supplies	Own, stand-alone domestic dwelling supply, like a roof water supply for a single household unit.

The Act requires drinking water suppliers to register the supplies which they own or operate.

The following is a summary of the supplies which have been registered. Overall, 84% of our total estimated population is served by registered drinking water supplies.

About drinking water suppliers and supplies



The summary of suppliers below shows that councils supply drinking water to most of the population served by a registered supply. Additionally, there are over 900 non-council, registered supplies which consist mostly of very small, small, and medium supplies.

Breakdown of those 1468 supplies and the population they serve by type of supplier

Supplier Type	Registered Supplies	Approximate Supply Population
Council	529	4,294,000
Department of Conservation	38	9,000
Department of Corrections	3	4,000
Ministry of Education	415	45,000
New Zealand Defence Force	11	14,000
Private and Community	472	74,000
TOTAL	1468	4.4 million

Public register of drinking water supplies

We are required to maintain a [public register of drinking water supplies](#) and we included the data we have from 1,449 registered supplies. An additional 19 supplies have some of their information withheld from the public register.⁶ In 2023, 39 supplies were deregistered.⁷ Of these, some (16) were deregistered when they were connected to an existing supply.

Suppliers must apply for a renewal of registration each year, which means confirming their registration information and other information they have lodged with us. We are continuing to work with suppliers to ensure they complete their annual renewals, so their information on the register is up to date. Suppliers must also notify us of any changes to their registration details (such as their legal name, the location of their supply, sources or treatment plants). Suppliers can update this information themselves at any time through our online supplier portal.

As of 31 December 2023:

- 97% of council supplies have had their registration renewed.
- 39% of government supplies have had their registration renewed.
- 75% of private and community supplies have had their registration renewed.

Private and community supplies

Under the Act, all drinking water suppliers (except domestic self-suppliers, which fall outside of the definition of a drinking water supplier/supply) are currently covered by the regulatory system and required to provide safe drinking water.

We are progressing work to fully understand the characteristics and challenges facing registered private and community supplies. Approximately 1% of the population (74,000 people) get their water from these suppliers.

An unknown number of unregistered supplies will be required to be registered by November 2025. We anticipate that most of these will be small (populations from 26 to 100) or very small community

and private supplies (population of 25 or less). It is difficult to estimate the impact of regulating these supplies when there is uncertainty about the number of supplies and their condition is unknown. Since many of these supplies have not been regulated before, it is likely that many will require assistance to become compliant by late 2028.

As of 31 December 2023, there are 43 very small, 146 small, 64 medium (populations from 101 to 500) and 18 large (populations above 500) private and community supplies registered. In addition, 201 supplies have no associated population and consist mostly of water carriers and their supplies, and a few community drinking water stations.

Many community and private supplies are in remote locations with limited infrastructure, such as reliable electricity supply necessary to run pumping, treatment and monitoring equipment, access to reliable network coverage to support technology-based systems, limited access/greater distance to health services, and disproportionate exposure to severe weather events and their impact.

We have limited information about the quality of the water they supply and the associated health risks. Many private and community supplies will likely need financial, technical and infrastructure assistance to meet existing regulatory requirements. These supplies often lack council investment or support and are often run by volunteers. Without such supplies and the voluntary work undertaken, many rural communities would be without access to sufficient drinking water.

Some of these supplies, such as marae, campgrounds and community halls, have fluctuating populations and provide Civil Defence and emergency support in the event of incidents or disasters, as was the case in the aftermath of Cyclone Gabrielle in 2023. Others provide drinking water to vulnerable communities, such as rural schools, residential care facilities and through community drinking water stations.

We are undertaking a range of work to ensure regulatory settings are proportionate to the needs and challenges facing private and community supplies. We will continue to engage with these

⁶ Under the Act, we may withhold information from the public register if it is in the public interest to do so, including to protect the privacy of people or the security of a drinking water supply.

⁷ Some (16) deregistered supplies were connected to an existing supply, six are not supplying water for drinking, five were at locations that no longer exist, four are water carriers that have ceased trading and three we do not have enough information to determine the reason for deregistration

suppliers to meet the needs of their communities and inform regulatory settings, while addressing any matters that pose a risk to public health. We intend to work with these suppliers to ensure our tools and guidance are fit for purpose and effective for their communities.

General exemptions are one possible option for some private and community suppliers. General exemptions exempt a supply (or class of supply) from most requirements. They are intended for situations where it may be unreasonable or impractical to comply with legislative requirements.

In December 2023, we granted our first general exemption for the Torrent Bay Township drinking water supply. We considered it would be impracticable and disproportionate to the risks of the supply for it to comply with the Act because of its remote location, lack of a continuous reliable electricity supply to the community, small population and lack of any permanent residents in the community. The community also provided solutions to ensure the safe consumption of drinking water, specifically, ensuring consumers have end point treatment or are aware of the need to boil water.

General exemptions are discussed further at the end of Part One of the report.

Te Mana o te Wai

Te Mana o te Wai provides a te ao Māori based framework to guide how we collectively approach water management.

One of the statutory objectives of the Act is that we give effect to Te Mana o te Wai, to the extent that it applies to our functions, powers and duties. This obligation also applies to all drinking water suppliers who operate under the Act.

Te Mana o te Wai is a te ao Māori concept that recognises the important relationship between the protection of water, the health of the wider environment and people. At its core, Te Mana o te Wai is about restoring and preserving the balance between the wellbeing of water in its own right, the needs of communities and economic development. It requires us to make intergenerational decisions that moves New Zealand towards taking a whole of water source approach, which will support the health needs of people, and provide for other uses. We acknowledge that this will take time.

The National Policy Statement for Freshwater Management 2020 (NPS-FM) provides the definition of Te Mana o te Wai used in the Act.

Local communities are responsible for defining what Te Mana o te Wai means for them at a local level. It is these local definitions that drinking water suppliers need to consider under the Act, and how to reflect this in how they provide drinking water and their long-term planning.

Through this report we identify ways that our work is setting us on the path to give effect to a whole of water source approach (Te Mana o te Wai). The concepts that underpin Te Mana o te Wai have been considered when taking a holistic approach to water management, which begins with the protection of source water quality and continues through the supply of safe drinking water to consumers.

About the data in this and future drinking water regulation reports

In this report we look at data provided by drinking water suppliers and accredited laboratories which are indicators of drinking water safety, compliance, risk and overall performance of the sector.

This includes:

- Consumer advisories.
- Notifications from accredited laboratories and drinking water suppliers.
- Information about Drinking Water Safety Plans and source water risk management.
- Reporting from suppliers on requirements in the Drinking Water Quality Assurance Rules.
- General and residual disinfection exemptions.
- Registration information, including data on sources, treatment plants and distribution zones.

We analyse the data by:

- Population bands: very small (0 to 25 people), small (25 to 100), medium (101 to 500) and large (more than 500 people).
- Supplier type.
- Supply type.

More information on data, data analysis, and data quality is available in Appendix 3 of this report.

Over time as sector reporting matures, data quality and insights will continue to improve, and comparisons will become more meaningful.



PART ONE:

Drinking water safety

In this part, we:

- describe drinking water safety in the context of risk management
- address how suppliers proactively manage the safety of their supplies, and
- look at data and information collected from consumer advisories and notifications about the safety of drinking water in Aotearoa New Zealand.

Access to a sufficient supply of safe drinking water is an internationally recognised human right.⁸ In New Zealand, drinking water suppliers have a duty of care to ensure the drinking water they supply to their consumers is safe.

Under the Water Services Act 2021 (the Act), drinking water is 'safe' if it is unlikely to cause a serious risk of death, injury or illness either immediately or over time – regardless of whether serious risk arises solely from the consumption of or use of drinking water, or in combination with other causes.

We are exposed to drinking water by multiple ways. The Act addresses this by defining drinking water as water used for human consumption, oral hygiene, food preparation, or washing dishes or other utensils associated with eating or drinking. The Maximum Acceptable Values (MAVs) set in the Drinking Water Standards for New Zealand 2022 (the Standards) are designed to ensure that drinking water is safe to drink.

The primary risks to drinking water supplies are from microbiological pathogens, such as bacteria, protozoa and viruses, which can cause widespread

outbreaks of acute illness. In general, chemical exceedances are unlikely to result in an acute illness unless they are at a very high level.⁹ The Standards also contain MAVs for radiological determinands, and testing is required where appropriate. However, this year's report focuses on bacterial and chemical MAV exceedances.

Source water, whether from rivers, streams, roofs (rain) or bores, will generally require treatment to make it safe to drink. The purpose of treatment is to kill or inactivate microorganisms and to reduce the concentration of chemicals that may be present in the source water.

The composition of source water will vary between sources and over time, so treatment must be able to successfully treat the highest level of contamination possible in the source water. Prioritising the health of source water may help to reduce the treatment required. Therefore, it is important that suppliers understand their source water to ensure that they can treat it effectively and manage foreseeable changes and events that impact the source.

The safety of drinking water can also be affected by incidents impacting treatment or distribution

⁸ United Nations General Assembly, 64/292 The human right to drinking water and sanitation, 2010.

⁹ The MAV for nitrates is an exception, in that it is an acute limit intended to prevent "Blue Baby Syndrome" or methaemoglobinaemia, in alignment with the World Health Organisation guidelines. This is a serious condition in infants that leads to reduced oxygen availability and can cause death.

systems. These may occur due to issues within the supply itself or external factors, such as a major weather event, power outage or supply chain problem. A single contamination event has the potential to cause widespread illness, injury or death.

Suppliers are required to develop and implement drinking water safety plans (DWSPs) to ensure that all potential risks and hazards associated with their supply are identified and eliminated, controlled or managed. This includes explaining how the supply meets legislative requirements such as quality assurance rules. Suppliers must also document how they will respond to incidents and emergencies to ensure that public health is protected. To protect public health during an incident, suppliers may issue advice for example to boil water or use an alternate supply.

Risk from microorganisms

Removing microbiological pathogens is the primary purpose of drinking water treatment as they can cause widespread outbreaks of acute illness in communities. While waterborne pathogens that cause more severe illness like cholera are extremely rare in countries with developed sanitation systems, any waterborne illness could be serious and even fatal, particularly for young children, older people and those with underlying health conditions.

Waterborne pathogens generally come from animal and human faecal matter. These can enter source water directly, for example from bird or animal faeces, or stormwater and wastewater overflows, or in a diffused way through run-off from land. Effective treatment should remove or inactivate these pathogens from drinking water. Drinking water can also become contaminated after it leaves the treatment plant and travels through the distribution system to consumers. Residual disinfectants like chlorine help to keep the water safe by killing bacteria within the distribution system. However, distribution systems should be designed, operated and maintained in a manner that minimises microbiological contamination.

It is important to recognise that bacteria, protozoa and viruses have different characteristics that often require different treatment processes. For example, chlorine is not an effective barrier for protozoa at the levels used in drinking water treatment.

Testing for individual pathogens would be time consuming and expensive. Instead, drinking water samples are normally tested for indicator organisms like coliform bacteria, including *Escherichia coli* (*E. coli*). The presence of *E. coli* indicates recent faecal contamination and therefore the potential presence of pathogens. Testing for total coliforms gives an indication of the general quality of the water.

Another way to demonstrate that water is not contaminated with microorganisms is to ensure that the water maintains a chlorine residual. Testing for chlorine is used by water suppliers to demonstrate that some pathogens (bacterial and viral) in water are sufficiently controlled.

Turbidity (or dirtiness) of water is also used to indicate that some pathogens, generally protozoa, have been removed. Testing of the turbidity of water after a treatment process like filtration is used by water suppliers to demonstrate that the filtration process is working effectively.

Water suppliers also demonstrate that effective barriers are in place to control microbiological pathogens by monitoring treatment process performance. For example, the UV dose, a measure related to the exposure of organisms to ultraviolet light, can be used as an indicator of the effectiveness of a UV disinfection treatment process.

While there are MAVs for microorganisms these tests only ensure that the sample of water collected is not contaminated. Monitoring of treatment processes continuously combined with effective risk management ensures drinking water is free from microbial contamination at all times.

Risk from chemicals

Chemicals may be present in source water naturally; an example of this is arsenic. Chemicals can also be in source water due to contamination from human activities where materials are dumped, discharged or run off into water, including pesticides, petrochemicals and nitrates. Chemicals may be added during treatment, which may contain other chemicals due to impurities. Other chemicals can be produced during a water treatment process. Post treatment chemicals can enter water as it travels through the distribution system. This is because most water in New Zealand is plumbosolvent, which means it can leach metals from plumbing systems and material, such as lead, into the water.

The MAVs in the Standards are generally based on values set by the World Health Organisation (WHO) to ensure that water does not represent any significant risk to health over a lifetime consumption, including different sensitivities that may occur between life stages. The WHO sets these values based on the body of scientific evidence available at the time of the assessment and includes safety factors where there are uncertainties. This means that short term exceedances for most chemicals are unlikely to present an acute risk to health.

The risk from chemical exceedances will depend on the chemical, the level of the exceedance and the duration of the exposure. Occasionally, events can result in drinking water containing high concentrations of chemicals, or low concentrations of very toxic chemicals that require immediate action to protect public health.

Many of the requirements to monitor for chemicals in drinking water supplies are new for suppliers. This has identified issues with chemical compliance in several supplies. We are working to develop a comprehensive understanding of the chemical composition of drinking water supplies across New Zealand.

This is our first report on drinking water that exceeds chemical MAVs and our first report that presents the state of source water quality across the country.

A multi-barrier approach to drinking water safety

To manage the risks from pathogens and chemical hazards associated with a supply, drinking water suppliers must establish a drinking water safety planning process that includes a multi-barrier approach to drinking water safety. This approach means that if one barrier fails or is ineffective, there is another barrier or barriers that will control the hazard or risk and ensure that drinking water is safe.

In drinking water there are four main types of barriers that contribute to a multi-barrier approach:

- Prevention of raw water contamination (for example, prevention of stock from defecating in sources of human drinking water).
- Removal of contamination (for example, filtration of protozoa or removal of chemicals).
- Killing or inactivating pathogens (for example, UV inactivation of protozoa and bacteria).
- Maintaining the quality of treated water throughout a reticulation system (for example, residual disinfection and backflow prevention).

The Rules set out the minimum monitoring and treatment requirements which should be met for barriers to be effective. The Rules are based on the type of supply and the population served. This is complemented by the implementation of drinking water safety planning, which is essential to ensure that all hazards are identified and suitable management of risks are in place to provide effective multi-barrier protection.

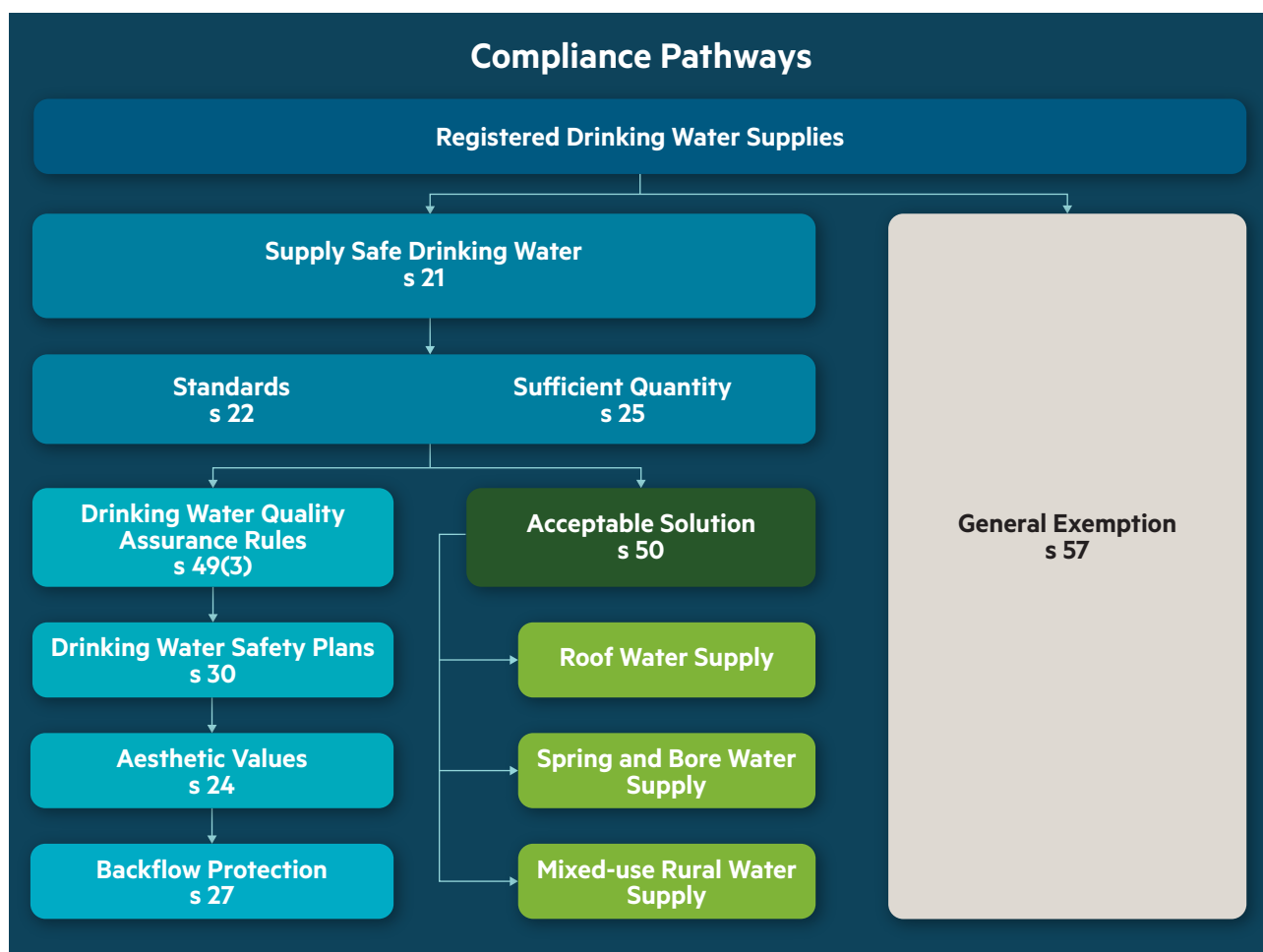
From a practical perspective, a multi-barrier approach is the most effective way to keep consumers safe.

In part two of this report, we discuss how suppliers are performing against their duty to ensure their DWSPs include a multi-barrier approach. This is discussed by considering supplier reporting against compliance rules.

Acceptable solutions

Acceptable solutions provide drinking water suppliers with a ready-made option to meet selected compliance obligations under the Act and enable the use of end point treatment systems. They are developed in consultation with suppliers, apply to particular supply types and situations, and must be implemented in their entirety.

Suppliers that choose to follow an acceptable solution do not have to prepare a DWSP. They must still register, supply safe drinking water and notify us if their drinking water is or may be unsafe, or if a MAV is exceeded.



There are currently three acceptable solutions for:

- drinking water suppliers that abstract water from springs and bores
- mixed-use rural supplies (where at least 50% of the water supplied is intended to be used for agricultural or horticultural purposes)
- supplies that rely on roof water.

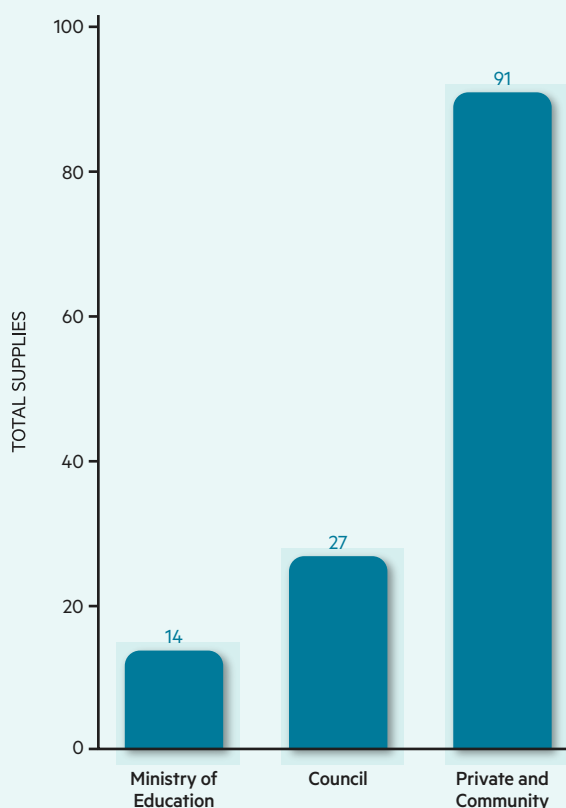
Acceptable solutions allow suppliers to use off-the-shelf end point treatment systems. End point treatment is more suitable for supplies with a few buildings or those with a small number of dispersed properties where centralised treatment would not be practicable.

Acceptable solutions focus on ensuring raw water supplied to consumers is suitable for end point treatment and that the end user of the drinking water treats it to a suitable standard.

If complied with in full, the acceptable solutions will ensure that suppliers are fulfilling many of their obligations under the Act.

We consulted with many key stakeholders about the practicality and use of the acceptable solutions to ensure they were proportionate to risk. Some suppliers have indicated in their registration that they comply with acceptable solutions. We expect more uptake of the acceptable solutions in the future as smaller unregistered supplies enter the system.

Supplies that have adopted acceptable solutions



While acceptable solutions were made to be flexible to suit as many situations as possible within the scope of the solution, they are not a one-size-fits-all solution and may not work practically in many scenarios. The primary pathway to comply with the Act for suppliers is through drinking water safety planning and compliance rules.

Drinking Water Safety Plans

The Act requires each drinking water supply owner to develop and implement a DWSP for their registered supply and to lodge a copy of this plan with us unless the supply is following an acceptable solution or has a general exemption.

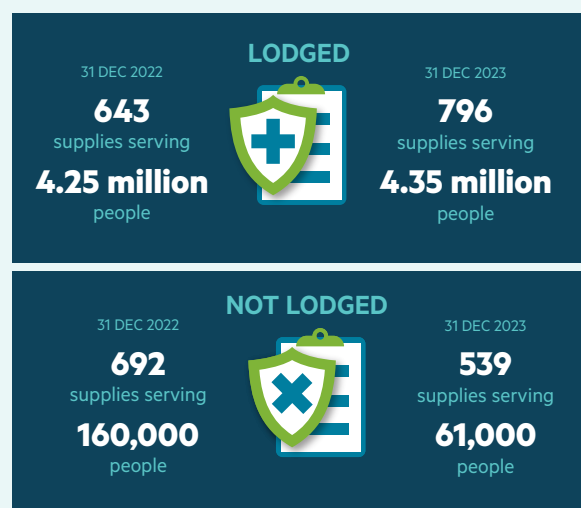
Drinking water safety planning is a risk management process that aims to ensure a safe supply of drinking water to consumers. It focuses on identifying,

assessing, and managing the risks across the whole drinking water supply system, from where the water is sourced to the point of supply to consumers.

A DWSP is supply-specific, so for those supplies that require one, the DWSP must be individualised specifically for that supply.

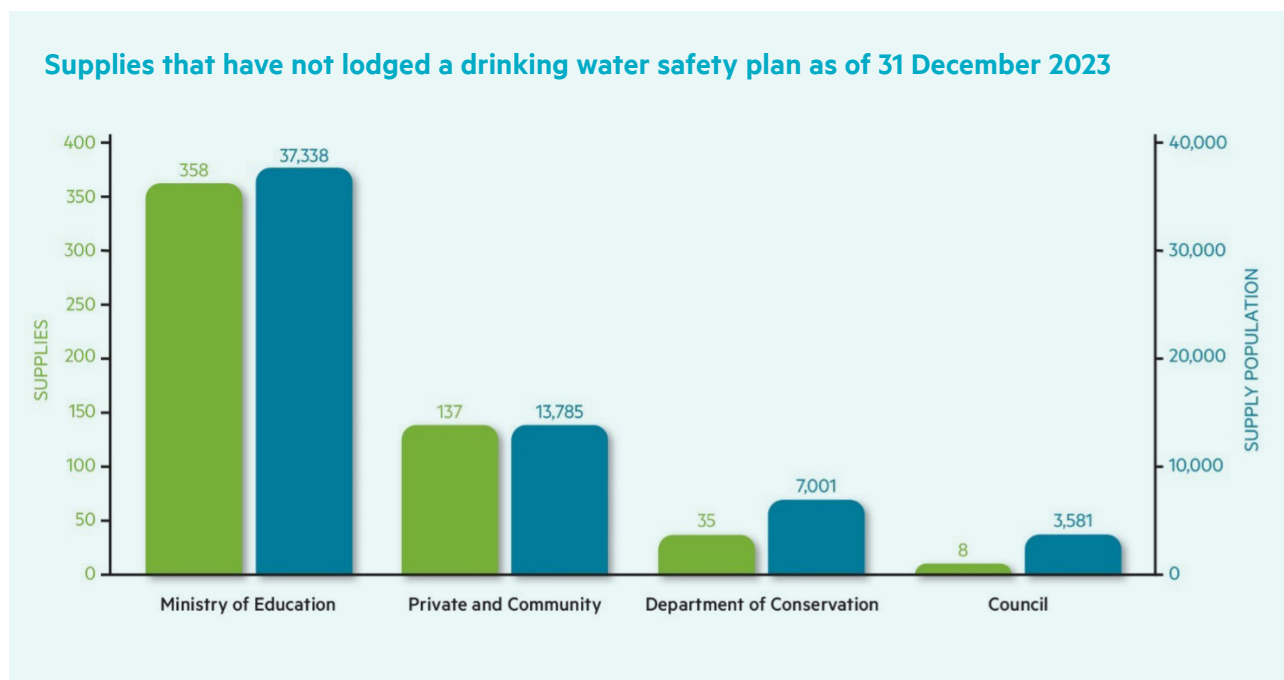
The numbers of registered supplies that have lodged DWSPs have increased since 2022 as shown on the left of the figure below. The majority of council supplies serving most of the population have lodged DWSPs. However, many suppliers without a DWSP have not told us what compliance pathway they have chosen for their supply: implementing a DWSP while following the Rules or following an acceptable solution.

Drinking water safety plans lodged



Most of the registered supplies that have not lodged a copy of their DWSP, but are required to, are government and private and community supplies serving populations of less than 500 people as shown below. These supplies were not required to prepare a DWSP under the Ministry of Health (MoH) regime, prior to 2022.

The plot below shows the number of supplies (green) and total supply population (blue) that have not lodged a plan by supplier.



The Ministry of Education (MoE) is actively working to put self-supplied schools on a compliance pathway, including undertaking necessary infrastructure upgrades.

Only 10% of MoE's supplies have lodged a DWSP and only 3% have adopted an acceptable solution, leaving approximately 87% of supplies non-compliant with the Act.

MoE's school supplies are generally located in rural areas and serve small populations. The majority of school supplies (95%) require significant infrastructure upgrades. MoE has indicated that it will follow a phased approach to undertaking necessary infrastructure upgrades, and in the interim, manage health and safety risks at its supplies. It is working to prepare DWSPs or follow an acceptable solution for most of its supplies by mid-2025.

Similarly, the Department of Conservation (DOC) is actively working with us to understand the pathway to compliance for their supplies, including through exemptions and acceptable solutions.

DOC has not lodged a DWSP for 35 of its 38 registered supplies, the same number as last year.¹⁰

New Zealand Defence Force has not lodged a DWSP for just one of its 11 facilities, an improvement from three last year. The remaining supply is a water carrier that does not have a permanent supply population.

Preparing a DWSP is new for many private and community supplies.

We have supported private and community suppliers by preparing DWSP templates and guidance tailored to small and medium sized supplies. Although some suppliers have used these templates, 138 registered private and community supplies have not lodged a copy of their DWSP. This situation is understandable given our focus in 2023 was mostly on council and government supplies. We are progressing a programme of work to understand what further

¹⁰ At the end of 2023 we were in discussions with DOC about general exemption applications for many of their supplies, which may explain their low rates of reporting.

support these suppliers need to prepare and lodge a DWSP with us to meet their obligations.

When suppliers annually renew their registration details, they must confirm that their DWSP is up-to-date and implemented, if not they must lodge a new or amended DWSP. Last year, 96% of supplies that lodged a DWSP completed their annual renewals, including confirming that their DWSP was up to date. Some 29 supplies did not complete their annual renewals. We have provided a list of local and central government supplies and whether they have a lodged DWSP as of 31 December 2023 in Appendix D.

Drinking Water Safety Plan reviews

The Act requires us to review DWSPs, including for compliance with legislative requirements, based on the scale, complexity and risk profile of drinking water supplies.

We review DWSPs but we do not otherwise approve or certify them. Under the Act, it is the supplier's responsibility to make sure they are meeting their obligations. This is a large shift in regulatory approach from the previous Health Act 1956 regime.

We started our systematic review of DWSPs on 1 July 2023. Our focus is currently on larger supplies owned or operated by local government and supplies where we see safety concerns.

The information gathered in our reviews helps us to:

- Identify risks and non-compliance with the Act.
- Take compliance action where necessary.
- Improve our understanding of the sector.
- Inform future priorities and improvements.

Our reviews are a key source of information about the safety of each drinking water supply, the risk management approach that suppliers are taking and the capability of a supplier.

Key issues and areas we are looking at in our reviews include:

- Drinking water safety planning. Does the supplier have an up to date DWSP?
- Compliance approach. Does the DWSP outline how the supply complies with the Rules and is

the DWSP appropriate?

- Bacteria and protozoa risk and treatment. Does the supply have appropriate barriers and are they effective? Is there a plan in place to promptly address the risks?
- Response plans. Does the supplier have appropriate response plans for a range of water quality events, natural hazards and other types of events (such as infrastructure failure)?

We will continue to support drinking water suppliers to consider how they will give effect to Te Mana o te Wai in DWSPs, to the extent it applies, and to consider how to engage with their local iwi, hapū and broader communities on what an approach to Te Mana o te Wai looks like in their location.

We are obtaining valuable insights into councils' risk management practices from our DWSP reviews.

Our review of DWSPs has shown us many suppliers are undertaking appropriate risk management practices. However, some suppliers have significant gaps which lead to unacceptable risks not being mitigated for. This shows the need to improve practice and raise awareness of the best way to manage risks to the provision of safe drinking water.

We are engaging with suppliers on the results of reviews and ensuring appropriate actions are being taken to resolve the gaps that we identify. Many suppliers we have engaged with in the review process have responded proactively to the issues we identify and are actively resolving issues which significantly lower the risks to their supply.

As we learn more through our ongoing review of DWSPs, we will identify further trends, areas of concern and opportunities for improvement across the sector. We will use this information to help us identify where to prioritise our regulatory effort, as well as to identify where we may want to provide clear expectations, information and/or guidance to the sector. At the moment, we are prioritising our efforts on ensuring that council and government supplies have appropriate multi-barrier protection for water supplies.

Drinking Water Standards, Rules and Aesthetic Values

In this section, we give an overview of the Standards, and the Rules. We also briefly discuss the Aesthetic Values for Drinking Water Notice 2022 (Aesthetic Values).

New Standards, Rules and Aesthetic Values for drinking water came into effect for drinking water suppliers from November 2022.¹¹

This is the first year that suppliers have been required to monitor and report on their performance and compliance with the Rules, following public consultation in early 2022.

Many of the requirements in the current Standards, Rules and Aesthetic Values were required under the Drinking Water Standards for New Zealand 2005 (Revised 2018) (administered by the Ministry of Health). For example, supplies with surface water sources were first required to have a protozoa barrier in the 1995 standards.

Many of the requirements in the Rules have been in force for many years, like bacteria and protozoa treatment for supplies serving over 500 people.

Other requirements in the Rules and Standards are new, like testing for chemicals such as aluminium, nitrate, lead, arsenic, and chlorate. It is understandable that many suppliers will not have yet fully complied with some of these new requirements. In the next year, we will progress work to understand what support these suppliers need to meet their obligations.

Regular testing of source water is a new requirement in the Rules, which then informs part of the chemical monitoring requirements in treated water. Continuous monitoring is now available for distribution zones to reduce the burden of collecting samples. Rules have been split across population bands to provide compliance pathways that are suitable according to the scale, complexity and risks of different supplies, and therefore supplies serving less than 500 people have a new range of rules. The requirement of bacteria treatment for any supply serving more than 25 people was also brought in with the Rules.

The Drinking Water Standards

The Standards set MAVs for a range of determinands that can affect the safety and quality of drinking water. The MAVs are generally based on guideline values set by the WHO. When a MAV is exceeded, both the supplier and the accredited laboratory that tested the water must notify us. Suppliers are responsible for determining whether they comply with the Standards and whether their drinking water contains determinands above the MAV. Notifications of MAV exceedances are how we know whether suppliers are not complying with the Standards.

The Rules

The Rules set out the minimum requirements for monitoring and treatment of drinking water supplies in relation to a supply's source water abstraction points, treatment plants and distribution zones. This includes water quality monitoring to ensure the Standards are met and quality assurance measures to ensure systems, processes and monitoring equipment are working effectively.

The Rules are aligned with international good practice and are designed to be proportionate to the scale, risk and complexity of the supply.

Compliance with the Rules is intended to ensure that water provided by suppliers is safe and does not exceed the MAVs for key determinands set out in the Standards. We expect suppliers to test for other determinands that may be present in their source water and drinking water and to outline this monitoring in their DWSPs and source water risk management plans. Where MAVs cannot be (or are not) used to measure compliance, the Rules instead specify operational requirements for treatment plants.

In the Rules, the number of consumers served by a water supply (i.e. the population size) is used to identify the appropriate rules for the supply. Suppliers can opt for rules above their population band, which can make a wider range of options available and is sometimes preferred by more experienced water suppliers.

¹¹ Suppliers which elect to comply with an acceptable solution do not need to comply with the Rules or lodge a DWSP.

Aesthetic Values

The Aesthetic Values are designed to ensure that drinking water is acceptable to consumers in terms of how it looks, tastes and smells. They specify or provide minimum or maximum values for substances (such as hardness, iron and colour) and other characteristics that relate to the acceptability of drinking water to consumers. The values are generally based on guideline values set by WHO.

Most aesthetic values do not directly influence the safety of drinking water. However, consumers may sometimes seek water from alternative, possibly unsafe, sources rather than drink water they consider is aesthetically unacceptable.

A supplier must take all reasonably practicable steps to supply drinking water that complies with aesthetic values we have issued under the Act.

Notifications from water suppliers and laboratories

Suppliers must notify us if they consider their drinking water is, or may be, unsafe, or if it does not comply with the Standards.

Notifications are vital to enable us and the supplier to take appropriate action to reduce risk to public health.

A supplier's first priority is to take any immediate action needed to protect public health. Next, they must notify us, investigate the source or cause of the incident and take remedial action to resolve the situation.

A supplier must identify and implement measures required to ensure that the incident does not happen again. This work may take place over a longer period, for example as a normal part of the supplier's drinking water safety planning process.

A supplier must also take all practicable steps to advise consumers and suppliers that the drinking water is or may be unsafe and what measures should be taken to protect public health (for example, boiling).

We received an average of 108 notifications each month in 2023. Our records indicate that suppliers are generally submitting notifications as required by the Act and taking appropriate action to mitigate any public health risks.

Accredited laboratories must also notify Taumata Arowai if testing reveals drinking water samples do not comply with the Standards.

Suppliers must use an accredited laboratory to analyse water samples. Notifications from laboratories can alert us to water issues before a notification comes through from the supplier. Laboratory notifications are a regulatory backstop and ensure that we receive information about all drinking water suppliers, particularly those that may be unaware or not fulfilling their duty to notify us.

How we respond to notifications

We categorise notifications from drinking water suppliers and laboratories by their level of criticality (critical, high, medium or low). The level assigned to a notification determines how they are prioritised for risk assessment and the order in which our regional teams will consider them. While we endeavour to respond to all notifications, critical notifications are responded to first as these are the highest priority (for example, a MAV exceedance that presents an immediate risk to public health).

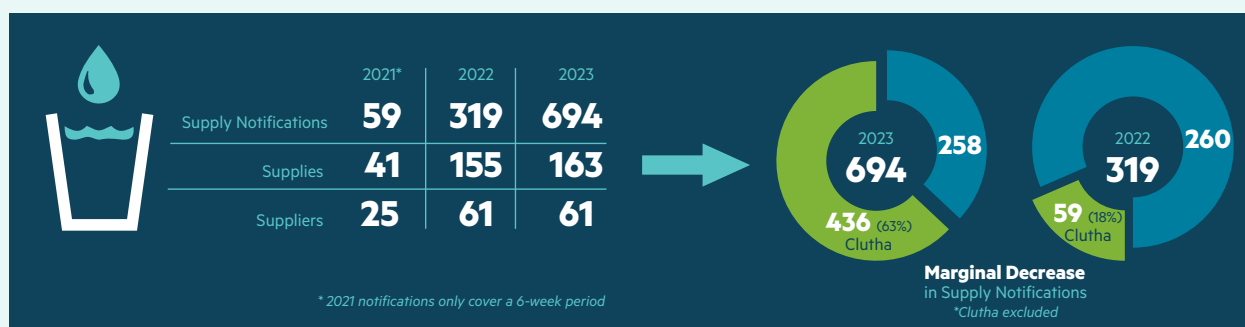
We actively monitor responses to notifications to ensure that the supplier is taking appropriate action depending on the seriousness of the notification. We will contact the supplier if we do not have enough information to be satisfied that their planned response is adequate or if we need to take further action.

Notifications of drinking water that is, or may be, unsafe

In 2023 we received 694 notifications that drinking water is, or may be, unsafe. This is more than double the 319 notifications we received in 2022. 436 (63%) of these notifications were from Clutha District Council and largely relate to their ongoing monitoring of aluminium levels in their supplies. If we exclude Clutha, we saw a marginal decrease in these notifications from 260 in 2022 to 258 in 2023.

In the sector performance section, we discuss the direction we issued to Clutha District Council as a result of the aluminium levels in its supplies.

Notifications from registered supplies that drinking water is or may be unsafe



It is important that suppliers continue to notify communities where drinking water may be unsafe.

These notifications included reasons such as:

- A treatment plant failure.
- Low residual disinfectant in the network that affected the water delivered to consumers.
- Laboratory report stated that *E. coli* had been detected in treated water.
- Laboratory report stated that a chemical MAV had been exceeded in treated water.
- A breach in the integrity of the distribution system.
- A severe weather event had occurred causing issues with a supply.

Scenarios of the kind listed above do not mean that the entire population served by a supply are at risk. Frequently, only one zone served by a supply, or a limited number of consumer properties will be affected, rather than all consumers.

Suppliers are taking different approaches to their interpretation of whether drinking water “may be unsafe”. Some suppliers are following a conservative approach and will notify us when they suspect a

treatment plant failure could have led to untreated water being supplied before they have determined whether the water is safe or not. Other suppliers may only notify us when a MAV is breached.

Some suppliers have notified us of non-compliance with the Rules in situations where the drinking water may still be considered safe to drink, such as when there has been a monitoring data gap while the plant has intentionally not been providing water. Notifications from suppliers are intended to communicate potentially unsafe water and disruptions to supply. Failure to meet one of the Rules does not always result in potentially unsafe water. We have reviewed our notification form to ensure it is clear what a supplier must notify us of.

These notifications indicate that some water supplies in New Zealand are not consistently providing safe, compliant drinking water to consumers. The exact population exposed to unsafe drinking water is unknown.

We expect to see an increase in notifications in the short term as more suppliers come into the regime and all registered suppliers become more familiar with their notification requirements under the Act.

Supplies with notifications of MAV exceedances

In 2023, we received 335 notifications about supplies where either *E. coli* or a chemical determinand was found at levels exceeding the MAV.

We received 604 laboratory notifications in 2023, indicating a discrepancy between supplier notifications and notifications by laboratories.

Supply notifications of MAV exceedance

Year Submitted	2021 (6 weeks)	2022	2023
Notifications	37	199	335
Notifications of Bacterial Exceedance	26	91	114
Notifications of Chemical Exceedance	11	109	221

Year Submitted	2021 (6 weeks)	2022	2023
Notifications	53	330	604
Notifications of Bacterial Exceedance	42	210	235
Notifications of Chemical Exceedance	11	120	369

This discrepancy can be attributed to multiple factors. In certain cases, we may allow for a supplier to notify us only once testing ramps up until an issue is resolved to reduce administrative burden (so the supplier does not need to keep reporting individual exceedances that relate to the same underlying issue). However, we have not made that allowance for laboratories.

Some 24 suppliers did not satisfy their duty to notify us of MAV exceedances, as we received laboratory notifications without any corresponding supplier notification.

We find this behaviour concerning given the laboratory must also notify the supplier immediately upon receiving a test result that exceeds the MAV. While we allow for some flexibility in the timing of supplier notifications to allow the supplier to prioritise operational response and their duty to immediately protect public health, we expect suppliers to notify us promptly after being notified by the laboratory of a MAV exceedance. We

approach each of these suppliers as appropriate considering the scale, complexity, and risk of the supply.

In the following sections we analyse data notified to us from laboratories of MAV exceedances, broken down by the determinand that exceeded the MAV.

Laboratory notifications of *E. coli* MAV exceedances

One of the determinands which may be found in drinking water is *E. coli*. *E. coli* is a species of bacteria that is an indicator of faecal contamination, and it may therefore contain other pathogens that can cause illness. Common sources of *E. coli* bacteria are human wastewater discharges, animal waste, bird droppings and stormwater run-off.

Drinking water should be completely free of *E. coli* to ensure that it is safe.

Most of the time a positive *E. coli* result will prompt suppliers to issue some form of consumer advisory and only lift it once the supplier has verified that the issue has been resolved.

E. coli tests are helpful to verify that water is safe but must be used in combination with other requirements in the Rules to uphold safe drinking water standards.

We continue to be concerned by the number of *E. coli* notifications we receive, given it indicates the presence of pathogens that have the potential to cause widespread illness. *E. coli* tests generally take at least 24 hours to incubate to a final result, so by the time it is detected, contaminated water has continued to be supplied to the population without any risk mitigation. The tests are also only for 100 mL of sample, which only represents a tiny fraction of the water being supplied.

We received 235 notifications from laboratories where *E. coli* exceeded the MAV, up 12% from 210 in 2022. These notifications are represented geographically in the map below.

Notifications of MAV exceedance – *E. coli*



A number of communities across New Zealand continue to experience events where unsafe water is being supplied to consumers.

Some 21 supplies serving 8,100 people had more than two laboratory results that were positive for *E. coli*. Supplies with more than two notifications of *E. coli* are more likely to be failing in their duty to identify and implement measures to stop the event recurring. However, a response may include additional monitoring to identify the issue, potentially resulting in additional test results that are positive for *E. coli*. The supply with the most *E. coli* notifications was Waitahuna Rural in the Otago Region which has a long-term boil water notice in place. Clutha District Council is currently undertaking major works to bring online a new scheme to replace the Waitahuna Rural supply by the end of 2024.

Appendix 4 gives a list of supplies and whether we received a notification for a bacterial MAV exceedance for each supply.

A future focus area for us is notifications of low counts of *E. coli*. There is a risk that suppliers may incorrectly disregard these results as being due to sample contamination or laboratory error. This is a known contributing cause to water-borne disease outbreaks from drinking water in New Zealand and overseas. We recommend that suppliers take a precautionary approach to all *E. coli* detections while the cause is being investigated, ensuring additional measures, such as consumer advisories, are in place until there is sufficient evidence that safe water is being supplied.

We expect suppliers to recognise that any notification of *E. coli* is serious and requires an effective response and investigation.

Safe and compliant drinking water should not contain pathogens or their indicators. In England and Scotland, rates of *E. coli* in drinking water are exceptionally low. If suppliers detect pathogens in drinking water, our expectation is they will fulfil their duties under the Act, including taking steps to protect public health, investigating the cause, and preventing recurrence.


Chemical MAV exceedances

When drinking water exceeds a chemical MAV, the supplier must determine whether there is significant risk to public health. It is essential that a supplier consults public health experts to determine whether there is an immediate risk. This enables suppliers to inform consumers of any public health risks and steps they may need to take to protect their health.

If certain chemicals like cyanotoxins are detected above the MAV, a 'Do Not Use' notice must be issued to ensure that people are not exposed to water containing cyanotoxins and do not react adversely to contact with the water. These are very rare occurrences.

The table below shows a summary of chemical contaminants for which we received five or more laboratory notifications in 2023. We also received one notification of a MAV exceedance for chromium. We received no laboratory notifications from registered supplies where nitrate exceeded the MAV in 2023.

Chemical MAV exceedances



Chemical determinand	Lab notifications received in 2021	Lab notifications received in 2022	Lab notifications received in 2023	Number of supplies affected by notifications made in 2023	MAV (mg/L)	Median lab result received in 2023 (mg/L)	Maximum lab result received in 2023 (mg/L)
Aluminium	0	0	210	10	1	1.8400	115
Chlorate	0	8	87	16	0.8	2.5440	11.9
Arsenic	7	90	27	9	0.01	0.0120	0.024
Disinfection by-products	3	11	21	8	Varies	-	-
Lead	1	7	10	10	0.01	0.0136	0.021
Manganese	0	1	7	4	0.4	0.6550	2.3
Chlorine	0	1	6	5	5	5.7500	33

Notifications for aluminium, chlorate, disinfection by-products, lead, manganese, and chlorine have increased year-on-year since 2021.

There could be several reasons for the observed increase in notifications above, but the most likely is the introduction of requirements in the Rules in 2023 for more suppliers to undertake mandatory testing of chemicals in their supplies.

Notifications for arsenic have decreased from 2022 to 2023, with most of the arsenic results being at or near the MAV.

There are three locations in New Zealand known to us where there are typically higher concentrations of chemicals that exceed MAVs regularly. They are:

- Taupō District Council water supplies containing arsenic exceeding the MAV. Arsenic occurs naturally in drinking water but occurs at higher levels in volcanic areas. In the last year we have received 23 notifications of arsenic exceeding the MAV across seven of the council's 18 supplies, accounting for 85% of the total arsenic exceedance notifications from laboratories. The council has developed a programme of work to address this issue.
- Clutha District Council water supplies containing aluminium exceeding the MAV. We received 202 notifications for aluminium exceeding the MAV in 2023 accounting for 96% of aluminium exceedances. In March 2023, we issued a direction to Clutha District Council and the

previous operator of its supplies to address aluminium MAV exceedances across five supplies. Since then, the council has undertaken extensive additional monitoring for aluminium and has taken steps to reduce the concentration in its drinking water supplies.

- Hastings District Council water supplies containing chlorate exceeding the MAV. Chlorate is a known by-product of the drinking water disinfection process. In the last year, we have received 87 notifications of chlorate exceeding the MAV across 16 supplies and 61% were in Hastings District. The council has conducted significant levels of additional sampling to inform the implementation of management practices to minimise chlorate formation in the affected supplies. A detailed investigation was completed to determine the reasons for the exceedances and the council has been working with the National Public Health Service to inform residents of the worst affected supply.

We are actively monitoring all these situations and are working closely with the suppliers to address them.

A geographic representation of chemical MAV exceedances is given on the next page.



Notifications of MAV exceedance – Chemical



Appendix 2 gives more information about the chemical determinands we discuss in this report. Appendix 4 lists supplies and whether MAV exceedances were notified to us in 2023 by laboratories.

Consumer advisories

Suppliers issue consumer advisories if they identify issues with the drinking water they supply if it significantly increases the risk to consumers. This enables suppliers to inform consumers of any public health risks and what they need to do to protect their health, like boiling water, while the supplier takes steps to improve the water quality.

While consumer advisories can be effective safety measures over short time frames, for example in response to extreme weather events, long-term consumer advisories likely indicate systemic problems with the supply and indicate that a supplier is regularly failing to supply safe drinking water. Use of consumer advisories over extended

periods can also become ineffective and potentially dangerous, if advisories become normalised and ignored by consumers. We encourage suppliers to ensure the need to boil water continues to be understood by consumers, and to consider potentially changing how they communicate this information to consumers over time.

As depicted below, there were 93 temporary boil water advisories, 23 do not drink advisories and two do not use advisories used at some point in 2023. These are in addition to 105 long term boil water advisories that were in place in 2023 by some suppliers as long-term risk mitigation strategies. We expect there to be further consumer advisories that had been issued by suppliers that we have not been made aware of.

Consumer advisories - 2023

				
	Boil water	Do not drink	Do not use	All
Long-term	105	7	0	112
Temporary	93	23	2	118
All	198	30	2	230

Some 107 of the temporary advisories above were closed by the end of the year with nearly two thirds being in place for two weeks or less. We actively work with suppliers to resolve temporary consumer advisories.

Registered supplies with an active temporary advisory in 2023

				
	Boil water	Do not drink	Do not use	All
Council	46	0	0	46
Department of Conservation	1	0	0	1
Ministry of Education	16	18	2	31
Private and Community	7	2	0	9
All	70	20	2	87

The long-term advisories are made up of 53 that were in place before 2023 and 59 initiated in 2023. 23 of these were closed leaving 89 long-term advisories in force at year end.

Over three quarters of the closed advisories were in place for less than two years, however the longest had been in place in Kaikoura for more than six years

for a largely agricultural supply. This was followed by a supply in Ashburton that struggled with turbidity during heavy rainfall and had a boil water notice in place for five years.

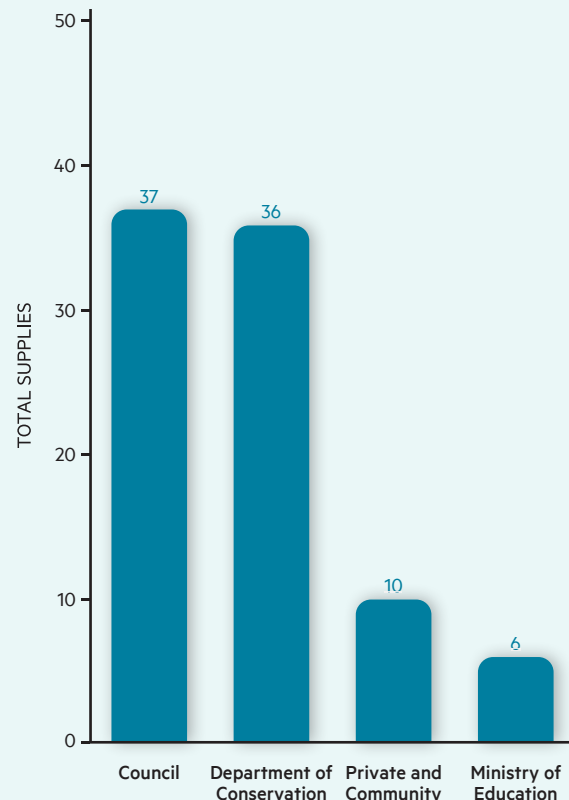
The table below shows the total supplies with a long-term advisory in force at the end of 2023.

Registered supplies with an active long-term advisory as at 31 December 2023

	 Boil water	 Do not drink	 All
Council	36	1	37
Department of Conservation	36	0	36
Ministry of Education	2	4	6
Private and Community	10	0	10
All	84	5	89

Many supplies under long-term consumer advisories face challenges which may not be resolved quickly. We work with suppliers to face these challenges and find an appropriate pathway for them to meet their obligations under the Act. For instance, most of DOC's supplies are under a long-term consumer advisory. One path that may be appropriate for these supplies is a general exemption.

Supplies with long-term advisories in force as at 31 December 2023



We are concerned by the high number of consumer advisories issued in New Zealand compared to other countries like England and Scotland, where the numbers of consumer advisories issued is exceptionally low. Our current focus is ensuring suppliers are issuing consumer advisories appropriately and that these suppliers work to ensure issues are being addressed, whether that is an alternative compliance pathway or ensuring improvements are planned and funded to resolve underlying supply issues.

General exemptions

A drinking water supplier can apply for a general exemption to become exempt from most requirements of the Act. General exemptions are intended for situations where it may be unreasonable or impractical for a supplier to comply with legislative requirements.

General exemptions should be used sparingly, to solve exceptional problems or respond to exceptional circumstances where other options have been discounted.

To support consideration of an exemption, suppliers must explain to us how an exemption will be consistent with the main purpose of the Act, which is to ensure that suppliers provide safe drinking water to consumers. They also need to explain how they would manage risks affecting their supply.

Since 1 January 2023, we have received three general exemption applications. As of 31 December 2023, two of these applications have been withdrawn and one decision has been made to grant a general exemption. We expect the number of general exemption applications to increase in the near future as previously unregistered supplies register and find a pathway to compliance.

The general exemption we granted in 2023 related to the Torrent Bay Township drinking water supply. This supply has some particular characteristics that were considered in assessing the application. Torrent Bay is a remote community that is only accessible by boat or a three-hour bush walk. The township has a small seasonal population and no permanent residents. Operating a treatment plant would be unreasonable or impractical due to the lack of a continuous reliable electricity supply to the community. We considered it would be impracticable and disproportionate to the risks of the supply for the supplier to have to satisfy all the duties in the Act. The conditions of the general exemption ensure that the supply will operate in a manner consistent with the main purpose of the Act. These conditions require each property to be responsible for maintaining and operating suitable end-point treatment at each property or boiling their drinking water. Public taps such as the campsite must also have clear signage advising the need to boil water before drinking.



PART TWO:

Drinking water supplier performance

In this part, we look at how suppliers are performing against multi-barrier approach requirements in the Drinking Water Quality Assurance Rules (the Rules). We also look at sector capability.

An effective multi-barrier approach

A multi-barrier approach as a part of drinking water safety planning is a key to ensuring drinking water is safe for everyone, every day.

In part one, we discussed how a multi-barrier approach means that if one barrier fails or is ineffective, there is another barrier or control to control the hazard or risk and ensure that drinking water is safe. This section discusses how suppliers are performing against their duty to take a multi-barrier approach to drinking water safety.

To achieve a multi-barrier approach, our expectation is that all drinking water supplies will comply with the Water Services Act 2021 (the Act) and the Rules.

We consider an effective multi-barrier approach to include:

- Effectively operating barriers for all types of contamination, including operating supplies in compliance with the minimum requirements of the Rules.
- Appropriate monitoring, including monitoring required by the Rules.
- Well-trained, experienced staff to manage and operate supplies who have knowledge of good practices. They also need to be aware of the kinds of hazards that can be present in a drinking water supply and how to manage the risks from these hazards.

The above interpretation of a multi-barrier approach supports our strategic goal of safe water, every day, for everyone.

Suppliers determine whether they comply with the Rules that apply to their situation and report the results of their compliance to us. We expect suppliers to report accurately.

In the ordinary course of events only the supplier will know whether they are fully compliant with the Rules. In this report we are reflecting a summary of what suppliers are telling us about their supplies. We do not verify suppliers' reports to us on their compliance with the Rules.

At a minimum, small supplies (26 to 100 people) follow level 1 rules, medium supplies (101 to 500 people) follow level 2 rules, and large supplies (more than 500 people) follow level 3 rules.

Individual rules are technical and nuanced, so we have categorised select rules as indicated below. The individual rules which have been analysed for each category are given in Appendix 3. These categories relate to different aspects of the safety of a supply.

Performance with the following categories and the source of data analysed includes:

- Source
 - Source water monitoring (levels 1 to 3 rules)
 - Cyanobacteria risk assessment (levels 2 and 3 rules only)
- Treatment plants
 - Treatment barriers (registration information)
 - Treatment performance for small and medium supplies (level 1 and 2 rules only)
 - Bacteria treatment performance for large supplies (level 3 rules only)

- Large supplies meeting protozoa log credit requirements (level 3 rules only)
- Treatment chemical monitoring (level 2 and 3 rules only)
- Distribution
 - Bacterial monitoring (levels 1 to 3 rules)
 - Residual disinfection barrier (registration information)
 - Residual disinfection monitoring (level 2 and 3 rules only)
 - Distribution chemical monitoring (levels 1 to 3 rules)
 - Backflow prevention (levels 2 and 3 rules only)
 - Distribution storage practices (level 3 rules only)
 - Hygiene procedures (level 3 rules only)
 - Interruption to supply (notifications by suppliers)

These categories relate to how suppliers are performing against their duty to take a multi-barrier approach to drinking water safety, as well as their duties to identify hazards and manage risk.

Supplies which have met or not met their requirements in these categories does not imply that the water is safe or unsafe. Rather not meeting requirements is more related to the risk of the supply.

In future reports, we will look at supplier performance across other requirements in the Rules. This may include:

- A more detailed assessment of protozoa barrier performance.
- Checking whether suppliers are reporting their sample results, verifying that these align with the requirements of the Rules, and further analysis of drinking water quality of New Zealand.
- Checking whether suppliers are testing for additional determinands above the requirements of the Rules based on their source water risk management plan.
- Improving our systems to check the completeness and correctness of each report.

To do this, we need to work with suppliers to improve the quality of data being collected. While we ultimately rely on suppliers to effectively report as required in the Rules, we can improve this process by refining our reporting tools, reviewing our guidance on the Rules, and gathering feedback from suppliers.

Methodology for performance analysis

The analysis of supplier performance includes the following steps:

1. Suppliers provide information to us on whether each of their supplies comply with individual rules and requirements.
2. We group individual rules and requirements into categories. Note: Not all requirements in the Rules are used in our analysis.
3. For each category, we calculate average performance for all supplies, assigning a value from 0-100% to each supply for all categories.
 - a. For example, if a category has three requirements and a supplier only reported on two requirements including that they complied with one but not the other, and did not report on the third requirement, then our analysis would return a 50% value for that category and supply.
4. For each performance category, we report on the number of council supplies in New Zealand which meet their requirements with the following grouping:
 - a. All met: 100% of category requirements reported to us were met.
 - b. Almost met: 95-99% of category requirements reported to us were met.
 - c. Partially met: 1-94% of category requirements reported to us were met.
 - d. None met: No category requirements reported to us were met.
 - e. No valid reports found: We did not receive any reports which made it through our validation process for the category being analysed.

Appendix 3 gives more detail on the methodology of analysis.

Data sources and validation

We have implemented many validation checks which feed back to the supplier whether their reporting submission passed or failed. If the report fails, the supplier must correct the issue and reattempt to submit the report. Where registration information is used, we have given suppliers the opportunity to correct any errors.

We have had to implement a limited amount of validation checks during our analysis after reports were submitted. This may result in suppliers reporting to us without receiving feedback that their report was not valid, as analysed by us this part. We also intend to give additional feedback to each supplier on their performance against the categories. This provides a chance to correct any reporting errors.

We will work to improve our systems and processes to incorporate additional validation checks for reporting against rules, as well as feedback to suppliers on their reported performance against the Rules. This will likely help to reduce the reporting administrative burden on suppliers. We will also review reporting requirements to understand whether they may be reduced. Any changes to reporting requirements would require a revision to secondary legislation, i.e. the Rules, including public consultation.

Reporting rates by suppliers


We had a mixed uptake from the supplies we expected to receive rule reports for.

We received some level of reporting for 95% of council owned supplies for rules analysed in this report. These council owned supplies account for over 4.2 million people.

The uptake of reporting indicates that councils understand the importance of reporting and are committed to providing transparent information about the performance of their supplies.

However, overall suppliers submitted some level of reporting for only 47% of supplies. Low rates of reporting among government, private and community suppliers are most likely a reflection of a reporting learning curve, or not being aware of their obligations. We have identified additional improvements to increase reporting rates among these suppliers, including targeted guidance for small suppliers.

Registered supplies expected to provide Rules reporting



Supplier Category	Supplies reported on	Supplies requiring reports
Council	463	486
Department of Conservation	2	35
Department of Corrections	3	3
Ministry of Education	-	362
New Zealand Defence Force	-	8
Private and Community	30	175
TOTAL	498	1,069

The reporting for Government suppliers reported on the Rules at very low rates. The exception was the Department of Corrections (Corrections), which reported on all its supplies. The Ministry of Education (MoE) and the New Zealand Defence Force (NZDF) did not provide valid reports to us on any of their supplies, while the Department of Conservation (DoC) provided us with reports for two of its supplies.

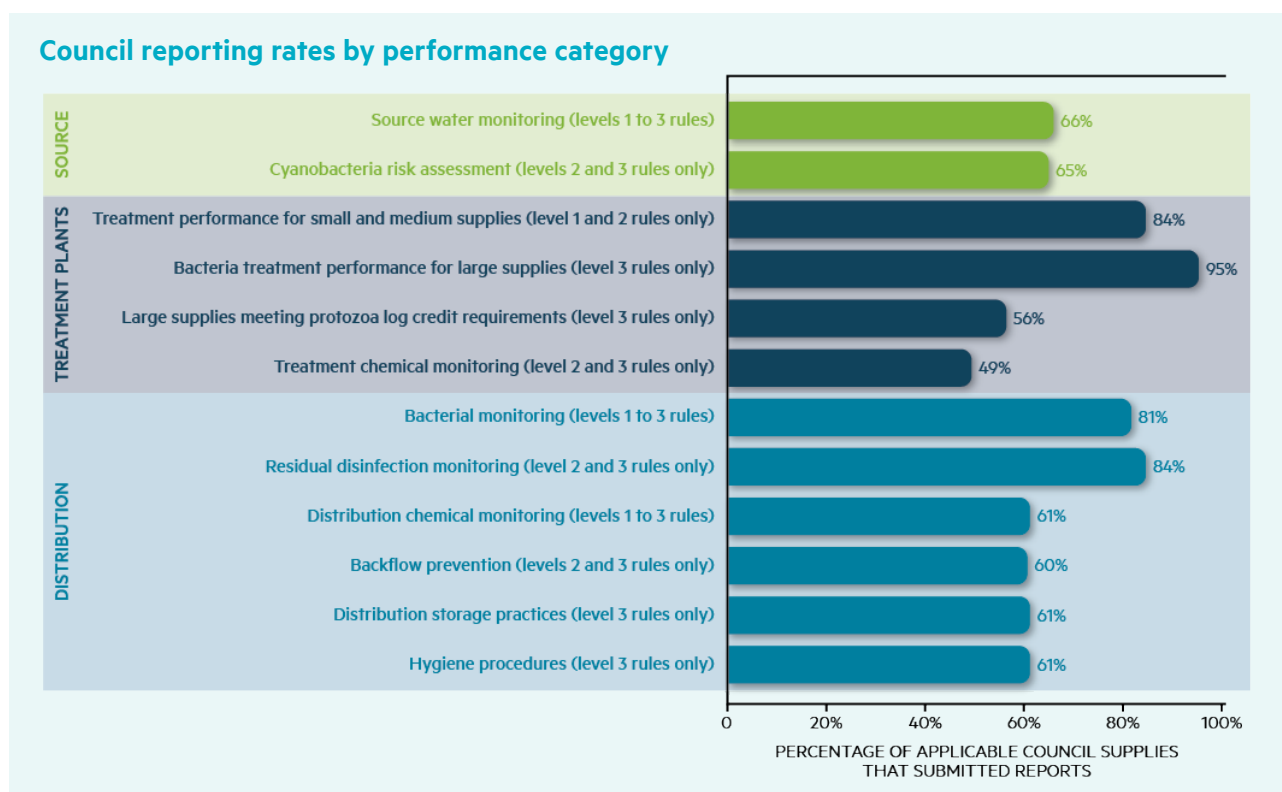
Many of the supplies not reported on are self-supplied schools, so we have no assurance these supplies are meeting their requirements under the Rules.

Additionally, we received valid reports on just over 17% of private and community supplies.

Due to the high reporting rate by councils, we have chosen to focus our analysis of supplier performance on council supplies only.

While council owned supplies provided rules reporting at a higher rate overall, there were still significant gaps in particular areas. For example, the chart below shows that 95% of council owned supplies submitted bacteria treatment reporting but only 56% submitted reports against the protozoa log credit requirement.¹² These are both key performance indicators for our analysis of council performance.

We will continue working with suppliers to improve reporting rates and expect these rates to improve significantly next year.



One reason there are variable valid reporting rates is the learning curve which needs to be managed to report these results to us. However, even if suppliers are not reporting everything required, they still must comply with the rules which are applicable to them.

We make limited assumptions in our analysis of performance which are outlined in Appendix 3. However, we make no assumptions when we have not received a valid rule report for a supply, as that supply may or may not be performing well.

Some suppliers may not have reported all their requirements in a category. As long as one requirement is reported against, we include it in our analysis. This means that some suppliers may not be complying with the requirements they didn't report on, which could affect performance rates next year.

We intend to analyse the completeness of reporting and incorporate this into our report next year.

¹² Only T3.22 was analysed for this performance category. Suppliers may have submitted on other requirements related to protozoa that are not captured in this analysis.

Source water

Source water monitoring

Source water is monitored by suppliers so they know the quality of water they must treat. There are no source water quality limits which must be met for drinking water sources. Sampling and testing source water is a new requirement for suppliers, though many suppliers already had some monitoring in place prior to these requirements coming into effect.

Drinking water suppliers test each of their abstraction points for a range of common bacterial and chemical determinands to:

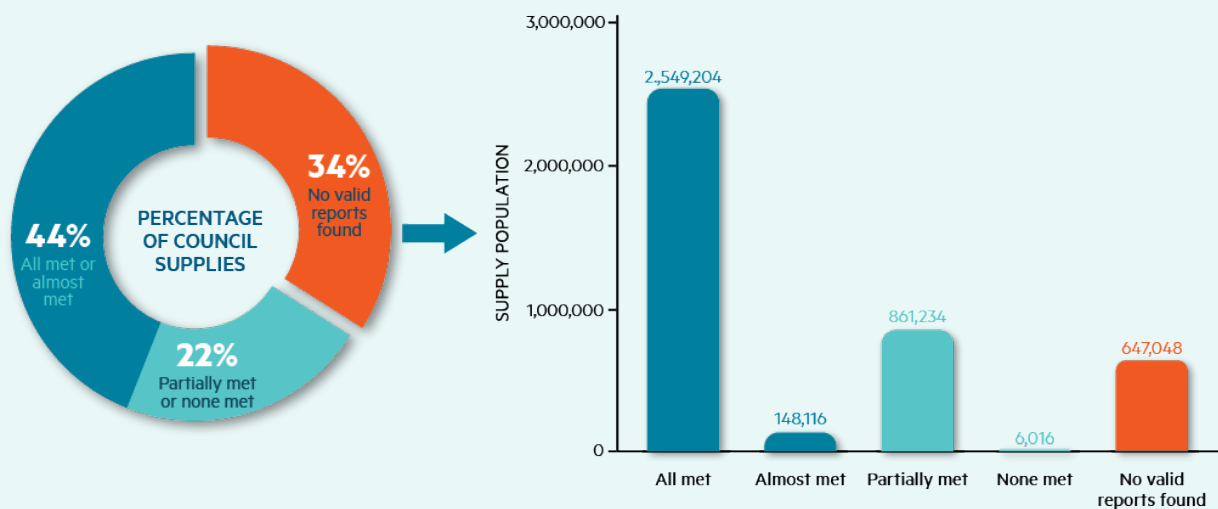
- Inform their source water risk management planning, including what measures may need to be taken to protect source water or to prevent contamination of raw water.

- Inform improvement plans in the wider context of drinking water safety.
- Identify trends and patterns in their sources.
- Identify when they must carry out additional testing of treated water to ensure the efficacy of treatment if elevated determinands are detected in source water.¹³

Source water monitoring requirements are proportionate to the population supplied. For example, large supplies must carry out more frequent monitoring than small supplies.

The figure below shows whether council supplies met applicable source water monitoring rules which require suppliers to take samples for determinands commonly found in source water. These rules do not require source water to meet any specific limits. It also shows the total supply population provided water by these supplies.

Council supplies meeting source water sampling and testing rules



We received valid reports for 312 council supplies (66%). We did not receive valid reports for 163 council supplies (34%).

All or almost all reported source water sampling and testing rules were met by 44% of supplies. About one in five council supplies did not meet or partially met their rules. We expect to see increased reporting and more suppliers meeting requirements next year.

¹³ The Rules require that any determinand identified at above 50% of the Maximum Acceptable Value (MAV) in source water must also be tested in treated water.

Cyanobacteria risk assessment

Cyanobacteria are a hazard of emerging concern. Cyanobacteria can produce cyanotoxins which pose a risk to drinking water that may have immediate and serious health risks. The Rules require suppliers to assess the cyanobacteria risk to each of their supplies. If the risk is medium or high, additional requirements apply. Suppliers are also required to update this risk assessment in their source water registration details on our online supplier portal.

Our data indicates that many suppliers, including some councils, are struggling to assess the cyanobacteria risk of their source waters. We will undertake further work to assist suppliers in understanding these requirements.

The figure below shows the outcomes of councils' cyanobacteria risk assessments of their sources (by source type).

Council sources of drinking water and their cyanobacteria risk



Source Type	Low	Medium	High	Unknown	TOTAL SOURCES
Bore (<10 m deep)	60	2	1	8	71
Bore (10-30 m deep)	141	15	-	10	166
Bore (>30 m deep)	403	4	1	19	427
Lake	5	25	13	8	51
River, Stream, Creek	91	94	21	34	240
TOTAL SOURCES	700	140	36	79	955

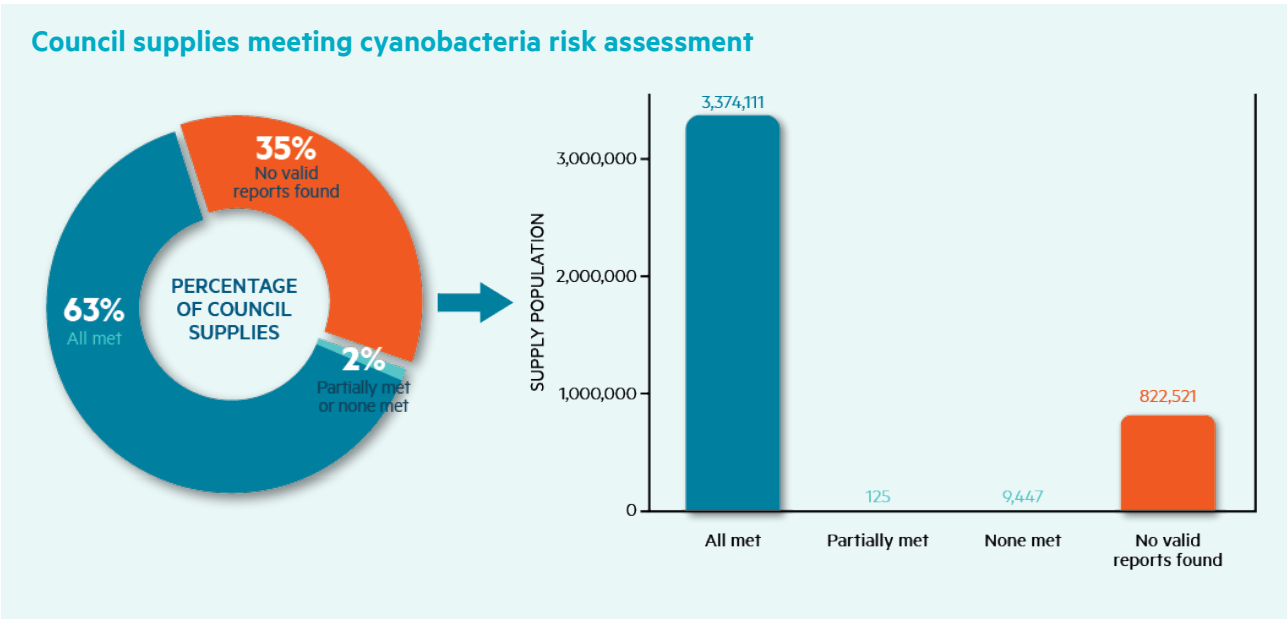
Most council surface water sources were assessed as being medium or high risk of cyanobacteria which is expected as surface waters are prone to cyanobacteria blooms. The remaining 96 council surface water sources were assessed as being at low risk of cyanobacteria. Bores are generally not at risk of cyanobacteria, unless they are shallow bores extracting shallow groundwater near surface water sources.

It is good practice to consider surface waters to have at least a medium risk of cyanobacteria and cyanotoxins in New Zealand, especially as they continue to become more prevalent. In addition, the effects of climate change are likely to result in an increase in cyanobacteria blooms.

We intend to follow up on why some suppliers consider their surface waters to be low risk for cyanobacteria and are considering whether joint research into this would be valuable. We will also consider whether to publish guidance on cyanobacteria management to assist suppliers to understand what due diligence looks like regarding these risks.

Suppliers are also required to report on rules associated with assessment of their cyanobacteria risk for their sources.

The figure below shows council reporting to us whether they have undertaken a risk assessment as per level 2 and 3 cyanobacteria rules for sources. It also shows the total supply population provided water by these supplies.



We received reports for 261 council supplies (65%). We did not receive valid reports for 143 council supplies (35%).

Most council supplies which we received reports for have had their sources assessed for cyanobacteria risk but reporting rates are too low.

We will consider incorporating additional analysis in this category next year to include requirements for sources which are medium and high risk for cyanobacteria.



Treatment barriers

As of 31 December 2023, up to 489,000 people may have received drinking water from council supplies with no protozoa treatment barriers where one is required. Over the same period, up to 25,000 people may have received drinking water from council supplies with no suitable bacteria treatment barriers. We are working to ensure that council suppliers not meeting these basic requirements provide a viable plan to install these barriers, and in the interim, proactively manage their risks.

There are several barriers that can be used to reduce, remove, kill, or inactivate pathogens like bacteria, protozoa, and viruses, and make water safe to drink. Common barrier processes include:

Barrier	Description
Source protection and monitoring	Source water protection can reduce the level of protozoa treatment required. An implemented source water risk management plan can reduce the risk to raw water and ensure treatment is effective for the quality of the source water. This may include implementation of preventative measures such as riparian zones around water bodies free from livestock grazing, ensuring discharges upstream of drinking water treatment plants are operationally effective, and ensuring groundwater is abstracted through sanitary bores.
Coagulation, Flocculation and Sedimentation	These processes are commonly used in surface water sources and when optimised enhance filtration barriers. It may also be used to reduce the colour of the water.
Oxidation	Oxidation may be combined with other barriers, such as filtration, to remove chemicals like arsenic and manganese from water. It may also be used to make the water more aesthetically pleasing.
Filtration	Filtration removes physical particles from water. This includes protozoa, like cryptosporidium and giardia, as well as chemicals that may be present like arsenic and manganese particles. Filtration can be an essential step for the effectiveness of other treatments, including ultraviolet (UV) treatment and chlorination.
Ultraviolet (UV) treatment	UV treatment uses ultraviolet light of a particular wavelength (254 nanometres) to disinfect water of bacteria, protozoa, and to a lesser extent, viruses. On contact, UV damages the genetic code of a microbiological organism, preventing pathogens from reproducing.
Ozone treatment	Ozone is a powerful disinfectant that is effective against all pathogens that present a risk to drinking water. It is also effective at lowering cyanotoxins and many other chemical compounds.
Chlorination (primary disinfection)	Adding chlorine kills most bacteria and viruses in a process known as primary disinfection.
Chlorination (residual disinfection)	Chlorine can continue to protect water in the pipes between the treatment plant and the tap, at a lower concentration than is typically applied for primary disinfection. Monitoring residual chlorine levels in distribution networks can also help to find other problems – for example low chlorine levels can be a sign of contamination or other issues.

The Rules require suppliers to have multiple barriers to protect consumers from different pathogens. These pathogens include bacteria, protozoa, and viruses.

Treatment barrier requirements

Treatment plants which receive groundwater of high quality, i.e. class 1 sources, must have bacteria treatment of some form, but do not require a protozoa barrier.

All other treatment plants which receive groundwater which does not meet the requirements of class 1 source water and all other sources of water must have protozoa and bacteria treatment barriers.

Supplies serving populations up to 25 people are not required to have any barriers. However, to supply safe water these supplies may need to consider installing treatment of some form.

The requirement to have treatment barriers is proportionate to the scale, complexity, and risk profile of supplies.

- Small and medium supplies require filtration and UV treatment.
- Small and medium supplies may elect to perform at the level required by larger supplies to access the larger range of treatment options or to address additional risks to their supply not met by the level 1 and 2 rules.
- Large supplies explicitly require a bacteria barrier, for which there are many options including numerous combinations of barriers.
- Supplies with Class 1 source water do not require protozoa treatment, as they have other measures in place to protect the source water from contamination. All other supplies require protozoa treatment, for which there are many options including the numerous combinations of barriers.
- Medium and large supplies must also meet minimum requirements in the Rules for residual disinfection where reticulation exists. Small supplies with reticulation do not have any minimum requirements for residual disinfection in the Rules.



Supplies lacking a protozoa barrier

78% of council supplies which require a protozoa barrier are meeting this requirement. A significant amount of people (up to 489,000) may receive water from supplies which have a treatment plant without a protozoa barrier in place where one is required.

30 councils may be supplying drinking water from a treatment plant which does not have a barrier in place. However, it is important to note that some of their supplies may have multiple treatment plants, but only one of those treatment plants does not have a barrier and it may only be used in emergency situations.

The risk of not having a barrier to protozoa depends significantly on the quality of the source water. Some supplies without protozoa barriers may be facing more risk than other supplies.

For example, deep bore water is at very low risk of protozoa contamination, though entry of contamination containing protozoa can occur if wells are not protected sufficiently at the ground level

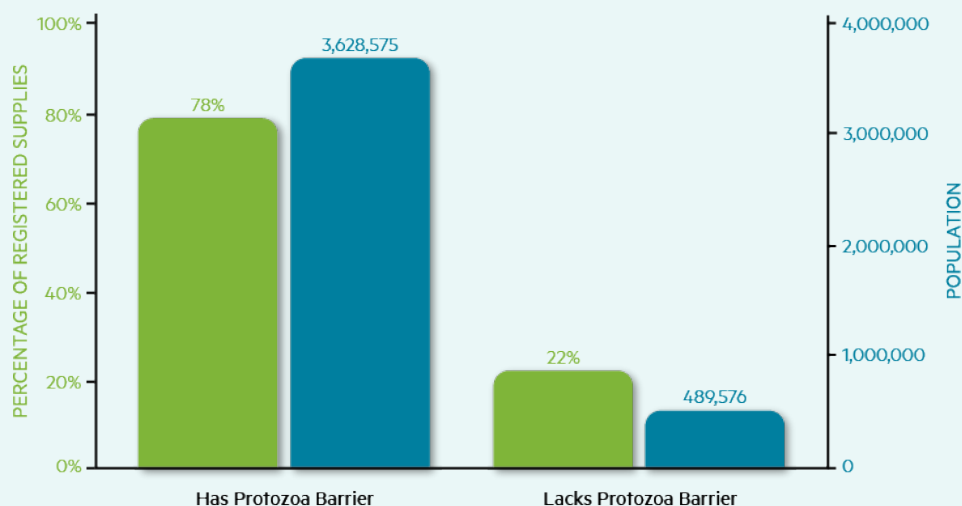
or nearby bores have contaminated the aquifer. In contrast, surface waters and groundwater impacted by surface waters are at elevated risk of protozoa.

As testing for protozoa is resource intensive and complex, having a protozoa barrier is often the most cost-effective way of knowing whether drinking water meets the Standards for protozoa. Without a protozoa barrier, a supplier cannot ensure the safety of their water at all times, particularly for supplies which use surface waters.

In addition to having a protozoa barrier, the operation of the barrier also has to be effective. We cover the performance of protozoa treatment further on in this section.

The figure below shows the percentage of council supplies with a protozoa barrier. It also shows the total supply population provided water by these supplies.

Council supplies with a protozoa barrier



Council supplies lacking a bacteria barrier

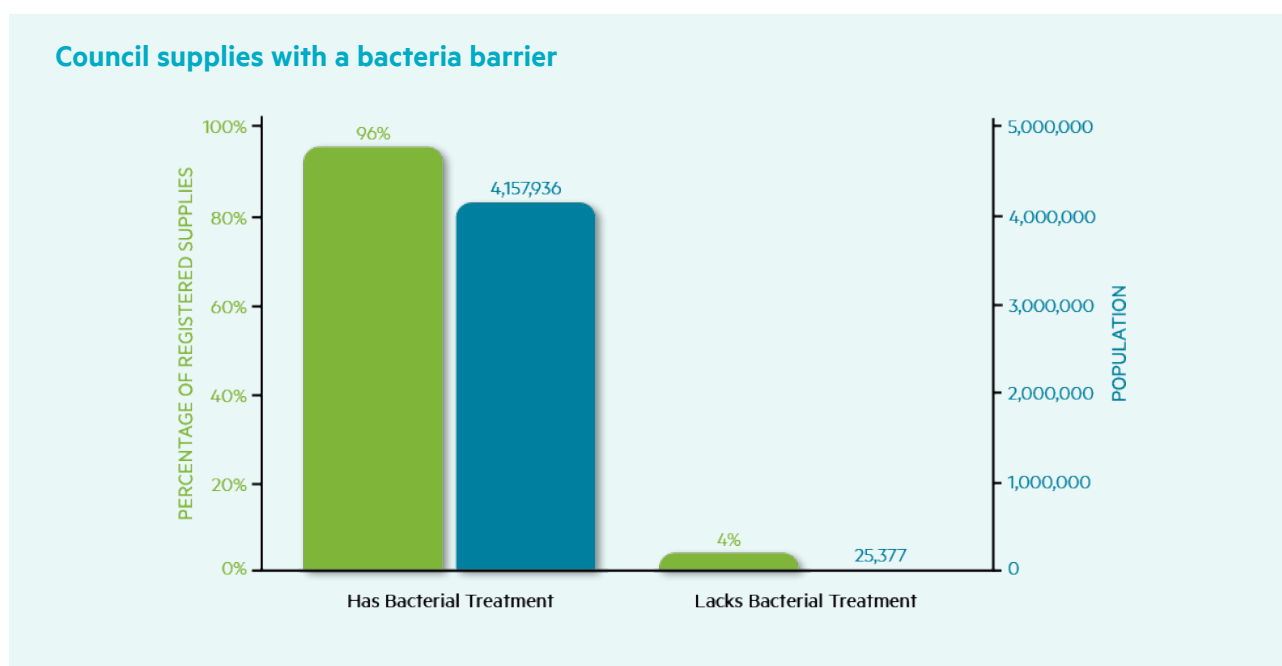
More than 99% of the population served by a council supply meets the requirement for a bacteria barrier. About 25,000 people supplied by council supplies may not be served by a treatment plant which has a bacteria barrier in place where one is required.

Some 12 councils may be supplying drinking water from a treatment plant which does not have a bacteria barrier in place. As with protozoa barriers, some of these supplies may have multiple treatment plants, but only one of those treatment plants

does not have a barrier and may only be used in emergency situations.

We are continuing to work with councils that have supplies without a bacteria barrier to ensure they are supplying safe water by understanding and managing their risks.

The figure below shows the percentage of council supplies with a bacteria barrier. It also shows the total supply population provided water by these supplies.



Our work to address the lack of treatment barriers

The statistics above reinforce the fact that there are gaps in the treatment some suppliers have in place to provide reliably safe drinking water to communities.

We have been prioritising our resources to ensure those suppliers implement and maintain an effective multi-barrier approach, or have appropriate plans to do so, as the priority for addressing most of the gaps in treatment.

On 5 October 2023, we published a list of 27 councils that had drinking water treatment plants without a protozoa barrier in place. On 28 November 2023, we released a subsequent list of 13 councils that were lacking either a bacteria barrier or residual

disinfection. Coupled with source water risk management, these barriers are key components of a multi-barrier approach.

For those supplies that are not compliant, we want to see a viable plan to achieve compliance by a particular date. We also expect that drinking water risks are actively managed until necessary barriers are installed.

Most councils have acknowledged that they have received our letters and have agreed to provide a confirmed and funded plan within our specified timeframes. In next year's report we will provide an update on how councils have responded.

Treatment performance

Although most supplies have both protozoa and bacteria barriers, these barriers must be optimised and operating effectively to ensure a multi-barrier approach is achieved.

Suppliers must comply with the Rules to demonstrate that their barriers are being operated effectively.

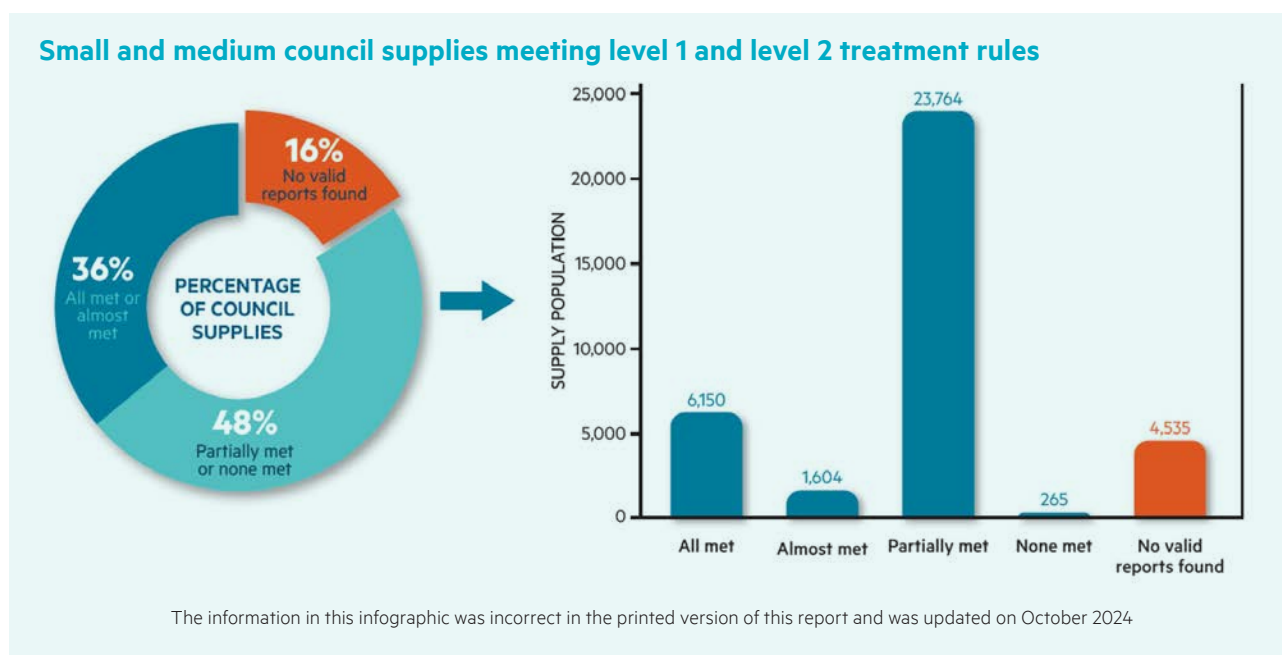
Ensuring treatment is proportional to the risk of source water will be a continued area of focus for us as we move to ensure barriers are not just present, but effective.

Treatment performance for small and medium supplies

We only received reports for 24% of all registered small and medium supplies following level 1 and level 2 treatment rules. Councils reported for 84% of their small and medium supplies. The reporting requirements for small and medium supplies are new, so we expect these reporting rates to increase year on year.

Small supplies are required to follow the level 1 treatment rules. Medium supplies are required to follow the level 2 treatment rules. Both these sets of rules require filtration and UV treatment which work together to achieve effective barriers for both protozoa and bacteria. In addition, medium supplies must also have some level of primary disinfection by chlorination. All supplies that have a DWSP and reticulation must also maintain residual disinfection.

The figure below shows a summary of whether small and medium council supplies met level 1 and level 2, respectively, treatment rules which includes a combination of taking samples for testing, meeting limits for water quality, and meeting other treatment process requirements. It also shows the total supply population provided water by these supplies.



We received reports for 156 council supplies (84%) following level 1 and 2 bacteria treatment rules. We did not receive valid reports for 30 council supplies (16%).

Over a third of council supplies (36%) met or almost met all reported requirements. Nearly half partially met reported requirements. The remaining supplies either did not meet any requirements or did not submit a valid report. As you can see from the above figure, these supplies represent a small portion of the overall population of registered supplies.

Treatment performance for large supplies

Large supplies (population over 500) must demonstrate daily that their treatment plants have effective barriers to bacteria and protozoa against the level 3 treatment rules. Different rules will apply to an individual supply depending on what treatment type the supply uses to demonstrate compliance. This offers more options for suppliers. Smaller supplies can also elect to report against level 3 rules as opposed to their minimum requirements.

We received reports for 51 smaller supplies that elected to follow level 3 treatment rules, many of which were reported as meeting most of their requirements.

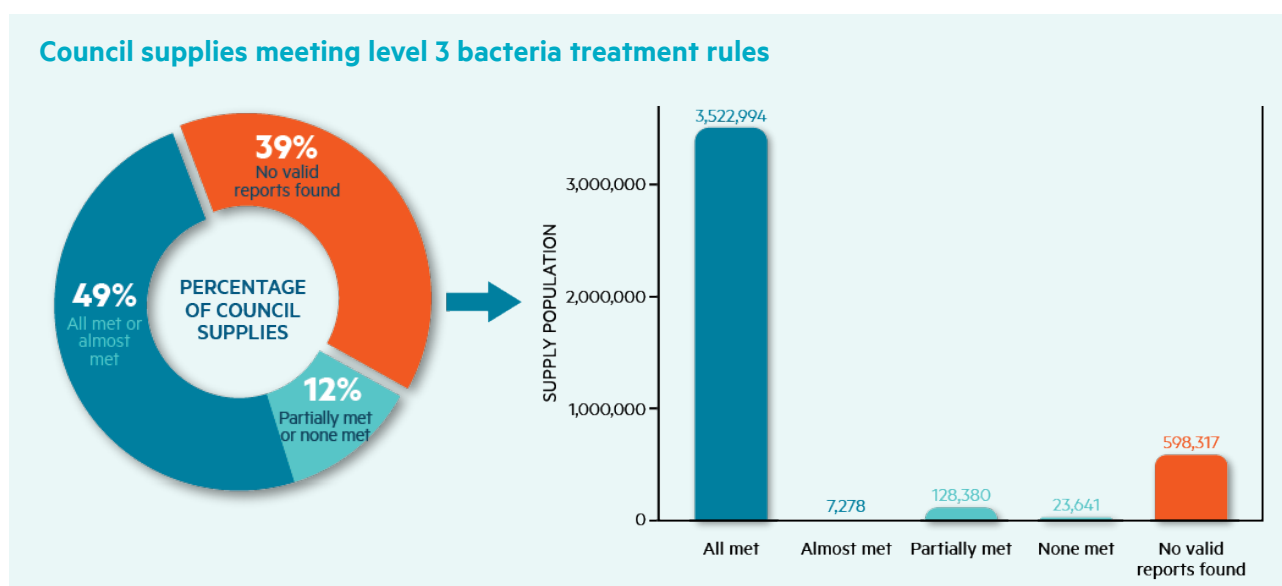
Overall, there were 323 supplies which reported on, or are required to report on bacteria and

protozoa treatment performance for large supplies. 290 of these are council supplies.

Bacteria treatment performance for large supplies

Most large council supplies have reported against their level 3 bacteria treatment rules. Approximately 7 in 10 council supplies in this category were reported as meeting or almost meeting their bacteria treatment requirements.

The figure below shows a summary of supply performance against bacteria treatment rules which includes the requirements to monitor treatment processes continuously and effectively, and to produce drinking water that meets quality limits. It also shows the total supply population provided water by these supplies.



We received reports for 275 supplies (95%) following level 3 bacteria treatment rules. We did not receive valid reports for 15 supplies (5%).

For supplies that almost met reported requirements, this may include cases:

- Where missing data contributed to lack of performance.
- Where an instrument was not calibrated frequently enough.
- Where a significant treatment failure occurred but this is infrequent.
- A power failure occurred and caused a brief loss of data communications.

- Where rules are almost met, there may be elevated risk to those supplies depending on the circumstances which led to non-performance.
- Where rules are partially met, there is more likely to be significant risk to those supplies which will need to be managed appropriately.

We expect the 59% of supplies which have reported not meeting all their bacteria treatment requirements, including those that almost met their requirements, to be managing their risk appropriately and be working to improve their performance.

Large supplies meeting protozoa log credit requirements

In addition to bacteria treatment, protozoa treatment is also required for many large supplies. The higher the risk of protozoa contamination in a source water, the higher amount of protozoa treatment required. This is measured through log credits, which is the approach adopted by the United States Environmental Protection Agency. Different types of treatment achieve different log credits, and multiple treatment types can be used in series to accumulate the required log credits or treatment level.

Large supplies must report that each of their treatment plants achieve the protozoa log credits required by their class of source water. There are four classes of source water which are described in more detail in the Rules, as well as the number of protozoa log credits which must be achieved by treatment processes. Class 1 source water does not require a treatment barrier for protozoa. For example, deep bores (more than 30 m) in the Canterbury Plains with sanitary bore heads. Class 2 source water requires 3 protozoa log credits. For example, a 20 m deep bore in a paddock. Class 3 source water requires 4 protozoa log credits. For example, a river source with risks related to protozoa contamination from animals and humans. There is also the option to reduce the protozoa log credit

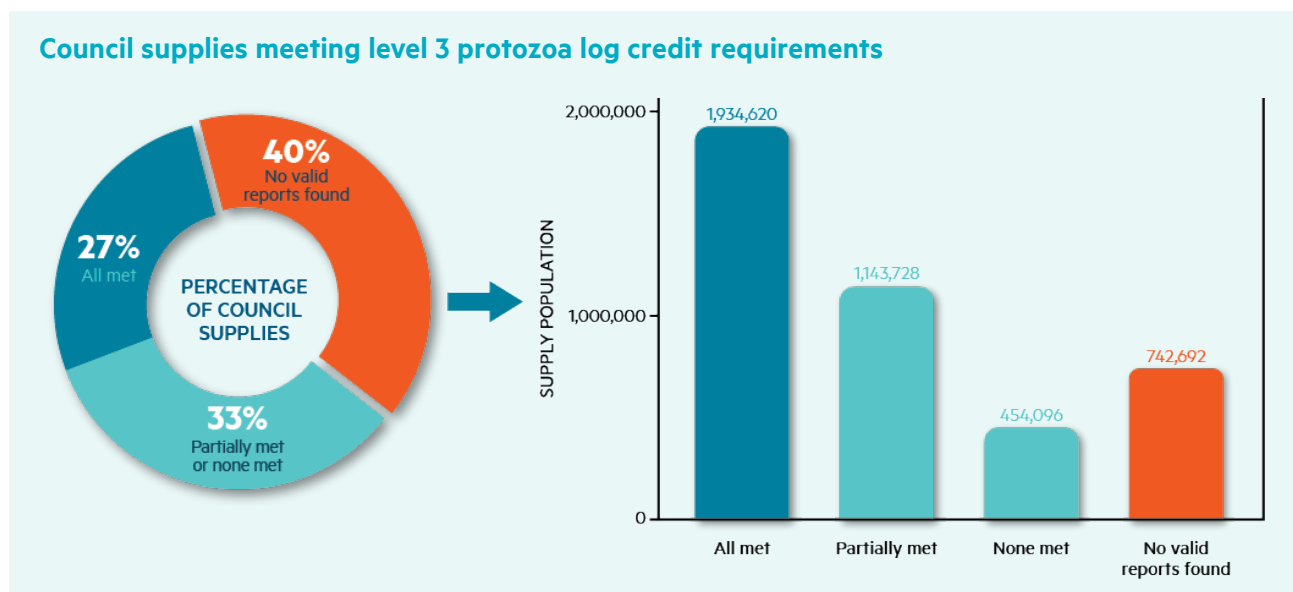
required by Class 3 source water to 3 protozoa log credits, if evidence shows that the risk of protozoa in the source water is low. In this later scenario, the source would be designated as Class 4 source water.

Certain treatment processes provide anywhere from 0.5 to 4.0 log credits removal of protozoa. 1 log credit provides 90% removal of protozoa, 2 log credits provides 99% removal of protozoa, 3 log credits provides 99.9% removal of protozoa, and 4 log credits provides 99.99% removal of protozoa. Suppliers must have treatment processes where the total log credits is equal to or greater than that required of their source water.

The above methodology aligns with the international good practice of having a treatment barrier for protozoa in all but the most protected of source waters.

While the requirement to have a protozoa barrier has existed for many years, these requirements were extended to cover additional supplies in November 2022.

The figure below shows a summary of council supplies which met the protozoa log credits required of their source water.¹⁴ It also shows the total supply population provided water by these supplies.



We received reports for 163 council supplies (56%) following level 3 protozoa rules. We did not receive valid reports for 127 council supplies (44%).

¹⁴ This analysis is based on council reports on one rule, T3.22, and does not include an analysis of the rules which require continuous monitoring and treated water to meet water quality limits.

Reporting on whether protozoa log credits were achieved was low among large council supplies. We expect reporting to increase next year.

All reported requirements were met by 43% of council supplies. 13% of council supplies reported not meeting the protozoa log credit requirements for their supplies. Two main reasons for this include:

- Not having any protozoa treatment when the supply was required to have it (see “Council supplies lacking a protozoa barrier” section above)
- Having protozoa treatment which achieved 3 protozoa log credits when the source water required 4 protozoa log credits.

Ensuring treatment is proportional to the risk of source water will be a continued area of focus for us as we move to ensure barriers are not just present, but effective.

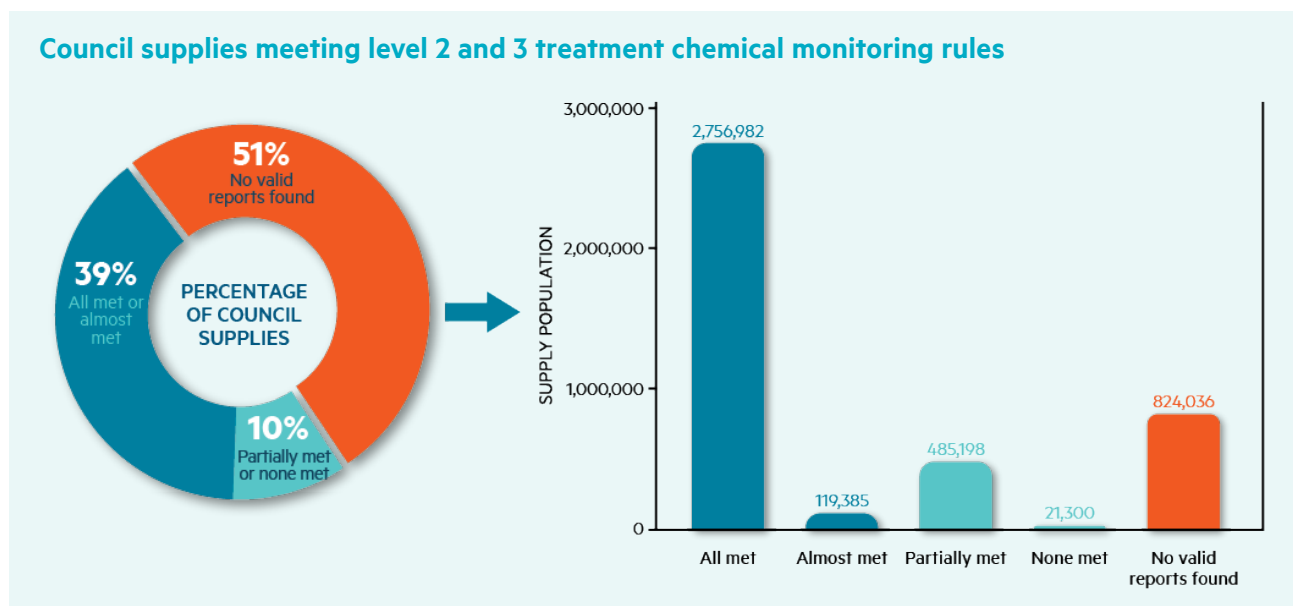
Treatment chemical monitoring.

Suppliers with large supplies must monitor for chemicals which they use in treatment of drinking water. They must also monitor for chemicals which are elevated in their source water to ensure treatment has sufficiently removed them.

The extent of monitoring is influenced by supply characteristics, such as elevated levels of a determinand in the source water, or a particular treatment process that involves the addition or production of a particular chemical.

The level of a determinand in water at a treatment plant determines the frequency of monitoring. Higher levels require more monitoring while lower levels require less monitoring.

The figure below shows supply performance against level 2 and 3 chemical monitoring rules requiring them to take samples for determinands which may specifically be found in their treated water prior to distribution. It also shows the total supply population provided water by these supplies.



We received reports for 201 council supplies (49%) following level 3 rules. We did not receive valid reports for 207 council supplies (51%).

39% of council supplies met all or almost all reported requirements, though some supplies (10%) were not monitored according to the Rules.

For many suppliers, these requirements are new to their supplies, so we expect to see both improved reporting and performance year on year.

Additional chemical sampling in distribution zones must be undertaken by large supplies for determinands such as disinfection by-products and metals. This is analysed in the following section on distribution zone performance.

Distribution zone performance

Drinking water needs to be transported to consumers after it is treated at a treatment plant. A distribution network is a series of reservoirs, pump stations, valves and underground pipework that conveys drinking water to points of supply, typically, a toby or storage facility at or near a consumer's property boundary.

A distribution network may be divided into different zones that can be isolated from each other. These distribution zones allow operators to monitor the water supply and better manage the pressure and flows in the network.

For each zone, there are defined boundaries where the quantity of water entering and exiting can be measured.

Ingress of contaminated water into the network and direct contamination from humans or animals in storage reservoirs are two important risks to manage when operating a network. Microbiological and chemical contamination can occur due to a variety of different issues which the Rules address in large supplies.

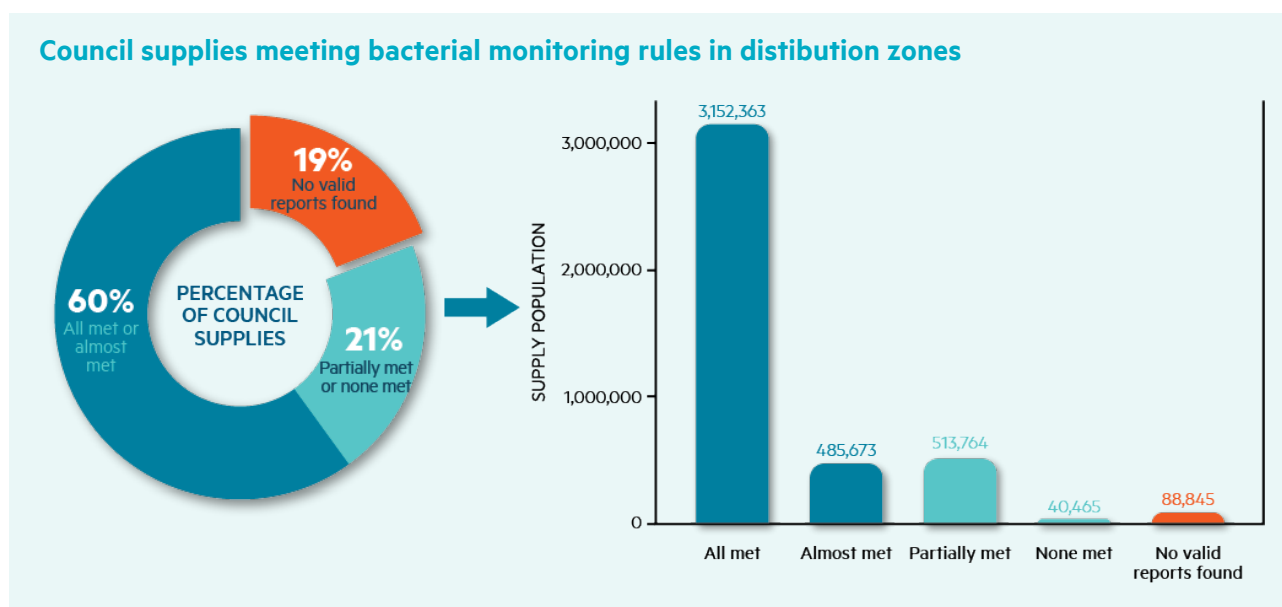
The following sections elaborate on performance by suppliers to address these risks.

Bacterial monitoring

Bacteria can enter a distribution zone either from insufficient treatment or a contaminating event in the distribution network. Sources of contamination include aged or low-quality infrastructure assets or improper hygiene practices when performing operations and maintenance. Other contamination risks are discussed in following sections.

To confirm risk management of bacterial contamination in the distribution network is effective, the Rules require bacterial monitoring to be undertaken by the supplier for all supplies. All supplies with populations greater than 25 people are required to report compliance with their bacterial monitoring performance.

The figure below shows a summary of whether small, medium, and large council supplies met bacterial monitoring rules which require taking enough samples for *E. coli* and total coliforms at a minimum frequency in the supplies' distribution zones. It also shows the total supply population provided water by these supplies.



We received reports for 395 council supplies (81%) following level 1, 2 and 3 distribution rules. We did not receive valid reports for 91 council supplies (19%).

Only 60% of council supplies met or almost met reported requirements.



The requirement to monitor distribution zones for bacteria is new for small and medium supplies. In contrast, the Rules reduced the bacterial monitoring requirements for large supplies. The Rules increased residual disinfection monitoring requirements, e.g. monitoring for chlorine, in distribution zones to account for the lowered requirements for bacterial monitoring.¹⁵

We expect reporting rate and performance to improve in the coming years.

Residual disinfection barrier

Any microbiological organism that has not been managed by the treatment process can remain viable. To control these microorganisms, a low concentration of disinfectant is added to the water when it leaves the water treatment plant to be distributed through a network to consumers. This is known as providing residual disinfection.

The efficacy and stability of chlorine makes it the ideal residual disinfectant. Chlorine can be maintained as an active disinfection chemical throughout the distribution network and an indicator of contamination events from the treatment plant to the consumer.

There are many risks in a distribution network, including backflow of contaminated water into the distribution network and introduction of contamination through maintenance on pipework. This can result in bacterial contamination in the network. Backflow prevention programmes and implementation of a hygiene code of practice are essential to ensure these risks are mitigated.

Residual disinfection provides another barrier to recontamination of the network. Residual disinfection with chlorine also allows suppliers to monitor their network for potentially adverse events, like backflow events.

Chlorine levels normally decrease gradually as water travels through a network. However, chlorine levels would rapidly drop if a contamination event occurred in the network. Therefore, if residual chlorine in the network disappears, this should be investigated to determine whether there is a threat to the drinking water. In this way, chlorine serves as an effective way to monitor complex networks and ensure safe water is being provided to consumers.

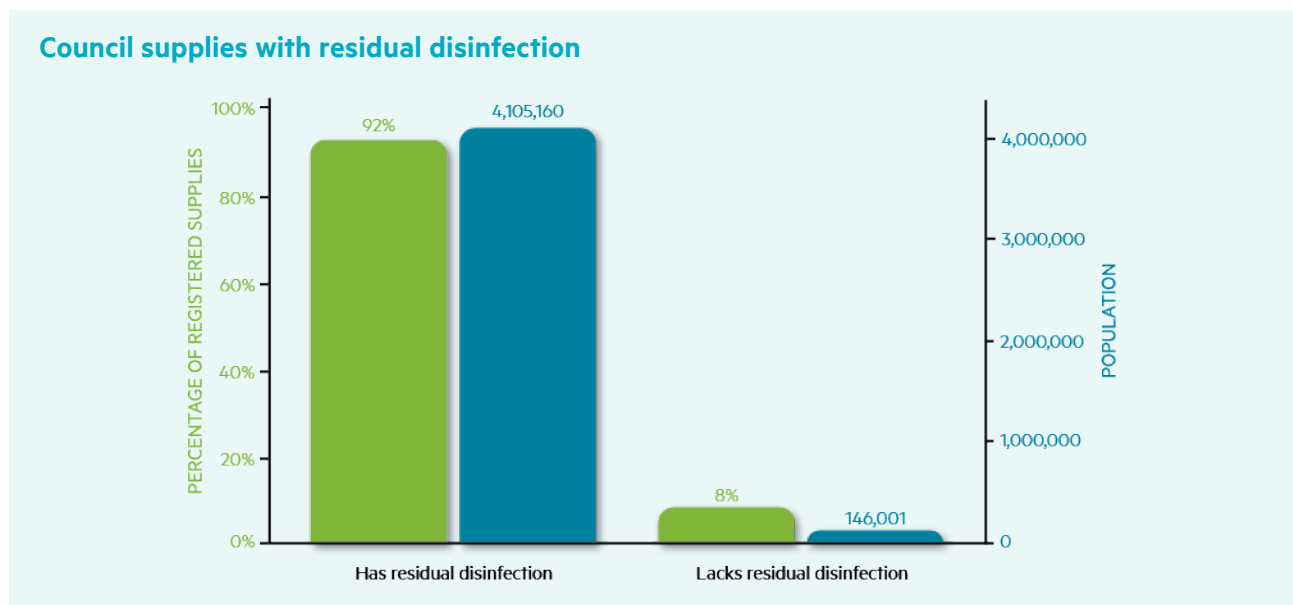
¹⁵ Chlorine testing returns a test result within minutes, but bacterial tests take 24-48 hours to return a result.

Chlorine is a safe and effective means of treatment and also necessary for controlling many risks in drinking water networks. It has been added to drinking water supplies around the world for over a hundred years.

The Act requires all drinking water supplies that include reticulation to have residual disinfection. The only exceptions are where an exemption to residual disinfection is granted or another compliance pathway such as an acceptable solution is followed.

Certain supplies, like community drinking water stations and self-supplied buildings which do not have reticulation, do not require chlorination.

The figure below shows the percentage of council supplies which have residual disinfection, as stated in their registration information and excluding supplies which have no reticulation, e.g. do not require residual disinfection. Total supply population for each performance metric is also shown.



Most of the population is supplied by treatment plants and distribution zones which have been indicated to provide residual disinfection. However, a significant amount of people (146,000) receive drinking water from supplies that have no or partial residual disinfection.

As with protozoa and bacteria barriers, some of these supplies may have multiple treatment plants, but only one of those treatment plants does not have residual disinfection and may only be used in emergency situations. These would not be

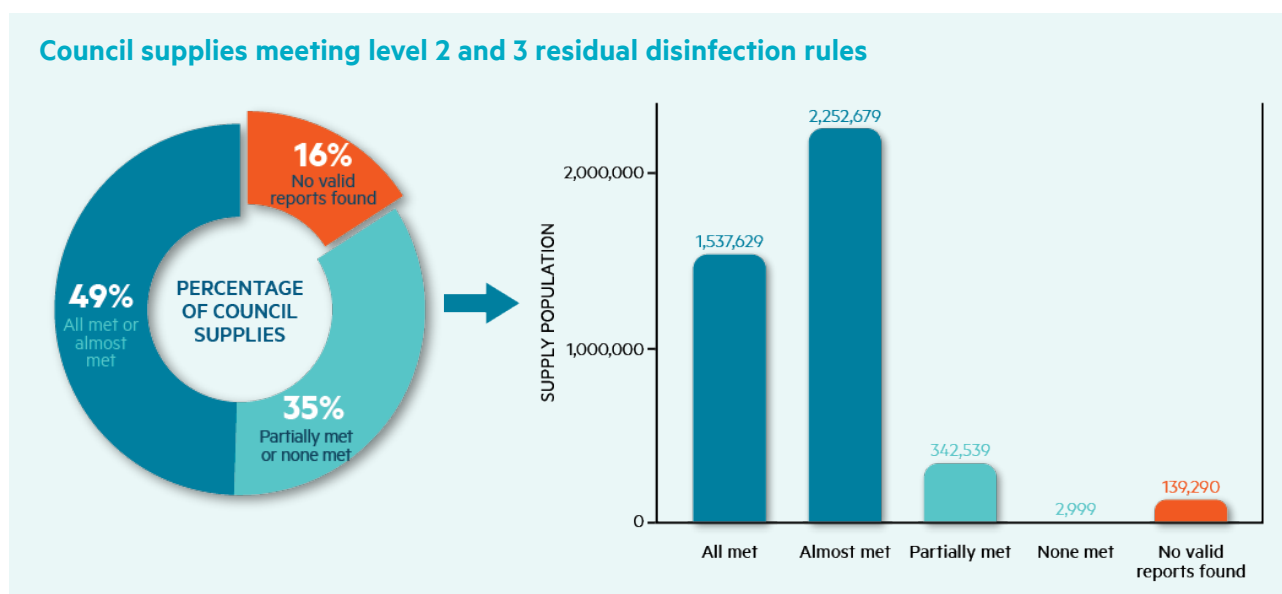
considered as a breach of the Act's requirement to maintain residual disinfection. We will look to improve our systems to distinguish between these cases in future reports.

Those supplies which lack residual disinfection must ensure that they are managing the risks to their network effectively and working towards meeting their obligations under the Act. We will continue to work closely with these suppliers, case by case, to find a path forward to meet their obligations.

Residual disinfection monitoring

To ensure effective residual disinfection is in place, suppliers must maintain a certain level of residual disinfection across their networks and regularly monitor it. The Rules require minimum sampling requirements at suitably located sampling sites across the distribution network and at frequencies which vary according to the size of each zone. These monitoring requirements can also be met using continuous monitoring equipment across the distribution network instead of regularly collecting grab samples.

The figure below shows whether council supplies met level 2 and 3 residual disinfection monitoring rules. These require suppliers to take samples for chlorine in their network and maintain a minimum level of chlorine in their network. It also shows the total supply population provided water by these supplies.



We received valid reports for 348 council supplies (84%). We did not receive valid reports for 66 council supplies (16%).

Most of council supplies reported whether they met residual disinfection monitoring rules. About half of council supplies (50%) were reported as meeting or almost meeting residual disinfection rules in their distribution zones. About a third of council supplies (34%) were reported as partially meeting their requirements.

Many suppliers previously maintained residual disinfection and monitored residual in their network, aligning with good international practice. The requirement to monitor residual disinfectant will be new for many supplies of all sizes, so we expect the reporting rates and performance to improve.

One of the requirements for large supplies is to never drop below 0.1 parts per million of chlorine. This can be a difficult rule to meet, particularly for large complex networks. A few very large supplies almost met all the requirements. We will consider whether this rule needs to be amended in the future, but for now it appears able to be met in full for about half of supplies.

Residual disinfection exemptions

A supplier can apply to be exempt from residual disinfection requirements in a supply that includes reticulation. A residual disinfection exemption may apply to all or part of a supply.

To grant a residual disinfection exemption, we must be satisfied that:

- The exemption will be consistent with the main purpose of the Act, which is to ensure that drinking water suppliers provide safe drinking water to consumers.
- The supplier's drinking water will comply with all other legislative requirements (including their drinking water safety plan (DWSP)) on an ongoing basis.

A residual disinfection exemption does not exempt a water supplier from any other treatment requirements.

In 2023, we received two new residual disinfection exemption applications and finalised our decisions on four applications, all of which were declined. We had nine applications under consideration as of 31 December 2023.

Common issues with declined applications included the risk from human pathogenic enteric viruses in the source not being adequately addressed and the lack of understanding of water loss in the distribution network.

Some exemption applications were declined as we were not satisfied that they would comply with all other legislative requirements and the DWSP on an ongoing basis as required by the Act. Common risk factors included:

- lack of backflow prevention
- unexplained or unacceptable levels of water loss
- a lack of source water risk assessment and management.

One application was not granted because they requested exemption from treatment processes that were not an aspect of residual disinfection and therefore not eligible for an exemption.

Selwyn District Council's first exemption application for the Rakaia Huts supply was declined in September 2022. This was subsequently approved and will be reported on in our 2024 report.¹⁶

For more information on why we granted and declined exemption applications, you will find all of our decision papers published on our [website](#).

¹⁶ [Exemption-Decision-Report-Rakaia-Huts-Final.pdf \(taumataarowai.govt.nz\)](#)

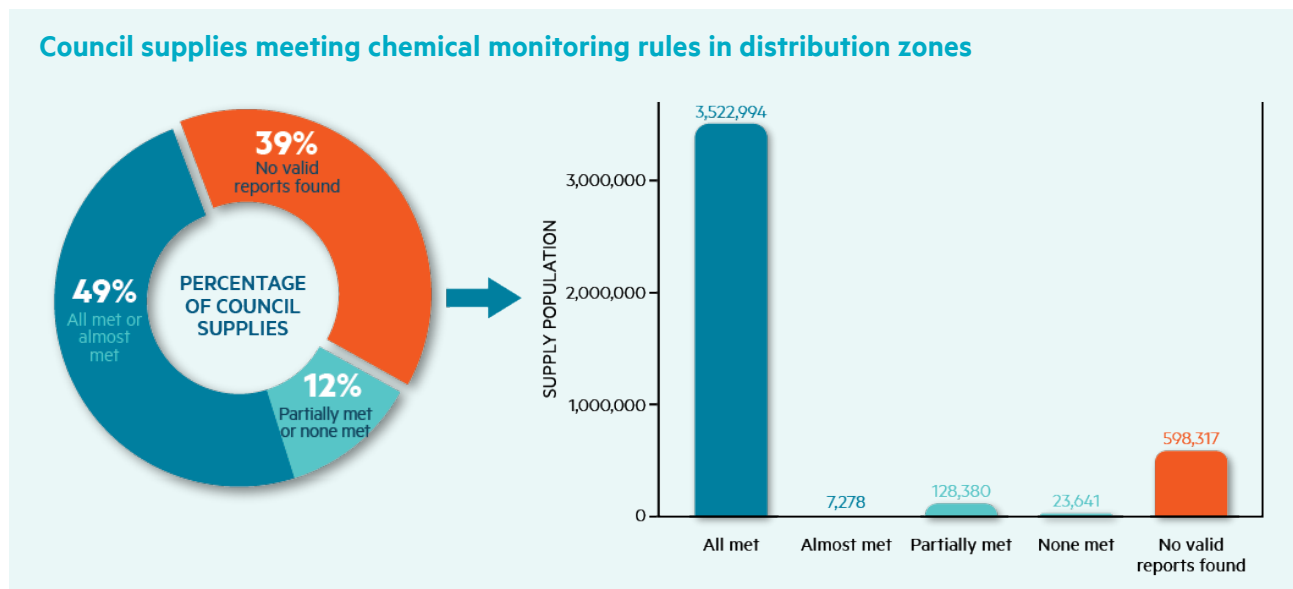
Distribution chemical monitoring

Suppliers with large supplies must monitor for chemicals, like metals and disinfection by-products, which can form or be released in the distribution system.

In distribution networks, metals like lead, manganese, and copper can leach into a supply from metallic pipes and fittings. Backflow from unprotected, risky connections can also contaminate the distribution system with metals. Level 1 supplies may need to monitor for metals in their distribution system if it is identified as a risk. Level 2 and 3 supplies must monitor for metals in their distribution system.

Disinfection by-products can form in distribution systems. This often depends on several factors including but not limited to source water quality and optimisation of treatment, the location of chlorine dosing, and water temperature and pH levels. Only level 3 supplies must test for disinfection by-products.

The figure below shows whether supplies met level 1, 2, and 3 chemical monitoring rules requiring suppliers to take samples for determinands which may specifically be found in their treated water in the distribution system. It also shows the total supply population provided water by these supplies.



We received reports for 296 council supplies (61%) following level 1, 2, and 3 rules. We did not receive valid reports for 189 council supplies (39%).

49% of council supplies met or almost met all reported requirements, though some supplies (12%) were not monitored according to the Rules.

For many councils, these requirements are new to their supplies, so we expect to see both improved reporting and performance year on year.

Backflow prevention

Backflow is the undesired reversal of water flow. Backflow can cause potentially contaminated water from a consumer's private property to enter the public distribution system.

Cases of microbiological and chemical contamination of a water supply due to backflow have occurred in New Zealand and globally, presenting real risks to public health.

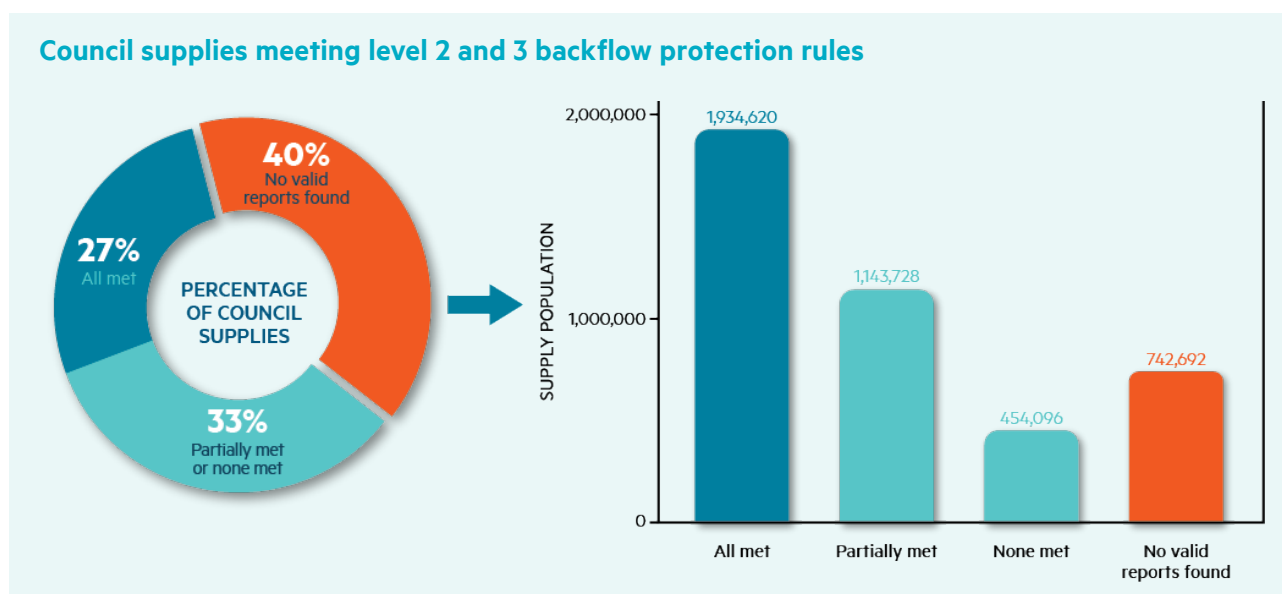
Backflow contamination events leave little opportunity to remedy the situation before the contaminated water reaches other consumers. It's therefore important to protect a supply by implementing a suitable backflow prevention programme.

To meet the requirements of the New Zealand Building Code, backflow preventers are often a standard requirement of connections to a water supply. Higher risk properties such as those with industrial, commercial, or agricultural activities require a more robust backflow preventer that is also testable.

Drinking water suppliers have a duty of care to ensure that the supply arrangements protect against the risk of backflow.

The Rules include a range of backflow protection requirements for different scales of water supply, though only suppliers with supplies serving populations greater than 100 people must report on these requirements.

The figure below shows council supplies which met level 2 and 3 backflow protection rules for distribution zones. These include requirements to prepare and implement a backflow prevention programme, undertake regular risk assessments of backflow in their networks, ensure appropriate backflow prevention devices are installed at points of supply, and ensure testable backflow prevention devices are tested annually, as well as keeping records of the testing and assessment of these devices. It also shows the total supply population provided water by these supplies.



We received reports for 250 council supplies (60%) following level 2 and 3 distribution rules. We did not receive valid reports for 164 council supplies (40%).

About a quarter of council supplies (27%) met all reported requirements. About a third of council supplies (33%) did not meet or only partially met reported requirements.

There is a significant gap in councils' performance against backflow prevention requirements. While the backflow prevention rules are new, the requirement to have backflow prevention dates back to the Water Supplies Protection Regulations from 1961 and is internationally accepted good practice. We expect both reporting rates and performance to increase year on year.

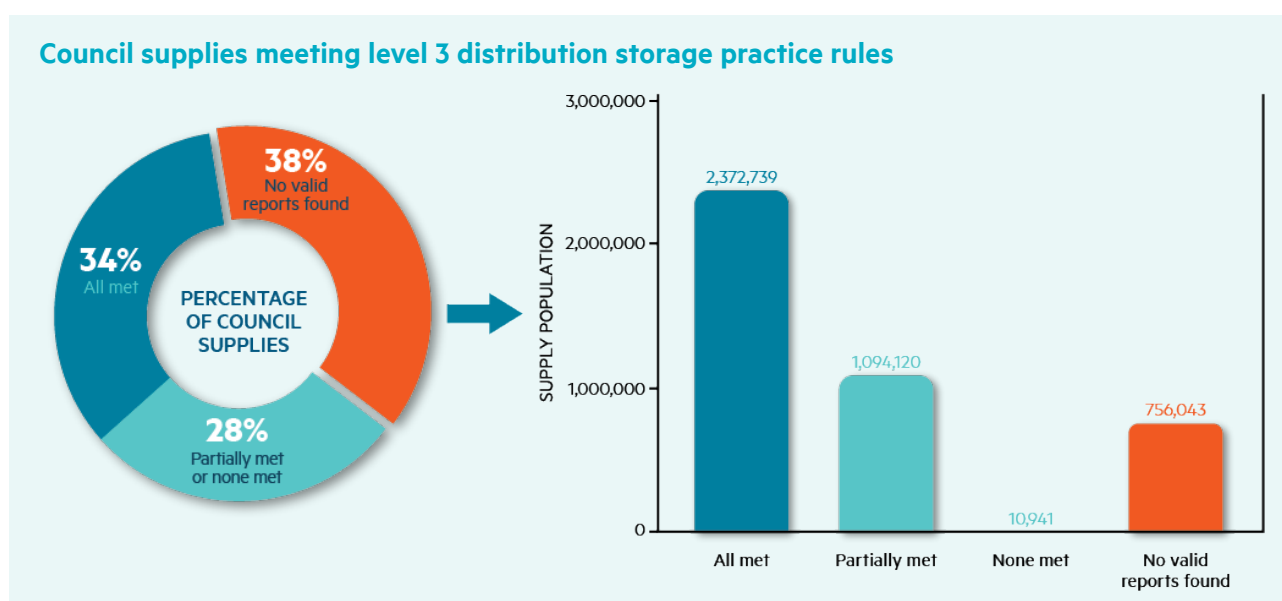
Distribution storage practices

Water storage plays an important role in water safety. It ensures there is sufficient water to meet health needs for users even when there is a disruption to supply such as power outages or extreme weather events.

However, storage facilities are also prone to ingress of contaminants through unsecure entry points such as access chambers and overflow outlets.

The Rules outline standard requirements of distribution storage practices for supplies serving populations over 500 people.

The figure below shows council supplies which met level 3 distribution storage practice rules for distribution zones having water storage management plans, ensuring storage reservoirs are secure and free from contamination, and following industry best management practices. It also shows the total supply population provided water by these supplies.



We received reports for 157 council supplies (62%) following level 3 distribution rules. We did not receive reports for 100 council supplies (38%).

About one third of council supplies (34%) met all reported requirements. Over a quarter of council supplies (28%) partially met or did not meet reported requirements.

There is a significant gap in councils' performance against distribution storage practice requirements. While the distribution storage practice requirements are new, these requirements align with international good practice. We expect both reporting rates and performance to increase year on year.

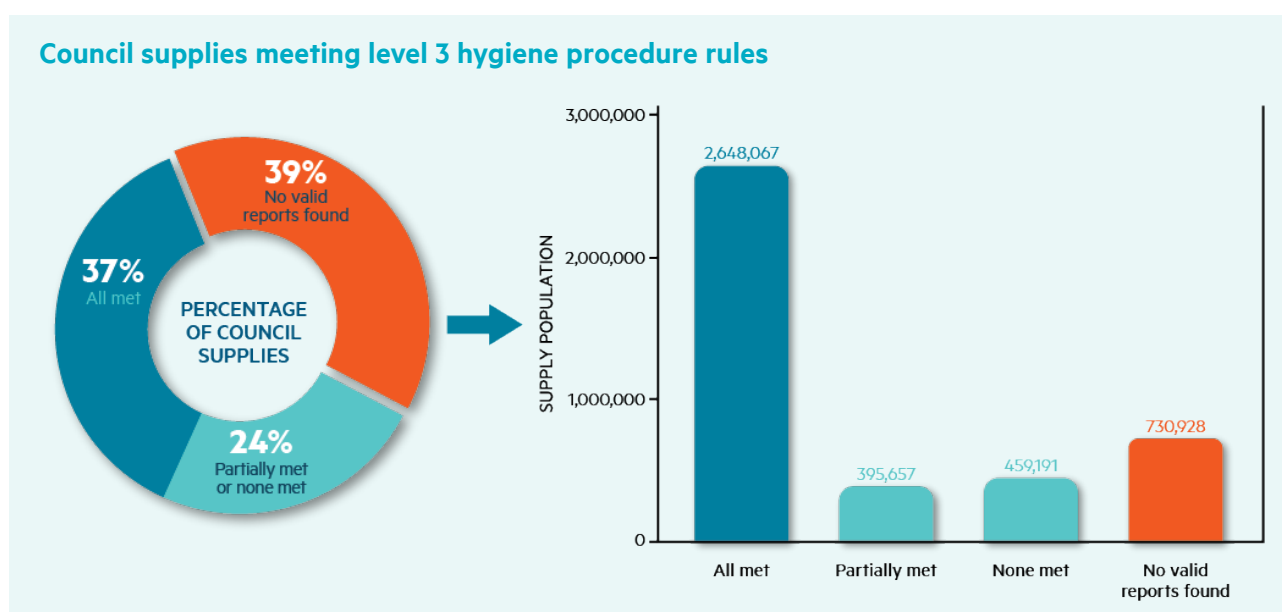
Hygiene procedures

Any operational or maintenance work on a distribution network can lead to contamination of the water supply through exposure to the environment and when new materials are added. It's important that anyone working on a distribution network understands and follows appropriate operating procedures. This includes maintaining a high level of hygiene when interacting with the network.

The Rules address aspects of hygiene procedures required of a large water supply, such as record

keeping and development of procedures, as well as activities like disinfection of mains and tools interacting with the water supply.

The figure below shows council supplies which met level 3 hygiene rules for their distribution zones, including requirements to have standard operating procedures and undertake maintenance and repairs according to best management hygienic practices on drinking water supply networks. It also shows the total supply population provided water by these supplies.



We received reports for 156 (61%) of council supplies following level 3 distribution rules. We did not receive valid reports for 101 supplies (39%).

Over a third of council supplies (37%) met all reported requirements. About a quarter of council supplies (24%) partially met or did not meet reported requirements reported.

There is a significant gap in councils' performance against hygiene practice requirements. While the hygiene practice rules are new, these requirements align with international good practice. We expect both reporting rates and performance to increase year on year.

Interruption to supply

Drinking water suppliers (other than water carriers) are responsible for providing a sufficient quantity of drinking water to meet the ordinary drinking and sanitary needs of consumers who use their supply.

If a supplier plans to interrupt the supply of drinking water for more than eight hours, they must get prior approval from us and take all practical steps to advise affected consumers. The supplier must also make arrangements to ensure that a sufficient quantity of drinking water is available to affected consumers through an alternative supply (such as a water carrier). Where this is not feasible, a planned interruption of more than eight hours cannot occur, unless this is contrary to directions given under the Civil Defence Emergency Management Act 2002 when a state of emergency in the region is declared.

Good planning practices can reduce the burden of major works which take longer than eight hours to complete, on affected consumers.

While alternative water supplies can present additional risks that need to be managed, their availability helps ensure consumers have ongoing access to safe drinking water.

There were 22 notifications of planned restrictions or interruptions lasting between 11 and 12 hours in 2023, but only 11 included a plan to provide an alternative water supply.

Suppliers must also notify us if, due to unforeseen circumstances or an emergency, the supply of drinking water will be interrupted for more than eight hours. Suppliers must advise us of the reason for the interruption no later than 24 hours after the supply was interrupted and take all practicable steps to advise affected consumers. The supplier must also ensure that a sufficient quantity of drinking water is available to affected consumers through an alternative supply.

Unplanned restrictions or interruptions to supply for long periods of time may result in a significant burden to a community. Some events are unpredictable and inevitable, but having planned responses to mains breaks and other urgent repairs to efficiently restore access to the normal supply of drinking water can help to limit the impact on communities.

In 2023, 36 suppliers notified us of 183 instances of unplanned events occurring in 76 supplies. Outages lasted 20 hours on average, with the maximum unplanned outage lasting 54 hours. In 168 of the total unplanned events, suppliers were unable to maintain sufficient supply of water. Only in 82 of the unplanned events was an alternative water supply provided to consumers.



Sector capability

Nāku te rourou nāu te rourou ka ora ai te iwi - With your basket and my basket, we will sustain everyone.

This section looks at capability among drinking water suppliers and across the wider water services sector.

Drinking water infrastructure, including treatment plants and distribution networks, carries many safety risks if not operated properly.

The water industry has identified a lack of capability among suppliers to manage drinking water issues, and this continues to be a concern. This is discussed below under the section titled “External reports on sector capability”. The data we have received from suppliers and laboratories also indicates that there is an urgent need for increased sector capability.

An improvement in capability across supplier types is required quickly, with some suppliers facing additional challenges relating to the size and type of their supplies.

In the first part of this section (below) we discuss examples of the data we have received which shows sector capability is an issue.

Example 1: Exceedances of aluminium

In 2023 we received 210 laboratory notifications (for 10 supplies) for MAV exceedances of aluminium.

Suppliers need to test for aluminium if they add it during treatment or if it is likely present in the source water that they use.

Aluminium salts are commonly added as coagulants during water treatment to remove turbidity, organic matter and microorganisms. Optimised treatment plants which dose aluminium into the raw water typically leave only a small amount of aluminium residual in the treated water (usually less than 0.1 mg/L). MAV exceedances indicate a failure of an operator to operate the coagulation process optimally.

Example 2: Exceedances of chlorate

In 2023, we received 87 notifications (for 16 supplies) of MAV exceedances for chlorate. Chlorate is a compound which is generally only found in drinking water where solutions of hypochlorite (liquid chlorine) are used to maintain a residual disinfectant. The risk of chlorate exceeding a MAV is more likely under certain conditions. For example, when hypochlorite is not stored in cool environments or large volumes of liquid chlorine are required to be added to the supply to treat the water adequately. When chlorate exceeds the MAV there is a public health concern which needs to be managed.

The formation of chlorate can generally be prevented by operators understanding the conditions that cause it to form and managing liquid chlorine supplies. There are many assurance measures suppliers can take to ensure their hypochlorite solutions do not contain elevated levels of chlorate. We expect suppliers to be implementing good practices when they choose to use hypochlorite solutions.

While testing for chlorate is a new requirement for suppliers, we have seen wide variation in the response to elevated chlorate with some undertaking a thorough investigation into their incidents. Others, however, need much more assistance, particularly where suppliers have limited capability and capacity.

The Rules require medium and large council supplies to report on whether work on a water supply is being carried out by suitably trained and experienced personnel. In this respect, we received reports for two thirds of medium and large council supplies. 70% of these council supplies, serving up to 3.3 million people, met all reported requirements. 5% of these council supplies, serving up to 548,000 people, did not meet reported requirements. We didn't receive reports for 25% of council supplies, serving up to 378,000 people.

Example 3: Detection of total coliforms in distribution networks

While we require suppliers to monitor total coliforms, there are no legislative requirements to take any action if total coliforms are detected in the supply, as they are not a direct indicator of faecal material in the supply.

However, total coliforms are an indicator that something has or is going wrong, and a pathway for contamination is exposing the supply to elevated risk.

International good practice is to undertake immediate response and investigate all total coliforms results, particularly when repeated results occur.

We have found suppliers vary in their response to total coliforms, with some suppliers undertaking immediate response, while other suppliers do not initiate any response. This is concerning to us, as these investigations can prevent outbreaks from water-borne pathogens.

In the second part of this section (below) we discuss some of the capability issues we are seeing in relation to suppliers' performance against the Rules.

Performance of councils

Our expectation is that all drinking water suppliers will comply with the minimum requirements set out in the Rules. However, our data indicates that some councils are struggling to meet these minimum requirements, particularly their requirements for smaller supplies.

Some councils may be experiencing capacity issues as we did not receive valid reports for about a third of supplies. These also tend to be councils operating small supplies.

Councils have a duty of care to supply safe drinking water to their consumers. Our data shows that some councils hold significant risks as evidenced by their own reporting that they don't meet minimum requirements.

We also encourage all suppliers to consider whether they should also be exceeding minimum requirements, so that when a single failure or incident occurs, other mitigation measures are in place which prevent a drop in performance and compliance rates.

Performance of government suppliers

As discussed in the "Reporting rates by suppliers" section, MoE and NZDF did not report on the performance of any of their supplies and DOC only reported on two of its 35 supplies. At the end of 2023 we were in discussions with DOC about general exemption applications for many of their supplies, which may explain their low rates of reporting. Corrections reported to us on all its supplies but did not meet all their requirements under the Rules.

Our data indicates that government suppliers are not meeting their minimum legislative requirements.

We expect MoE, DoC, and NZDF to be reporting on all their supplies like Corrections. We acknowledge that each government department has unique challenges to address and will continue to work with these suppliers to ensure that they are supplying safe water to the communities they serve.

Performance of private and community suppliers

Some private and community supplies reported to us on whether they met their requirements. While reporting rates are low among this group, we acknowledge that many of these supplies are run by volunteers and community members and may have limited funding opportunities. Some of these supplies may also be struggling to find operators for their supplies. We are progressing work to fully understand the challenges facing private and community supplies.

Despite their challenges, we have found that many small and private community supplies are doing everything they can to ensure they provide safe water to their neighbours, friends and whānau.

While there remains work to be done to ensure these supplies are supplying safe water every day, we encourage private and community supplies to get in touch with us if they need assistance with understanding or meeting their obligations as a supplier.

Private and community supplies are discussed in more detail in the "Private and community supplies" section.

External reports on sector capability

In this part of the section, we discuss two reports which look at sector capability.

In 2019, Beca produced a report on the capability of drinking water suppliers in New Zealand. Five capability categories of governance, management, financial, technical and systems were considered. This report found that only one council-owned supply met the 80-100% capability score, and 77% of councils were in the 40-60% capability range. The scores for self-suppliers and non-council networks were considerably lower, with 98% of these suppliers scoring below 60% capability. This capability gap results in risks to system failure and public health that are not being managed effectively.

In 2022, Assurity Consulting Design & Innovation produced a workforce development strategy report for the water services sector. This report presents a snapshot of the state of the water industry, taken from a workforce lens. It found that there is an increasing skills deficit in the water industry, with almost 60% of water sector workers unqualified. There is also a wide variation in water service capability throughout New Zealand. The quality of water services is related to scale, with smaller providers often lacking the specialist skills needed to achieve high-quality results. Career pathways in the water services sector are also hidden and challenging to access.

Current and projected workforce modelling indicates considerable growth in the workforce across all roles is needed. A combination of factors contributes to the current skills and personnel shortage, such as challenges in the training landscape, infrastructure deficits, career visibility, aging workforce, and fiscal challenges.

Lifting sector capability

Lifting sector capability requires collective effort from us and the water services sector. Suppliers' responsibilities include engaging with mana whenua to further uplift supplier capability as part of their duty to give effect to Te Mana o te Wai, to the extent it applies. As the regulator, we have a role in supporting drinking water suppliers to understand their duties and how to satisfy applicable legislative requirements. We also support suppliers to consider

what an approach to Te Mana o te Wai looks like for their community.

Some suppliers are unfamiliar with the new requirements that they must follow and the guidance and tools that can support them to manage their risks. As we have grown, we have begun to provide technical guidance to different suppliers so they can manage their risks and build their own capability.

We work closely with suppliers and stakeholders to support the development of knowledge and capability through research, education and training, with the aim of ensuring the standards being set can be met by the sector.

We have continued to be actively involved in supporting industry groups and training providers in the development of the Workforce Strategy, Ko Wai Tātau. This strategy, discussed above, focuses the sector collectively on the industry needs and actions for successful and sustainable sector growth. We were also involved with the strategy's activation, Te Mahere Whakamahinga. The years ahead will see a sharpened strategic focus around pathways associated with qualifications and training, funding, and international workers.

While not standardised, many councils provide training programmes either facilitated in-house or from external agencies. In our engagements with sector representatives, they have characterised elements of current training options as voluntary, inconsistent, and at times out-of-date. They have also noted significant barriers to participation. For community and private supplies, they are often dependent on volunteer operators and need to be able to access localised training and development. We are yet to engage in depth with these communities to better understand their needs so we can then partner with training and technical providers to offer appropriate support.

The Act provides for the establishment of an authorisations framework to improve the professional capability of drinking water suppliers, so operators and workers in water networks have the right skills, qualifications, or experience. If we look to other authorisations frameworks, they are a common tool to manage human-factor risks in other sectors in New Zealand and internationally.

During 2023 we began engaging with sector representatives on an authorisations framework, which is continuing in 2024. We are committed to working with the sector as we develop our approach in this area.

Compliance action

We have a range of regulatory tools and powers under the Act to protect and promote drinking water safety and related public health outcomes. This includes the ability to carry out investigations, issue directions, serve compliance orders and impose statutory management on suppliers.

Our emphasis since November 2021 has been on encouraging voluntary compliance through relationship building and raising awareness. Our work has been focused on general supplier engagement. We have also taken a targeted approach to assisted compliance or directed compliance in some areas (such as DWSP reviews).

We are committed to working constructively with suppliers to promote compliance. We aim to support voluntary and assisted compliance by helping suppliers improve their understanding of their legal duties, the Drinking Water Standards, the Rules and drinking water safety practices, as well as their capabilities to address areas or risks of non-compliance.

Sometimes, we need to use our powers when there is a risk to public health. When this occurs, we ensure we use our powers in a proportionate and reasonable manner that accounts for the risk of harm as well as the supplier's actions and specific circumstances.

As of 31 December 2023, we have issued one direction and two compliance orders, as described below.

Queenstown *cryptosporidiosis* outbreak

In September 2023, there was an outbreak of *cryptosporidiosis* in Queenstown, which was caused by the protozoa *cryptosporidium*. The water treatment plant serving the area did not have a protozoa barrier, a key part of a multi-barrier treatment approach, which removes or inactivates *cryptosporidium* before it can cause illness.

This incident is an example where the lack of an effective multi-barrier approach meant the drinking water supply could not be ruled out as a source of this outbreak. Te Whatu Ora Health New Zealand determined the most likely cause of the outbreak was human faecal contamination of the source water, Lake Wakatipu.



We completed an initial review of the DWSP for the Queenstown supply prior to the outbreak. This review identified the lack of a protozoa barrier at the Two Mile water treatment plant despite the long standing use of a surface water source. The lack of suitable treatment barriers was also implicated in a gastroenteritis outbreak in Queenstown in 1984.

Some 94 cases have been linked to the 2023 outbreak (74 confirmed, 20 probable). 11 people presented at hospital emergency departments, with three admitted to wards for further treatment.

We served a compliance order on the Queenstown Lakes District Council in September 2023 which required them to keep a boil water notice in place until they had installed treatment for protozoa or were otherwise able to provide safe drinking water to consumers. The Council completed a programme of work from October to December 2023 to meet the requirements of the compliance order, particularly in relation to the Two Mile water treatment plant. The work included installing temporary UV disinfection equipment, cleaning all reservoirs, and carrying out flushing across the Two Mile network. As a result of this, the boil water notice for the Two Mile supply was lifted in December 2023.

We are continuing to engage with the Council as they install a permanent protozoa barrier solution for the Queenstown supply. The Council expects this work to be completed by September 2024.

We issued a compliance order in this case due to the immediate risk to public health arising from the lack of a protozoa barrier, where there was a material risk this was the cause of illness emerging in the community.

As mentioned earlier in this section, 27 councils that had drinking water treatment plants without a protozoa barrier in place were contacted in October 2023 and asked to provide a viable plan to install this barrier within a reasonable timeframe. These supplies were not served with compliance orders as their risk profile had not increased as was the case with the Queenstown supply that had an active protozoa outbreak.

Clutha supplies

In March 2023, we issued a direction to Clutha District Council and Citycare Water Ltd (the operator of the supplies at the time) in relation to exceedances of the aluminium MAV across five of the council's supplies. This direction required the council to provide us with a remedial action plan detailing actions to be taken, with specific timeframes, to ensure all treatment systems at the supplies affected by the MAV exceedances were operating effectively.

The Council carried out extensive monitoring for aluminium and took steps to reduce the concentration in the drinking water it supplies. Although issues have been resolved at a number of the Clutha supplies and overall performance has improved since the direction was issued, there are still MAV exceedances for supplies included in the direction (Moa Flat, Waitahuna Rural and North Bruce Rural) as well as those not included (Lawrence).

We prioritised a review of the DWSP for the Milton supply. The review identified systemic issues in the identification and management of risk being adopted by council, requiring further attention for other supplies it managed. A decision was made to review each DWSP for the council's supplies.

Following the review and further investigations, a compliance order was issued in November 2023 for the Milton supply. The compliance order sets out what is needed from the council to become compliant and assure us that they are providing safe drinking water to the consumers of the Milton supply. Since serving the compliance order, the areas of highest risk have been addressed and improved risk management practices have been put in place across all Clutha supplies.

We continue to work with the council as it addresses these issues across its supplies.



PART THREE:

Source water

In this part, we discuss the importance of source water protection, and look at source water risk management planning and source water monitoring.

The first barrier

The fundamental principles for safe drinking water acknowledge that prioritising the health and protection of source water is of paramount importance. This was a key takeaway from the Havelock North Drinking Water Inquiry and recognised as an internationally accepted example of good practice.

A 'source water' is the water body where water is abstracted for use in a drinking water supply. It includes rivers, streams, lakes, underground aquifers, and rainwater. If the source water becomes contaminated, it may impact the rest of a drinking water supply and necessitate adjustments to treatment processes, or potentially present a public health risk to consumers. By effectively protecting source water from activities that adversely affect source water quality, the risks of providing contaminated water to consumers can be significantly reduced.

Source water protection should also prioritise protecting the health of water. Important source water bodies, like the Waikato and Whanganui Rivers, have significance to all New Zealanders. Iwi and hapū across the central North Island will also have specific rights and interests recognised in Treaty of Waitangi settlements, and Māori data implications may arise, particularly around the information we hold and make publicly available about source water data extraction points.

As part of a multi-barrier approach, protecting source water provides the first and very significant barrier against drinking water contamination and illness. This approach includes identifying and understanding the risks to drinking water

sources and addressing and managing those risks appropriately.

Source water risks

Every source water has its own unique risks that need to be managed by suppliers.

There are multiple types of source water, usually grouped into surface water like rivers and lakes, and groundwater from aquifers. Rainwater also needs to be considered. The quantity of water available in a source water, as well as the quality, can impact the drinking water supply.

Surface water sources are bodies of water that are open and exposed to the environment and all activities near them, and therefore tend to be more vulnerable to activities occurring in the catchment than other sources. Some source water catchments are confined to remote areas of natural forest, while others can have agricultural and commercial activities or even entire townships in their catchment. Surface water sources are considered highly vulnerable to microbiological contamination due to the inevitable presence of animals in the area, and activities like wastewater discharges and septic waste from human populations. Surface water sources can also be vulnerable to potentially harmful algal blooms, specifically cyanobacteria. Aside from the negative impact algal blooms can have on the environment they occupy, they have the potential to create taste and odour issues and release cyanotoxins that are a public health risk to people and animals that interact with the contaminated water.

Aquifers are bodies of water below the surface of the land where groundwater exists in the spaces

between gravel, stones and rock fissures. Water enters aquifers through permeable land and travels through the system following geological formations. Drinking water suppliers access this water by drilling bores down to the aquifer or by collecting water as it naturally exits the ground via springs. Water in the aquifer can be years or decades old and often relatively stable (less affected by surface activities), depending on the depth from which it is abstracted. However, human activity interacting with aquifers can change these profiles significantly, with contaminants entering aquifers through poorly managed bores, contaminated land and construction of deep piles. There are also natural hazards in groundwater due to the geology of areas in New Zealand, such as naturally occurring arsenic and manganese.

Due to the relatively slow movement of groundwater through an aquifer, if an activity at the surface is the source of contamination, ceasing the activity will stop additional contaminants entering the aquifer, but it may take some time for the affected groundwater to pass through the aquifer.

At the smaller end of the scale, rainwater from roof collection systems are a common source of water for remote areas of New Zealand. It's a standard water supply arrangement for individual dwellings, as well as rural community properties like schools and marae. Potential roof water contaminants may come from the materials that are used in the structure, including lead flashings and paint, and matter that may be deposited on the roof, such as animal faeces and air pollutants. Any contaminant on the roof is then washed into the rain tank and provided to consumers.

Standard seasonal weather variations affect all sources of water, but surface waters more because of their exposure to the environment. Heavy rain and storms can induce slips and high runoff into surface waters, or result in flooding around bores, both of which can increase turbidity and contamination risk. Storms are frequently a cause of reduced source water quality for supplies across the country, causing treatment and quantity issues that must be managed, sometimes urgently. The more information a supplier has on their source water and

the risks it is exposed to, the more prepared they can be for these events.

While it is not possible for a drinking water supplier to protect a source water catchment from every source of contamination, steps can be taken to influence activities in the catchment, and cooperation with other stakeholders in the area can improve the quality of water that is abstracted for drinking water supplies.

The Water Services Act 2021 (the Act) is part of a broader framework.

The Act is part of a broader framework that enables risks to source water to be properly identified, managed, and monitored. This framework includes the Resource Management Act 1991, regulations made under that Act such as the National Environmental Standards for Sources of Human Drinking Water (NES-DW)¹⁷, and the National Policy Statement for Freshwater Management (NPS-FM).

Managing rivers, lakes and aquifers, as well as land uses and activities that may affect water quality or quantity, is the responsibility of regional councils under the Resource Management Act 1991. Regional councils make regional policy statements and plans, along with decisions on resource consent applications. They are also responsible for compliance, monitoring, and enforcement of requirements arising from the planning instruments they have made and resource consents they have granted.

Relationships with suppliers, regional councils and other government agencies are crucial in ensuring the source water risk management framework is successful. The relationships local authorities and suppliers have with whānau, hapū, and iwi Māori are essential to the quality of information being used to inform water supplier understanding of source water quality.

Droughts and severe weather are an increasing issue for suppliers.

Source water risks include quantity issues due to water shortages or damage to abstraction infrastructure. These risks are heavily influenced by climate conditions, with uncharacteristically dry

¹⁷ Set out in the Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007.



weather affecting water bodies and extreme storms causing damage to infrastructure. These weather-induced risks can be exacerbated by poor catchment management where activities are either diverting water away from the drinking water supply or producing hazardous debris.

Summer water supply became a focus near the end of 2023 as it became clear that dry weather or drought over the summer period might impact drinking water suppliers across multiple regions. The El Niño weather pattern and subsequent drier than normal summer was not the only reason for water shortage issues. High levels of water loss were highlighted across the Wellington region and other areas of the country, resulting in supplier-imposed water restrictions. We worked closely with Wellington Water to ensure that all reasonable steps were taken to mitigate the risk of a water shortage in the Wellington metropolitan area, and that appropriate response mechanisms were in place. This work continues as the risk remains for future summers.

Managing water loss (or leakage) from drinking water networks has increased in priority for the water industry as various factors like ageing infrastructure, population growth and increased environmental effects due to climate change all place increased demands on source water. The initial data we hold indicates that the inherent mana and mauri of water being abstracted is not being valued as appropriately as it could be, as poor infrastructure and leaky pipes result in significant wastage in some networks. Water loss may also contribute to quantity issues. We expect suppliers to actively manage quantity risk to their supply and proactively notify us when there is a problem. Managing water loss in drinking water networks is discussed further in our Network Environmental Performance Report 2022/23.

Mātihetihe Marae water supply case study

Introduction

The Mātihetihe Marae water supply case study from Northland illustrates the value in investing and maintaining good relationships within communities. It also shows how as a regulator we can play a pastoral and mana-enhancing role in supporting communities to make their own solutions despite facing an array of challenges. It is an example of how a one-size-fits-all approach does not work. Marae especially are unique in the way they function, and their supplies are maintained. It offers us a glimpse into the commitment of a community dedicated to ensuring there is safe drinking water for their marae.

Background

Mātihetihe Marae is a registered private and community supplier that services the small settlement of Mitimiti in the Far North – Te Tai Tokerau with a population of 98. It lies close to the Warawara Forest, between the mouths of the Whangape Harbour and Hokianga Harbour on Northland's west coast, 44 km west of Kohukohu. Mitimiti is part of the Hokianga North statistical area. The supply, which draws its source water from the Moetangi river, provides drinking water to 49 homes, a marae, a co-education primary school, and some public toilets managed by Far North District Council.



Supply operation and treatment processes

The supply is operated by volunteers, particularly Anne Te Wake, with governance provided by the Mātihetihe marae trustees. There is a treatment plant next to the source water extraction point. The land the treatment plant sits on was gifted by Māori landowners to help provide safe drinking water. The existing treatment process was developed and implemented as part of the Public Health Unit rural programme. It includes a river pump at the extraction point. This feeds into pre-treatment and raw water storage, through to a treatment process that includes pH correction, filtration, and UV disinfection. The treated water is then pumped up to tanks for distribution to the community via a reticulated system as shown in the first image above.

Challenges

The challenges facing the Mātihetihe Marae supply is not unusual in Northland. It takes approximately an hour and a half driving along windy unsealed roads to get to the near towns of Kaikohe and Kaitiā - many still damaged and awaiting repair following Cyclone Gabrielle. Socio-economic deprivation mixed with the remote setting makes connectivity, access and cost a challenge to the operation of their supply - with limited access to water testing a barrier to measuring ongoing compliance. Since 2021, there have been 12 notifications associated with the Mātihetihe supply.

Successes

Despite these challenges, Mātihetihe has maintained the operation of its supply and conduct regular testing with support from Te Rūnanga o Te Rārawa and the Me He Wai programme. Their enduring commitment has ensured that safe drinking water has continued to be supplied, with appropriate safety mechanisms and advisories in place as needed. This is a testament to the resilience of the people of Mitimiti and their commitment to ensure safe drinking water for their community with little support.

Water treatment plant upgrades

The supply is in the final stages of an upgrade to its water treatment plant, which will see an upgraded and new treatment process including pre-filtration, multimedia filtration, pH correction, new UV disinfection - and for the first time, chlorine disinfection. Funded by the rural drinking water programme through the Department of Internal Affairs and Crown Infrastructure Partners, funding has supported commissioning, training and ongoing support. The project, managed by Filtec and delivered by locally based contractors, should see a marked improvement in the profile of the treated drinking water.

The following image shows what the new water treatment system will include once work has been completed.

Mātihetihe Marae - River Water S2/T2/D2 - 100m³/day



Source water risk management plans

As part of drinking water safety planning, most suppliers must prepare and implement a source water risk management plan (SWRMP) identifying the hazards and risks associated with source water and how these will be managed.

A supplier does not have to complete a SWRMP if they have adopted an acceptable solution, obtained a general exemption or they do not have a source from which they abstract water (e.g. some water carriers).

SWRMPs must:

- Identify any hazards that relate to the source water (including emerging or potential hazards such as contaminated land, pesticide use, algal blooms or geothermal activity).
- Assess any risks that are associated with those hazards.
- Identify how those risks will be managed, controlled, monitored or eliminated as part of a DWSP.
- Have regard to any values identified by local authorities under the NPS-FM that relate to a freshwater body that the supplier uses as a source.

The source water risk management plan then informs additional relevant monitoring that drinking water suppliers must conduct in accordance with the Rules, and report results to us. This is discussed in more detail in “Source Water Quality” below.

SWRMPs support a long-term, multi-barrier approach to understanding the health and wellbeing of source water. We are currently reviewing SWRMPs as part of a broader programme for the review of drinking water safety plans (DWSPs).

Some suppliers have developed experience in identifying and monitoring risks to source water. However, for many suppliers this will be new. The information available to suppliers about risks and hazards near a source also vary across local authorities, as does suppliers’ ability to access and use that information.

We expect that the quality of SWRMPs will improve as:

- Local authorities and drinking water suppliers

become familiar with the process and information available to inform their plans.

- Suppliers build meaningful partnerships with whānau, hapū and iwi, and increase their understanding of mātauranga Māori and Te Mana o te Wai.
- All source water provisions in the Act are operating fully.

An effective and holistic approach to source water risk management will contribute towards Te Mana o te Wai outcomes through the DWSP identification of hazard, risks, and mitigations to prioritise outcomes that uphold the health of the water. Many SWRMPs and DWSPs that have been recently updated refer to Te Mana o te Wai outcomes. There is ongoing work required to ensure that through our monitoring and reviewing role, we continue to support the sector to consider these outcomes in their safety and risk planning.

Source water monitoring

The Act and the Drinking Water Quality Assurance Rules (the Rules) require significant monitoring of source water than was previously required.

The Act and the Rules promote the use of a risk-based monitoring regime. Suppliers are required to identify potential hazards to their source water, monitor associated determinands at their abstraction point to confirm that these hazards are not presenting an unacceptable risk to consumers, and act when monitoring reveals if risks are unacceptable.

Additional monitoring could involve testing for specific chemicals or water quality parameters associated with hazards in the catchment, so that when they are present at elevated levels, the cause can be investigated and the impact to the water supply assessed. This assessment could lead to focussed monitoring to ensure Standards are not breached in treated water, and preparation for potential water shortages and provision of an alternative water supply if the hazard cannot be managed. Effective source water monitoring enables water suppliers to take action early to manage and protect their water supply with minimal impact to users.

This is a significant shift from the previous regime under the Health Act 1956, which focused on the

quality of treated drinking water leaving a treatment plant and in a distribution network. This approach centred on putting treatment in place to ensure drinking water was safe.

The Rules introduced new requirements to monitor source water, and the Act includes statutory provisions that are intended to foster increased information sharing about source water quality between local authorities and suppliers. The risks to a water supply start in the source water catchment – and can be managed and reduced to an extent prior to reaching the water treatment plant. This has the potential to reduce the risks of providing poor quality water to consumers and reduce the cost of treatment in the supply. As with other aspects of the Rules, source water monitoring varies depending on the population of the supply, and therefore the smaller the supply the less source water monitoring required.

The supplier is ultimately responsible for understanding and monitoring risks to their sources of drinking water.

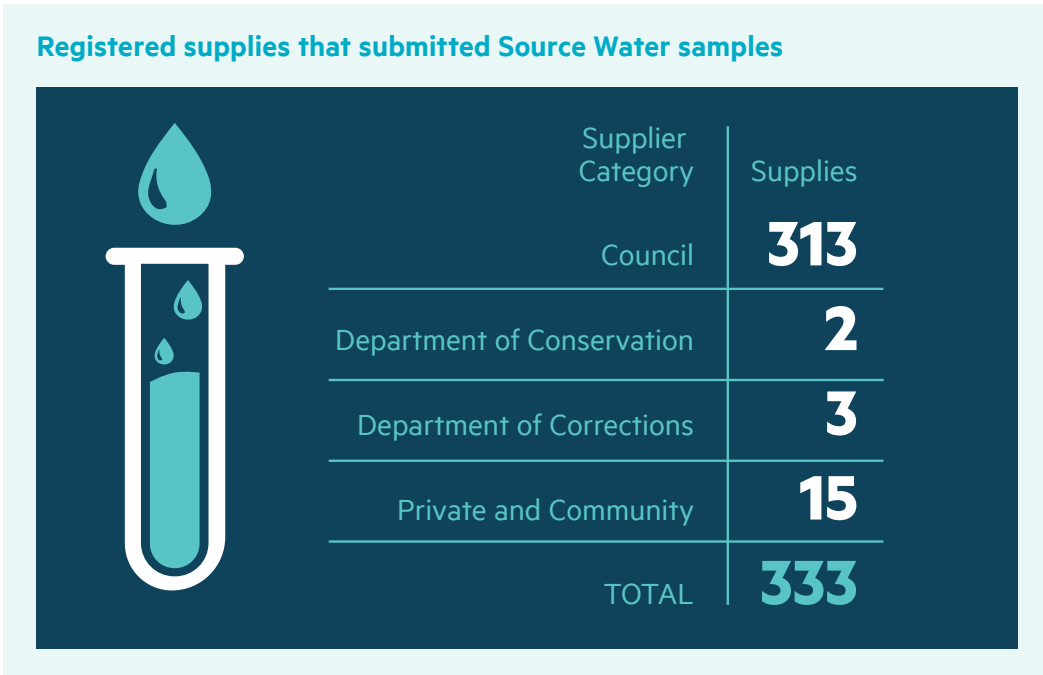
Monitoring may be done by grab sampling or continuously monitoring a parameter. Continuous monitoring is only required for large supplies. Both types of monitoring have benefits and limitations for suppliers. They allow for suppliers to detect and react to changes in source water quality, which aligns with one of the fundamental principles of operating a safe supply. Grab sampling,

however, only shows a snapshot of what was in the water when the sample was obtained from a source. Continuous monitoring measures physical parameters, like pH, turbidity and conductivity, and allows for suppliers to detect significant events that might change these parameters on a minute-by-minute basis.

The Rules requires supplies serving more than 500 people to continuously monitor their source water, while all suppliers must regularly monitor their source water (in accordance with Rules) via grab sampling for a range of microbiological and chemical determinands. Suppliers must annually report the results of their source water monitoring to Taumata Arowai.

In 2023, 55 suppliers reported at least one sample result for at least one of their supplies through our reporting framework. In total we received sample results for 333 supplies. Low levels of reporting are most likely a reflection of the learning curve to report on these new requirements. Those supplies that we have received reports for cover a large percentage of the population.

Private and community supplies are more likely to be smaller supplies with fewer source water sampling requirements. Large supplies with comprehensive source water risk management plans, which are commonly council supplies, are more likely to have identified additional determinands in the source water requiring monitoring and reporting.



Source water monitoring results

The following is a summary of the results that have been reported to us with a focus on determinands that may present significant health risk.

E. coli in source water

E. coli monitoring in source water can help suppliers determine the general microbiological quality of their sources. *E. coli* is often present in most surface water environments due to animal and human activity. The standard testing does not determine whether *E. coli* is from humans, birds, cattle, sheep or other animals, only that faecal contamination is present.

Spring and bore supplies in general are likely to have better microbiological quality than surface water due to the reduced exposure to the environment and the longer period of time the water is stored below the ground surface.

Any detection of *E. coli* indicates the presence of faecal matter, and therefore there is no safe limit for consumption. Very high levels of *E. coli* in source water may indicate that additional source water management measures are needed to improve the health of a water body. Typically, *E. coli* is much higher in sources impacted by raw or poorly treated sewage discharges, as well as other discharges that can contain high amounts of faecal content. Sources can also be adversely impacted by runoff from livestock grazing or urban stormwater.

The figure below shows a summary of the number of *E. coli* results by source water type (Bore and depths, spring, river/stream/creek, lake, and roof) and the level of those results (<1, 1-10, 11-100, >100 units/100mL).

Summary of *E. coli* results from different source types received from registered supplies in 2023



Units: cfu/100ml or mpn/100 mL¹

Source Water Detailed	0 or <1	1 to 10	11 to 100	over 100	TOTAL SAMPLES
Bore (>30 m deep)	8,956	470	15	3	9,444
Bore (10-30 m deep)	908	38	6	2	954
Bore (<10 m deep)	513	82	22	11	628
Spring	219	96	10	1	326
River, Stream, Creek	765	805	831	893	3,294
Lake	163	385	214	79	841
Roof	56	70	103	95	324
TOTAL	11,580	1,946	1,201	1,084	15,811

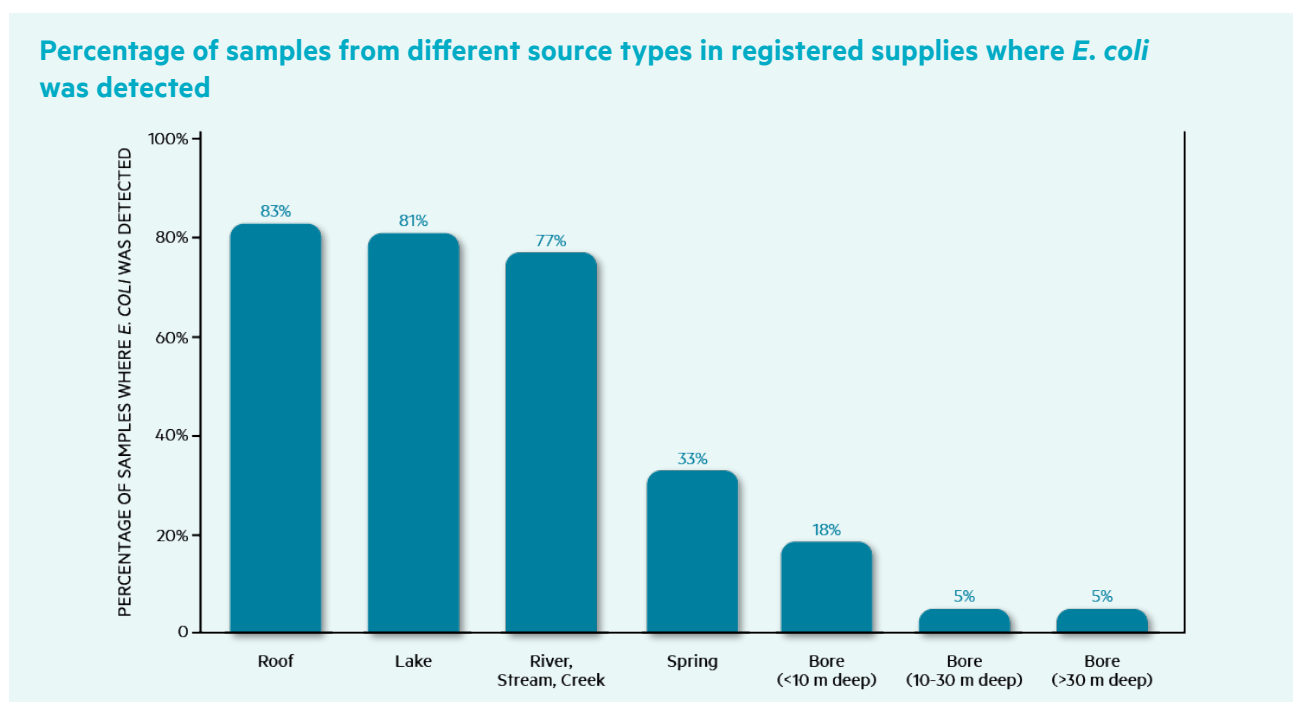
¹ Colony-forming unit – cfu ¹ Most probable number – mpn

In 2023, we received 15,811 test results for *E. coli* from 571 source abstraction points that supply water to 302 supplies serving 3.36 million people. The results ranged from <1 under the detection limit to a maximum of 68,300 cfu/100 ml¹⁸. There are over 10 times more *E. coli* samples from groundwater than any other source, which is a result of the frequent testing requirements of Class 1 groundwater sources that are collecting data to demonstrate a minimal risk of protozoal contamination.

Groundwater typically has higher microbiological quality than other sources. Surface water sources like rivers, lakes and streams, have more variability

in their water quality and are more susceptible to faecal contamination. Roof water sources are also shown to be at risk of contamination by faecal material. Springs typically have better microbiological quality than surface and roof sources, with groundwater generally being the highest quality source microbiologically. Shallow groundwater (0-30 m) shows increased susceptibility to faecal contamination than deep groundwater (> 30 m).

The figure below shows the percentage of source water samples in which *E. coli* was detected as reported by suppliers.



The reported results show that surface waters and roof water have the highest percentage of *E. coli* detections, indicating the elevated risks they have to faecal contamination. Despite roof water being considered a good quality source by many, 80% of roof water samples indicated faecal contamination. The percentage of groundwater samples where *E. coli* was detected decreases with depth.

It is generally considered that water abstracted from greater than 30 metres deep is not impacted by faecal contamination. It is concerning that 5%

of samples from groundwater abstracted from this depth (488 samples) contained *E. coli*, including 18 samples with relatively high levels of contamination.

Overall, while the figure indicates the groundwater deeper than 10 metres is less likely to have faecal contamination, it also shows there is still a risk of contamination no matter the source water and therefore a bacteria barrier at minimum is necessary for any substantial supply.

18 Colony-forming unit - cfu

Chemicals in source water

Chemicals can exist in source waters from natural or human causes. Chemicals that are present in source waters may or may not be removed by conventional treatment processes and it is important for a water supplier to design their treatment process to remove or reduce chemicals to a safe level for consumers. While some contaminants associated with particles may be removed by filtration, chemicals in their soluble or dissolved state are not able to be removed by filtration alone. Alternative treatment methodologies are available but can be costly and difficult to maintain.

As the MAVs are only applicable to water post treatment, it is important that water supply treatment processes are designed to remove any determinands that exceed a MAV level in source waters to ensure these are not exceeded in water for consumers.

The Rules require a minimum level of source water testing for some key determinands. Large supplies are also required to design their source water testing according to their source water risk management plans. Where values are above 50% of the MAV in source water samples, additional testing is required. Source water sampling also informs treated water sampling.

A short description of each of the major chemical determinands discussed in this section is given in Appendix Two. Some significant chemicals detected in source water sampling are discussed below, and while they are compared to MAVs, it is important to note that MAVs are only applicable to drinking water (i.e. post treatment), and therefore are only used for comparison in raw source water.

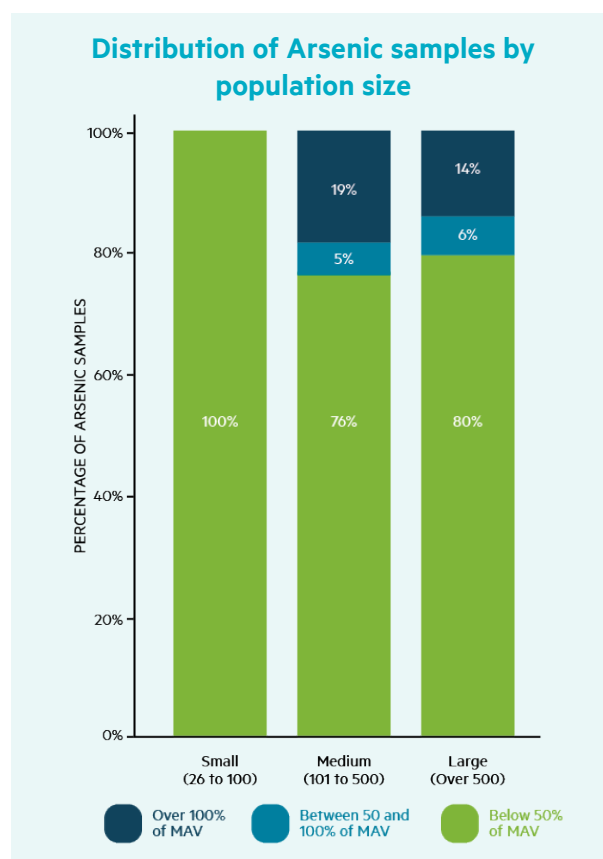
Arsenic (MAV 0.01 mg/L)

Arsenic can be present in source waters due to natural geological formations which are common in New Zealand.

Groundwater and surface waters fed by springs in geologically volcanic areas may contain elevated levels of arsenic. It is more prevalent in groundwater but can enter surface water from springs discharging into water bodies. These areas may have levels that are often just over the MAV, which do not pose a significant health risk in the short term since the MAV is based on ensuring that drinking water does

not present a significant risk to health over a lifetime of exposure. However, regular reports of elevated arsenic in source water may indicate the need for further treatment to reduce arsenic levels in affected supplies.

The figure below shows arsenic levels in source water across small, medium and large supplies, as reported for 248 supplies, from 942 tests carried out at 431 sources and abstraction points.



The results ranged from under the detection limit to a maximum of 1.91 mg/L, nearly 200 times the MAV. 17 supplies reported at least one result above the MAV. An additional 13 supplies reported at least one result between 50 -100% of the MAV. These elevated arsenic levels were detected in medium and large supplies at similar rates.

We are concerned by the numbers of results for arsenic levels at above the MAV in source waters.

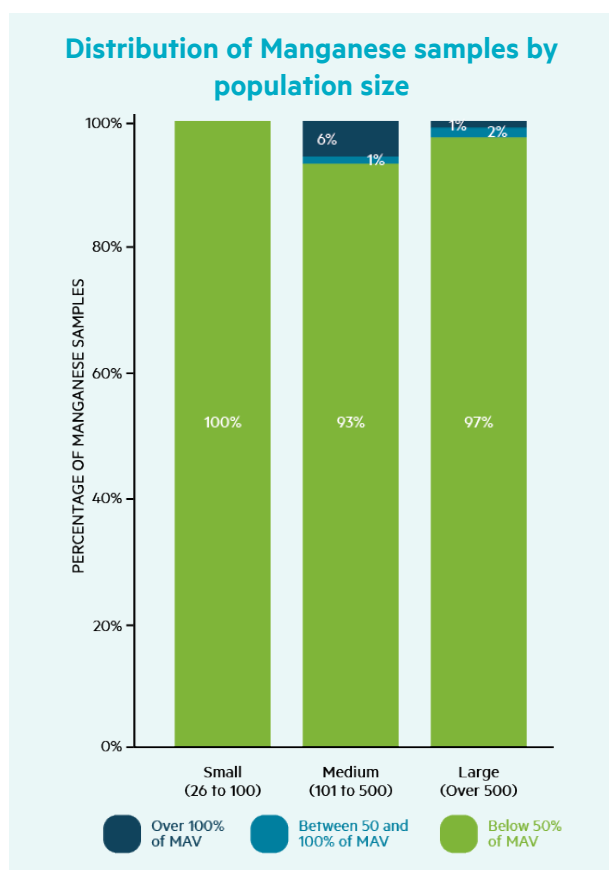
Council suppliers that have regularly reported arsenic MAV exceedances in their source water either have plans in place to install arsenic removal in affected supplies, or in the case of Whakatane District Council's Braemar water treatment plant, have already installed and implemented these barriers to reduce arsenic concentrations.

Manganese (MAV 0.4 mg/L)

Depending on the form present in source water, manganese can disrupt treatment processes and cause aesthetic issues for consumers, like laundry staining and dark coloured water. Manganese can affect the aesthetic qualities of water and has a health-based MAV.

Manganese may be present in particle form which can be removed from a supply by filtration, or it may be present in dissolved form and not easily removed by filtration alone.

The figure below shows manganese levels in source water across small, medium and large supplies, as reported for 259 supplies, from 4,376 tests carried out at 526 sources and abstraction points.



The results ranged from under the detection limit to a maximum of 61 mg/L – more than 150 times the MAV.

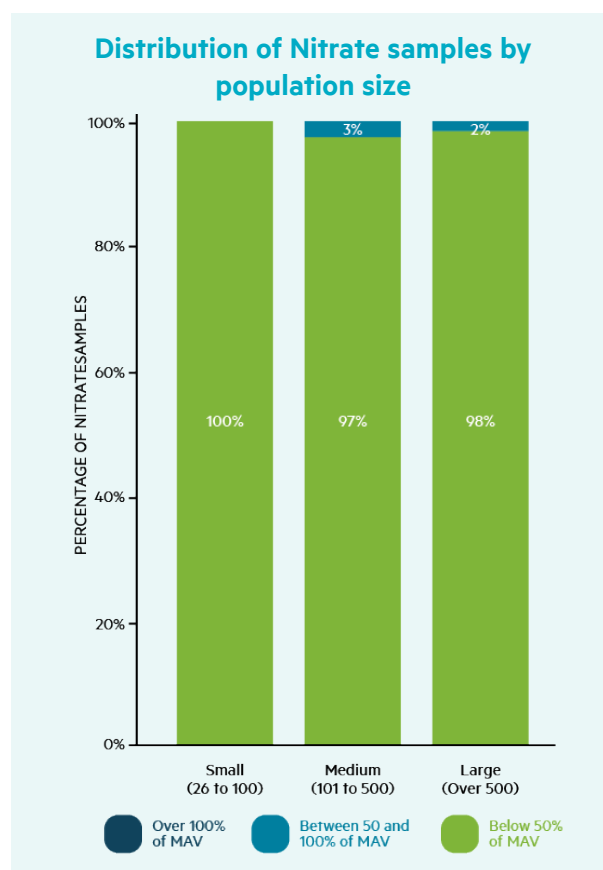
Of the 259 supplies, 232 supplies reported all results under 50% of the MAV, 16 supplies reported at least one result between 50-100% of the MAV and 19 supplies reported at least one result above the MAV.

Nitrate (MAV 50 mg/L as NO₃)

Nitrate can be present in source waters from naturally forming in the environment, or from human activities which increase the levels of nitrates in the environment.

Nitrate can be expressed in different forms which need to be considered in testing. The MAV for nitrate is also different from others in the Standards because it's a short-term limit, meaning an exceedance indicates an immediate health risk to consumers.

The figure below shows nitrate levels in source water for small, medium and large supplies, as reported for 188 supplies, from 3,930 tests carried out at 432 sources and abstraction points.



The results ranged from under the detection limit, to a maximum of 46 mg/L as NO₃, which is below the MAV of 50 mg/L.

Of the 188 supplies that reported test results, 177 supplies reported all results under 50% of the MAV, 11 supplies reported at least one result between 50-100% of the MAV and no supplies reported any samples above the MAV.

Lead (0.01 mg/L)

The World Health Organisation suggests that there is no safe level of lead for human consumption and any exceedance of the MAV is a health concern.


Elevated lead readings in source water are unexpected, as the main source of lead contamination in drinking water comes from fittings and materials in the distribution network and private pipework.

We received 510 test results for lead from 339 sources and abstraction points that supply water to 167 supplies serving over 3.1 million people. The results ranged from under the detection limit, to a maximum of 1.2 mg/L.

Of the 167 supplies that reported test results, 158 supplies reported all results under 50% of the MAV, five supplies reported at least one result between 50-100% of the MAV and four supplies reported at least one result above the MAV. Of these, only Reefton had multiple lead samples over 50% of the MAV at the same source.

It is worth noting that some international water regulations, such as the European Union Drinking Water Directive,¹⁹ have taken steps to lower the maximum lead limit to 0.005 mg/L, 50% of the current MAV. Therefore, samples that exceed 50% of the current MAV are also of interest.

Registered supplies that submitted source water Lead samples at over 50% of MAV in 2023

					Total samples between 50% and 100% of MAV	Total samples over MAV
Supplier Name	Supply ID	Supply Name				
Auckland Council	BEA006	Beachlands Log Cabin			0	1
Auckland Council	BEA007	Beachlands War Mem. Hall			0	1
Auckland Council	WHI019	Whitford War Memorial Domain			1	0
Buller District Council	REE001	Reefton			0	2
Department of Conservation	MTC001	Aoraki/ Mt Cook			0	2
Gisborne District Council	GIS001	Gisborne			1	0
Hauraki District Council	KER005	Kerepehi/Waitakaruru			1	0
Watercare Services Ltd (Auckland)	AUC003	Auckland			1	0
Watercare Services Ltd (Auckland)	HEL005	Helensville/Parakai			1	0

Suppliers which have identified lead as a risk in their source water are also required to monitor lead in their treated water to ensure treatment is effective.

¹⁹ DIRECTIVE (EU) 2020/2184 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2020 on the quality of water intended for human consumption (recast) [Directive - 2020/2184 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eli/dir/2020/2184/oj)

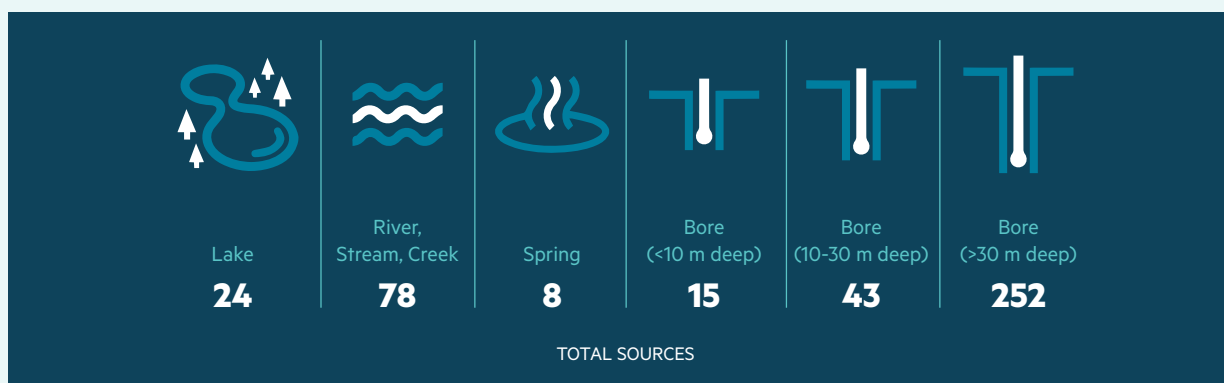
Continuous monitoring of source water

Continuous monitoring provides drinking water suppliers with up-to-date information on their supplies which can be highly beneficial when conditions change rapidly and affect treatment processes. Therefore, it is important that supplies with sources at higher risk of rapid change are monitored regularly to enable quick responses by manually or automatically adjusting treatment parameters and investigating unusual results.

The rules require large water supplies using source waters at a higher risk of contamination to continuously monitor the conductivity, pH and turbidity of raw water arriving at the treatment plant.

According to reporting, 154 supplies are continuously monitoring their source water.

Sources that are continuously monitoring their water quality



We expect the number of sources that are continuously monitored to increase in the near future, as suppliers with large supplies install necessary instrumentation to meet their obligations in the Act and Rules.





TAUMATA
AROWAI

PART FOUR:

Our performance

In this part, we look at our achievements and discuss the extent to which the Water Services Act 2021 (the Act) is meeting its main purpose.

Our performance

The Act requires that we report on the performance of our functions, including our performance to achieve the objectives and targets set out in our Compliance Monitoring and Enforcement (CME) Strategy. An in-depth evaluation of our performance against the CME can be found in Appendix 1.

Our first two years after becoming the water services regulator were focused mostly on setting ourselves up and starting to regulate the sector. We are now moving to focus on ensuring we are clear about our expectations and priorities and ensuring we are providing information and guidance that supports suppliers to use the options which are available to them, proportionate to the risk for their supply, to provide safe drinking water for their communities.

We focussed our compliance efforts in 2023 on ensuring suppliers have a multi-barrier approach because it is the single most effective way to reduce the incidence of water-borne illness from drinking water supplies. This included working closely with suppliers that are not currently compliant with the requirements of the Act, the Drinking Water Standards and the Drinking Water Quality Assurance Rules and discussing options for mitigating risks with their supplies, including identifying pathways to compliance.

We have continued to have a strong focus on drinking water incidents and emergencies, in part due to the number of extreme weather events in 2023. We supported supplier responses, including assisting with compliance requirements around unplanned supply of drinking water to communities affected by the Auckland flood events and Cyclone

Gabrielle. We also responded to the Queenstown cryptosporidiosis outbreak in September, which was the first widespread outbreak of disease where drinking water was identified as the likely source since our establishment. This was also our first instance of serving a supplier with a compliance order under section 120 of the Act.

To mitigate merging issues of dry weather and potential drought, we worked with drinking water suppliers to mitigate serious risks of water shortages. This included actively monitored Wellington Water's planning and mitigation of risks on their ability to maintain a sufficient supply of drinking water across the 2023/24 summer.

We also supported capability uplift of suppliers to ensure they were meeting their annual reporting obligations by running workshops to guide them through the rules and our public reporting system.

During 2023 we completed the assessment of five exemption applications, resulting in four not granted and one granted exemption. The exemption we granted was for the Torrent Bay Township Committee general exemption was granted, details of this are provided in the general exemptions section earlier in this report.

Reviewing drinking water safety plans (DWSPs) was also a key focus because they identify the hazards and risks that may affect a supply and covers the steps the supplier takes to ensure that the drinking water they are supplying is safe. DWSPs are a key source of information about the safety of each supply and the capability of its supplier, and we use these to determine what actions (if any) we might take to reduce the risk of harm to communities.

Our first Drinking Water Regulation Report covering a full year (2022 calendar year) was published. We used this process as an opportunity to write to all suppliers in June 2023 to remind them of the requirements under the Act and Rules, and we set out our expectations of compliance.

We continue to actively monitor notifications from laboratories and suppliers where Maximum Acceptable Values (MAVs) have been exceeded, working with suppliers and public health agencies to ensure that risks to public health are well managed and understood. We have made enhancements to the notifications system and completed policy work to establish a system to notify Taumata Arowai of risks and hazards as identified in section 35 of the Act.

Comprehensive reporting on our functions can be found in our latest [Annual Report Annual-Report-2022-2023.pdf \(taumataarowai.govt.nz\)](#)

Meeting the purpose of the Act

The main purpose of the Act is to ensure that suppliers provide safe drinking water to consumers by:

1. Providing a drinking water regulatory framework that is consistent with internationally accepted best practice, including a duty on drinking water suppliers to:
 - a. have a DWSP; and
 - b. comply with legislative requirements (such as drinking water standards) on a consistent basis.
2. Providing a source water risk management framework that, together with the Resource Management Act 1991, regulations made under that Act, and the National Policy Statement for Freshwater Management, enables risks to source water to be properly identified, managed, and monitored.
3. Providing mechanisms that enable the regulation of drinking water to be proportionate to the scale, complexity, and risk profile of each drinking water supply.

The Act is only two years old which is a limited period of time to assess whether it is meeting its purpose. While Taumata Arowai was established in March 2021, our initial focus was on establishing our regulatory system to ensure we could exercise our regulatory functions.

The Department of Internal Affairs is the administering agency for the Water Services Act 2021.

Having worked with the Act now for two years, we are utilising the powers and functions provided to us more. Some transitional provisions are still to come into force, notably the requirements that unregistered supplies have until November 2025 to be registered and November 2028 to become compliant. The Act provides us with a broad toolkit to exercise our regulatory functions to ensure suppliers provide safe drinking water—from setting requirements, monitoring adherence to those requirements and taking action where appropriate when suppliers are not fulfilling their obligations under the Act and Rules.

In order to operate effectively, the framework established by the Act depends on making secondary legislation in some areas. Some of this is still in progress. Operationalising the source water requirements in Part 2, Subpart 5, building an infringement regime and an authorisations framework are important pillars of the regime.

We have considerably more data on the performance of the water sector compared to last year largely from the Rules reporting data. This allows us to better understand where there are concerns about the safety of drinking water and to target our resources more effectively and efficiently to mitigate these concerns.

We take a proportionate regulatory approach. We are developing an operational decision-making framework that will further support proportionate regulatory decision-making. We apply robust policy processes to ensure that any regulatory requirements we set consider the impacts (including cost) on suppliers.

The data and insights provided in this report are important to provide transparency about performance of the water sector, which in turn helps us to assess the performance of the regulatory system, including whether the Act is meeting its main purpose. Our ability to make more informative insights, start being able to identify trends and base our actions on evidence, will enable us to more effectively support achieving the goal of safe drinking water.

GLOSSARY

Technical terms

Term	Definition
Abstraction point	The location at which source water is abstracted for use in a drinking water supply (for example, the location at which water is abstracted from a river, stream, lake, or aquifer)
Act, the Act	The Water Services Act 2021
Acceptable solution	Prescribed requirements that a water supplier can adopt to meet some of the legislative requirements set out in the Water Services Act 2021.
Accredited laboratory	A scientific facility equipped to test source water, raw water and drinking water. Registered drinking water suppliers must use an accredited laboratory. Accreditation is managed through International Accreditation New Zealand (IANZ).
Aesthetic Values	Maximum or minimum values for substances or characteristics of drinking water that relate to its acceptability to consumers, such as appearance, taste, or odour.
Boil water notice	A notice issued by a drinking water supplier when the drinking water supply contains or could contain microorganisms, such as viruses, bacteria and protozoa, that could make consumers sick. Water for drinking, preparing food (including infant formula) and brushing teeth must be boiled (or have some other treatment e.g. bleach) before use.
Catchment	An area of land that water collects in and moves through. This is often collected into streams and rivers through a valley but can also apply to groundwater.
Consumer	A person who consumes or uses drinking water supplied by a drinking water supplier.
Consumer advisory	A notice issued by a water supplier when the drinking water supply is not safe to drink in its current state. There are different types of consumer advisories for different situations, see boil water notice, do not drink notice or do not use notice
Determinand	A substance or characteristic that is determined or estimated in drinking water.
Do not drink notice	A notice issued by a water supplier when the drinking water supply contains harmful chemicals and toxins. In this case boiling water will not make it safe.
Do not use notice	A notice issued when the water is, or could be, contaminated in way that any contact, for example with the skin, lungs, or eyes, may be unsafe. These types of notices are rare.
Domestic self-supply	A stand-alone domestic dwelling that has its own supply of drinking water
Drinking Water Quality Assurance Rules (the Rules)	Rules that set out what drinking water suppliers need to do to comply with key parts of the Drinking Water Standards and the Water Services Act
Drinking Water Standards (the Standards)	The Water Services (Drinking Water Standards for New Zealand) Regulations 2022, which sets the MAVs for a range of determinands that can affect the safety of drinking water.
Drinking water supplier	A person who supplies drinking water through a drinking water supply, which includes the owner and operator of a drinking water supply (refer to the Water Services Act 2021, s8 for a full definition), but does not include a domestic self-supplier.
Drinking water supply	Infrastructure and processes used to abstract, store, treat, transmit or transport drinking water for supply to consumers or another drinking water supplier. Does not include temporary or unplanned drinking water supplies or domestic self-supplies (refer to the Water Services Act 2021, s9 for a full definition).
<i>Escherichia coli (E. coli)</i>	A bacteria species used as an indicator of faecal contamination of water. The presence of <i>E. coli</i> in a water sample almost certainly indicates pathogens harmful to human health are present.
Maximum Acceptable Value or MAV	The Drinking Water Standards set limits for the concentration of determinands in drinking water. The limits are referred to as Maximum Acceptable Values (MAVs). The MAVs for any determinand must not be exceeded at any time.
Microbiological organism	Living organisms too small for the naked eye to see. This includes bacteria, viruses, protozoa and algae, collectively known as microbes.

Term	Definition
Monitoring	Sampling and analysis of drinking water to test for compliance with the Drinking Water Standards or process control by detecting changes in the concentrations of its constituent determinands or deviations of these from target values.
Non-compliant	When a drinking water supply has not met legislative requirements. Refers specifically to non-compliance with Drinking Water Standards in the context of section 22 of the Act.
Notifications	When suppliers and accredited laboratories notify Taumata Arowai if any tests undertaken as part of their monitoring requirements show non-compliance with the Drinking Water Standards or Drinking Water Quality Assurance Rules
Registered supply	A drinking water supply registered in accordance with the requirements of Part 2, Subpart 7 of the Act.
Residual disinfection	A disinfectant, typically chlorine, remaining in or added to drinking water after it leaves a treatment plant to act as a barrier to recontamination in a distribution system.
Safe drinking water	Water that is unlikely to cause a serious risk of death, injury or illness (refer to the Water Services Act 2021, s7 for a full definition).
Source water	Water body where water is abstracted for use in a drinking water supply. Sources include rivers, streams, lakes, aquifers, and collected rainwater.
Toby, Water	A water shut-off valve between a private connection and the public network, often considered the point of supply from a reticulated network.
Unregistered supply	A drinking water supply that is operating but not registered in accordance with the requirements of Part 2, Subpart 7 of the Act.
Water carriers	A drinking water supplier that transports drinking water (other than by reticulation) for the purpose of supplying it to consumers or another drinking water supplier.
Water services sector	Refers to any organisation or agents involved with the regulation, provision or management of water supply, trunk sewers, local reticulation, sewage treatment and stormwater assets.

Kupu Māori

Term	Definition
Aotearoa	New Zealand.
Hinekōrako	Our Regulatory and Intelligence system. This name was gifted to Taumata Arowai by Te Atiawa and means a rainbow made with moonlight.
Hapū	Kinship group, tribe.
Iwi	Extended kinship group, tribe.
Mana	Prestige, authority, control, power.
Mana whenua	Customary authority exercised by an iwi or hapu in an identified area.
Mauri	Life force.
Tangata	People, persons, human beings.
Tangata whenua	People of the land. In relation to a particular area, means the iwi, or hapu, that holds mana whenua over that area.
Te Mana o te Wai	See Introduction. 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.
Te Puna	The Māori advisory group for Taumata Arowai, established by section 14 of the Taumata Arowai—the Water Services Regulator Act 2020.
Wai	Water.
Whakatauāki	Proverbs or significant sayings that give some insight into a traditional Māori world.

APPENDIX 1:

Compliance Monitoring and Enforcement Strategy

The Compliance Monitoring and Enforcement Strategy has areas of focus and a plan over three years to develop products and services that will assist the water services sector in meeting the requirements of the Act or Taumata Arowai in undertaking its role as regulator. Whether the plan has been met in whole or in part is described in the text against each applicable year and focus area.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Build the regulatory system and set expectations				
Give effect to Te Mana o te Wai	<ul style="list-style-type: none"> Produce source water risk management guidance. Engage with Ministry for the Environment to ensure alignment of Water Services Act requirements to the NES-DW was continuing. Develop understanding of Te Mana o te Wai through internal and external engagements was continuing. Develop and implement drinking water network environmental performance measures, the first tranche were in force. 	<ul style="list-style-type: none"> Review and update source water risk management guidance to reflect deeper understanding and expectations of Te Mana o te Wai is waiting on clarification and effect of rebalancing on use of Te Mana o te Wai. Produce and publish best practice guidance for giving effect to Te Mana o te Wai is waiting on clarification and effect of rebalancing on use of Te Mana o te Wai. 	<ul style="list-style-type: none"> Review and update source water risk management guidance to reflect deeper understanding and expectations of Te Mana o te Wai. Build Te Mana o te Wai into compliance monitoring activities for Taumata Arowai, including developing audit criteria for drinking water suppliers. 	<ul style="list-style-type: none"> Taumata Arowai is considering our approach to releasing Te Mana o te Wai guidance to ensure alignment with the Government's direction in this area. We developed a five-year strategic plan to outline how we will meet our legislative obligations.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Drinking water supplier guidance and information	<ul style="list-style-type: none"> • Drinking Water Safety plan (DWSP) and Source Water Risk Management plan (SWRMP) guidance; templates for less complex/low risk supplies. • Risk management guidance complete and risk maturity model being developed. • Supporting material and user guides to assist suppliers using Hinekōrako. - • Explanatory information on supplier duties and obligations. • Guidance for suppliers seeking exemptions. • Information for registered supplies transitioning from the Ministry of Health into Hinekōrako completed. • Information for how to apply to register supplies for planned temporary events completed. • Requirements for registered suppliers to operate under current Drinking-water Standards for New Zealand 2005 (revised 2018) has been completed. • Good practice expectations guidance was not started. 	<ul style="list-style-type: none"> • Review and update of guidance – ongoing. • Information sharing for suppliers and local government entities is in progress. • Guidance for drinking water suppliers to meet their obligations under the Drinking Water Quality Assurance Rules and how to apply the new Drinking Water Standards is being developed. • Continuing to develop guidance based on knowledge of the sector from engagement activities, e.g., acceptable solution options; monitoring and testing requirements; renewal of registration details continuing • Good practice expectations review ongoing is continuing. 	<ul style="list-style-type: none"> • Review and update of guidance – ongoing. • Issuing discussion documents on proposed authorisation framework for drinking water suppliers – particular focus on Local Authority and Council Controlled Organisations to be authorised drinking water suppliers. • Good practice expectations review. 	<ul style="list-style-type: none"> • Guidance has been provided for Rules reporting to water suppliers. • Rules clarifications (website) were last updated in December 2023. • Rules technical webinars and workshops provided to water suppliers. • Supply Summary Table has been added to the Hinekōrako online portal, giving suppliers visibility, across all their supplies, of data that may be used in the DWRR. • Guidance provided to suppliers on the supply summary table and how to update data if it is incorrect. • Communication to suppliers following updates or changes to the Hinekōrako online portal. • Examples of good practice have been included in the Rules reporting guidance.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Marae/ Papakāinga engagement	<ul style="list-style-type: none"> Engagement to understand issues and needs to inform design of fit for purpose regulatory approaches/ application of regulatory tools for marae/kāinga supplies is continuing. Register any marae and papakāinga supplies who wish to register early was begun and is continuing. 	<ul style="list-style-type: none"> Continue to register marae/kāinga supplies in Hinekōrako. Publish fit for purpose marae/kāinga specific guidance for supply of safe drinking water, a programme of work is in progress. Agreement of marae/kāinga suppliers to take part in longitudinal case study was completed. Initial benchmarking and design of qualitative measures to follow is in progress. 	<ul style="list-style-type: none"> Ongoing engagement with whānau/hapū/ Iwi. Test fit for purpose marae/kāinga specific guidance for supply of safe drinking water. Review and update guidance based on engagements and feedback. Developing solutions for suppliers that reflect tikanga of mana whenua (whānau/hapū/iwi). Enable performance and capability uplift amongst those we engage with. Qualitative Case Study - Finalise initial benchmark. Design of qualitative measures. Report quarterly, publish annually. 	<ul style="list-style-type: none"> Engagements with whānau/hapū/ iwi have provided valuable insight into what their needs are, what we can do better and how. We will build on what we have learned so to create an improved way of working with our most vulnerable water suppliers.
Unregistered suppliers: (marae/ papakāinga; rural; small population supplies)	<ul style="list-style-type: none"> Engage with suppliers and sector reference groups to understand needs to inform design of fit for purpose regulatory approaches / application of regulatory tools was begun. Engage third party expertise to support small suppliers and to test potential Acceptable Solutions and regulatory interventions, templates, and guidance was begun. 	<ul style="list-style-type: none"> Design, develop and test proposed regulatory requirements is in progress Publish good practice guidance for small supplier community, an initial package has been published. 	<ul style="list-style-type: none"> Publish regulations and guidance for registration of unregistered supplies. 	

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Develop regulatory instruments: (regulations; rules; standards; notices)	<ul style="list-style-type: none"> • Drinking Water Quality Assurance Rules were completed. • Drinking Water Standards were completed. • Review Maximum Acceptable Value for lead in Drinking Water Standards was begun. • Notifiable hazards and risks was begun. • Acceptable Solutions: (Rural & Agriculture; Roof Water; Bores & Springs) was completed, with potential for more to be developed. • Drinking Water Network Environmental Performance Measures. The first tranche of drinking water measures was completed and in force. Consultation of the second tranche was completed. • Source Water Risk Management Plan guidance was completed. • Drinking Water Aesthetic Values were completed. 	<ul style="list-style-type: none"> • Complaints regulations have not been started • Infringement regulations are awaiting clarity on possible legislation changes Acceptable Solutions as required based on engagement with sector groups was not progressed • Update of Drinking Water Network Environmental Performance Measures was not started. 	<ul style="list-style-type: none"> • Review regulatory system needs in anticipation of entities. • Developing regulations to support authorisation of Council-Controlled Organisations and Local Authority drinking water supplies. • Update of Drinking Water Network Environmental Performance Measures. • Information, format, and content, sharing rules. 	<ul style="list-style-type: none"> • The complaints regulations were originally repealed from the Water Services Act and put into the Water Services Economic Efficiency and Consumer Protection Act 2023. However, due to the repeal of that legislation, parts of the WSA have been amended regarding complaints, pending future decisions regarding the economic regulator. Work on this will commence once legislative settings are confirmed. • No new acceptable solutions have been identified to progress. • Update to drinking water network environmental performance measures is being rescoped to reflect current capacity and capability of the sector.
Transition registered drinking water supplies:	<ul style="list-style-type: none"> • Transfer and confirm all council controlled and large registered supplies. This was completed, however not all previously registered supplies were able to be verified despite significant effort. • Verify and commence process for transferring registered supplies serving populations of fewer than 500 people [as above]. 	<ul style="list-style-type: none"> • Continue the process of transferring registered supplies serving populations of fewer than 500 people, was completed as far as possible. • Renewal of Council-Controlled Organisations and large registered supplies was completed 	<ul style="list-style-type: none"> • Renewal of all registered supplies. 	<ul style="list-style-type: none"> • We continue to engage with these suppliers to support them into the new regulatory regime.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Monitoring performance				
1. Review and audit of drinking water safety plans and supplier performance	<ul style="list-style-type: none"> Design the methodology for reviewing DWSPs and SWRMPs was in progress. Determine priority order for review was in progress. Develop Regulatory risk framework and assessment tool was in progress. Develop drinking water supply audit methodology and programme was paused. 	<ul style="list-style-type: none"> Carry out review of DWSP in accordance with the review methodology is in progress. Review of plans as required in response to safety concerns is ongoing. Implement audit programme and carry out audit activity in accordance with the programme is not being progressed at this time 	<ul style="list-style-type: none"> Carry-out review of DWSP in accordance with the review methodology. Review of plans as required in response to safety concerns. Implement audit programme and carry out audit activity in accordance with the programme has been paused. 	<ul style="list-style-type: none"> Work to implement an audit programme is paused due to priority work of reviewing DWSP. Site visits are undertaken if a desktop review of a DWSP indicates poor risk management practices or multiple areas of non-compliance that suggest the water may not be safe. The methodology and guidance for DWSPs review includes that for SWRMPs. A review of the methodology and guidance is underway and will be completed in Year 2. A prioritisation index has been developed and piloted, with more work to iterate it to proceed in Year 3.
2. Receive and monitor notifications of non-compliance:	<ul style="list-style-type: none"> Design, develop and implement online system to receive notifications was completed. Receive and respond to notifications was completed. 	<ul style="list-style-type: none"> Receive and respond to notifications is ongoing. Review of notification system is in progress. 	<ul style="list-style-type: none"> Receive and respond to notifications. Review of notification system. 	<ul style="list-style-type: none"> Enhancements to the notification system have been completed as part of our continuous improvement with a full review scheduled for 2024 as part of implementing system workflows for receiving notifications for notifiable risks and hazards.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Supplier water quality monitoring data reporting	<ul style="list-style-type: none"> Develop and consult on Drinking Water Quality Assurance Rules and Drinking Water Network Environmental Performance Measures was completed. 	<ul style="list-style-type: none"> Registered suppliers start monitoring and reporting results as specified in the Water Quality Assurance Rules and Drinking Water Network Environmental Performances Measures has been in progress. Reporting as required by exemption condition is ongoing. 	<ul style="list-style-type: none"> Registered suppliers report monitoring results as specified in the Drinking Water Quality Assurance Rules and Drinking Water Network Environmental Performances Measures. Reporting as required by exemption condition. 	<ul style="list-style-type: none"> Work to improve our data collection and reporting processes is underway to support more accurate data reporting in 2024.
Drinking water incidents & emergencies				
The Four Rs of Civil Defence and Emergency Management 1. Declaring Emergencies	<ul style="list-style-type: none"> Internal training and capability building was completed. Establish relationships and engage with suppliers and response sector agencies was completed Carry out annual drinking water emergency exercise and share lessons learnt was completed. Regional and national coordination activities was completed. Determine and articulate response triggers for incidents and emergencies was completed. 	<ul style="list-style-type: none"> Internal training and capability maintenance has been completed. Carry out annual drinking water emergency exercise is scheduled for June 2024. Regional and national coordination activities has been completed. Debriefing supplier responses to emergencies to inform continuous improvement has been completed. Assess DWSP response procedures has been completed. 	<ul style="list-style-type: none"> Internal training and capability maintenance. Carry out annual drinking water emergency exercise. Regional and national coordination activities. Debriefing supplier responses to emergencies to inform continuous improvement. Assess DWSP response procedures. 	<ul style="list-style-type: none"> CIMS training participation for Regulatory Operations kaimahi. Participation in Exercise Rū Whenua scheduled for June 2024. Coordination activities carried out throughout the year, with a focus on readiness and response coordination (Queenstown and Wellington Water) Internal and interagency debrief conducted for Queenstown cryptosporidiosis response, lessons management process established. Response procedures considered as part of DWSP review process.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Targeted Interventions & Enforcement activities				
Exemptions	<ul style="list-style-type: none"> Receive and process exemption applications was ongoing. Establish international expert panel for exemptions was completed. 	<ul style="list-style-type: none"> Receive and process exemption applications has been ongoing. Enforce non-compliance with exemption conditions has been ongoing. 	<ul style="list-style-type: none"> Receive and process exemption applications. Enforce non-compliance with exemption conditions. 	<ul style="list-style-type: none"> Since March 2022 Taumata Arowai has received 18 applications for general/residual disinfection exemptions. As of December 2023, five of these applications were finalised with four residual disinfection exemption applications not granted and one general exemption application for Torrent Bay Township Committee granted. A further four applications were being assessed, five applications were on hold, and four applications were withdrawn by the applicants.
Statutory direction/ Remedial actions	<ul style="list-style-type: none"> Design and develop regulatory approach guidance for drinking water sector was completed. Exercise statutory decision making and issue directions and require remedial actions as appropriate has been ongoing. 	<ul style="list-style-type: none"> Exercise statutory decision making and issue directions and require remedial actions as appropriate has been ongoing. Assurance review of statutory decisions has been ongoing. 	<ul style="list-style-type: none"> Exercise statutory decision making and issue directions and require remedial actions as appropriate. Assurance review of statutory decisions. 	<ul style="list-style-type: none"> An assurance approach has been in effect which includes review or preparation of proposed instruments by Legal and advice on associated decisions and sign off by Head of Regulatory. Operational policies (e.g. on compliance and enforcement tools) have been drafted.

Focus Area	Year 1 (July 22 – June 23)	Year 2 (July 23 – June 24)	Year 3 (July 24 – June 25)	Comment for 2023
Enforceable undertakings	<ul style="list-style-type: none"> Design and develop enforceable undertaking guidance for drinking water suppliers was in progress. 	<ul style="list-style-type: none"> Implement enforceable undertaking framework for drinking water suppliers has been completed. 	<ul style="list-style-type: none"> Accept enforceable undertakings as business-as usual regulatory function. 	<ul style="list-style-type: none"> We developed and published guidance for suppliers about the purpose of enforceable undertakings and how suppliers can apply. We have set up business processes in Hinekōrako to support suppliers applying for an enforceable undertaking. We have established internal procedures, business processes and training for staff to ensure they are well-placed to support suppliers that wish to pursue an enforceable undertaking. We have started to receive inquiries from council suppliers.
Higher level enforcement activity	<ul style="list-style-type: none"> Work to develop an infringements' regime was paused. Prosecutions and s 83 appointments as required policy was in development. 	<ul style="list-style-type: none"> Implementation of an infringements regime was paused while awaiting clarity on possible legislation changes. Infringement notices, prosecutions and s 83 appointments as required has been paused. 	<ul style="list-style-type: none"> Prosecutions and s 83 appointments as required. 	<ul style="list-style-type: none"> No prosecutions have occurred, and no s 83 appointments were made in 2023.

APPENDIX 2:

Chemical determinands in drinking water

Lead

It is possible for lead found in drinking water to originate in the source water, but it is far more commonly due to taps and other plumbing materials that are found in drinking-water plumbing in most houses. Lead can leach from poor quality taps, brass fittings and fixtures, copper pipes with lead-containing solder, pure lead pipes, and other lead containing plumbing materials in short periods of time.

Lead is one of the few determinands where poor sampling technique or poor-quality plumbing materials at a drinking water sampling site can contribute to it appearing like there is lead in the mains supply, when really it was from the tap or pipes between the tap and mains that the sample was taken from. Generally, plastic, newer copper pipes, and stainless steel do not leach lead, particularly when flushed thoroughly.

We expect suppliers, who are required to sample for lead in their distribution networks, to understand these concepts and ensure that their sampling points do not contain lead materials and their sampling process accounts for good practice when taking samples which will be analysed for lead.

Aluminium

Aluminium is typically dosed into raw water to help coagulate particles in water so that they can be removed by sedimentation and filtration processes. Optimised treatment plants that dose aluminium into the raw water typically leave only a small amount of aluminium residual in the treated water (usually less than 0.1 mg/L) Compare this with an antacid tablet. At 0.1 mg/L, aluminium is estimated by the WHO to contribute to only 4% of overall exposure to aluminium, the majority of aluminium being present in food. In addition, a teaspoon of antacid can contain 4000 times the amount of aluminium than a litre of drinking water from a well-controlled treatment plant.

Arsenic

Arsenic in drinking water can originate from industrial activity or be naturally occurring. Water that has been exposed to volcanic rock and sulfide mineral deposits can contain high levels of arsenic. Water suppliers that use sources in volcanic areas or which take groundwater must take action to reduce levels of arsenic to below the MAV in their drinking water.

Suppliers do not have to notify us of exceedances of the MAV in source water, but if they do find elevated levels in source water, they must test for the chemical in their drinking water to ensure it is removed. Some arsenic can be removed by filtration alone, other forms of arsenic must be removed by a more complex oxidation and filtration step.

Chlorate

Chlorate is a compound that is generally only found in drinking water where solutions of hypochlorite are used to maintain a residual disinfectant. Chlorate forms in these solutions as hypochlorite solutions age. The formation of chlorate can increase when solutions are highly concentrated, when solutions are warmer, and the longer a solution is stored, whether in transit or in a storage facility.

There are many assurance measures that suppliers can take to ensure their hypochlorite solutions do not contain elevated levels of chlorate and we expect suppliers to be implementing good practices when they choose to use hypochlorite solutions.

Chlorine

Many suppliers dose chlorine for one of two reasons, as a primary disinfectant to kill bacteria pathogens or as a residual disinfectant to ensure they maintain the quality of their treated water as it transits their network to consumers. Suppliers are required to notify us when chlorine levels exceed 5 mg/L. This level of chlorine would be akin to drinking water from a well-maintained spa. Some people with sensitive skin conditions can experience issues when coming into contact with water chlorinated to such high levels. It is important that suppliers don't dose over this level of chlorine as it can lead to acute illness and even injury. An optimised and well-maintained drinking water supply can maintain a level of chlorine between 0.2 mg/L and 1 mg/L. Water within this range of chlorine levels also tastes much better than with higher levels of chlorine.

Manganese

Manganese can cause a number of issues when it comes to operating a drinking water supply. Manganese can cause aesthetic issues with the supply, which do not result in any increased risk to public health. Manganese has a MAV so it can be a public health risk if not removed from source waters. Manganese can be removed by an oxidation and filtration step, amongst other processes. Manganese can be found in surface waters, particularly lakes and reservoirs that are stratified, and in groundwaters exposed to deposits rich in manganese.

Nitrate

Nitrate (NO₃) and nitrite (NO₂) are forms of nitrogen in the environment, both natural and human made. Large amounts of nitrate in drinking water can be harmful to a person's health because it can change into nitrite in the human body. Low levels of nitrate in drinking water may be naturally occurring and sources of nitrogen is a vital for many aquatic organisms. When nitrate is found at higher levels in drinking water, it is often from fertilizers, livestock waste and failing septic tanks, drainfields and drywells.

The Ministry of Health is the policy agency for nitrates in drinking water and they are maintaining a watching brief on relevant international research and regulation.

APPENDIX 3:

Methodology of Rules Performance Analysis

The reports from suppliers on the Rules are a complex and nuanced set of data. We have made our best attempts to reflect the data in a way that simply, fairly and accurately portrays supplier's self-reported performance against the Rules.

Suppliers report their information to us via online platforms like Lutra or WaterOutlook or an excel template. We have and will continue to work with suppliers, mainly councils, to ensure this reporting is done consistently across the country.

There are two kinds of rules:

- Monitoring rules are based on monitoring water quality to determine if the Standards are being met using grab samples, continuous monitoring equipment or other methods.
- Assurance rules outline activities a supplier needs to undertake that contribute to the provision of safe drinking water, for example preparing and implementing a backflow prevention programme or ensuring continuous analysers are calibrated according to manufacturer instructions.

We used both types of rules in our analysis depending on the category.

Suppliers have submitted their first annual reports to us which were due 28 February 2024 for the 2023 calendar year. To assist suppliers in the required reporting, we developed and published guidance material and held training webinars and workshops to support this deadline. Suppliers had already been required to submit more frequent reporting depending on the level of Rules that the supplier elected to comply with.

We are aware of some issues, like rules which are ambiguous and need further clarification, which will need to be dealt with during the next update to the Rules. In the meantime, we have published guidance and rule clarifications to reduce ambiguity and signal our interpretation for each rule.

A failure to meet the Rules does not always equate to unsafe water being supplied. It is more likely that a failure indicates there is increased risk for the supply that must be managed. Determining whether the risk from a failure to meet the rules is enough to make the water unsafe is the duty of the supplier.

Assumptions

We made the following assumptions in our analysis:

1. All reports received for reporting periods in 2023 that were received by 31 March 2024 were used in the calculation of the report.
 - a. No extension was granted to the deadline for reporting of 28 February 2023. However, we have made allowance for any 2023 reporting submitted prior to 31 March 2024 to be included in this report given this was the first year of reporting for suppliers and there was a significant learning curve which had to be overcome to undertake this reporting.
 - b. This allowed some suppliers additional time to complete their reports. Reports received after 31 March 2024 will not be accounted for in the report.
 - c. Suppliers can correct their reports at any time, though this will not be reflected in this report.
2. The reports we received are reported by suppliers or accredited laboratories. We do not verify or audit this data as it is the responsibility of the supplier to comply with the Rules and report accurately.
3. Certain rules are conditional. These rules were either not used in the analysis, or the conditions were incorporated into the analysis. For example, for roof water sources we ensured that only reporting on rules relevant to roof water sources were used in analysis.
4. Only rules applicable to each category, as determined by our technical staff, were used to calculate performance. A list of rules used to calculate performance for each category is given below. Some rules have multiple requirements.

Each requirement, what we refer to as a rule ID, is reported on individually and treated with equal weighting within each category. Note: Some rule IDs were deprecated at the end of last year, but we have incorporated reporting from these deprecated rule IDs in our analysis for this year's report.

5. Some categories only apply to the supplies following certain rule levels, so not all supplies will be analysed for every performance category reported. If a supply population indicates a performance category does not apply to that supply and the supplier did not provide a report on any rule in this category, it is labelled as not applicable and omitted for analysis from this category.
6. We do not make assumptions about data that is not reported by suppliers. As long as one applicable rule in a performance category is reported on correctly for each supply component, performance is assessed. Some reports are not complete. For example, one supplier may only report their supply complied with five rules, but 10 rules were required to be reported in a category. This supply would be shown as "all met" for their reported requirements. Another supply may report their supply complied with nine rules and did not comply with one rule. This supply would be reported as requirements being "partially met". Therefore, comparative analysis of supplies is not recommended at this time. In the future we plan to incorporate report completeness into our analysis, but we will also work with suppliers to provide complete reports.
7. Each rule report that is analysed receives equal weighting within each performance category for each supply component of the supply. We are aware of a few reports which were incorrectly reported, which may affect comparative analysis between supplies/suppliers. We have attempted to address all these issues, but further validation improvements are needed to prevent this from happening in the future.
8. Each supply component (source, treatment plant, or distribution zone) analysed in a category receives equal weighting, thus the performance score for each supply is a simple average of their supply component performance. We acknowledge that weighting each component's performance to the volume sourced, produced, and consumed by each component would be

more representative of performance, however, we do not have enough information to perform this calculation in context of the Rules.

9. A supply may be shown as meeting requirements, but it may be missing reports against some rules which could have changed the performance.
10. While we have implemented many quality control and assurance measures that prevent submission of poor-quality data, there is still a small amount of reported data that has been inputted incorrectly. As part of our continuous improvement process, we will continue to develop our processes to ensure data quality is improved from year to year where resources allow. We also issued additional guidance in late 2023 to ensure consistency of reporting across New Zealand. We perform the following additional checks to ensure data is valid:
 - a. Valid supply component: For each rule ID reported we check that the supply component field is also appropriate. We also check whether a source rule which applies to a specific type of source is appropriately reported using registration data about the source component reported on.
 - b. Valid rule compliance and non-compliant periods: We ensure that the report of compliance with a rule aligns with the non-compliant periods reported for treatment and distribution zone rules. For source rules we only take into account the report of compliance and do not use the non-compliant periods field.
 - c. Protozoa requirements: We check registration data for whether a source is indicated to be Class 1 or Interim Class 1, and rules against treatment plants are appropriately reported.

Calculation of rule, supply component, and supply performance

1. We use the most recent reports on rules to calculate performance. This allows suppliers to correct any mistakes by simply providing another report for a rule.
2. Supplier-reported compliance with each reported rule ID was assigned a performance indicator from 0 to 1 with 0 representing a rule requirement that was not complied with at all over the reporting period and 1 representing a rule requirement that was fully complied with over the reporting period.
 - a. Where applicable, partial compliance was calculated using the ratio of non-compliant periods reported to the number of compliance periods in each reporting period and then subtracting this ratio from 1. If the calculation was less than 0 or greater than 1, these reports were deemed invalid and not used in any further calculation.
 - b. Where multiple reports for a rule requirement for different reporting periods were received in a year, the outcome of each rule ID report is averaged to produce a number from 0-1 for each rule reported on for each supply component of a supply over 2023.
3. We then average the performance value of each rule ID reported over all the rule IDs reported in that category to yield a supply component performance value. For example, each source would receive a performance value for source water monitoring where at least one rule from the category was reported correctly on each source.
4. Next, we average the performance values of each supply component type in each category. For example, for source water monitoring, each source is weighted equally to produce a final supply performance value from 0 to 1.
5. Finally, the supply performance value is converted to a description for each category and represents an average performance for the whole supply.

Rules included in each performance category

Source water monitoring (Roof water sources)	Source water monitoring (Non-roof water sources)	Cyanobacteria risk assessment	Treatment performance for small and medium supplies	Bacteria treatment	Large supplies meeting protozoa log credit requirements	Treatment chemical monitoring	Bacterial monitoring	Residual disinfection monitoring	Distribution chemical monitoring	Backflow prevention	Distribution storage practices	Hygiene procedures
Level 1 rules: S1.2	Level 1 rules: S1.1	Level 1 rules: Not assessed	Level 1 rules: T1.8	Level 1 rules: None	Level 1 rules: None	Level 1 rules: None	Level 1 rules: D1.1	Level 1 rules: None	Level 1 rule: D1.1	Level 1 rules: None	Level 1 rules: None	Level 1 rules: None
Level 2 rules: S2.2	Level 2 rules: S2.1	Level 2 rules: S2.4	Level 2 rules: T2.1 to T2.3 T2.9 to T2.14 T2.18 to T2.21	Level 2 rules: None	Level 2 rules: None	Level 2 rules: T2.22	Level 2 rules: D2.1	Level 2 rules: D2.1 D2.5	Level 2 rules: D2.1	Level 2 rule: D2.7	Level 2 rules: None	Level 2 rules: None
	Level 3 rules: S3.3	Level 3 rules: S3.7	Level 3 rules: None	Level 3 rules: T3.1 to T3.6 T3.7 to T3.11 T3.12 to T3.14 T3.15 to T3.18	Level 3 rule: T3.22	Level 3 rules: T3.92 T3.93	Level 3 rules: D3.29	Level 3 rules: D3.19	Level 3 rules: D3.22	Level 3 rules: D3.1 to D3.6	Level 3 rules: D3.12 to D3.17	Level 3 rules: D3.7 to D3.11

APPENDIX 4:

Summary of Drinking Water Supplies in New Zealand

We have published a list of each drinking water supply covered in this report on our website. This list provides a summary at a supply level of most of the information provided by suppliers and accredited laboratories that we have analysed in this report. This includes data relating to:

- Drinking Water Safety Plans.
- Supplier and laboratory notifications.
- Short-term and long-term consumer advisories.
- Bacteria and protozoa barriers.

View: taumataarowai.govt.nz/water-services-insights-and-performance/

In the future, we intend to also publish a summary at a supply level of the data we have analysed in this year's report on the Rules.



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