KO WAI TĀTAU

WE ARE WATER

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Three Waters Industry Scan

THREE WATERS WORKFORCE
DEVELOPMENT STRATEGY

ASSURITY DESIGN & INNOVATION
MARCH 2022

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KO WAI TĀTAU

THREE WATERS WORKFORCE DEVELOPMENT STRATEGY —

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SECTION

ONE

INTRODUCTION

How might we uncover the potential of the Three Waters industry to make it a ‘Plan A’ career path?

PROJECT PHASES

Three Waters Workforce Development Strategy

Baseline research

Phase 1

1. **Iwi engagement** – Overview of Te Ao Māori contexts of the industry and establishment of a draft vision that fully encompasses Māori perspectives.
2. **Industry scan –** Understand the challenges faced under the current 3W setup and use a workforce development lens to identify gaps on the road to regulation and reform.
3. **Small supplier engagement –** Understand how to meaningfully engage with an estimated 75,000 small-scale suppliers to incorporate their perspectives.
4. **Comms plan –** Establish a communication plan: who we want to engage with and how.

Targeted research and consolidation

Phase 2

- **Qualitative research –** 44 in-depth interviews with a diverse range of stakeholders from ‘Gen Z’ students to CEOs, including iwi/hapū engagement.
- **Collective refinement** – Collaboration with key project stakeholders to refine results.
- **Report** – Preparation of the Ko Wai Tātau / We are Water Workforce Development Strategy Report and website.

Team up with ESI to activate solutions

Phase 3

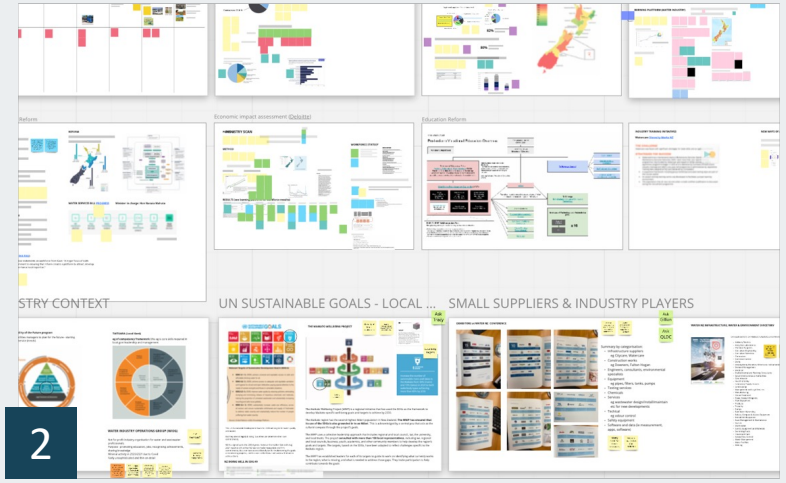
- **Establishment of iwi and hapū reference group** – Establishment of dedicated iwi- and hapū- led workstream on workforce development.
- **Discovery** – Workshops with industry to agree on target outcomes, tackle uncertainties, and review any critical information.
- **Strategy development –** Action and test solutions for improved industry visibility and pathways

HOW WE BUILT THIS INDUSTRY SCAN

Three step process

Identify sources

Discovery workshop with industry stakeholders to identify project outcomes and build a comprehensive document list.



Scan and collect data

Scan identified documents with an industry and workforce lens, collect and cluster data.

Identify topics and themes

Internal workshops to identify and cluster topics and key themes.

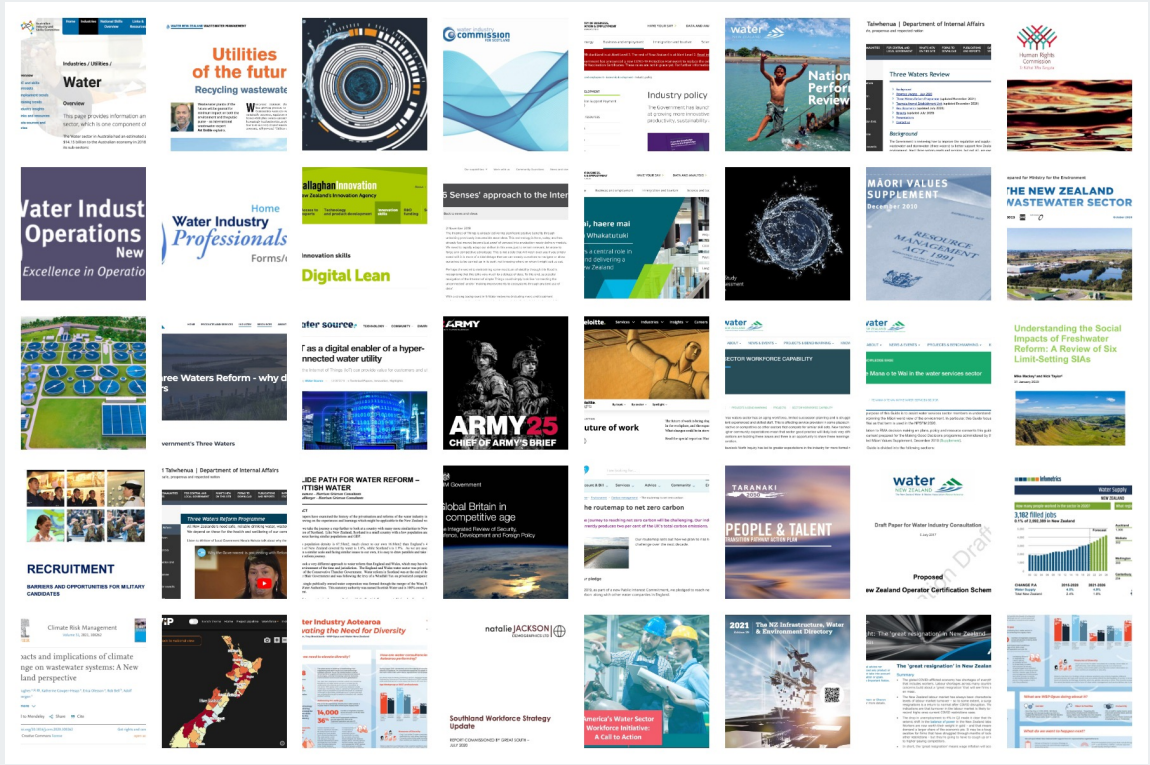
HOW WE BUILT THIS INDUSTRY SCAN

We looked at over 48 documents and conducted empathy interviews with industry leaders and water asset managers.

38+ New Zealand Documents

10+ International documents

5 Interviews with industry leaders and water asset managers

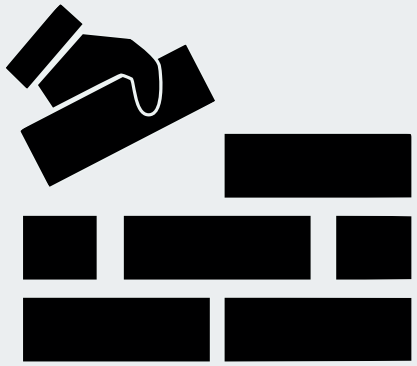


HOW THE INDUSTRY SCAN SUPPORTS OUR APPROACH

Rather than offering solutions, the industry scan forms a **baseline of foundational knowledge** to begin the process of forming the strategies that will retain and build the Three Waters workforce.

It presents a snapshot of the current state of the water industry amid reform, taken with a workforce lens.

The accuracy of this scan was shaped by the data sources, and the voices of industry contributors.



SECTION TWO

FINDINGS

A PERFECT STORM IS BREWING

The water sector is facing infrastructure deficit, skills deficit and labour shortages.
This is against a backdrop of growing demand, social pressures and increasing regulation.

OVERVIEW OF AN INDUSTRY AND ITS WORKFORCE CHALLENGES

The water sector is falling short of service delivery and environmental expectations.

Effective reform will only be possible if significant workforce challenges are addressed.

Inconsistent performance

Parts of New Zealand do not have access to safe drinking water or compliant wastewater services.

Overextension

In its current state the water industry is straining to maintain its existing infrastructure and is unsure how to meet the needs of tomorrow.

Fragmentation

Our most crucial services are currently planned, managed and delivered by 67 councils and a long tail of unregulated small suppliers.

Stretched workforce

From employers looking to build capability, to employees working beyond their skillsets, the industry is facing increasing workforce pressure.

Industry Challenges
Inconsistent Performance

Parts of New Zealand do not have access to safe drinking water or compliant wastewater services.

“There is big underinvestment in local government. Not only in maintaining or growing their assets, but under-investment is also in staff.”

Policy leader

Parts of New Zealand do not have access to safe drinking water or compliant wastewater services.

Critical underinvestment

Local authorities are struggling to meet water costs.

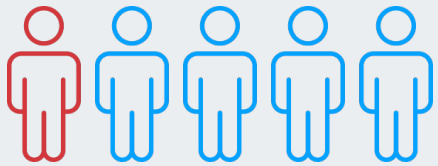
64%

64% of councils don't have water revenues to meet the full costs of running water services and assets.

Source: Minister of Local Government

Health impact

Easy access to clean drinking water is a fundamental human right.



This right is not adequately met for one in five New Zealanders.

Source: Department of Internal Affairs

Social impact

Remote populations and Māori are at much greater risk from substandard water services.

20%

Nationally, water charges have increased 20% in the last five years, disproportionately affecting low earners.

Source: Water NZ

Environmental impact

3,385 wastewater overflows were reported in 2020.

9 overflows/day

The true size of the problem, and the full extent of resultant environmental impacts are unknown.

Source: Water NZ

CRITICAL UNDERINVESTMENT

INCONSISTENT PERFROMANCE

"Local authorities are not investing enough in three waters assets, indicating that assets could be deteriorating to an extent that they are unable to meet the levels of service that their communities expect."

Office of the Auditor General

"There is an issue with councils not investing because it's not seen to be flash or doesn't offer any legacy."

Network manager

- **Local government is struggling to meet water costs –** 64% of councils don't have water revenues that can meet the full costs of running water services and assets (MoLG).
- **Not enough is being spent on improvement** – 1.59b was spent on water capex projects in 2020. (Water NZ) This is less than the estimated ~5b per year required to transform the sector over the next 30 years (DIA).
- **Insufficient resources to meet existing budgets –** Actual spending on capital expenditure projects was only 75-80% of the budgeted spend (Water NZ).
- **Cost inefficiencies –** Efficiency in supply chains within the investment pipeline is sub-optimal due to fragmentation, scale and lack of standardisation.
- **Playing catchup** – Improved performance is needed to bring New Zealand up to par with mature water systems. Looking overseas, the Scotland Water Services Act (2005) set an example of how, with effective regulation, water services can be transformed from lagging to top-performer (DIA).

HEALTH IMPACT

INCONSISTENT PERFROMANCE

"Water is a basic human right and is fundamental to human dignity… If people cannot enjoy their right to water, they cannot enjoy their right to life."

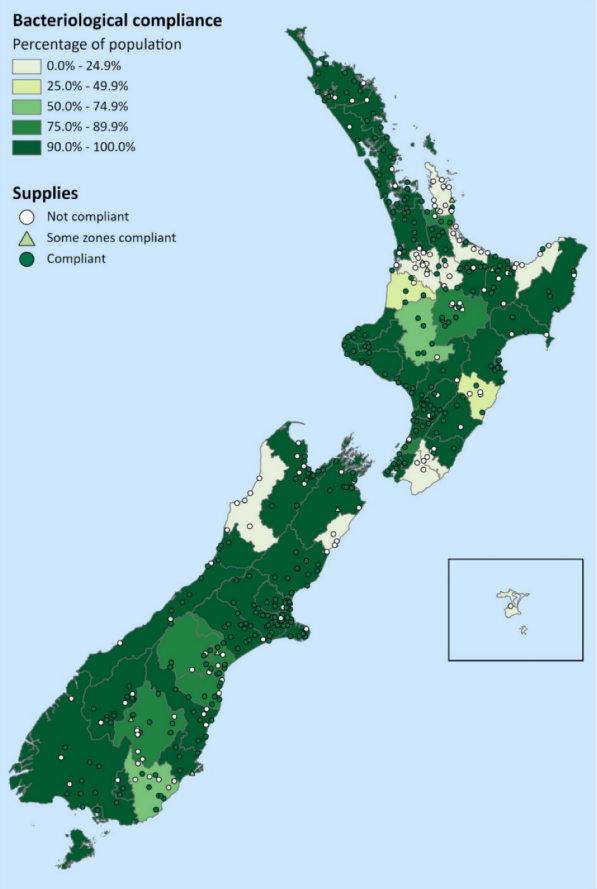
Michelle Bachelet, UN High Commissioner for Human Rights

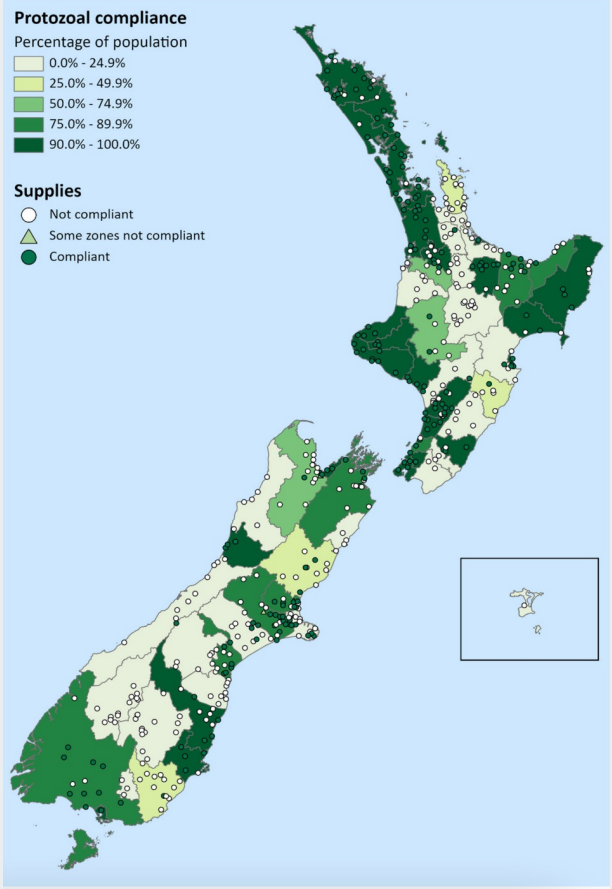
- **Poor access –** One in five people in New Zealand do not have access to clean and safe drinking water (MoH).
- **Illness as direct result of water quality –** New Zealanders suffer an average of 96 cases of water-borne gastrointestinal illness every day. That's 35,000 cases per year – equivalent to the population of Blenheim (MoH).
- **The problem is probably bigger –** The above figures are likely to be an underestimation of the true incidence of illness due to the large number of visitors in small, non-compliant townships and/or the under-reporting of waterborne illnesses (DIA).
- **Many water suppliers have room to improve –** More than 20 per cent of water supplies that serve more than 100 people are not meeting national drinking water standards (MoLG).
- **High costs –** Drinking water-related health issues cost New Zealanders 25m per year in healthcare and lost productivity (DIA).
- **Public danger from poor environmental outcomes –** People can become sick from contact with harmful bacteria, for example, from sewage in contaminated seawater. Kaimoana (seafood) can also be affected (MfE & Stats NZ). From a Māori perspective, sewage systems and food gathering should occur in completely separate domains, with land-based treatment of sewage preferred (Harmsworth, 2002; MfE & Stats NZ).

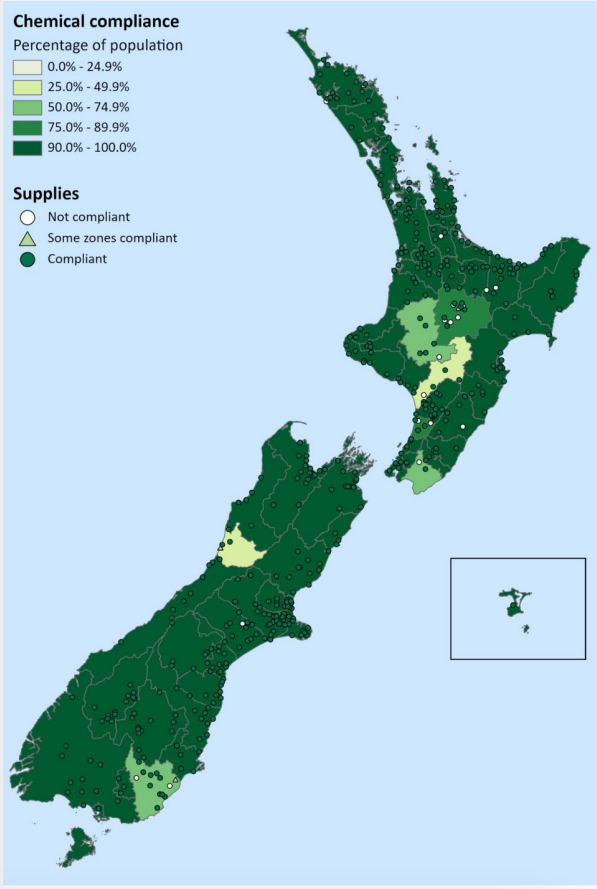
HEALTH IMPACT

INCONSISTENT PERFROMANCE

Unsafe drinking water is primarily in remote, rural regions







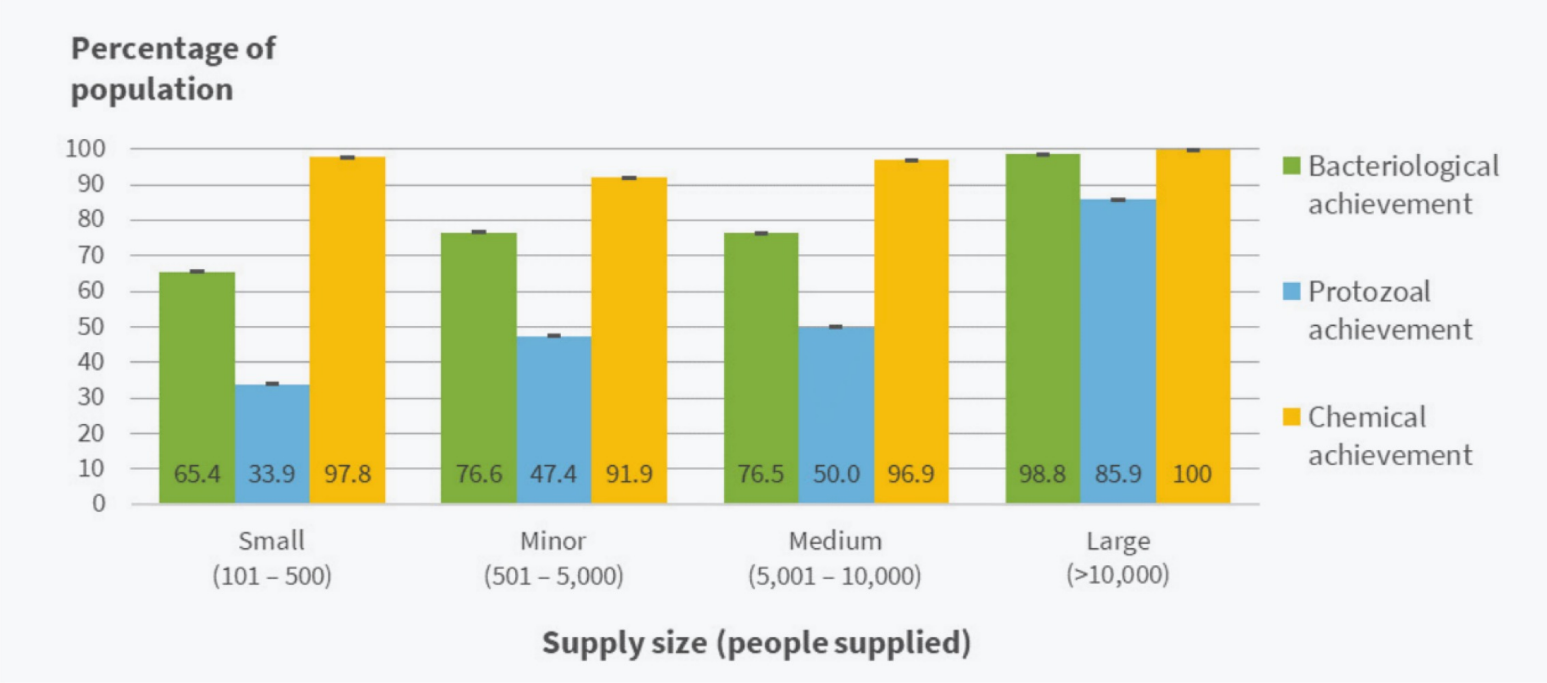
Source: Ministry of Health

HEALTH IMPACT

INCONSISTENT PERFROMANCE

People served by smaller suppliers are less likely to have access to safe drinking water.

Percentage of population with access to safe drinking water during the 2019/20 reporting period, by supply size.



Note: 95% confidence intervals have been presented as error bars.
Source: Ministry of Health 2021

Generally, smaller supplies have lower levels of bacteriological and protozoal achievement.

SOCIAL IMPACT

INCONSISTENT PERFROMANCE

“We need to change the way we invest and provide water services so that every community across the whole country can benefit. The status quo is no longer an option.”

Minister for Local Government
Hon. Nanaia Mahuta

- **Social impacts are complex –** Due to the physical, social and economic variation between water catchments, approaches to addressing drinking water inequity are complex and nuanced (Mackay and Taylor for Agresearch).
- **Vulnerable communities are more exposed to increase costs –** There is a wide variation in water charges, particularly for vulnerable communities (DIA).
- **Māori disproportionally affected –** There is a demonstrable link between Māori in remote communities and substandard water services (See overleaf).
- **Increased cost to users –** Water charges have increased 20% in the last five years (Water NZ), disproportionately affecting low earners.

SOCIAL IMPACT

INCONSISTENT PERFROMANCE

Remote populations and Māori are at much greater risk.

A study has found that "cost and and access of water were cited as the main problems for isolated communities"

"Many individual household systems—tanks, roofs, guttering, pipes—needed urgent repair or even replacement, and there was a need for additional water storage. Reports of contamination of roof water supplies from road dust, pine pollen, animal fouling, agricultural fertiliser, pesticide and weed control sprays were commonplace; many households in one community talked about a 1080 rodent poison drop in the locality. In some instances, water was described as discoloured, smelly or muddy during particular climatic conditions or weather events."

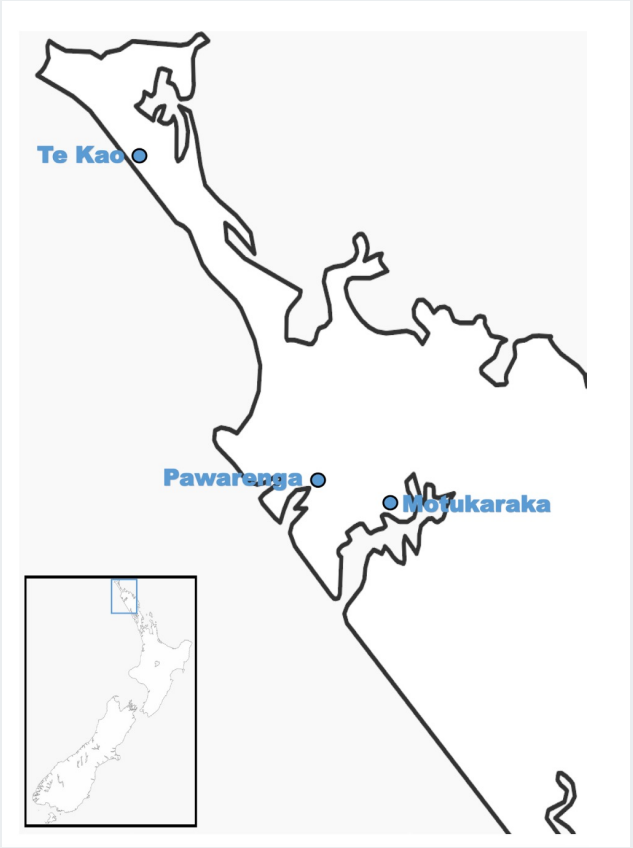
(Source: Mai Journal 2019, Enhancing Drinking Water Quality in Remote Māori Communities)

Health findings – The Drinking-water Standards for New Zealand (Ministry of Health, 2008) state that a level of less than 1 E. coli organism should be present in 100 millilitres of drinking water. Those were the results for the community:

Up to 6 per 100 millilitres in Te Kao

Up to 5 per 100 millilitres in Pawarenga,

Up to 100 per 100 millilitres in Motukaraka.



ENVIRONMENTAL IMPACT

INCONSISTENT PERFROMANCE

"Reform is significant for upholding Te Mana o te Wai, the functioning of society, the health of the environment, and the performance of the economy."

DIA Three Waters Report

- **Water sources are not inexhaustible –** To meet our needs, large volumes of water are taken out of rivers, lakes, and groundwater. Taking water from rivers alters the volume and flow of water, which can degrade freshwater ecosystems and reduce the quality of freshwater for recreational and cultural uses (MfE & Stats NZ, 2020).
- **Non compliant wastewater –** 3,385 wastewater overflows were reported in 2020 – That's an average of at least nine overflows per day. The true extent of the problem is unknown.
- **Widespread discharge to land –** When not in urban areas, wastewater is discharged on land. In New Zealand, approximately 21% of the population is not connected to a reticulated sewer system (Water NZ, 2019).
- **Wide regional variation in wastewater treatment –** Public access to wastewater service varies greatly on a per region basis (see overleaf).
- **Waterways –** Wastewater pollutes waterways and coastal water with nutrients and pathogens (MfE & Stats NZ).

ENVIRONMENTAL IMPACT

INCONSISTENT PERFROMANCE

Where our wastewater goes

Used water treated by wastewater treatment plants (WWTPs) in New Zealand is discharged into land, rivers and sea.

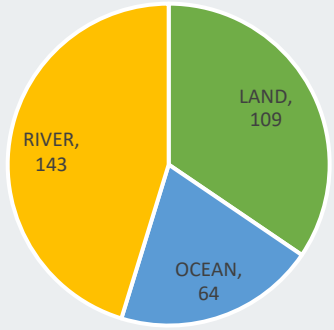
Most commonly, WWTPs outflow effluent into rivers – particularly smaller WWTPs.

When taking a view of the overall serviced population, however, we can see that most effluent is discharged onto the ocean by larger WWTPs.

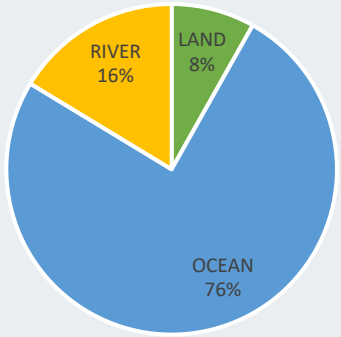
When not in urban areas, wastewater is discharged on land. In New Zealand, approximately 21% of the population is not connected to a reticulated sewer system (Water NZ, 2019). Most of these people are living in rural areas where water services are not provided by the local council.

In such situations, buildings have to be serviced by an on-site wastewater management system (OWMS) that treats all the household wastewater flows. For these OWMS, the treated wastewater effluent is discharged to a land application area on the property.

Number of WWTPs by discharge environment



WWTP serviced population by discharge environment



Region	Territorial Authority	Percentage of the population not connected to a wastewater network
Northland	Far North	64%
	Kaipara	63%
	Whangarei	40%
Auckland	Auckland	6%
Waikato	Hauraki	44%
	Waipa	34%
	Taupo	29%
	Hamilton	0%
Bay of Plenty	Whakatane	39%
	Western Bay of Plenty	27%
	Rotorua	11%
	Tauranga	10%
Hawke's Bay	Hastings	29%
	Napier	0%
Manawatu-Whanganui	Ruapehu	43%
	Tararua	40%

Large regional variation in access to public wastewater services

Source: MfE, StatsNZ

ENVIRONMENTAL IMPACT

INCONSISTENT PERFROMANCE

The future state of our fresh water - A perspective from the Ministry for the Environment

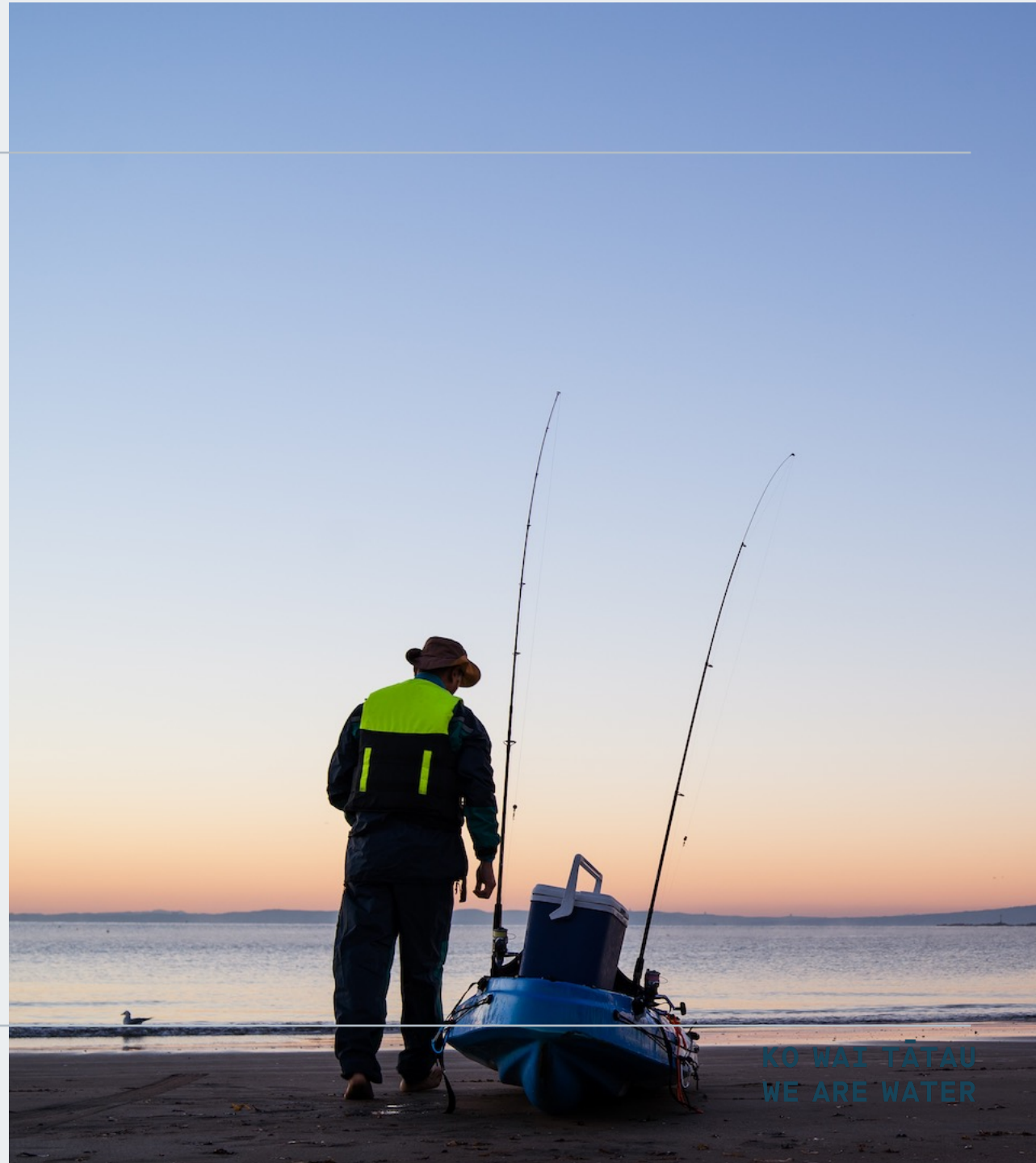
The importance of fresh water (MfE)

Water is essential to New Zealand's social, cultural and economic well-being. It is also a focal point for recreational activities and our outdoor way of life. Managing the quality and quantity of fresh water is critical to ensure sufficient availability for human drinking, agricultural use and ecosystems. The Ministry for the Environment is looking to achieve the following outcomes:

- Quality of fresh water maintained and improved.
- Optimal availability of freshwater.

These two longer term outcomes are affected by another three outcomes:

- Well-managed undesirable effects of land use on water.
- Appropriately managed increasing demands.
- Efficient use of fresh water.



Industry Challenges
Overextension

In its current state the water industry as a whole is straining to maintain its existing infrastructure, and to meet the needs of tomorrow.

“We need to change the way we invest and provide water services so that every community across the whole country can benefit. The status quo is no longer an option.”

Minister for Local Government

In its current state the water industry is straining to maintain its existing infrastructure, and to meet the needs of tomorrow.

Ageing & inadequate infrastructure

Water services in New Zealand face a significant infrastructure deficit due to decades of underinvestment.

25%

Almost a quarter of wastewater plants are not consented, more than half wastewater plants will need to be re-consented in the next ten years.

Source: DIA

Industry under pressure

Societal and regulatory pressure to improve water quality and environmental outcomes is building, even as usage increases.

12%

National demand for drinking water increased 12% in the four years to 2020.

Source: Water NZ

Growing industry

The water industry is poised to enter an unprecedented period of growth as it is brought in line with regulations.

$14M

$120b to $185b capex investment needed over the next 30 years. That's around $14M capex every day of the year.

Source: DIA

Variable technology uptake

Technology uptake by sector organisations is variable, with some having full digital supervisory control and data acquisition, and others relying on full manual operation.

AGEING AND INADEQUATE INFRASTRUCTURE

OVEREXTENSION

"Underinvestment, including deferred maintenance and renewals expenditure, has left a legacy of impending costs and poor services for future generations."

Minister for Local Government
Hon. Nanaia Mahuta

- **Massive infrastructure deficit –** The wider water sector in New Zealand faces a significant water infrastructure deficit due to decades of underinvestment.
- **Leaky networks –** 21% of water is lost between the supply to distribution and end use, and this amount is increasing. Median current annual real water loss per property increased by 44% in the five years to 2020 (Water NZ).
- **Substandard wastewater plants –** Almost a quarter of wastewater plants are not consented, and more than half wastewater plants will need to be re-consented in the next ten years (DIA).
- **Ageing pipes –** The average age of wastewater pipes in the top six centres is 42 years (stuff.co.nz Wellington case study).

6-9k

Average increase in FTEs (across all sectors) resulting from material investment in the water services sector.

Source: DIA

INDUSTRY UNDER PRESSURE

OVEREXTENSION

“Society's expectations of water quality both in terms of drinking water, and in what we discharge has shifted dramatically.”

Policy leader

- **Increasing national demand –** National demand for drinking water increased 12% in the four years to 2020 (Water NZ).
- **International trends –** Global demand for accessible water will exceed supply by more than 40 percent in 2030 (UN 2019).
- **Rising expectations –** Societal and regulatory pressure to improve water quality and environmental outcomes is building.

INDUSTRY UNDER PRESSURE

OVEREXTENSION

Rural and urban areas across the country are experiencing more flooding and droughts. Water shortages disproportionately affect small, rural, and/or vulnerable communities, iwi/Māori, and households that depend on rainwater tanks.

DIA

- **Climate change –** Climate-related events are bringing greater variation and extremes in our climate, and taxing our workforce, above and beyond daily operational tasks – responding to flooding, extreme weather events, increased temperatures and droughts.
- **Vulnerable sector –** The wastewater sector is vulnerable to the direct and indirect impacts of climate change, including coastal inundation and erosion, changing patterns in precipitation, and drought frequency. Analysis of the location of WWTPs in New Zealand identified 5% are located within 5 km of coastlines highly sensitive to inundation and 14% are within 5 km of a segment of coastline highly sensitive to erosion. A significant number of WWTPs are also located in flood hazard areas, such as in the Waikato, where 32% of Plants are within a flood hazard zone and 41% within 1 km of these zones.
- **Climate change potential direct implications –** (a) Inundation and flooding, (b) increased pressure and damage to infrastructure & (c) Pressures on the treatment process during extreme weather
- **Climate change potential indirect implications –** (a) Treatment process efficiencies, (b) Increased sensitivity of the receiving and surrounding environment, (c) Increased demand for storage capacity and reduced availability of land & (d) Influent and effluent quality and bio-solids management.

Source: Ministry of Environment (MfE)
Climate Change Pressures in the Wastewater Sector and Adaptive Planning

GROWING INDUSTRY

OVEREXTENSION

"The estimated GDP impact is large because water is an input to every business and household - hence the reform impacts every corner of the economy."

Deloitte Three Waters Impact Assessment

- **Increased expenditure in water and wastewater –** In 2020, capex increased 44% for water, and 30% for wastewater services (Water NZ).
- **The operational expenditure will also increase –** As capital projects come online, the new infrastructure will likely incur additional costs to operate, maintain and monitor. Operational projections are currently underway by the DIA.
- **On boarding of stormwater quality management –** The number of service providers with stormwater quality management plans increased by 43% between 2017 and 2020 (Water NZ).
- **More investment needed –** Minimum of $120b to $185b capex investment needed over the next 30 years. That's around $14M capex every day of the year (DIA).

VARIABLE TECHNOLOGY UPDATE

OVEREXTENSION

Global demand for fresh water will exceed supply by 40% in 2030 (UN). This challenge will be met by new benchmarks in water management and technical enablers.

- **Technology uptake is not standardised, or a given –** Technology uptake by sector organisations is variable, with some having full digital supervisory control and data acquisition, and others relying on full manual operation (Water NZ).
- **Good practice will require knowledge of latest technologies –** New technologies will likely change the definition of good practice in the sector, with Taumata Arowai likely looking for assurance that providers stay up to date with the latest technologies (Water NZ).

Industry Challenges
Fragmentation

Our most crucial services are currently planned, managed and delivered by 67 councils, and a long tail of unregulated small suppliers.

“Organisation and stewardship is missing. That's what the reform is trying to achieve.”

Policy leader

Our most crucial services are currently planned, managed and delivered by 67 councils, and a long tail of unregulated small suppliers.

Incomplete workforce data

There is no reliable and up-to-date single source of water workforce data on education, gender, age, ethnicity, locations and roles.

70%

Seven out of ten ten water consultancies do not collect data on staff ethnicity.

Source: Water NZ

Inconsistent water delivery services

There is a wide variation in water service scale, capability, quality and charges throughout the country, with approximately 720 medium to large suppliers providing for 80% of the population.

720 → **80%**

medium to large suppliers — Of the population

Source: DIA

Unknown performance of small suppliers

Assessing and bringing small suppliers to compliance will bring additional complexity to an already fragmented sector.

1.3k → **75k**

Registered suppliers — Unregistered suppliers (est.)

Source: ESR / Taumata Arowai

Lack of large-scale strategic and coordinated planning

There is a need for shared vision and approach on how to prioritise resources, and how giving effect to Te Mana o te Wai will influence industry best practices.

Broken pathways and missing qualifications

Skills and experience standardisation across the sector is needed to lift service quality and streamline pathways into and across the sector.

LACK OF LARGE-SCALE STRATEGIC AND COORDINATED PLANNING

FRAGMENTATION

"The sheer size of the infrastructure deficit that has developed (is) symptomatic of a wider systemic failure underpinning the way three waters services are currently delivered."

DIA Three Waters Report

- **Lack of common vision and approach –** Water is managed by 67 councils: 67 visions on water priorities; 67 ways of defining what is important.
- **Guiding principles and Iwi engagement –** Te Mana o te Wai is not currently universally upheld or applied as a foundational guiding principle for sustainable water management.
- **Embedding Te Tiriti o Waitangi –** Exercise of tino rangatiratanga (alongside kāwanatanga) as stipulated in Te Tiriti o Waitangi is not adequately allowed for.
- **Uncertain pathways to defining best practice –** Lack of shared vision on how future changes, such as technology, or community expectations, will affect good industry practice.
- **Workforce uncertainty –** No overarching vision on how to attract, skill, up-skill and maintain the workforce needed to deliver sector transformation.

INCONSISTENT WATER DELIVERY SERVICES

FRAGMENTATION

“We have to be a jack of all trades, whereas bigger councils have larger teams and specific roles and can do a higher quality job. Better processes are more achievable with scale.”

Small council water asset manager

- **Wide variation in service scale –** Approximately 720 medium to large suppliers provide water to 80% of the population. The remainder are either self supplied or obtain drinking water from a long tail of up to 75,000 neighbourhood suppliers (ESR).
- **Wide variation in water quality –** The variation in size of water service providers means the quality is variable. 40,000 people lived with boil water notices in 2020. In Northland, some small water supplies had up to 100 times the maximum count of E. coli bacteria in their drinking water (Mai Journal).
- **Wide variation in water charges –** National average of $878 per year per household, with some areas paying up to $1772 (Water NZ).
- **Inconsistent levels of capability –** Many smaller providers do not have the specialist services required, and employees are often stretched to also deliver non-water services.
- **Lack of standards –** No fully endorsed national framework for pipeline assessments, or above ground assets (Water NZ, etc).
- **Rising customer discontent –** Customer complaints almost doubled in the five years to 2020 (Water NZ).

UNKNOWN PERFORMANCE OF SMALL SUPPLIERS

FRAGMENTATION

"We are well aware of three waters reform since we have farmer friends, but only now starting to think about implications for us"

Unregistered small supplier

- **Added complexity –** Assessing and bringing small suppliers to compliance will bring additional complexity to an already fragmented sector.
- **Many community suppliers do not have specialist skills –** Many registered suppliers do not have specialist water capabilities, with almost half supplying to 500 people or less (ESR).
- **Registered suppliers will be onboarded first –** Taumata Arowai will require all 1377 registered suppliers to reach compliance in the four years following reform.
- **Long tail of neighbourhood suppliers –** The process of working with an estimated 75,000 further unregistered suppliers will begin after four years (Taumata Arowai).

The workforce requirements needed in order to bring small suppliers up to compliance are unclear.

INCOMPLETE WORKFORCE DATA

FRAGMENTATION

“It's useful to capture age demographics because then it would feed into how we develop them, but we need to be clear on what information is important – I would be wary of capturing information just for the sake of it.”

Network manager

- **No overarching collection of workforce data –** No reliable and up-to-date single source of water workforce data on education, gender, age, ethnicity, locations and roles.
- **Consultancies collect some workforce data –** Only three out of ten water consultancies collect data on staff ethnicity, and none collect data on disability (Water NZ).
- **What constitutes a water worker is not always clearly defined –** The lack of data is compounded by the fact the sector is serviced by a wide range of industries that also service other sectors.

BROKEN PATHWAYS AND MISSING QUALIFICATIONS

FRAGMENTATION

“My biggest gripe is the absence of clear pathways that someone coming in can see, and the different ways to progress.”

Network manager

- **Missing qualifications –** While there are standard NZQA (L4 and 5) courses available for drinking and wastewater treatment, these do not cover all roles in the industry. The “in house” training for non-standard roles is not easily transferable, is variable in nature, and is potentially a contributor to the quality variation we see in the sector today.

  “There is a lack of formalised specialist development training in the operations space.” Network Manager

- **Uncertain pathways –** There is a perceived absence of an effective and standardised system of qualifications and competency assessment that can allow people to develop and excel in their water sector careers (Water NZ, proposed operator certification). A lack of clear journeys to competence makes pathways into and across sectors riskier, more nebulous, and less attractive to potential employees (ESI Workforce Strategy Report).
- **Regulation can supercharge standards on skills and pathways –** The appointment of Taumata Arowai will bring governmental oversight to industry operators (Water Services Regulator Act 2020). This will inform requirements, and trigger progress, on the nation-wide frameworks that training and industry organisations need to build tomorrow’s workforce.

Industry Challenges
Stretched Workforce

From employers looking to build capability, to employees working beyond their skillsets, the industry is facing increasing workforce pressure.

“Across the board we need more treatment plant operators, general maintenance staff, project managers, asset managers, compliance staff - everywhere we need for more people… Automation and apps are coming in but this also causes more challenges and headaches””

Small council water asset manager

From employers looking to build capability, to employees working beyond their skillsets, the industry is facing increasing workforce pressure.

Urgent need to expand the skilled workforce

Transforming the water sector will be one of the greatest workforce challenges of our time.

50%

Under reform, labour and related direct costs represent an estimated 50% of total costs of capital works.

Source: DIA

Competitive labour market

Dwindling supply, stiff competition and no option to import labour means maintaining a water workforce is already a challenge.

46%

In the year to September 2021, overall online vacancies for technicians and tradespeople across all industries increased 46%.

Source: MBIE

Increasing demands, diminishing skills

As regulatory pressures build, a skills deficit will grow in the gap between workforce capacity and sector compliance.

59%

59% of water sector employees have no qualifications listed with their employer.

Source: DIA

Skills for the future

Technology uptake by sector organisations is variable, with some having full digital supervisory control and data acquisition, and others relying on full manual operation.

56

The average age for a wastewater worker is around 56.

Source: WIOG

URGENT NEED TO EXPAND THE SKLLED WORKFORCE

STRETCHED WORKFORCE

“The ratio of the number of qualified people doing the jobs versus labourers that have been pulled in to help has deteriorated over time.”

Policy leader

- **For industry transformation, talent is everything –** Labour and related direct costs – in their various forms – is the largest cost input into water transformation capital works by a substantial margin, representing an estimated 50% of total costs (DIA).
- **The operational workforce will also need to increase –** As capital projects come online, the new infrastructure will require additional staff and skill sets to operate, maintain and monitor.
- **Water service transformation will require thousands of New Zealand workers –** Employment in the wider economy is expected to rise substantially under water service transformation, with the reform scenario providing 5,849 to 9,260 additional FTE jobs over the next 30 years (DIA).
- **Workforce within sector has increased –** The number of people employed by water service providers increased by 25% over the four years to 2020 (Water NZ National Performance Review).

COMPETITIVE LABOUR MARKET

STRETCHED WORKFORCE

"We have workforce competition in different places, for example the electricity sector and the trades are absolutely in competition with water."

Industry executive

- **Dwindling supply –** Unemployment has reached an all time low of 3.4% (Stats NZ).
- **Stiff competition –** Online vacancies grew by 93% in the year to September 2021. Vacancies for labourers and machinery operators more than doubled in the same period, with technicians and tradespeople increasing 88% (MoBIE).
- **Immigration off the cards –** COVID 19, along with changes in long-term immigration policy toward low volume high skills mean importing labour is no longer a viable option (ESI Workforce Development Strategy).
- **Low wage, long hours** - The average starting pay in 2018 was $48k, with most respondents working 40-50 hours per week (Connexis).
- **Fewer options for professional growth –** Electricity, gas and water services have a relatively low labour turnover of 12% as compared to the national average of 15% (ANZ). Low labour turnover rates can be an indicator of below-average wage growth, and a lack of career progression.
- **Uncertain workforce –** Employees are more likely to consider switching to roles outside of their sector in the face of uncertainty. Employees are uncertain what moving to another (likely bigger) entity means in terms of their personal journey map (industry interviews).

COMPETITIVE LABOUR MARKET

STRETCHED WORKFORCE

NZ's infrastructure pipeline is already seeing massive growth

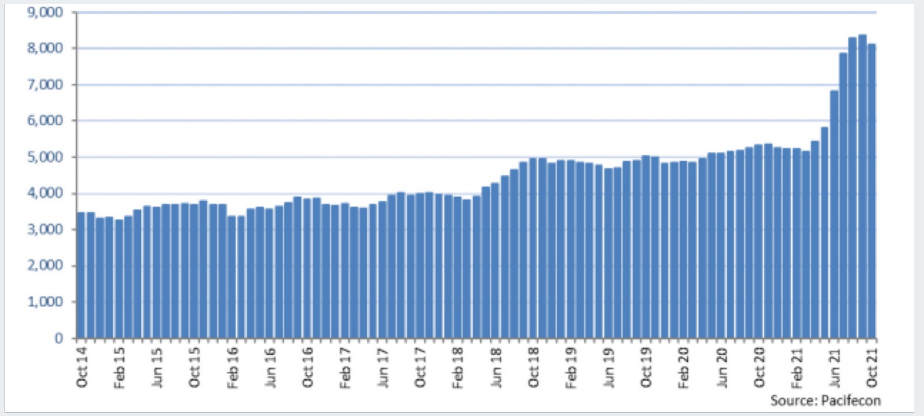
At the end of October 2021, 8,117 infrastructure projects were at planned stages in New Zealand (water included), with a combined value of $104b.

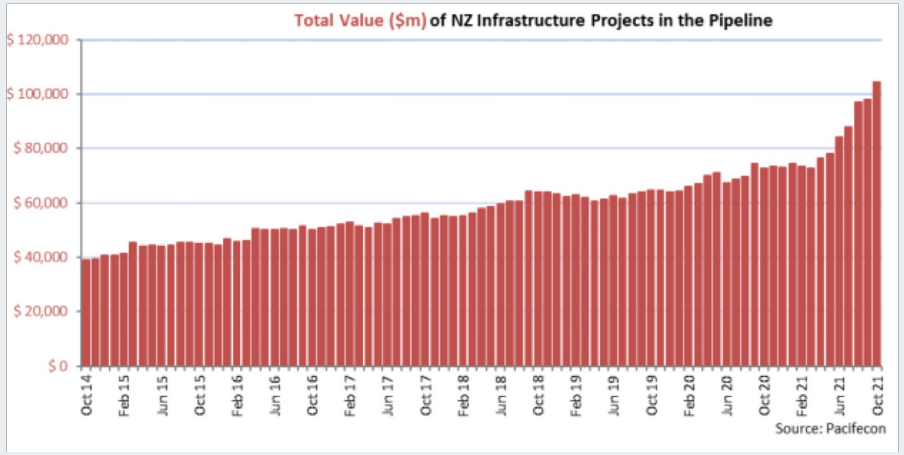
This is an increase in 43% in planned project value since 2020.

The number of projects rose massively in June-July when many central and local government projects were announced, with a commensurate growth in value.

(Source: Pacifecon Market Watch, Oct. 2021)

Total number of NZ infrastructure projects in the pipeline





COMPETITIVE LABOUR MARKET

STRETCHED WORKFORCE

Attraction and retention - views from a major network manager

Water careers, especially wastewater, careers can be a hard sell:

“It's not seen as a Gucci industry. ESI is similar but it doesn't smell. It's not as glamorous I guess as electricity.”

Retaining talent, particularly in rural areas, can be a challenge:

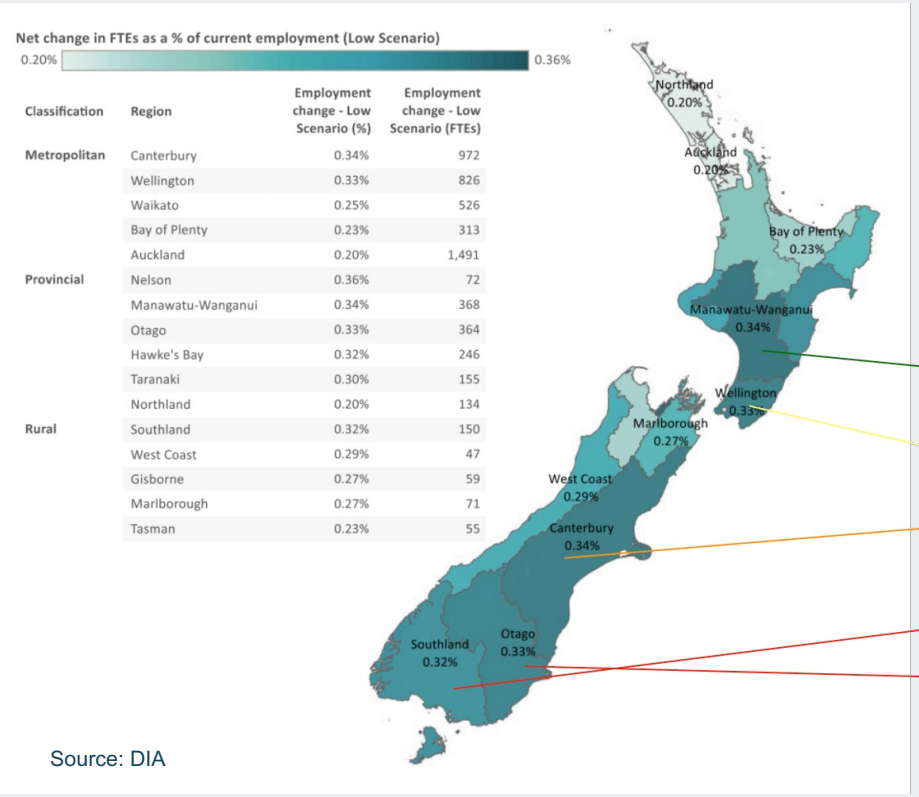
“If you do get a young bright star, and that bright star is working for Waitomo District Council, they are not there for long as bigger councils will pinch them.”

Lack of clear pathways makes the industry less attractive:

“There is a low awareness of career opportunities, and no formalised specialist development training in the operation space.”

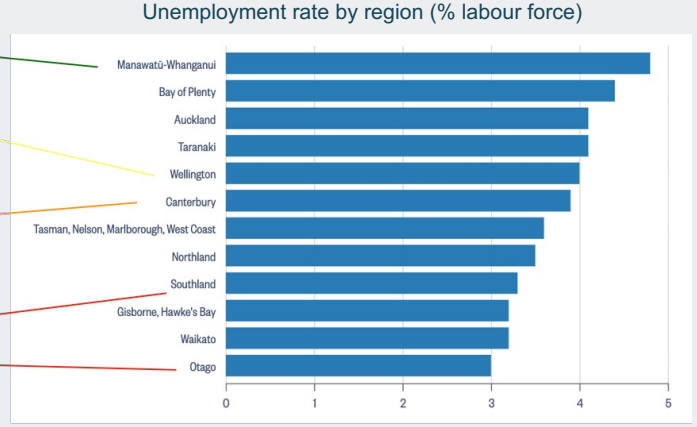
Regional workforce shortages

To execute the work required to transform the water services, some of the areas that require the highest change in workforce also have the lowest unemployment rates. Southland and Otago, for example, will require a larger percentage increase in FTEs, but also have some of the lowest unemployment rates.



Classification	Region	Employment change - Low Scenario (%)	Employment change - Low Scenario (FTEs)
Metropolitan	Canterbury	0.34%	972
	Wellington	0.33%	826
	Waikato	0.25%	526
	Bay of Plenty	0.23%	313
	Auckland	0.20%	1,491
Provincial	Nelson	0.36%	72
	Manawatu-Wanganui	0.34%	368
	Otago	0.33%	364
	Hawke's Bay	0.32%	246
	Taranaki	0.30%	155
	Northland	0.20%	134
Rural	Southland	0.32%	150
	West Coast	0.29%	47
	Gisborne	0.27%	59
	Marlborough	0.27%	71
	Tasman	0.23%	55

Source: DIA



Data source: Stats NZ

COMPETITIVE LABOUR MARKET

Councils versus firms

People in the industry are being attracted to higher paying positions in firms:

“People are leaving councils to make more money as consultants – a good manager in a local authority with an engineering degree will get poached by an engineering firm.”

Industry executive

However, water workers leaving councils is not necessarily bad for the industry as a whole:

“Once people leave the council they predominantly stay within the industry.”

Small council water asset manager

As long as knowledge and experience remain in the industry, moving workers between councils and consultancies may be beneficial to both the sector and workers. However, remuneration as the main driver for workforce could be an indicator of inequity across the industry.

INCREASING DEMANDS, DIMINISHING SKILLS

STRETCHED WORKFORCE

"Across the board we need more treatment plant operators, general maintenance staff, project managers, asset managers, compliance staff - everywhere we need for more people… Automation and apps are coming in but this also causes more challenges and headaches."

Small council water asset manager

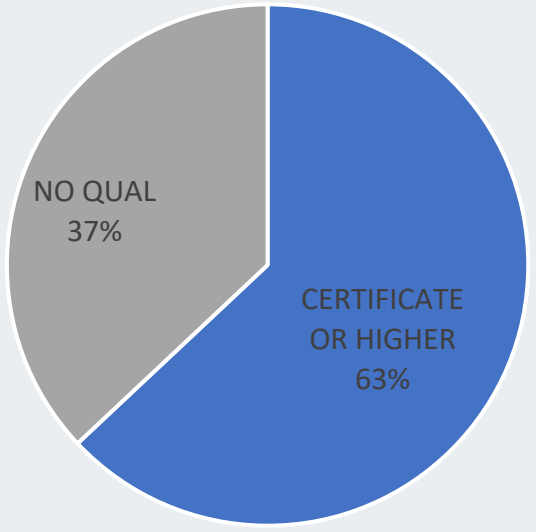
- **Changing skill requirements –** Increased regulatory pressures are likely to result in higher workforce capability requirements across all current proficiencies, and an increase in skill requirements related to the uptake of new technologies.
- **Retiring skills and experience –** The sector workforce is ageing with limited succession planning and is struggling to retain sufficient experienced and skilled staff (Water NZ). Compared to the total workforce in New Zealand, in 2018 there were fewer young workers (15-24) and more middle-aged workers (40-54) (Infometrics).
- **Transferring workforces from twilight industries –** There is potential in some areas to transfer common proficiencies from diminishing industries, such as the oil and gas sector or tourism; however, there is a risk this approach will fall flat if the timing is not right (DIA).
- **It takes time to build a skilled workforce –** Training for NZQA water and wastewater operator roles takes two years, at which time they are able to work independently. A further two years are required to achieve a senior qualification (Waihanga Ara Rau). "Real competence takes four to five years." – small council water asset manager.

INCREASING DEMANDS, DIMINISHING SKILLS

STRETCHED WORKFORCE

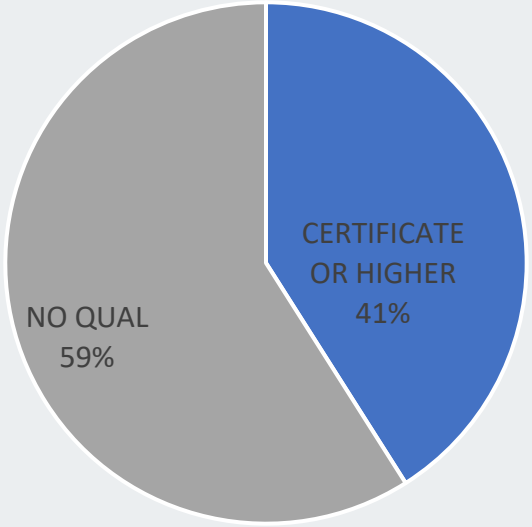
Reduction in qualified workers

Highest level of qualification of water supply workers **2013**



Source: Connexis

Highest level of qualification of water sector employees **2020**



Source: WaterNZ

"The ratio of the number of qualified people doing the jobs versus labourers that have been pulled in to help has deteriorated over time."

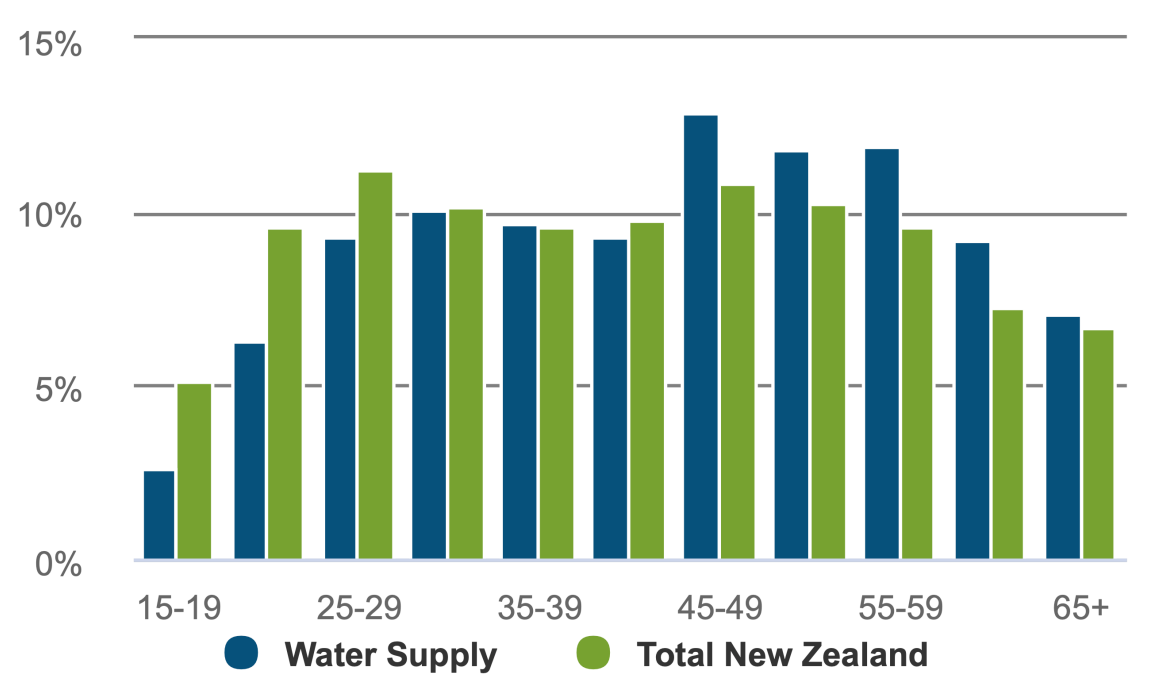
Policy leader

INCREASING DEMANDS, DIMINISHING SKILLS

STRETCHED WORKFORCE

Ageing workforce

Age profile of water supply workers in 2018



The Three Waters industry is highly deficient compared to the New Zealand workforce's average within the 15 to 35 age group, and overrepresented in the 45+ age group.

Source: Infometrics/Connexis

INCREASING DEMANDS, DIMINISHING SKILLS

STRETCHED WORKFORCE

Preserving skills for the future

Newer wastewater plants have modernised, and continue to improve in the face of environmental, social and regulatory pressure. The shift from low cost low complexity wastewater treatment to higher cost and higher complexity is ongoing, and therefore new skills are needed.

"People with experience should be subject matter experts but also provide mentorship."

Network manager

The average age wastewater worker is around 56 (WIOG). They most likely began their training here.

Much of their deep, tacit knowledge and experience will be lost to the industry in the next decade.

Low → High: Cost & Complexity

Treatment type	Era	Reason for use	Cost
Oxidation ponds	60s-80s	Simple to operate Free disinfection - sunlight	Cheap to operate
Wetlands	80s-90s	Natural system Cultural considerations	Cheap to install High maintenance requirements
Biological processes	1990s-2020s	Tighter discharge consents Smaller footprint	High structure cost but 100 year life Aeration costs Higher operator costs High biosolids disposal costs
Physical processes	2000s-2020s	Footprint restrictions Growth – easy add-on	High structure cost but 100 year life Cost to treat sludge
Chemical processes	2010s	Phosphorus consents Use of carbon for more complex biological treatment driven by tighter consent limits	Disposal of metal-rich biosolids
Advanced activated sludge processes	2000s	Tighter total nitrogen standards Phosphorus removal Footprint restrictions	High structure cost but 100 year life Aeration costs
Membranes	2010s	Footprint pressure Public health Very low nitrogen limits	Membranes Chemicals
Biosolids	2010s	Energy production Solids reduction	Structure Control systems

Source: Water NZ, Stats NZ

SUMMARY

KEY TAKEOUTS

1. There is significant national variance in the quality of water services.

Fragmented industry

Water is managed by 67 councils, and a long tail of an estimated 75,000 small suppliers.

Variable standards

A lack of universally adopted definitions of best practice, and no training standards for specialised roles, is contributing to inconsistent service delivery.

Smaller suppliers lagging

The quality of water services is related to scale, with smaller providers often lacking the specialist skills needed to reach high quality results.

Regions lagging

The regions are proportionally over-represented in terms of poor service outcomes, and under-served by distribution of water workers.

2. Water services are under increasing pressure to perform.

Increasing demand

In line with global trends, demand for clean and safe drinking water is increasing.

Societal pressures

Societal and regulatory pressure to improve water quality and environmental outcomes is building.

Knowledge shortfall

Best practices are changing, and regulation will require providers to build knowledge of the latest technologies.

Under-prepared workforce

Major capital projects are coming on line over the coming decades, but the industry workforce is inadequately prepared to build and operate this new infrastructure.

3. The need to build the Three Waters workforce is urgent, and the challenges are significant.

Major workforce expansion

Water service transformation will require thousands of new workers – to both complete capital projects, and to operate the reformed industry.

Competitive labour market

Recruitment is a challenge, with record low unemployment and immigration restrictions, along with increasing competition from the construction and wider infrastructure sectors.

Uncertain pathways

Journeys into the industry and competency are unclear, and further career progression is stifled through a lack of standard, transferable qualifications for specialist roles.

Diminishing skills

The industry is ageing with limited succession planning, and is struggling to maintain the workforce required to run the current setup. There is an increasing skills deficit, with almost 60% of water sector workers unqualified.

FUTURE RESEARCH

ADDITIONAL AREAS TO EXPLORE

This scan highlights aspects of the Three Waters industry but is by no means exhaustive. Potential areas for further research into workforce development include:

Industry strengths

What are the strengths we can leverage to build an effective workforce strategy?

Future industry

What are the specifics of the new and emerging skill sets that will need to be embedded and trained within the industry?

COVID 19 impact

What are the consequential impacts to other sectors for workforce development strategies?

International lens

What have more mature overseas water industries learned about how build a transformative workforce?

Download the full report and be a part of the conversation: www.wearewater.nz

NGA MIHI MAIOHA

THREE WATERS WORKFORCE
DEVELOPMENT STRATEGY —

KO WAI TĀTAU
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