From: Tan, John
To: Sam Ponniah
Subject: Impact on Rural Communities
Date: Friday, 30 April 2021 12:33:40 am

We’ve referenced this in the Tasmania case study on the impact of reform on rural communities

From: 9(2)(a) [redacted] 9(2)(a) [redacted] @deloitte.com.au>
Sent: Thursday, 29 April 2021 8:28 PM
To: 9(2)(a) [redacted] 9(2)(a) [redacted] @deloitte.co.nz>
Cc: Tan, John 9(2)(a) [redacted] @deloitte.co.nz>; Dent, Alan 9(2)(a) [redacted] @deloitte.co.nz>
Subject: RE: Draft Economic Impact & Affected Industries Presentation Slides (v2.0).pptx

This should fit the bill nicely. These towns are all rural/remote and many rely heavily on tourism, which was getting hit when boiled water alerts were being issued
https://www.abc.net.au/news/2018-08-22/all-boil-water-alerts-lifted-in-tasmania/10149232

From: Tan, John
To: 9(2)(a) [redacted] Dent, Alan
Cc: Sam Ponniah
Subject: Key Definitions
Date: Friday, 30 April 2021 3:23:41 pm
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png

Let me know if you have issue with any of these, otherwise, this is what we are running with up front in our report

Key Definitions

In this report we refer to the following key terms:

- The **Water sector**, which comprises the 'water delivery sector' *and* the wider 'water supply chain'
- The **Water Delivery sector** is a subset of the water sector that comprises: water supply, sewerage and drainage services; as well as waste collection, treatment and disposal services. This subset of the broader water sector is limited by data and definitional constraints of existing ANZIC codes.
- The **wider water supply chain** comprises services provided in other sectors such as water engineers (included in Business Services) or construction of water assets (included as part of Construction)
- The **Affected Industries** comprise all other sectors that are not the water sector/water delivery sector

The economic impact sections of this report and CGE modelling methodology generally refers to the impact on the 'Water Sector', except where we try to disaggregate sector GDP and employment impact, where due to the data constraints, we refer to the impact on the Water Delivery Sector in these sections.

The affected industries section of this report always refers to the Water Sector (in its broader sense) and Affected Industries as defined above

John Tan
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From: Tan, John
To: Sam Ponniah
Cc: Nick Davis; Dent, Alan; 9(2)(a) [redacted]
Subject: DAE Industry Development Study & Economic Impact Assessment
Date: Friday, 30 April 2021 4:59:20 pm
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
DAE Industry Development Study & Economic Impact Assessment (30 April).pdf

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Sam

Please find attached our final report. We'll send the supporting charts next week. Have a good break

John

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Deloitte.

Industry Development Study & Economic Impact Assessment

Department of Internal Affairs

30 April 2021

Deloitte Access Economics

Table of contents

1. Executive Summary

Executive Summary – Overview

This report assesses the economic impact of Three Waters Reform and the opportunities and risks for the industries affected by reform

Effective Three Waters services are essential to the wellbeing of all New Zealanders. However, New Zealand's Three Waters system is facing major challenges, and will continue to do so without transformational reform. Cabinet will take substantive decisions relating to the Three Waters reform (reform) in May 2021.

Deloitte Access Economics has been engaged by the Department of Internal Affairs (DIA) to assess the potential economic impact of the reform, and to develop an understanding of the opportunities and risks for the industries affected by reform. The economic impact assessment and affected industries study will provide evidence to support the Regulatory Impact Assessment (RIA).

The economic impact assessment estimates the economic impact of a material step up in investment in connection with reform, relative to the level of investment that might be expected in the absence of reform. The economic impact is quantified in terms of GDP, employment, wages and taxes, at a national and regional level.

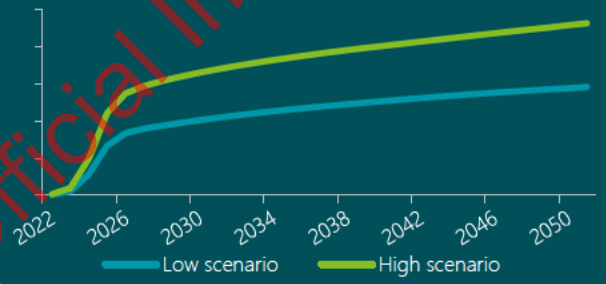
Overall, the results show, the material investment in the water sector will lead to an increase in GDP of between $14b to $23b in NPV terms over 30 years, an additional 5,849 to 9,260 FTE jobs, productivity will improve, and both provincial and rural areas are estimated to benefit more than metropolitan areas in relative terms. An overview of the key economic impact assessment results, for the two core scenarios considered in this report, are provided opposite.

The industry development study validates the economic impact assessment through targeted stakeholder interviews, which tests the potential implications of reform on a range of industries. Case studies and perspectives from Taumata Arowai – the new regulator – are also included in this report.

Change relative to counterfactual, 2022-2051

▲ 0.3% – 0.5%

Net change in GDP over 30 years



+ 5,849 to 9,260

Average increase in FTEs*

$14b - $23b

Present value increase in GDP

+ 0.2% to 0.3%

Increase in average wages

+ $4b to $6b

Present value increase in taxes

*We refer to the "average increase" as the average change in FTEs (full-time equivalents), GDP, wages, taxes or production over the 30 year modelled period from 2022-2051, relative to the counterfactual.

Executive Summary – Scenarios Modelled

We modelled four scenarios. The High and Low Scenarios comprise our core scenario range. Our key model input is the 'incremental capex shock' for each modelled scenario.

We have used our in-house Computable General Equilibrium (CGE) model, the Deloitte Access Economics Access Economics Regional General Equilibrium Model (DAE-RGEM), to estimate the potential impact of reform based on two scenarios:

- The **counterfactual scenario**, which sets out a possible investment pathway for Councils if the reform did not proceed.
- The **system transformation scenario**, which sets out a reform scenario where water services are provided by a small number of asset owning multi-regional water service entities (WSEs), operating under efficient regulatory standards, economic regulation and significantly improved access to capital – resulting in a substantial uplift in capital expenditure.

Water investment projected under each modelled scenario and the incremental water investment applied to assess the economic impact of reform (Total capex, 2022 to 2051, billions)

Scenario	System transformation capex	Counterfactual capex	Incremental capex
1. **Low Scenario:** Low system transformation vs low constrained counterfactual	$120b (WICS Approach 1: **UK** benchmarks)	$55b (Council debt and price constraints)	$65b
2. **High Scenario:** High system transformation vs high counterfactual constrained	$185b (WICS Approach 2: **Scotland** benchmarks)	$69b (**Councils achieve 20% savings**, which allows for greater capex spend)	$116b
3. **Optimistic Scenario:** High system transformation vs low constrained counterfactual	$185b (WICS Approach 2: **Scotland** benchmarks)	$55b (Council debt and price constraints)	$130b
4. **Historic Scenario:** Low system transformation vs historic counterfactual	$120b (WICS Approach 1: **UK** benchmarks)	$44b (Council spending based on historic levels)	$76b

Source: Deloitte Access Economics (2021)

Executive Summary – Economic Impact

The reform is estimated to deliver large economic benefits, across all modelled scenarios.

Economic impact assessment

The economic impact assessment focuses on the *incremental* capex, i.e. the difference between the system transformation and counterfactual scenarios . However, the counterfactual already includes a material step up in investment from the status quo (between 20% to 50% higher than historic expenditure might suggest). This reflects an expectation that Councils would seek to lift investment in response to increased regulatory pressures and community expectations around access to safe three waters services. For instance, under the Low Scenario, the GDP impact is estimated based on incremental capital expenditure of $65 billion, on top of $55 billion of capital expenditure already included in the counterfactual. The results presented in this report are therefore conservative.

The reform is expected to deliver large economic benefits, across all modelled scenarios:

	Scenario	Change relative to the counterfactual, 2022 to 2051				
		Incremental capex (Model Input)	GDP	Average FTEs	Average wages	Taxes
Core scenarios	**Low:** Low system transformation vs low constrained counterfactual	+$65b	+$14.4b	+5,849	+0.16%	+$4b
Core scenarios	**High:** High system transformation vs high counterfactual constrained	+$116b	+$23b	+9,260	+0.26%	+$6b
Other scenarios	**Optimistic**: High system transformation vs low constrained counterfactual	+$130b	+$25b	+10,217	+0.28%	+$6b
Other scenarios	**Historic**: Low system transformation vs historic counterfactual	+$76b	+$16b	+6,667	+0.18%	+$4b

Source: Deloitte Access Economics (2021)

Executive Summary – Economic Impact

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.

Summary of the impact on gross domestic product and taxes

The economic impact modelling shows that under the Low and High Scenarios described on the previous page:

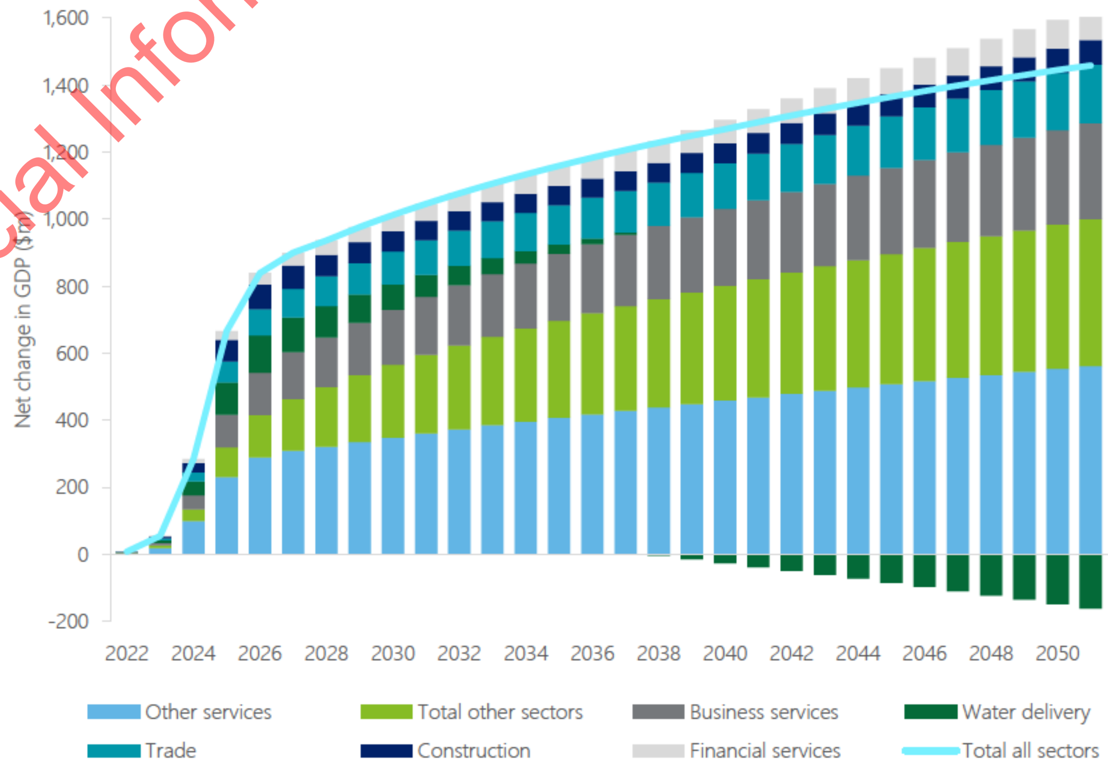
- Reform is likely to deliver a significant economic benefit of **$14 - $23 billion** over the next 30 years, in real present value* terms, relative to the counterfactual.
- This is equivalent to the New Zealand economy being on average **0.3% to 0.5%** larger over the 30 year period, than it otherwise would have been in the counterfactual.
- Tax revenue is estimated to increase by **$4 - $6 billion** from 2022 to 2051 in real present value terms.

The positive impact is also distributed across sectors. Trade, Financial Services, Business Services, Construction and Other Services are expected to see the largest increases in GDP as a result of reform. Other Services includes Public Administration and Defence, Education, Human Health and Social Work activities, and Dwellings (i.e. housing).

These are large sectors, which all benefit from the GDP and output growth that reform facilitates. GDP in all sectors shows growth in absolute terms. While the water delivery sector also increases initially, modelling shows a decline from mid-2038 *relative to the counterfactual*, due to efficiency driven cost savings in this sector as a result of reform.

Low Scenario

Net change in GDP each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

Unless otherwise stated, all references to present value terms are calculated over a 30 year period (2022 to 2051) using a real discount rate of 5%, per New Zealand Treasury guidelines.

Executive Summary – Employment Impact

Reform is expected to result in a material positive change in full-time equivalent jobs

Summary of the impact on employment and wages

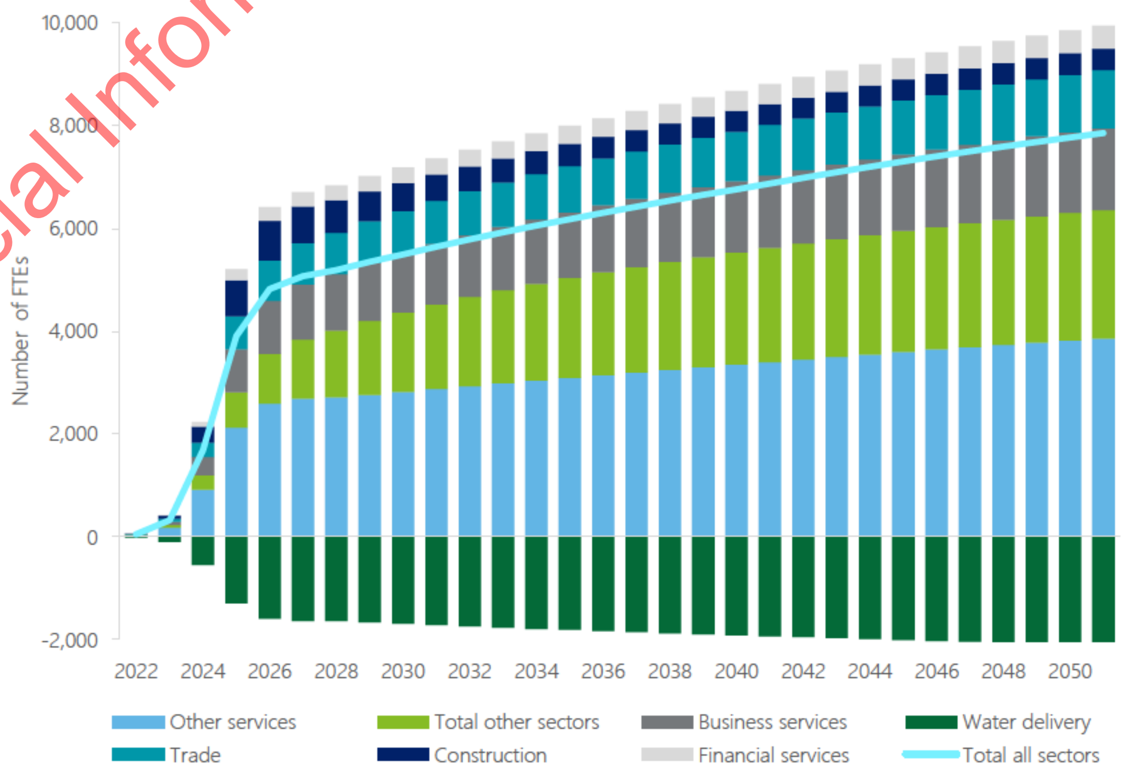
Under the Low and High Scenarios, reform is ~~also~~ projected to increase employment in the New Zealand economy:

- By adding between 5,849 to 9,260 full time equivalent (FTE) jobs on average over the next 30 years, compared to the counterfactual.
- This represents 0.26% to 0.41% of the current total workforce in the economy or between 0.36% and 0.57% of the total FTE jobs in the economy.
- Reform is also expected to generate an increase in average wages of between 0.16% and 0.26% over the 30 year period modelled, relative to the counterfactual.

Reform is expected to result in a material positive net change in FTEs, although the rate of growth in FTEs in the water delivery sector is expected to be slower under the reform scenario than under the counterfactual. This is explained further on the following page.

Reform is expected to support growth in jobs across all other sectors in the economy, with the greatest positive impact expected in the Financial Services, Trade, Business Services, Construction and Other Services sectors.

Low Scenario
Net change in FTEs each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

Executive Summary – Employment Impact in the water sector

While the rate of growth in water delivery sector employment may be slower than under the counterfactual, the water sector workforce is still expected to be 80% larger over the 30 year period

Key Definitions

In this report we refer to the following key terms:

- The **Water sector**, which comprises the 'water delivery sector' and the wider 'water supply chain'
- The **Water Delivery sector** is a subset of the water sector that comprises: water supply, sewerage and drainage services; as well as waste collection, treatment and disposal services. This subset of the broader water sector is limited by data and definitional constraints of existing ANZIC codes.
- The **wider water supply chain** comprises services provided in other sectors such as water engineers (included in Business Services) or construction of water assets (included as part of Construction)
- The **Affected Industries** comprise all sectors including the wider water supply chain that was expected to respond to the investment "shock" applied in the economic analysis

The economic impact sections of this report and CGE modelling methodology generally refers to the impact on the 'Water Sector' (in its broader sense), except where we try to disaggregate sector GDP and employment impact, where due to the data constraints, we refer to the impact on the Water Delivery Sector in these sections.

The affected industries section of this report always refers to the 'Water Sector' (in its broader sense) and Affected Industries as defined above.

Commentary on the employment impact in the water sector

The workforce for the water sector is complex. The modelling of sector FTEs defines the **water delivery sector** as water supply, sewerage, and drainage services as well as waste collection, treatment and disposal services based on ANZIC codes. However, this definition does not pick up employment outside of those services that are part of the broader water sector supply chain (e.g. water engineers and construction of water assets).

In both the Low and High scenarios, the employment impact in terms of additional FTEs is significantly positive for all sectors. However, the pace of growth in water sector FTEs under the system transformation is expected to be slower than under the counterfactual. At a national level, it is expected that there may be between 1,687 (under the Low Scenario) to 2,787 under the High Scenario) fewer additional FTE jobs on average in the water delivery sector under the system transformation scenario, *relative to the counterfactual*.

The reasons for this are likely to include a shift in composition of the workforce during the transition (given the ageing workforce and removal of duplicative jobs through reform), and in the longer term as more efficient systems and processes for delivering three waters take effect, and improve labour productivity.

Scotland had a similar outcome in its water reform. Scottish Water's headcount reduced by 2,500 FTEs over time; but total employment (water sector and its supply chain) has increased – a net estimated increase of 4,000 FTEs. WICS noted that New Zealand could experience something similar.

The reform offers opportunities for enhanced career pathways and greater specialisation within the workforce of the water sector, a greater focus on building the workforce required for the future through more proactive labour market interventions, and greater local employment linked to an increase in local renewals and minor capital works. This is highlighted by the significant 80% increase in the total water sector workforce that will be required under the system transformation scenario.

Executive Summary – Economic Impact on regional GDP and employment

Reform is expected to increase GDP and employment across New Zealand, but this impact will not be evenly distributed across all regions.

Distributional impact of the reform

Every region is expected to be positively impacted by reform in terms of GDP and employment growth. However, this impact is distributed across regions differently, in a way that reflects heterogeneity in the relative size, capital intensity, water intensity and import penetration of the regions:

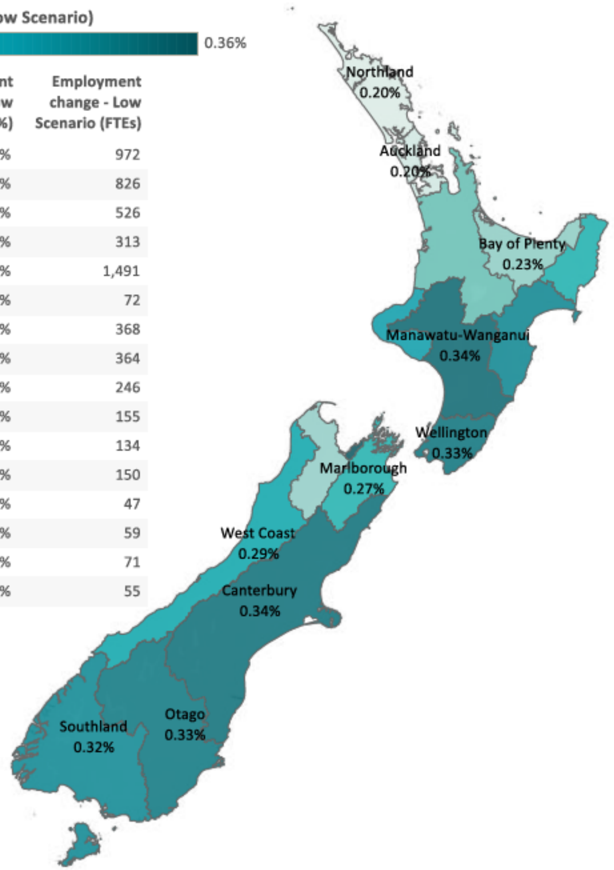
- Relative to current regional GDP, metropolitan areas see the smallest relative gains when compared to the average impact nationally. Provincial and rural regions enjoy the highest economic impact relative to their current regional GDP.
- The heat map shows the relative employment impact of reform across regions by dividing estimated additional FTEs due to reform by the current regional workforce. Provincial regions are estimated to gain the most relative to the estimated national average as a result of reform, along with two metropolitan regions – Wellington and Canterbury. Wellington, in particular, benefits from its high share of employment in Public Administration. Wellington and Canterbury also have a high share of employment in Business Services – another sector which strongly benefits from reform.

Evidence from stakeholder interviews and overseas experience suggests renewals and minor capital works – which represent a large component of the immediate investment requirements of the sector are considerably more labour intensive than major capital projects, and a relatively greater proportion of that labour component is delivered on location.

Net change in FTEs as a % of current employment (Low Scenario)

0.20% – 0.36%

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



Deloitte Access Economics (2021)

Executive Summary – Affected Industries

Reform will have a significant impact on industry participants.

Industry development study

We have validated the economic impact analysis through targeted stakeholder interviews to test the potential implications of reform on a number of industries. We tested information provided by stakeholders through the use of international and local case studies, and perspectives from Taumata Arowai – the new regulator. We also considered the implications and considerations.

The following significant changes on industry participants are expected post reform:

- Councils who participate in the reforms will no longer control water assets. While this may result in a reduction in the Council workforce, this decrease is expected to be more than offset by investment the new water entities undertake.
- Engineering, consulting and advisory firms will scale up their investment in operations and employees, despite likely issues with finding skilled labour.
- Contracting firms expect to see bigger workforces and a higher focus on compliance areas given the new regulatory environment. International firms may draw on offshore expertise and technology but will still need to deploy significant numbers of people on the ground.
- Materials and equipment providers are already scaling up in some cases in preparation for reform. Over time, increased investment in the sector is likely to result in an acceleration in the deployment of new technologies, which will flow through to operational efficiencies.

Supply Chain

Greater visibility of the investment pipeline is seen as a key driver of improvements in the efficiency and scale of the supply chain:

- The scale of the investment pipeline is likely to be attractive for new entrants, particularly major organisations with a significant presence in Australia but which are not currently present in New Zealand.
- Participants with an existing presence in New Zealand are likely to scale up their local operations as they gain greater confidence in reform. While new or scaled up entities may bring new capability, this may involve the acquisition and consolidation of local entities or existing capability.
- There are likely to be significant benefits of supply chain scale – including higher spend across standardised requirements, standardisation of parts and materials, and greater purchasing power, as well as the availability of greater specialisation.
- There is potential for existing smaller and mid-scale domestic operators to be squeezed out, thereby reducing the potential diversity of the supply chain – especially as a result of lumpiness or uncertainty associated with the project pipeline through the transition period.
- New Zealand is considered a small market by international standards for materials and equipment. While the current global supply chain is still being disrupted by the effects of Covid-19, a significant step up in investment is not expected to have a large impact on the ability to access materials and equipment over and above the generic challenges New Zealand faces given its scale and location.

Executive Summary – Affected Industries

Reform is an opportunity to address current workforce issues and reposition the water and affected sectors as a strong career opportunity – but this will take time and there will be near term challenges.

Workforce

The water sector is experiencing a workforce shortage, which is likely to be exacerbated given increasing regulatory pressures and community expectations that will drive an uplift in Council expenditure. Reform provides an opportunity to take a more proactive and longer-term approach to addressing challenges which include:

- The delivery of water services and the related capital expenditure required to sustain and expand water infrastructure is labour intensive – particularly in relation to renewals/minor capital works, which represent a significant element of the overall capital spend.
- The number of qualified staff needed to deliver capital works is already under stress due to a lack of overseas resources, increasing remuneration expectations and other opportunities in the wider construction sector. The contractor market is currently sized to reflect historic delivery requirements. The workforce is expected to be squeezed further as spending on Three Waters projects, shovel ready infrastructure projects, climate change and RMA reforms increase nationally.
- Concerns as to the capacity of the workforce to meet demand signalled through the current Council long-term plan (LTP) process. A significant step up in investment in water infrastructure is anticipated above that committed through Government's initial $761m stimulus package, as part of the first round of the reform process.
- Providers have indicated a wariness about resourcing up to meet that demand due to a concern as to the potential for a "boom/bust" cycle of investment, whereby following a burst of spending by Councils, a hiatus occurs as the new water entities work through their planning and prioritisation processes.
- The immediate pressure points are likely to be on specialist water consultancy expertise, which is seen as scarce and "boots on the ground" labour. Several interviewees noted that migration policies (once borders re-open) could help mitigate skill shortages in the near-term, but 'growing our own' was viewed as preferential. Again, reference was made to the Christchurch experience and the significant reliance placed on imported labour.
- Notwithstanding the scale of the sector, current providers and industry participants consider that there is a relatively low awareness of career opportunities and little in the way of sector driven training and development. This situation is compounded by the current industry structure and its fragmented approach to procurement.
- While articulating career opportunities supported by a focus on training pathways could mitigate some of the labour supply challenges, there is a risk the benefit of these initiatives could be diluted. As borders open – particularly with Australia – parts of the the trained/skilled workforce may move offshore to better remunerated opportunities in the near term. This situation could be exacerbated if borders with Australia re-open before those with other countries such as South Africa, the UK and Ireland, which have traditionally been large sources of both skilled and semi-skilled labour.
- Issues with workforce availability are not unique to New Zealand. Globally the sector is experiencing challenges with an aging workforce and a step up in the skills required as new technologies have been introduced. Countries such as the US have introduced initiatives directed at addressing this challenge. America's Water Workforce Initiative is an example of how other jurisdictions are responding to this challenge. This is a combined initiative involving the Environmental Protection Agency and other federal agencies working with states, utilities, tribes, local government and other stakeholders to address workforce issues.
- In the longer term a combination of a better articulation of career opportunities, the changing nature and increased sophistication of the roles/emerging roles available and the scale of the investment going into the water sector creates the prospect of elevating the status of a career in the water sector with a flow through to the ability to attract both domestic and international talent.

Executive Summary – Affected Industries

Reform should improve access to capital, and provide opportunities for significant productivity gains.

Capital Requirements

Reform should facilitate an easier access to capital to fund water infrastructure with flow through benefits to the supply chain.

- Long-term funding certainty for major infrastructure providers of water infrastructure, such as Councils currently or WSEs post reform, is pivotal to achieving gains in the sector. The need for regulatory certainty and the ability for regional water authorities to know they can recover capital costs in the long term from customers.
- The certainty provided enables an entity to take a long-term view of its investment programme. This allows it to develop a construction pipeline that can be funded through the economic cycle.
- Funding certainty by a long-term pipeline of work enables the ecosystem to work effectively, and drive innovation and efficiency. Parties can invest with confidence, leading to efficiencies which can be shared.
- The contracting and consulting firms we interviewed did not foresee capital constraints as an issue for them in scaling up in response to reform. The main hurdles discussed were labour supply and certainty of water entity investment.
- Smaller and mid-sized entities with more limited access to capital may be challenged if aspects of the supply chain start to consolidate. This situation could be exacerbated if lumpiness or uncertainty associated with the forward investment programme through the transition phase impacts cash flows and the ability to invest or retain/attract key staff.

Innovation & Productivity

Evidence from other jurisdictions indicates significant productivity gains are achievable over time with a different industry structure, and parallel developments such as an enhanced regulatory regime. Opportunities for productivity gains include:

- An immediate gain in developing a materially better understanding of the asset base and its condition, which should inform better planning processes and ensure the right investment decisions are being made and wasteful spending is reduced.
- Making more efficient investment decisions – for example, settling on the most efficient regional or cross regional waste-water plant networks.
- The ability to move away from current Council procurement practices which are seen as being fragmented, risk averse and too focussed on price as opposed to whole of life value in the tender evaluation process.
- Increased standardisation of componentry, which drives cost efficiency, specialisation and inventory management benefits.
- Increased use of intelligent componentry to reduce cost/improve performance.
- A better appreciation of/willingness to use international best practice/assets rather than a "do it yourself" approach.
- The ability to attract specialist global capability.
- The ability to outsource work at scale through improved procurement processes.

Despite the optimism around potential productivity gains, parties interviewed expressed some concerns given the:

- Country's relative isolation from major centres of capability
- Potential for a lack of collaboration between the WSEs, particularly in relation to cross boundary investment decisions and standardisation
- Risk workflow slows during the transition period as the supply chain scales up.

It was noted that productivity gains take time to accrue and there were mixed views expressed around the gains available in the water sector from advancements in technology enabled asset management practices until some of the more fundamental issues with the current system are addressed.

2. Introduction and Scope

The request

An economic impact assessment of the Three Waters Reform and its implications for affected industries

Overview

Effective Three Waters services are essential to the health, environment and economic wellbeing of all New Zealanders. However, New Zealand's Three Waters system is facing major challenges, and will continue to do so without transformational reform. Estimates suggest local government water service providers face a significant infrastructure deficit, which could take 30 years to eliminate and exceed the funding and operational capacity of many Councils.

In June 2020, Cabinet agreed to the Three Waters Reform (reform) needed to address this infrastructure deficit. This will see the delivery of Three Waters services shifted from 67 Councils to a smaller number of multi-regional water services entities (WSEs). This reform programme builds on the progress made through the Three Waters Review, established in the wake of the Havelock North water supply outbreak, and recent regulatory reform, including the establishment of Taumata Arowai and development of a new water services regulatory framework.

Cabinet will take substantive policy decisions relating to the reforms in May 2021. The Department of Internal Affairs (DIA) is preparing a Regulatory Impact Assessment (RIA) to support Cabinet decision making. The RIA will assess the impacts of reform, as well options available to the Government regarding design features of the new WSEs, and the overall Three Waters system.

Purpose of this report

Deloitte Access Economics has been engaged by DIA to assess the potential economic impact of the reform, and to develop an understanding of the opportunities and risks for industries affected by reform. The economic impact assessment and affected industries study will provide evidence to support the RIA.

Structure of this report

This report presents the findings of the economic impact assessment and industry development study.

Part one - Economic Impact Assessment

- Overview of economic impact assessment
- Scenario overview
- Approach and inputs
- National impacts
- Workforce impacts
- Distributional impacts

Part two – Industry Development Study

- Overview, including engagement process and methodology
- Industry structure
- Supply chain and workforce
- Capital requirements, and innovation and productivity
- Potential impact of reform and case studies

Attachments to this report

- Appendix A provides an overview of our CGE modelling
- Appendix B outlines the aggregated sectors and regions we modelled
- Appendix C lists our stakeholder interviews
- Appendix D sets out restrictions in relation to the use of this report.

Scope

An economic impact assessment of the Three Waters Reform and its implications for affected industries

Scope

The key requirements of the economic impact assessment were to:

- Analyse the potential economic impact of reform, focusing on how GDP, employment, wages and taxes could change as a result.
- Consider how this economic impact is distributed across areas, particularly at a national and regional level, and to a lesser extent, a local level.
- Discuss how these impacts could differ across sectors.
- Comment on the likely drivers of these impacts, where possible.
- Outline the assumptions and caveats behind this analysis.

The following analysis is out of scope for the economic impact assessment:

- While we have considered the high-level impact of reform on Councils, we have not analysed the detailed impact on individual Councils. Differences between individual Councils (e.g. different debt profiles) will influence the specific impact of the reform on that Council.
- We have not modelled wages and taxes at a sector level. Taxes are modelled in aggregate, rather than decomposed into specific types of taxes.
- Our analysis focuses only on the potential economic impacts of reform, not social, environmental, cultural, or other wider impacts.

The key requirements of the industry development study were to:

- Engage with affected industries through stakeholder interviews.
- Review relevant experiences of domestic and overseas reforms, and summarise key insights for New Zealand in case studies.
- Develop a narrative that sets out the industries most likely to be affected by reform, their current state, implications of reform for these industries, how they need to develop to leverage the benefits of reform, and how the Government could support industry development.

The following analysis is out of scope for the industry development study:

- While we have identified challenges associated with the envisaged increase in investment, from a workforce perspective our role has not extended to the development of the workforce strategy.
- Our engagement was focussed on entities and sector bodies associated with the immediate water sector supply chain. We did not engage with Councils, wider businesses, or social interests, which may also be impacted by the water reform.

3. Economic Impact Assessment

Overview

An economic impact assessment of the Three Waters Reform

The request

Deloitte Access Economics has been engaged by DIA to assess the potential economic impact of the Three Waters reform, and to develop an understanding of the opportunities and risks presented to the affected industries. The economic impact assessment and affected industries analysis will provide evidence to support the Regulatory Impact Assessment (RIA).

This section of the report provides **results for the economic impact** of the reform. Deloitte Access Economics assessed the economic impact of a material step up in investment in connection with reform, relative to the level of investment that might be expected in the absence of reform (i.e. the counterfactual). The assessment estimates how this would flow through to national and regional indicators such as GDP, employment, wages and taxes. Sections 10 to 17 discuss risks and opportunities for industries affected by reform.

Structure of this section of the report

This section presents the findings of economic impact assessment as follows:

- Overview of economic impact assessment
- Scenario overview
- Approach and inputs
- National impacts
- Workforce impacts
- Distributional impacts

Overview of the economic impact of the reform

- Economic activity involves a range of complex interactions between households, businesses and governments with these agents operating across regions and countries. A change in any part of the economy can therefore have a ripple effect throughout the whole economy. For example, a new project or program might create economic opportunities in one region, but could also increase the scarcity of inputs, and in turn affect output in other sectors.
- Computable General Equilibrium (CGE) models are the best-practice method available for examining the impacts of a change in one part of the economy on the broader economy. This is because CGE models explicitly account for behavioural responses of consumers, firms, governments and foreigners, while evaluating the impacts of a given policy change. At the same time, CGE modelling also accounts for resource constraints and effectively represents the economic trade-offs that face the economy and its participants.
- The economic impact of the reform has been estimated using Deloitte Access Economics' in-house Regional General Equilibrium Model (DAE-RGEM). More technical detail regarding CGE modelling can be found in Appendix A. Economic impact modelling compares two future projections of the economy (scenarios) and compares the difference between the two to estimate net impacts.

The two scenarios are:

- **Counterfactual**: Under the counterfactual scenario, we assumed a pathway for the water sector in the absence of reform. This scenario draws on the expected investment profiles without reform over the 30 years from 2022 to 2051.
- **System transformation**: This scenario models the New Zealand economy with reform, providing an illustrative range of the accelerated investment profile reform could enable relative to the counterfactual. This scenario factors in the expected investment profiles under reform, over the 30 years from 2022 to 2051.

Summary of results for core scenarios

Reform could deliver a significant economic benefit. Our focus in reporting the results are on the Low and High Scenarios to provide an indicative range of the potential economy impact.

Our analysis focuses on Low Scenario and a High Scenario, as this provides a low and high range for the resulting economic impact. Each scenario contains high or low inputs for forward investment profiles for the counterfactual and system transformation scenarios. The net economic impact for each scenario is presented below. We have used a 5% discount rate, per the New Zealand Treasury's default discount rate.*

A summary of the net economic impact relative to the counterfactual – 2022 to 2051. Change in:

Scenario	GDP	Production	Average FTEs	Average wages	Taxes
1. Low Scenario: Low system transformation vs low constrained counterfactual	+$14b	+$29b	+5,849	+0.16%	+$4b
2. High Scenario: High system transformation vs high counterfactual constrained	+$23b	+$47b	+9,260	+0.26%	+$6b

Source: Deloitte Access Economics (2021)

Definitions

GDP: Change in real Gross Domestic Product (GDP) in present value terms over the period 2022 to 2051. GDP includes value added and taxes.

Production: Value of the change in production in present value terms over the period 2022 to 2051. Production is the change in GDP plus the change in intermediate outputs.

Average FTEs: Average change in full-time equivalent employees, over the period 2022 to 2051.

Average wages: Percentage change in average annual wages as a result of reform, over the period 2022 to 2051.

Taxes: Value of the change in overall taxes, in present value terms, as a result of reform over the period 2022 to 2051.

*Using an Social Rate of Time Preference of 3.5%, under the Low Scenario, the GDP result is $18b, production is $36b and taxes are $4.4b. Under the High Scenario, the GDP result is $29b, production is $58b, and taxes are $7.2b.

Summary of results for other modelled scenarios

The Optimistic and Historic Scenarios also show a large positive impact across the economy as a result of reform.

We also modelled two other scenarios based on alternative assumption sets. The net economic impact of the other scenarios is shown below, again using a 5% discount rate. Neither of the two scenarios below are included in our preferred core scenario range. We do not consider the Optimistic Scenario as likely, and as the Historic Scenario is based on historic capital spend rather than a forward looking perspective, which we consider less relevant. The historic scenario provides a cross-check for what might happen if councils do not change historic behaviour in response to increased regulatory and community pressure.

A summary of the net economic impact relative to the counterfactual – 2022 to 2051

Scenario	GDP	Production	Average FTEs	Average wages	Taxes
3. Optimistic Scenario: High system transformation vs low constrained counterfactual	+$25b	+$51b	+10,217	+0.28%	+$6b
4. Historic Scenario: Low system transformation vs historic counterfactual	+$16b	+$32b	+6,667	+0.18%	+$4b

Source: Deloitte Access Economics (2021)

Definitions

GDP: Change in real Gross Domestic Product (GDP) in present value terms over the period 2022 to 2051. GDP includes value added and taxes.

Production: Value of the change in production in present value terms over the period 2022 to 2051. Production is the change in GDP plus the change in intermediate outputs.

Average FTEs: Average change in full-time equivalent employees, over the period 2022 to 2051.

Average wages: Percentage change in average annual wages as a result of reform, over the period 2022 to 2051.

Taxes: Value of the change in overall taxes, in present value terms, as a result of reform over the period 2022 to 2051.

4. Scenario Overview

Scenario Overview

This section summarises the scenarios considered in our assessment of the potential economic impact

Overview of the counterfactual and system transformation scenarios

To understand what the economic impact of the reform could be, it is necessary to determine what the water sector could look like in the absence of reform, and what it could look like with reform. This can be summarised into two broad scenarios:

The counterfactual scenario sets out a pathway for the water sector in the absence of reform. The counterfactual describes what Councils are expected to spend if the reform did not proceed, and the extent to which they might face regulatory pressure. Spend under the counterfactual case is higher than what Councils have spent historically. Debt and price constraints have been applied to the counterfactual. The counterfactual differs from the status quo, which we have not modelled, given regulatory changes (including the establishment of Taumata Arowai) have been confirmed by Cabinet and are in the process of implementation. Data for the counterfactual was based on WICS' phase two analysis, which was sourced through the Request for Information (RFI) process.

The system transformation scenario is illustrative of the forward investment profile the reform could enable far more quickly than under the counterfactual. Data for the system transformation scenario was based on WICS' Phase Two analysis, and modelling undertaken by WICS.

More detail on the policy parameters for each of the scenarios is provided on the subsequent pages.

Given substantive policy decisions which drive the exact volume and nature of investment are yet to be made, there is uncertainty around what the economic benefit might be. To account for this uncertainty, we have modelled four main scenarios, as described opposite.

Overview of the modelled scenarios

We have used two alternative inputs (a low estimate and a high estimate) for both the counterfactual and the system transformation scenario. This formed four modelled scenarios for the economic impact assessment:

1. Low Scenario: This scenario is characterised by a low estimate of the expected additional spend by Councils in the face of new regulatory constraints, and the spend with reform based on relationships between historical enhancement and growth investment in the UK and various geographical indicators (WICS Approach 1).
2. High Scenario: This scenario is characterised by a high estimate of the expected additional spend by Councils in the face of new regulatory constraints, and the spend with reform based on relationships between historical enhancement and growth investment in Scotland and various geographical indicators (WICS Approach 2).
3. Optimistic Scenario: This scenario is characterised by a low estimate of the expected additional spend by Councils in the face of new regulatory constraints, and the spend with reform based on relationships between historical enhancement and growth investment in Scotland and various geographical indicators (WICS Approach 2).
4. Historic Scenario: This scenario is characterised by an estimate of the expected spend by Councils if the regulatory pressure remains but this scenario provides a lower bookend for what might happen in the future if historic rates of expenditure were to continue (i.e. spend is based on the historical trend), and the spend with the reform based on relationships between historical enhancement and growth investment in the UK and various geographical indicators (WICS Approach 1).

This report focuses on the Low Scenario (the most conservative scenario) and the High scenario. We modelled the Optimistic Scenario and the Historic Scenario as sensitivities.

Counterfactual Scenario

Under the counterfactual scenario, Local Government retains responsibility for Three Waters services.

Our low and high estimates for the counterfactual draw on constrained expenditure figures provided by DIA. Constrained expenditure reflects the amount of investment that might be possible without reform, with particular debt and price constraints imposed.* The table below outlines the key, high-level policy parameters underpinning the counterfactual.

Dimension	Description
Number of providers	There is no amalgamation of water services into a small number of WSEs. Instead, the 67 Councils continue to provide Three Waters services, and retain direct ownership of water assets and responsibility for their funding. Revenue is sourced from households or other Council funds, and price increases for customers. Some efficiency gains are assumed for larger Councils, but overall efficiency gains are much lower under the counterfactual than under the system transformation scenario.
Regulatory standards	The establishment of Taumata Arowai, and the introduction of a new water services regulatory framework, will place greater pressure on Councils to improve service delivery. This is expected to improve compliance, regulatory oversight, and transparency and accountability. More regional collaboration across Councils in relation to resource management and land use planning is also anticipated.
Volume of investment	A renewed, collective focus on Three Waters services and greater public scrutiny around service delivery, is expected to drive a material increase in investment. However, a large infrastructure deficit will remain.
Financial constraints	Affordability constraints will limit significant investment, and see most Councils deferring much of their required investment. Borrowing is also likely to rise, although Councils' will not exceed 500% debt to revenue limit for water assets. Councils are expected to offset this higher debt to revenue ratio for water assets with lower debt to revenue ratios for other assets, so they continue to meet the LGFA debt covenants.
Economic regulation	Economic regulation is not introduced - or at least not to the same extent as under a system transformation scenario – as it is not feasible to apply this to 67 separate Councils. This also hinders efficiency gains.

*See page 34 for the specific debt and price constraints imposed.

System Transformation Scenario

System transformation transfers Three Waters services from Councils to a small number of water services entities.

Our low and high estimates for the system transformation scenario are sourced from WICS. The system transformation scenario reflects investment that might be possible with reform, based on either the UK's or Scotland's water reform experience. The table below highlights the key, high-level policy parameters underpinning this scenario.

Dimension	System transformation
Number of providers	Three waters services are shifted away from Councils' remit to a small number of multi-regional water service providers – likely three to five statutory, asset-owning entities. Other legislative changes to enhance the governance, management and resourcing of Three Waters, are also enacted. These changes will deliver a range of efficiencies, including elimination of duplicated functions, a greater ability to attract and retain talent, more effective procurement, and optimisation of asset levels.
Regulatory standards	As under the counterfactual, the WSEs would be subject to monitoring by Taumata Arowai, and a new water services regulatory framework. This will place greater pressure on Councils to improve network performance. However, Taumata Arowai will be able to perform its role more efficiently, as it will not need to monitor and regulate 67 separate Councils.
Volume of investment	Significant capital investment by the WSEs will be enabled through the separation of balance sheets from local Councils, and financial and operational autonomy, which will improve access to debt. The package of reforms (aggregation, policy clarity, stronger governance, and economic regulation) will also enable new entities to realise economies of scale in the delivery of Three Waters services, which can help to offset the significant forward investment requirements. As a result, capex is significantly higher under the system transformation scenario relative to the counterfactual, and the infrastructure deficit is reduced faster. Government funding will support the transition and establishment phases of reform.
Financial constraints	The WSEs will be better able to borrow to fund infrastructure requirements than Councils, as strengthened financial structures will allow them to take on more debt.
Economic regulation	Amongst other things an economic regulatory regime regulates the maximum revenue WSEs can earn for a given level of investment, taking into account required levels of service.

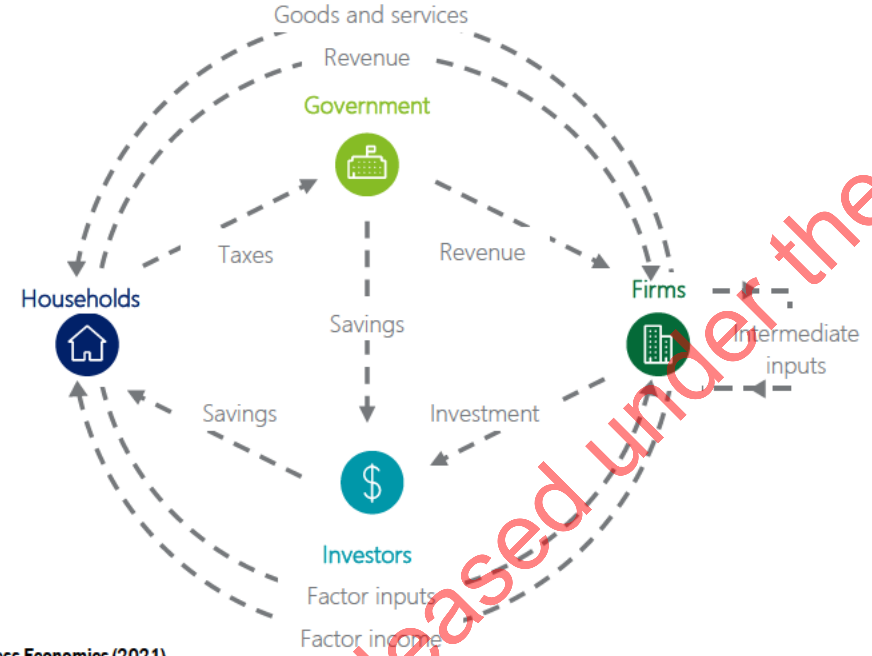
5. Approach and Inputs

Overview

We used Computable General Equilibrium modelling to determine the potential impact of reform on GDP, production, employment, wages and taxes.

The Economic Impact Assessment aimed to understand the impact of reform on GDP, production, employment, average wages and taxes – and how these impacts differ across regions and sectors. This requires an economic model which can assess the impact of a major change or policy on the economy, both over time and in terms of its distributional effects. CGE models are best suited to answering such questions.

We modelled the economic impact of reform using our in-house CGE model, which is a large-scale, dynamic, multi-region, multi-commodity model, representing the demand and supply relationships in the world economy. Below is a visual representation of in-house CGE model.



Source: Deloitte Access Economics (2021)

To show how the economy could change as a result of reform, DAE-RGEM requires a clearly defined baseline scenario, which represents the world without the policy in question (essentially business as usual), and a policy scenario or 'shock' to the model, which captures the world with the policy in question.

We refer to the baseline scenario as the counterfactual, which describes a pathway for the water sector in the absence of reform, and the policy scenario as the system transformation scenario, which describes the world with reform. We set out the key parameters underpinning each scenario on the following pages.

The indicators we modelled, and the dimensions across which they were modelled, are set out below. We have built and used a sixteen region, and fourteen aggregated sector version of our in-house CGE model. The list of sectors and regions is provided in Appendix B.

GDP | Production | Employment | Average wages | Taxes

Impacts across 14 aggregated sectors

Impacts at the national level and 16 main regions, including metro, provincial and rural areas

Annual impact across the 30 years from 2022 to 2051

The impact of COVID-19 has been excluded from our analysis. Despite the impact to economic activity, we do not expect it to be an enduring factor over the 30-year timespan of our analysis (2022 to 2051).

Formulating the shock for the Economic Impact Assessment

We have aggregated incremental capital expenditure profiles from individual Councils/Territorial Authorities into 16 regions to include within our Model.

The Three Waters infrastructure network consists of infrastructure and processes used to collect, store, transmit through reticulation, treat, and discharge, Three Waters. At its core, reform is intended to address the root causes of systemic failure in the existing system for delivering Three Waters. A key benefit of reform is that it addresses the challenges local authorities face in planning for and investing in long term infrastructure needs, by establishing new WSEs with the operational and financial autonomy to undertake a significant uplift in investment to address historic underinvestment, and meet health and environmental standards. DIA and WICS provided capital expenditure (capex) data for the system transformation and counterfactual scenarios, which projected the likely spend with and without reform.

As discussed earlier, CGE modelling considers the flow-on effects of investment in the water sector on other sectors, while accounting for the overall constraints in the economy (e.g. availability of labour). We formulated the CGE shock according to the steps below:

1. We used investment (i.e. capex data), at an individual Council/ Territorial Area (TA) level, over 30 years to calculate the incremental spend based on the difference between the system transformation and counterfactual data.
2. We aggregated TA level incremental investment (i.e. capex data) to a regional level.
3. We applied the incremental regional investment (i.e. capex data) as a shock to the CGE model. This shock was applied to the water sector on a regional basis.

Source: Deloitte Access Economics (2021)

Formulating the shock for the Economic Impact Assessment

We modelled an increase in capex, targeted towards the water sector. The resulting increase in water sector output was assumed to be driven by improved capital productivity.

1. The core input into the CGE model for each scenario was incremental capital expenditure i.e. the difference between projected capex under the system transformation scenario, and projected capex under the counterfactual.
2. The incremental investment data was collected at an individual Council/TA level, and aggregated to a regional level based on the regional boundaries defined by Statistics New Zealand and the location of each TA within a region. Where a TA's geographic boundary spanned two or more regions, we allocated that TA to the region with the greatest overlap.
3. The regional incremental investment profiles were used as the shock to our CGE model and implemented as capital-productivity induced expansion in the water sector's output:
   i. The reform aims to establish new multi-regional WSEs with financial and operational independence. The new entities would have enough balance sheet capacity to raise debt to finance water investment requirements, while being subject to economic regulation that regulates the maximum revenue these entities can earn. The water investment will be funded through a mix of user charges and improved efficiencies. This means the policy to be modelled has three key components: an increase in investment (making up for historical underspend), efficiency improvements in the water sector, and changes in user charges.

   ii. At present, there is only concrete information on the capex component. Simulating a blanket increase in investment across the various regions would give biased impacts – especially given the sector-specific nature of the investment and the general nature of capital in our CGE Model. Without some way to specifically target the water sector, the results would struggle to tell a meaningful story, given generic capex shocks tend to have broad-based benefits with particular concentration in construction, trade and business services.

   iii. Deloitte Access Economics used the capex data for the water sector and implemented this as capital-productivity induced expansion in the water sector's output. We have interpreted the figures in terms of their intended outcome (e.g. improved service outcomes), rather than the investment's expenditure effect. To determine the appropriate link between the level of capital expenditure and the implied improvement in the water sector's output, we pro-rated the investment figures down by the ratio of capital as an input to the water sector as well as the share of capital usage, for which the water sector accounts. So in cases where a region is set to receive a given increase in investment, it instead receives a proxied boost to water output which is achieved via more efficient capital coming online. Therefore, by focusing on a capital productivity shock, the model cannot factor in underlying economic inefficiencies associated with the counterfactual.

In addition, our counterfactual already includes a significant step up in investment relative to the status quo. The economic modelling cannot explicitly account for the impact of existing systemic challenges in the water sector, such as reactive and inefficient spend, and a lack of clear career pathways – which will likely continue under the counterfactual. As a result, the results presented in this report are a conservative estimate of the potential economic impact of reform.

Water infrastructure is complex, expensive, and largely located underground. Based on WICS data, below ground infrastructure is expected to comprise approximately 60% of investment. A number of studies suggest underground infrastructure leads to higher local employment multipliers, given the relatively labour intensive nature of associated capex. Due to data limitations in the counterfactual, the economic impact assessment focuses on the impact of the total investment profile. The Affected Industries section qualitatively discusses the different impacts above versus below ground investment could have.

Formulating the shock for the Economic Impact Assessment

We included a transition path to assess the economic impact of the reform.

To assess the economic impact of reform, Deloitte Access Economics applied a transition period to the reform programme, thereby delaying some of the economic impact of reform. For the purposes of this report, we assumed a transition path of six years.

Based on international experience, the transition path could be shorter if existing processes are already in place with the establishment of the new water entity. For example, Victoria (Australia) had a shorter transition period, where Ballarat Water Board absorbed a number of smaller water entities. However, if wholly new processes or entities need to be established, the transition period may be longer, as was the case with the Tasmanian water reform.

This reform is shaping up to be one of the largest in New Zealand's history, given it involves moving from 67 local Councils to a small number of new water entities. Establishing the new entities will be a large and complex process. The first phase of reform will need to focus on the establishment of the new entities, before reform activities themselves can get fully underway. This implies the transition period could be relatively long, with time needed to complete entity establishment, commence scoping of capital work requirements, and spending money. Accordingly, efficiency savings are likely to be delivered gradually over time as the new entities are established, and systems and processes take effect.

The transition path will also be influenced by the political will to drive reform, including the level of desire to accelerate the pace of change. For example, commitments that no staff will lose their jobs will affect the pace of change.

Scenarios modelled

We modelled four scenarios, with incremental capital expenditure the key input for each scenario.

To understand the potential economic impact of reform, we modelled four scenarios our in-house CGE model.

The table below summarises the total investment* required under the counterfactual and system transformation scenarios, under different data inputs – either a low estimate or a high estimate, or in the case of the "Historic Scenario", the counterfactual is based on trends in historic spend.

Water investment projected under each modelled scenario and the incremental ~~water~~ investment applied to assess the economic impact of reform (Total capex, 2022 to 2051, billions)

Scenario	System transformation capex	Counterfactual capex	Incremental capex
1. **Low Scenario:** Low system transformation vs low constrained counterfactual	$120b	$55b	$65b
2. **High Scenario:** High system transformation vs high counterfactual constrained	$185b	$69b	$116b
3. **Optimistic Scenario:** High system transformation vs low constrained counterfactual	$185b	$55b	$130b
4. **Historic Scenario:** Low system transformation vs historic counterfactual	$120b	$44b	$76b

Source: Deloitte Access Economics (2021)

**We have not modelled operating expenditure (opex). Modelling opex would likely show an additional economic benefit, which implies the results presented in this report are conservative.*

Incremental capex profiles

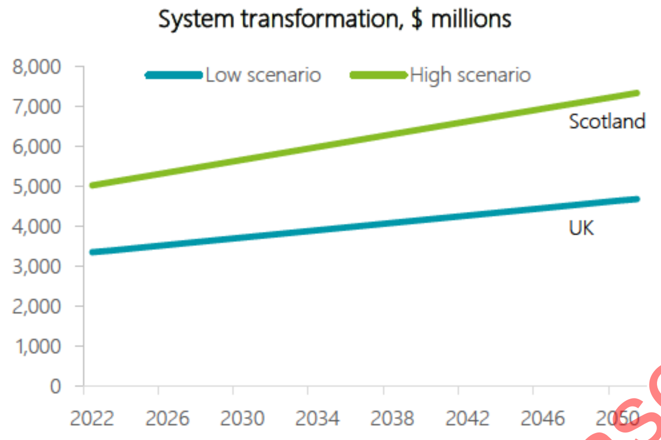
Using data from WICS and DIA, we produced an incremental capex for each modelled scenario. The shape of the incremental capex profile is based on the data inputs provided by WICS and DIA.

WICS provided a low and high estimate for the system transformation scenario, based on benchmarking against investment levels in the entirety of the UK or Scotland alone (i.e. WICS' approaches one and two), with these figures reflecting the policy parameters outlined in section 4 and on page 34.

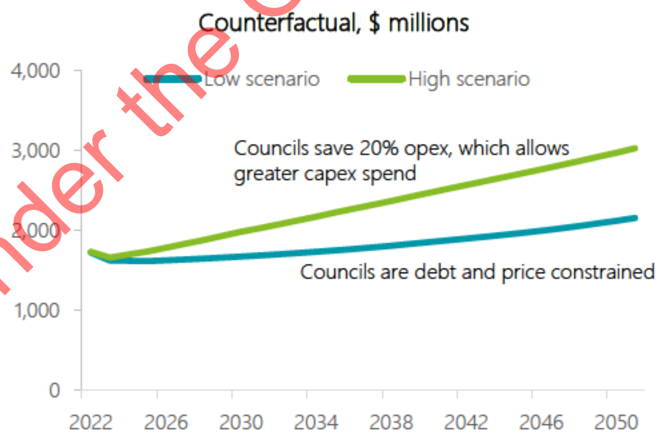
Under both the low and high estimates for the counterfactual, all Councils continue to face an infrastructure deficit (or capex backlog). However, under the high estimate for the counterfactual, DIA has assumed Councils are able to save 20% in opex spend in turn facilitates an increase in capex spend; hence the capex spend is greater under the high estimate than the low estimate.

While DIA has not sought to quantify where these savings come from, they are likely to be a combination of improved efficiencies, cost savings on opex, a relaxation of debt and/or price constraints, or a reprioritisation of spend towards capex.

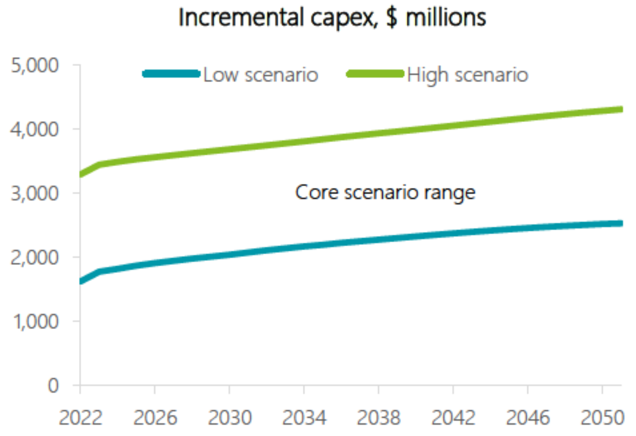
The system transformation and counterfactual capex profiles were used to calculate incremental capex, or the additional investment directly attributable to reform. This is the difference between projected capex under the system transformation scenario, and projected capex under the counterfactual for each year between 2022 and 2051. Data for the incremental capex profiles are based on phase two WICS data sourced through the Request for Information (RFI) process, and parameters developed by DIA. Given the incremental capex profiles are the core input to the CGE model, they directly influence the shape of our results, when presented over time. The capex profiles (all in real terms) are provided below.



Source: WICS



Source: DIA



Source: Deloitte Access Economics (2021) based on WICS and DIA

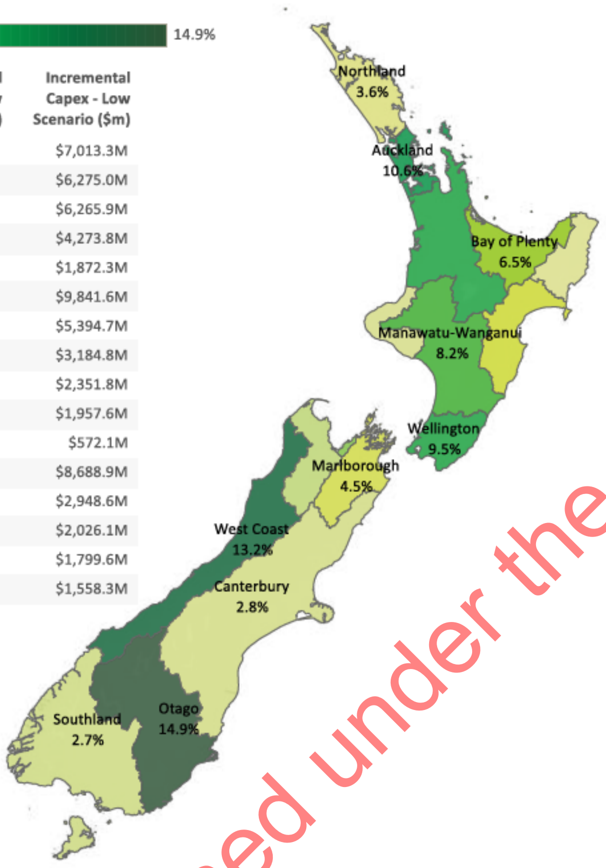
Incremental capex profiles

Using data from WICS and DIA, we produced an incremental capex profile for each scenario. These were the core inputs into the CGE model.

Incremental Capex - Low Scenario (%)

0.9% — 14.9%

Classification	Region	Incremental Capex - Low Scenario (%)	Incremental Capex - Low Scenario ($m)
Metropolitan	Auckland	10.6%	$7,013.3M
	Waikato	9.5%	$6,275.0M
	Wellington	9.5%	$6,265.9M
	Bay of Plenty	6.5%	$4,273.8M
	Canterbury	2.8%	$1,872.3M
Provincial	Otago	14.9%	$9,841.6M
	Manawatu-Wanganui	8.2%	$5,394.7M
	Hawke's Bay	4.8%	$3,184.8M
	Northland	3.6%	$2,351.8M
	Taranaki	3.0%	$1,957.6M
	Nelson	0.9%	$572.1M
Rural	West Coast	13.2%	$8,688.9M
	Marlborough	4.5%	$2,948.6M
	Gisborne	3.1%	$2,026.1M
	Southland	2.7%	$1,799.6M
	Tasman	2.4%	$1,558.3M

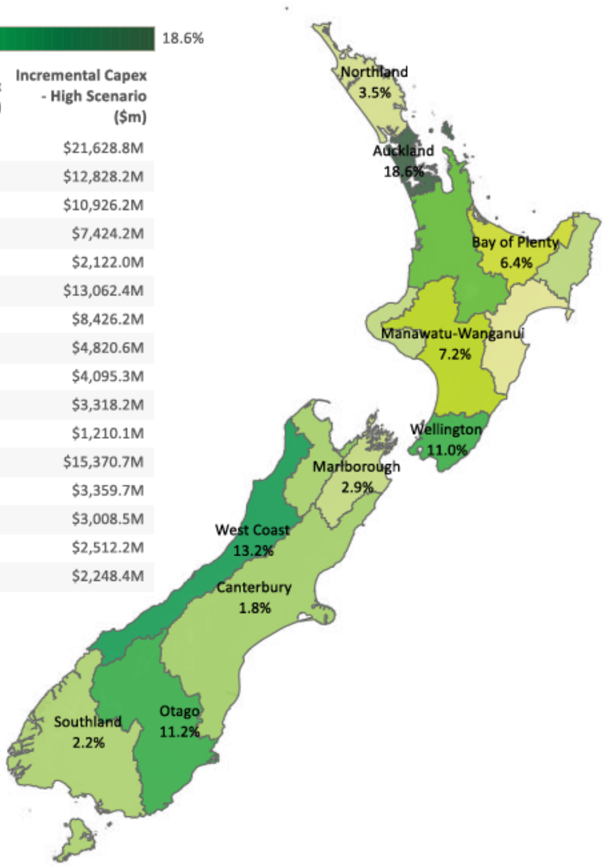


Source: Deloitte Access Economics (2021)

Incremental Capex - High Scenario (%)

1.0% — 18.6%

Classification	Region	Incremental Capex - High Scenario (%)	Incremental Capex - High Scenario ($m)
Metropolitan	Auckland	18.6%	$21,628.8M
	Wellington	11.0%	$12,828.2M
	Waikato	9.4%	$10,926.2M
	Bay of Plenty	6.4%	$7,424.2M
	Canterbury	1.8%	$2,122.0M
Provincial	Otago	11.2%	$13,062.4M
	Manawatu-Wanganui	7.2%	$8,426.2M
	Hawke's Bay	4.1%	$4,820.6M
	Northland	3.5%	$4,095.3M
	Taranaki	2.9%	$3,318.2M
	Nelson	1.0%	$1,210.1M
Rural	West Coast	13.2%	$15,370.7M
	Marlborough	2.9%	$3,359.7M
	Gisborne	2.6%	$3,008.5M
	Southland	2.2%	$2,512.2M
	Tasman	1.9%	$2,248.4M



Source: Deloitte Access Economics (2021)

Model design

An overview of our model design, the key inputs and outputs are provided below.

Models

Assumptions Workbook

- Counterfactual: Low Scenario capex
- System transformation: Low Scenario capex
- Mapping of capex profiles from a TA to regional level
- Counterfactual: High Scenario capex
- System transformation: High Scenario capex

CGE Model

- Economic modelling based on incremental capex profiles from Assumptions Workbook
- Varying of parameters/sensitivities
- Customised database of 14 aggregated sectors and 16 main regions

Area Impact Model

- Classification of regions as metro/rural/provincial based on population density

Inputs

- Counterfactual capex data (DIA)
- Population, land area by region, regional GDP and employment (StatsNZ)
- System transformation capex data (WICS)
- Policy parameters (DIA)

Outputs

- Change in GDP by 14 aggregated sectors, over 30 years and by area
- Change in production by 14 aggregated sectors, over 30 years and by area
- Change in employment by 14 aggregated sectors, over 30 years and by area
- Change in average wages by area, and over 30 years
- Change in taxes by area, and over 30 years

Key data sources

WICS' system transformation profile uses two approaches: the investment in the UK (approach one) or Scotland alone (approach two). DIA's counterfactual capex profile assumes debt and pricing constraints.

System transformation data

WICS provided data based on their defined Approaches One and Two for the system transformation scenario.

Approach one

Under approach one, the 'Revised approach used in phase one', WICS estimated potential expenditure on enhancement, growth and renewals. Enhancement and growth expenditure refers to the provision of new assets or enhancement of existing assets, while replacements refer to capital maintenance expenditure needed to maintain existing service levels to customers.

Enhancement expenditure was modelled based on investment in the UK, with population and geographic drivers accounted for. A similar method was used to estimate growth investment, but data for this was sourced from the RFI. This included growth from projected new connections reported by Councils, and a cap per connected citizen of $70,000 to account for financial constraints faced by Councils. WICS uses growth projections provided by Councils. Renewals were modelled in terms of the average annual replacement expenditure (i.e. economic depreciation), based on asset values reported by Councils.

Approach two

This aligns with approach one, with modelling undertaken based on population and geographic drivers, growth adjustments, and capping. However, modelling was benchmarked against Scotland only (rather than all of the UK). This was deemed appropriate as Scotland has many geographical and economic similarities with New Zealand.

Counterfactual

DIA drew on WICS data to forecast capex under the counterfactual scenario. A starting position was determined for Councils (i.e. revenue, operating expenditure, debt) based on WICS' phase two analysis, and in turn the level of capital expenditure that might be possible if Councils reach their debt limits, and raise water prices in line with historic increases.

The assumed water price increase is a maximum of 4.4% per annum, in line with the historical rate of increase (between 1993 and 2018).

As mentioned, the debt limit imposed does not allow Councils to exceed a debt to revenue ratio of 500% for water assets. Where the starting debt to revenue ratio is below 500%, it is assumed the debt to revenue ratio increases over time.

A 500% debt to revenue ratio for water assets is a conservative assumption, as most Councils use lower debt to revenue ratios in other areas to offset a higher debt to revenue ratio for water assets, ensuring they do not breach a debt to revenue ratio of 250%.

The forecast interest rate is assumed to be 3.5%.

6. National Impacts

Impact on gross domestic expenditure, production and tax implications

Impact on gross domestic product

Reform impacts every corner of the economy and could see the economy expand by $14 billion to $23 billion over the next 30 years, relative to the counterfactual.

The scenarios reported demonstrate the range of potential economic benefits reform could generate. The larger impacts are the results underpinning the **High Scenario**, while the more moderate results are the results underpinning the **Low Scenario**.

Reform allows economic activity to increase relative to the counterfactual, resulting in higher New Zealand GDP. GDP is value added plus taxes.

Compared to the counterfactual, under the **High Scenario**, Deloitte Access Economics estimated:

- The reform will increase GDP by a cumulative **$23.2 billion** from 2022 to 2051 (in present value real terms using a real discount rate of 5%), which **represents 7.1% of the current size** of the New Zealand economy.
- On average, the **New Zealand economy would be 0.46% larger** per annum than it otherwise would have been under the counterfactual.

Under the **Low Scenario**:

- GDP will increase by **$14.4 billion**, which represents **4.4% of the current size of the economy**.
- In relative terms, this equates to an **average increase in GDP of 0.29% per annum**.

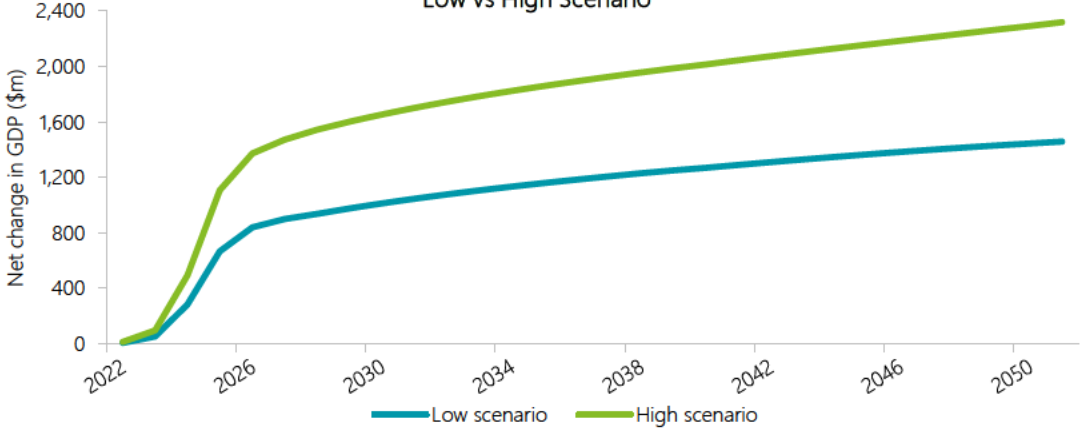
The economic impact analysis focuses on the incremental impact of the reform. However, the counterfactual envisages a material step up in investment from the status quo. For instance, under the Low Scenario, the GDP impact is estimated based on incremental capital expenditure of $65 billion, on top of $55 billion of capital expenditure included in the counterfactual.

National GDP impact relative to the counterfactual between 2022-2051

Scenario	GDP impact ($b)	Average increase in GDP	Percentage of the current size of the economy
Low	14.4	0.29%	4.4%
High	23.2	0.46%	7.1%

Source: Deloitte Access Economics (2021)

Net change in GDP between 2022-2051 as a result of reform ($ millions)
Low vs High Scenario



Source: Deloitte Access Economics (2021)

These results highlight the critical role the reform can play in the New Zealand economy. These results also show that even under the a more moderate investment profile, reform will still deliver economic dividends for New Zealand.

What impact does reform have across industries?

Reform supports economic growth across all sectors.

The impact on sectors is not equally distributed. **The impact of the reform across sectors are illustrated in more detail on the next slide.** There is an increase in activity across all sectors, particularly those that are more capital and water intensive. This activity is initially driven by activity in the water sector associated with reform, and subsequently there are positive flow-on impacts to sectors across New Zealand.

Under the Low Scenario, Trade ($1.5b) Financial services ($0.7b), Construction ($0.8b), Business Services ($2.5b) and Other Services ($5.1b) are expected to see the largest increases in GDP as a result of reform. Growth in GDP in the Business Services sector due to reform may be associated with greater activity at the Strategy and Planning, and Financing and Procurement, stages of the water industry life cycle. The sector impact under the High Scenario is also summarised in the table below.

The GDP impact on the water delivery sector may start to decline in relative terms versus the counterfactual from 2038 onwards, as cost savings and efficiencies increase. In today's terms, GDP in the water sector still increases by $0.3b between 2022 and 2051. The step-up in investment increases output in the water delivery sector, via improved capital efficiency. Any relative decline in water sector GDP is offset by an increase in intermediate inputs (i.e. how reform benefits all other sectors).

The modelling of sector GDP in this report defines the **water delivery sector** as water supply, sewerage, and drainage services as well as waste collection, treatment and disposal services based on ANZIC codes. This definition will not pick up economic activity in the broader water sector supply chain (e.g. water engineers and construction of water assets).

We recognise the economic activity in the water sector and affected sectors are fluid and it may be difficult to attribute activities to a specific ANZIC code. For example, an engineer involved in strategy and planning of a water project will be captured under Business Services, even though it relates to the water sector. Similarly, construction activity as a result of the reform will be captured under Construction, even though part of the project organisation and execution may be conducted by a Professional firm.

The Other Services sector is forecast to see the largest increase in GDP. Other services includes Public Administration & Defence, Education, Human Health and Social Work Activities, and Dwellings (i.e. residential housing). These are large sectors, which all benefit from the GDP and output growth facilitated by reform.

GDP impact relative to the counterfactual between 2022 to 2051, by selected sectors ($b)

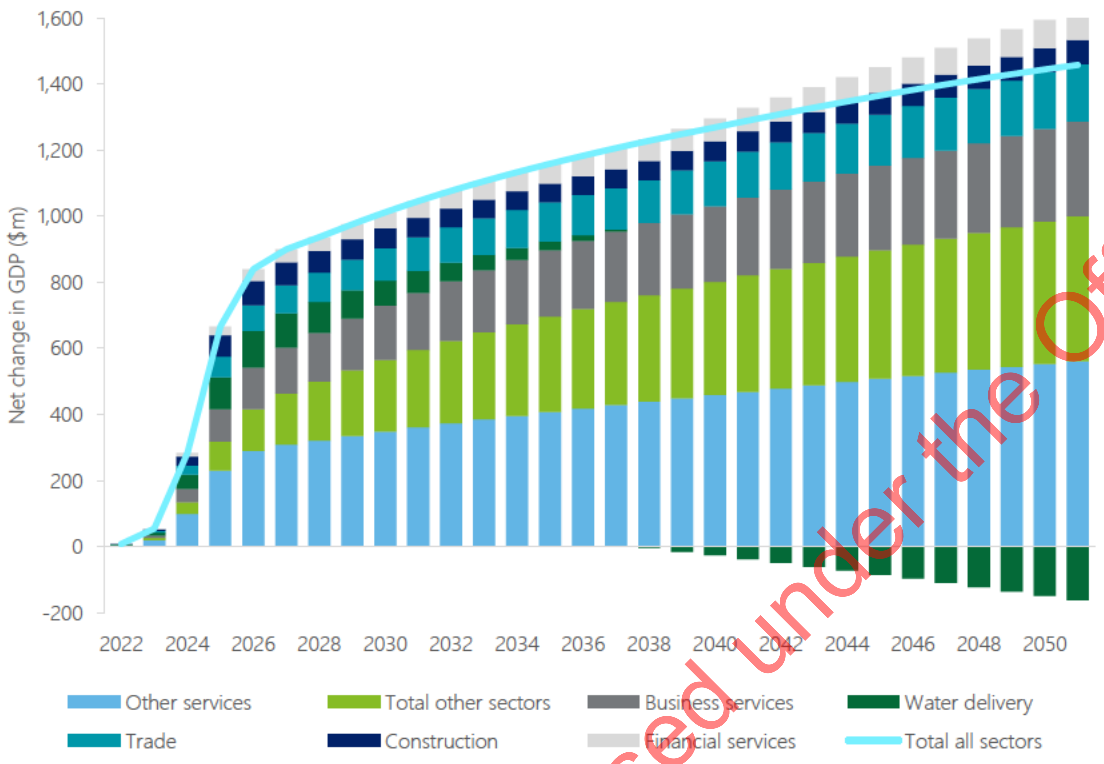
Sector	Trade	Financial Services	Construction	Business Services	Other Services
Low Scenario	1.5	0.7	0.8	2.5	5.1
High Scenario	2.4	1.2	1.4	4.1	8.2

Source: Deloitte Access Economics (2021). Note the figures in this table do not add up to the total GDP impact, as this table only presents the sectors with the largest GDP impact as a result of reform.

What impact does reform have across sectors?

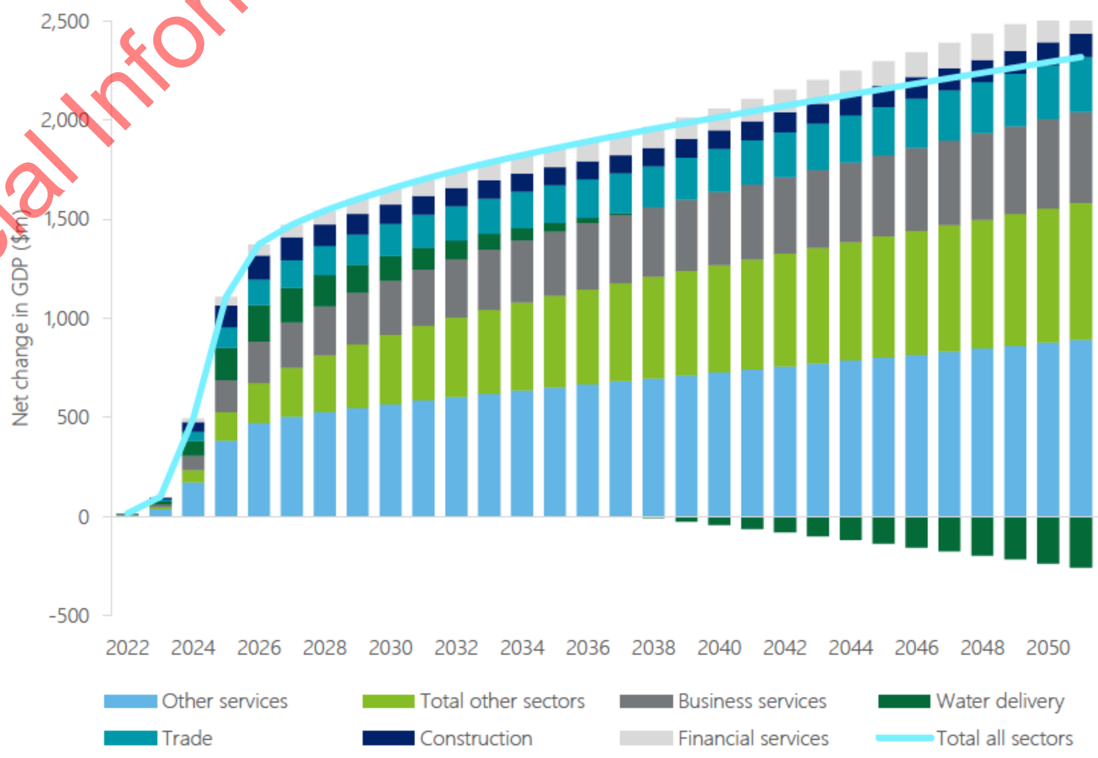
Reform supports economic growth across all sectors. The GDP impact in economic activity in the broader water sector supply chain captured in other sectors offsets the cost savings and efficiency gained in the water delivery sector.

Low Scenario
Net change in GDP each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

High Scenario
Net change in GDP each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

Impact on production and taxes

Reform could see production expand by $29 billion to $47 billion over the next 30 years, and generate $4 billion to $6 billion in additional tax revenue, relative to the counterfactual.

Impact on production

Reform will expand production (value added plus intermediate inputs) in the New Zealand economy. Compared to the counterfactual, under the **High Scenario**, Deloitte Access Economics estimated reform will:

- Expand production at a national level by **$46.6 billion** (in real present value terms using a real discount rate of 5%), over the period 2022 to 2051.
- Increase production by **$3.4 billion** on average, each year, relative to the counterfactual.

Under the **Low Scenario**, reform is projected to:

- Expand production (above the counterfactual level) at a national level by **$28.9 billion** (in real present value terms using a real discount rate of 5%), over the period 2022 to 2051.
- Increase production by **$2.1 billion** over the period 2022 to 2051.

Impact on tax

Deloitte Access Economics also estimated the economy wide tax revenue associated with the reform.

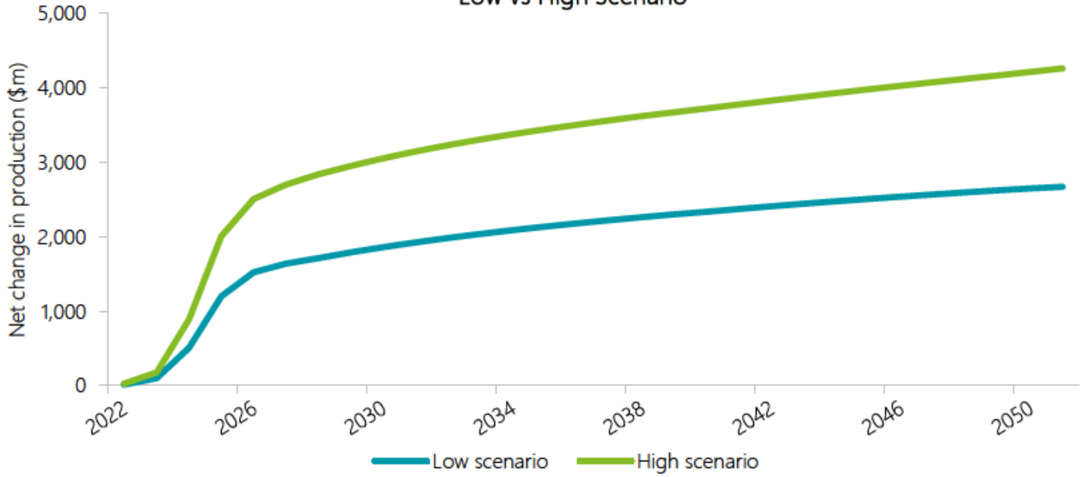
- Under the **Low Scenario**, our modelling shows reform will increase tax revenue by **$3.6 billion** from 2022 to 2051 (in real, net present value terms using a real discount rate of 5%) relative to the counterfactual.
- Under the **High Scenario**, Deloitte Access Economics also estimated the tax revenue associated with the reform. Our modelling shows reform will increase tax revenue by **$5.8 billion** from 2022 to 2051 (in real, net present value terms using a real discount rate of 5%) relative to the counterfactual.

National impact on production relative to the counterfactual over 2022 to 2051

Scenario	Production ($b)	Average annual increase ($b)
Low	28.9	2.1
High	46.6	3.4

Source: Deloitte Access Economics (2021)

Net change in production between 2022-2051 as a result of reform ($ millions)
Low vs High Scenario



Source: Deloitte Access Economics (2021)

7. Workforce Impacts

Workforce Impacts

Reform is expected to support jobs across the economy. Relative to the counterfactual, New Zealand could have on average 5,849 to 9,260 additional FTE jobs, over the 30 years

Impact on employment

Reform is also projected to increase employment in the New Zealand economy. Under the **High Scenario**, it is estimated reform will:

- Add **9,260 full-time equivalent (FTEs)** on average, each year, over the next 30 years compared to the counterfactual. This represents approximately **0.41% of the current total workforce** in the economy or **0.57% of the total FTEs** in New Zealand.*
- On average, the number of **FTEs is 0.30% larger** than it otherwise would have been under the counterfactual.

Under the **Low Scenario**, it is estimated reform will:

- Add **5,849 FTE jobs** on average from 2022 to 2051, compared to the counterfactual scenario. This represents approximately **0.26% of the current total workforce** in the economy or **0.36% of the total FTEs** in New Zealand.*
- On average, the number of **FTEs is 0.19% larger** than it otherwise would have been under the counterfactual.

Charts on the sectoral breakdown of the employment impact are presented on the next page. The charts show the sectors with the largest benefits as a result of reform include Construction, Financial Services, Trade, Business Services, and Other Services (including local government).

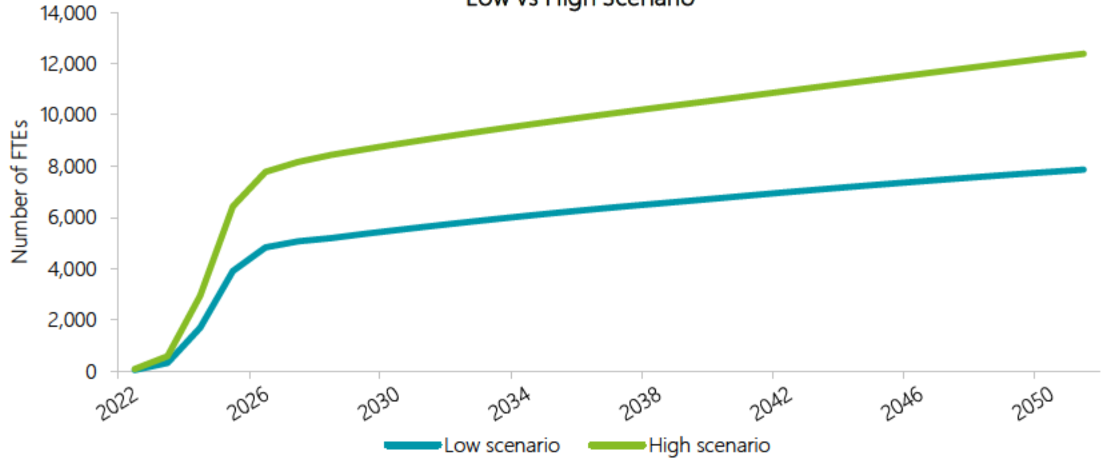
**According to Statistics New Zealand, the total workforce is currently 2,239,691 and the total current number of FTEs is 1,636,300.*

National impact on employment, relative to the counterfactual, 2022-2051

Scenario	Average additional FTEs pa	Average increase in FTEs pa	% of the current size of the workforce	% of the current full-time equivalent jobs
Low	5,849	0.19%	0.26%	0.36%
High	9,260	0.30%	0.41%	0.57%

Source: Deloitte Access Economics (2021)

Net change in FTEs between 2022-2051 as a result of reform
Low vs High Scenario

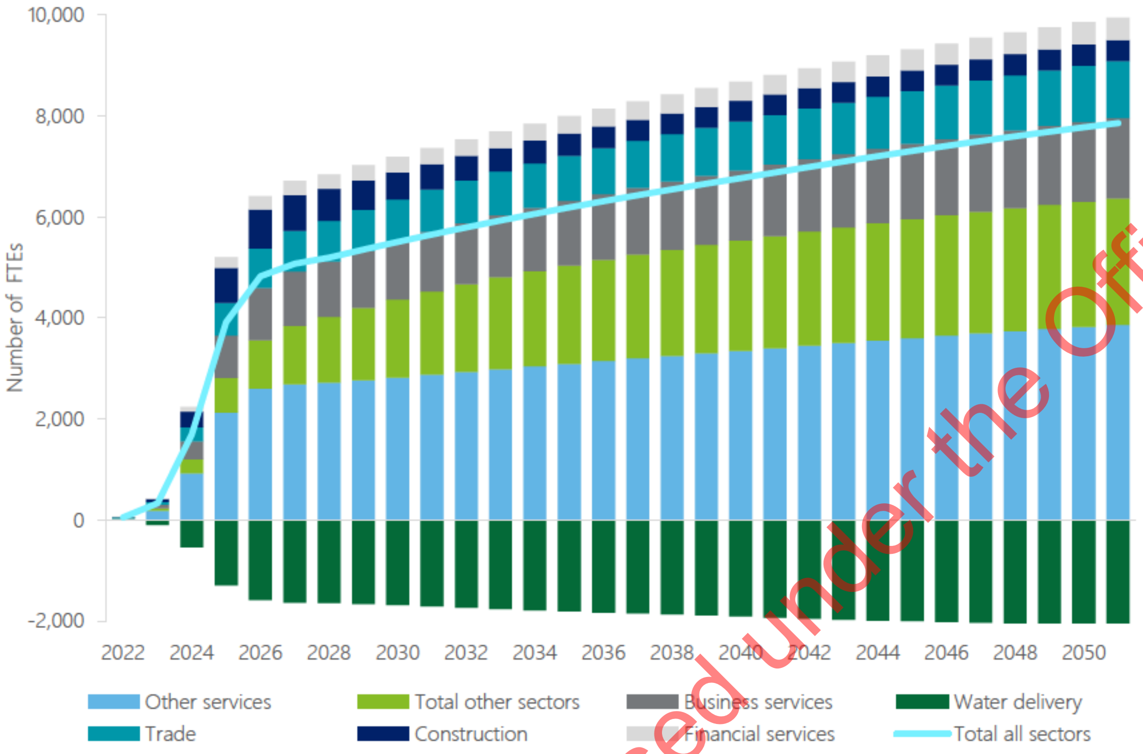


Source: Deloitte Access Economics (2021)

Workforce Impacts

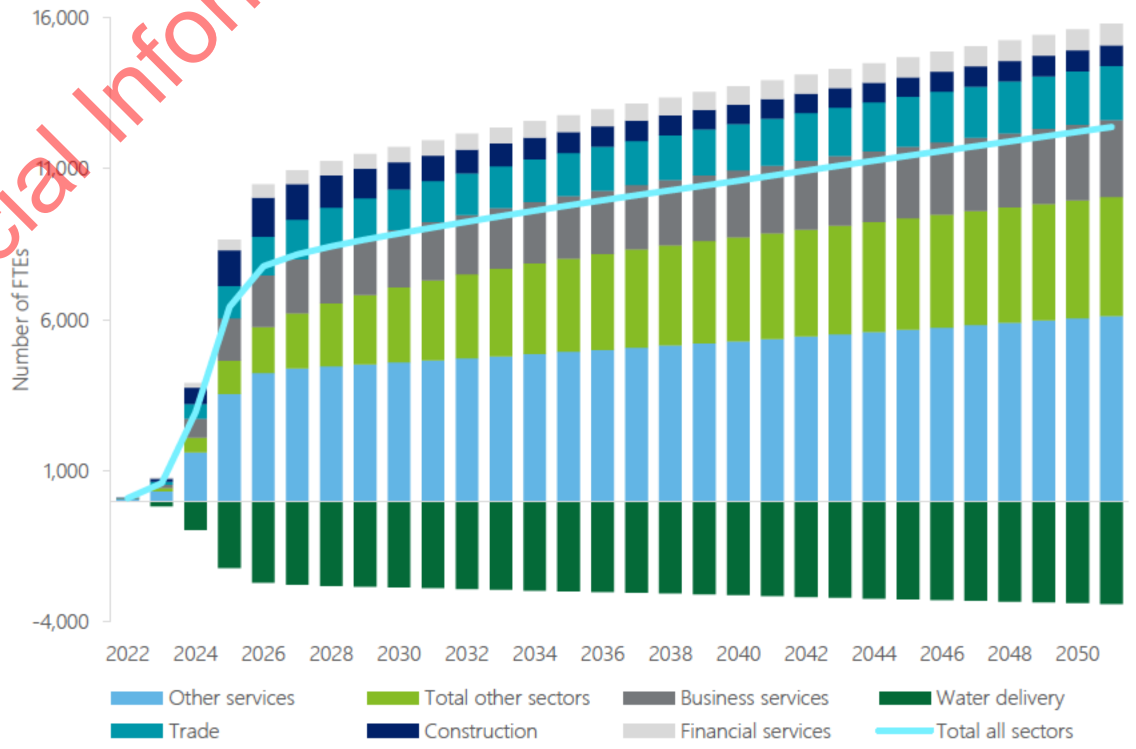
Reform is expected to create substantial additional FTEs across all sectors. The rate of job growth in FTEs in the water delivery sector may be slower under the system transformation scenario compared to the counterfactual.

Low Scenario
Net change in FTEs each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

High Scenario
Net change in FTEs each year as a result of reform, by selected sectors



Source: Deloitte Access Economics (2021)

Workforce Impacts

Total FTE jobs in the water sector are anticipated to increase by up to 80% following reform. However, growth is expected to be slower under reform relative to the counterfactual.

Impact on employment

The workforce for the water sector is complex. Similar to the sectoral analysis, the modelling of FTEs in this report defines the **water delivery sector** as water supply, sewerage, and drainage services as well as waste collection, treatment and disposal services based on ANZIC codes. This definition does not pick up employment outside of those services that are part of the broader water sector supply chain (e.g. water engineers and construction of water assets).

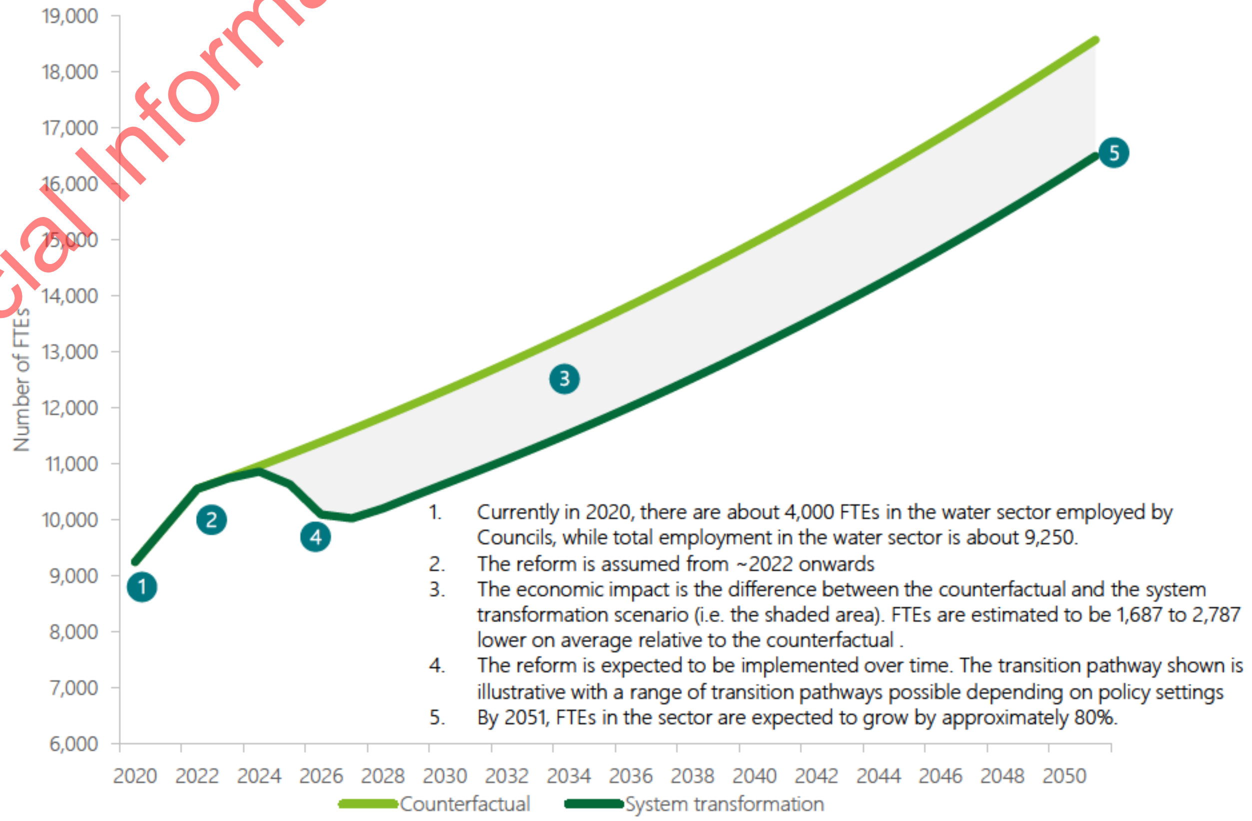
As the sector grows over time, the employment level rises to almost 80% higher than the current levels. As the sector matures, opportunities arise for greater specialisation and more attractive career pathways within the water workforce.

In both the Low and High scenarios, the employment impact in terms of additional FTEs is significantly positive for all sectors. However, the pace of growth in water sector FTEs under the system transformation is expected to be slower than under the counterfactual. At a national level, it is expected that there may be between 1,687 (under the Low Scenario) to 2,787 under the High Scenario) fewer additional job FTEs on average in the water sector under the system transformation scenario, relative to the counterfactual.

The reasons for this are likely to include a shift in composition of the workforce during the transition (given the ageing workforce, removal of duplicative jobs through reform and the increase in employment opportunities in other sectors) and in the longer term as more efficient systems and processes for delivering three waters take effect and improve labour productivity.

Scotland had a similar outcome in its water reform. Scottish Water's headcount reduced by 2,500 FTEs over time; but total employment (water sector and its supply chain) has increased – a net estimated increase of 4,000 FTEs. WICS noted that New Zealand could experience something similar.**

An illustration of the impact on employment in water sector (Total FTEs - based on the Low Scenario)



Source: Deloitte Access Economics (2021)

**Water New Zealand, National Performance Review 2018 – 2019 (Water New Zealand, 2019), 18.*

*** WICS, 01 April 2021, Economic Analysis of water services aggregation [Draft report], page 40*

Wage Growth

Average wages are expected to increase as a result of the reform, mainly driven by an increase in labour productivity.

At the national level, reform is expected to generate an increase in average real wages of **0.16% under the Low Scenario, and 0.26% under the High Scenario**, over the period from 2022 to 2051.

National impact on real wages, relative to the counterfactual, 2022 to 2051

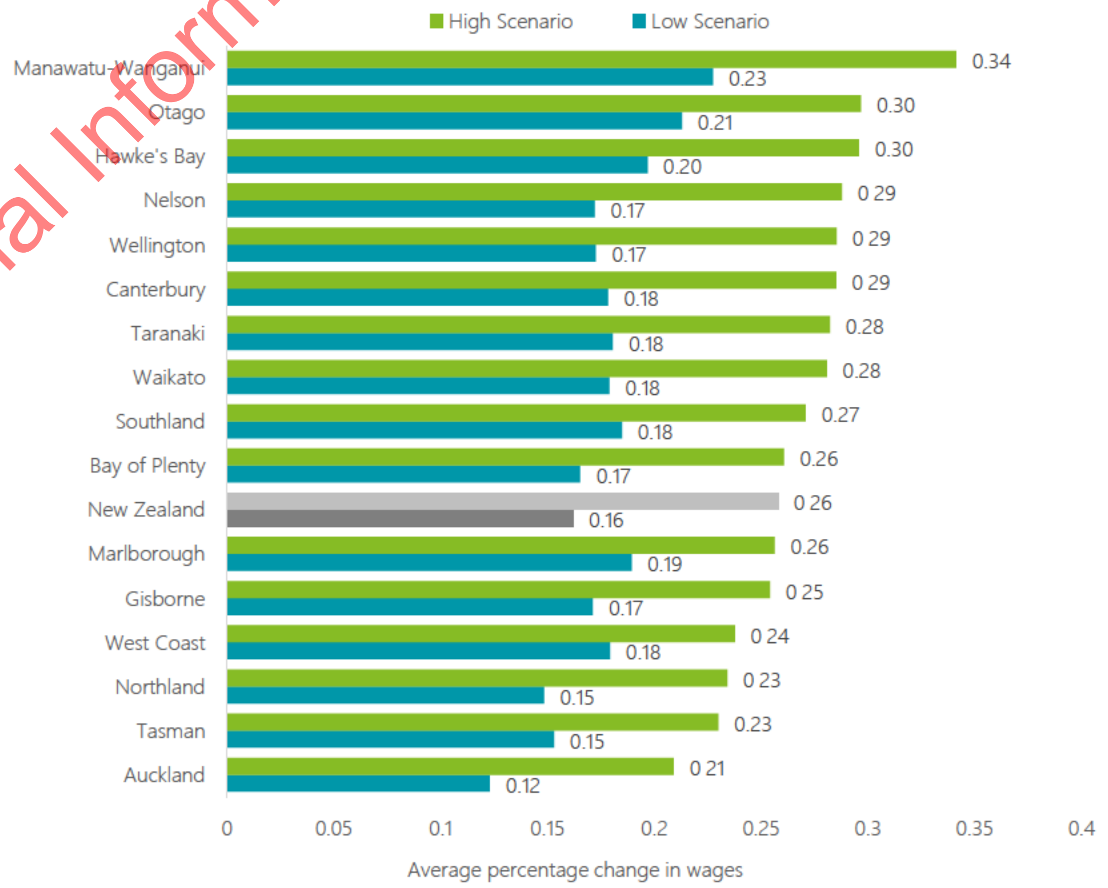
Scenario	Average increase in wages in real terms
Low	0.16%
High	0.26%

The increase in wages is mainly driven by the increase in labour productivity as a result of reform. Reform is expected to drive improved capital productivity through capital deepening – an increase in the proportion of capital stock relative to the number of labour hours worked. Capital deepening therefore leads to an increase in labour productivity, which can be associated with changes in wages.

All regions are expected to see an increase in average wages, but with some variation across regions. The impact on wages across regions is driven by the structure of each regional economy, cost of labour and labour productivity. In addition, sectors which see some of the largest gains in employment and GDP (e.g. Business Services, Financial Services), are more likely to have a higher proportion of skilled (rather than unskilled) employment, which increases the cost of labour.

The modelling suggests most regions will see an increase in average annual real wages close to the national impact. Manawatu-Wanganui is estimated to gain the most as a result of reform, followed by Otago, Hawke's Bay, Nelson, and Wellington. On the other hand, Auckland, Tasman and Northland see the smallest gains relative to the national average.

Average change in wages as a result of reform, regional overview
Low Scenario vs High Scenario



Source: Deloitte Access Economics (2021)

8. Distributional Impacts

How is the impact distributed across regions and across metropolitan, provincial and rural areas?

Distributional Impacts

Every region in New Zealand is positively affected by the economic impacts of the reform, but not all regions are impacted equally.

The previous section of the report explored the national economic impact of the reform – but that's only part of the story. Every region is positively affected by the economic impact of reform, with increases in GDP, production, employment, taxes and average wages are expected. However, not all regions are impacted equally – the magnitude of the increase in GDP and employment differs considerably across regions, and when considered in terms of metropolitan, rural and provincial areas. Rural and provincial areas (per the classifications opposite, based on population density) have the most to gain from reform, as these areas currently face large infrastructure deficits.

Heterogeneous impacts across regions are the result of differing structures and dynamics of each region's economy. Import-oriented regions (that is, inter-regional importing, as well as imports from overseas), benefit more than areas which are more exposed to domestic demand (spending and production within that area). As a result, smaller, import-oriented regions such as the West Coast, Gisborne, Marlborough and Southland see larger relative benefits.

We classified the 16 main regions into metropolitan, provincial and rural areas, based on population density and regional characteristics to consider local impacts of reform. Opposite is a summary of the classification we used:

Regions classified as metropolitan

Auckland

Wellington

Bay of Plenty

Waikato

Canterbury

Regions classified as provincial

Northland

Hawke's Bay

Taranaki

Manawatu-Wanganui

Nelson

Otago

Source: Deloitte Access Economics (2021)

Regions classified as rural

Gisborne

Tasman

Marlborough

West Coast

Southland

What impact does reform have across areas?

Low Scenario

Impact on GDP by region, relative to current regional GDP

New Zealand is projected to gain $14.4 billion as a result of the reform, representing approximately 4.4% of the current size of the total New Zealand economy. How is this impact distributed across areas?

The heat map shows the impact on regional GDP, in real present value terms over 30 years, as a proportion of the region's current GDP. Relative to the impact on the economy at a national level, regions characterised as rural and provincial are likely to benefit the most from reform.

Based on the current GDP of each region, **all rural regions benefit by more than the national average from reform**. The estimated change in GDP would represent 8.5% of the current regional GDP in Gisborne, 8.1% in West Coast, 7.1% in Marlborough, 5.7% in Tasman/Nelson and 5.2% in Southland.

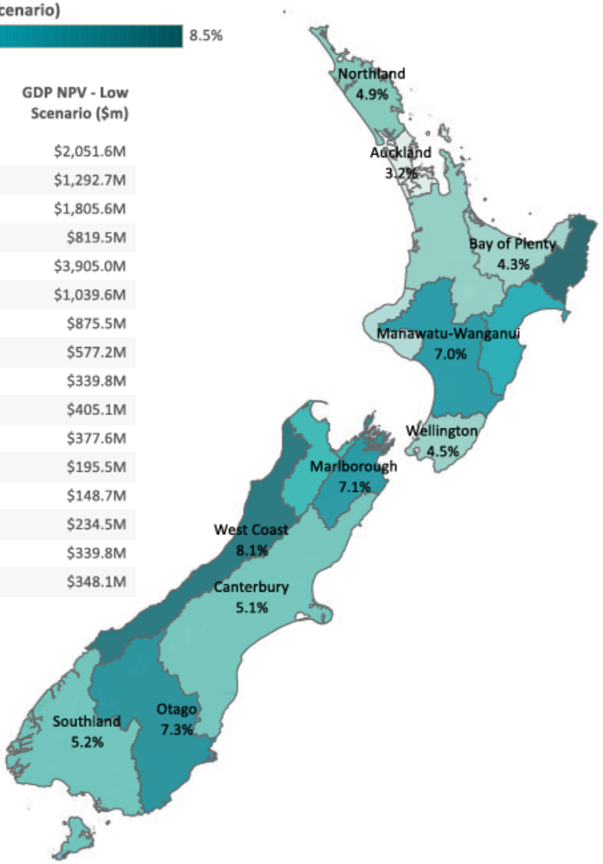
Most regions classified as provincial will also gain more than the national average. The estimated change in GDP would represent 7.3% of the current regional GDP in Otago, 7.0% in Manawatu-Wanganui, 6.3% in Hawke's Bay and 4.9% in Northland. However, Taranaki will gain less than the national average, where the estimated GDP impact is 4.0% of its current GDP.

Metropolitan regions see larger gains than the national average, except for Auckland. The GDP impact is 3.2% of Auckland's current GDP. While Auckland's GDP growth is below the national average, it represents 27% of the national increase and in absolute terms is still significant at $3.9b, relative to the counterfactual. Waikato and Wellington are estimated to benefit by slightly more than the national average, where the change in GDP is 4.6% and 4.5% of the current regional GDP, respectively. The metropolitan region which benefits most is Canterbury, where the GDP impact is 5.1% of its current GDP.

Net change in GDP as a proportion of current GDP (Low Scenario)

3.2% – 8.5%

Classification	Region	GDP change (%) - Low Scenario	GDP NPV - Low Scenario ($m)
Metropolitan	Canterbury	5.1%	$2,051.6M
	Waikato	4.6%	$1,292.7M
	Wellington	4.5%	$1,805.6M
	Bay of Plenty	4.3%	$819.5M
	Auckland	3.2%	$3,905.0M
Provincial	Otago	7.3%	$1,039.6M
	Manawatu-Wanganui	7.0%	$875.5M
	Hawke's Bay	6.3%	$577.2M
	Nelson	5.7%	$339.8M
	Northland	4.9%	$405.1M
	Taranaki	4.0%	$377.6M
Rural	Gisborne	8.5%	$195.5M
	West Coast	8.1%	$148.7M
	Marlborough	7.1%	$234.5M
	Tasman	5.7%	$339.8M
	Southland	5.2%	$348.1M



Source: Deloitte Access Economics (2021)

What impact does reform have across areas?

High Scenario

Under the High Scenario, it is estimated New Zealand would gain $23.2 billion over 2022 to 2051, representing 7.1% of the current size of the total New Zealand economy. The GDP impact under the High Scenario reveals a similar area distribution compared to the Low Scenario. Rural regions are estimated to gain the most relative to the estimated national average as a result of reform.

The heat map shows **all rural regions are estimated to benefit by more than the national average as a result of the reform**. The estimated change in GDP would represent 12.8% of the current regional GDP in Gisborne, 10.7% in West Coast, 9.6% in Marlborough, 9.1% in Tasman/Nelson and 7.5% in Southland.

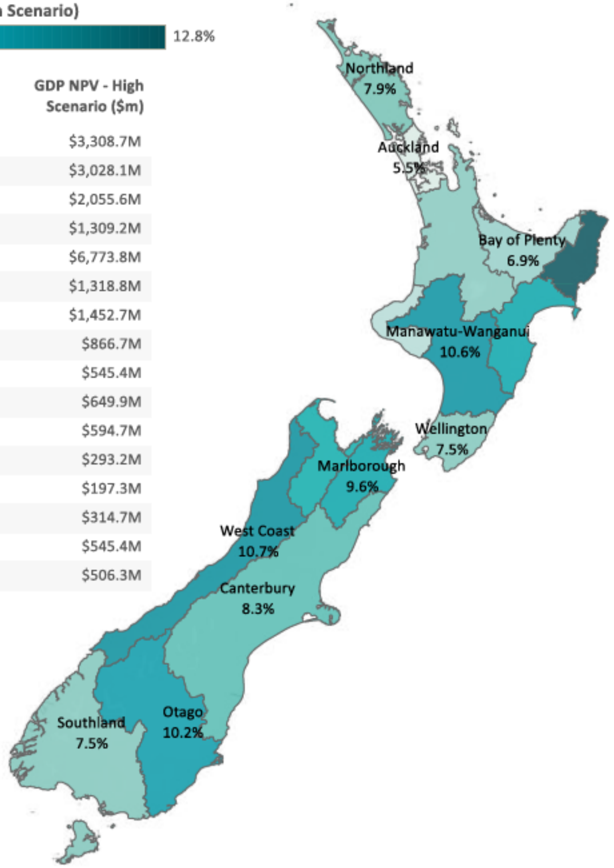
Most regions in Provincial areas will also gain by more than the national average. The estimated change in GDP would represent 10.6% of Manawatu-Wanganui's current GDP, 10.2% in Otago, 9.5% in Hawkes Bay and 7.9% in Northland. However, Taranaki will gain less than the national average, where the estimated GDP impact is 6.3% of its current GDP.

Metropolitan regions are estimated to benefit at a level similar to the national average, except for Auckland. The GDP impact is 5.5% of Auckland's current GDP. In absolute terms, Auckland still represents 29% of the overall increase, at $6.8b relative to the counterfactual. The impact in Bay of Plenty is also slightly less than the national average at 6.9%. Waikato and Wellington are estimated to benefit by slightly more the national average, where the change in GDP is respectively, 7.4% and 7.5% of current regional GDP. The metropolitan region which benefits the most is Canterbury, where the GDP impact is 8.3% of its current GDP.

Net change in GDP as a proportion of current GDP (High Scenario)

5.5% 12.8%

Classification	Region	GDP change (%) - High Scenario	GDP NPV - High Scenario ($m)
Metropolitan	Canterbury	8.3%	$3,308.7M
	Wellington	7.5%	$3,028.1M
	Waikato	7.4%	$2,055.6M
	Bay of Plenty	6.9%	$1,309.2M
	Auckland	5.5%	$6,773.8M
Provincial	Manawatu-Wanganui	10.6%	$1,318.8M
	Otago	10.2%	$1,452.7M
	Hawke's Bay	9.5%	$866.7M
	Nelson	9.1%	$545.4M
	Northland	7.9%	$649.9M
	Taranaki	6.3%	$594.7M
Rural	Gisborne	12.8%	$293.2M
	West Coast	10.7%	$197.3M
	Marlborough	9.6%	$314.7M
	Tasman	9.1%	$545.4M
	Southland	7.5%	$506.3M



Source: Deloitte Access Economics (2021)

Is job growth higher or lower than the national average?

Low Scenario

Under the Low Scenario, it is estimated reform will add 5,849 FTEs on average, each year, relative to the counterfactual. This is equivalent to 0.26% of the total current workforce. To consider the relative employment impact as a result of reform across regions, we considered the **estimated additional FTEs for each region as a proportion of the current workforce in that region**. The heat map opposite shows the estimated regional employment impact as a result of reform.

Provincial regions are estimated to gain the most relative to the estimated national average as a result of the reform, along with two metropolitan regions – Wellington and Canterbury.

All rural regions will benefit from additional FTEs as a result of the reform, but job growth is higher than the national average in some rural regions and lower in others. Southland's additional FTEs, relative to the counterfactual, are estimated to be 0.32% of its current workforce. The West Coast, Marlborough and Gisborne all gain by close to the national average – at 0.29%, 0.27%, and 0.27% again. Tasman, on the other hand, is slightly lower at 0.22%.

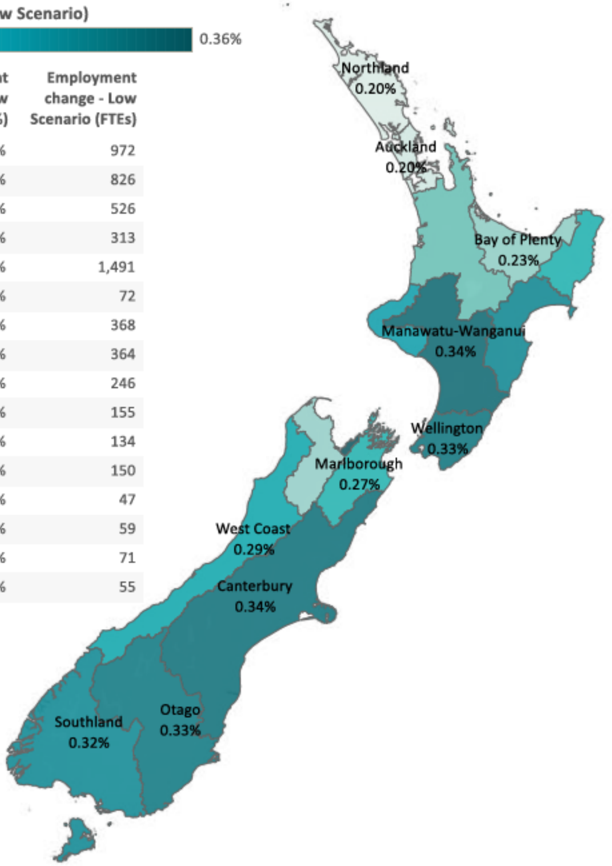
Regions classified as provincial areas show a similar outcome. Some regions are above the national average: Nelson's estimated additional FTEs is 0.36% of the total workforce, followed by Manawatu-Wanganui at 0.34%, Otago at 0.33%, Hawkes Bay at 0.32% and Taranaki at 0.30%. The provincial region which experience smaller gains than the national average is Northland with an average impact of an increase by 0.20% of the current total regional workforce.

The two metropolitan regions estimated to benefit more than the national average are Wellington (0.33%) and Canterbury (0.34%), mostly due to the strong presence in Business Services and Other Services. Other metropolitan areas are projected to benefit less than the national average – the estimated additional FTEs will be 0.25% of Waikato's current workforce, 0.23% of Bay of Plenty's current workforce, and 0.20% of Auckland's current workforce.

Net change in FTEs as a % of current employment (Low Scenario)

0.20% – 0.36%

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: Deloitte Access Economics (2021)

Is job growth higher or lower than the national average?

High Scenario

Under the High Scenario, reform will add 9,260 FTEs on average, each year, from compared to the counterfactual scenario. This represents approximately 0.41% of the total current workforce. The heat map opposite shows what the estimated regional employment impact could be as a result of reform.

As with the Low Scenario, there is some heterogeneity across regions. Regions with a large proportion of their workforce in Public Administration, Education and Business Services, are expected to gain the most relative to the national average, while regions with a higher share of water sector employment are expected to gain the least relative to the national average.

All regions classified as rural will benefit from additional FTEs as a result of the reform, but job growth is higher than the national average in some regions and lower in others. Southland's additional FTEs, relative to the counterfactual, are estimated to be 0.46% of the current workforce, which is above the national average. The other rural regions are slightly below the national average but still estimated to gain FTEs relative to the current regional workforce – Gisborne (0.40%), West Coast (0.38%), Marlborough (0.36%) and Tasman (0.34%).

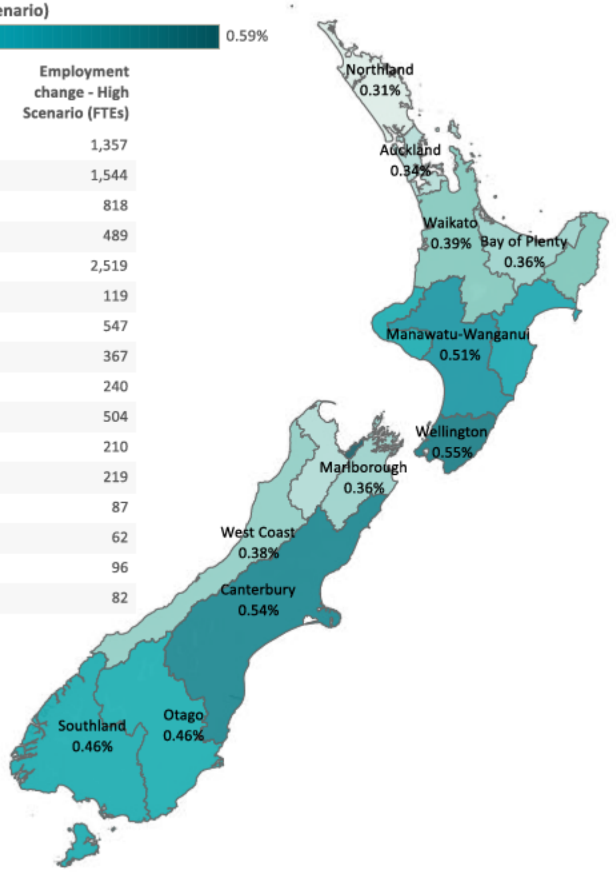
Regions classified as provincial areas show a similar outcome. Some regions are above the national average: Nelson's estimated additional FTEs represents 0.59% of its workforce, followed by Manawatu-Wanganui at 0.51%, Hawke's Bay at 0.48%, Otago at 0.46% and Taranaki at 0.46% of their respective workforces. A provincial region which gains slightly less than the national average is Northland, at 0.31% of its current workforce.

The two metropolitan regions estimated to benefit by more than the national average are Wellington (0.55%) and Canterbury (0.54%), mostly due to the strong presence in Business Services and Other Services. Other metropolitan areas are projected to benefit less than the national average – as a proportion of the following region's workforces, estimated additional FTEs are 0.39% in Waikato, 0.36% in the Bay of Plenty, and 0.34% in Auckland.

Net change in FTEs as a % of current employment (High Scenario)

0.31% — 0.59%

Classification	Region	Employment change - High Scenario (%)	Employment change - High Scenario (FTEs)
Metropolitan	Wellington	0.55%	1,357
	Canterbury	0.54%	1,544
	Waikato	0.39%	818
	Bay of Plenty	0.36%	489
	Auckland	0.34%	2,519
Provincial	Nelson	0.59%	119
	Manawatu-Wanganui	0.51%	547
	Hawke's Bay	0.48%	367
	Taranaki	0.46%	240
	Otago	0.46%	504
	Northland	0.31%	210
Rural	Southland	0.46%	219
	Gisborne	0.40%	87
	West Coast	0.38%	62
	Marlborough	0.36%	96
	Tasman	0.34%	82



Source: Deloitte Access Economics (2021)

10. Overview of Affected Industries

Introduction & Reform Objectives

Targeted stakeholder interviews were undertaken to understand the implications of reform on a number of industries.

We engaged with a cross section of service providers through an interview process. The purpose of these interviews was to understand providers' current role in the sector and how the industry in which they operate (the "Affected Industry") might evolve under reform. While the information and insight gained through the interview process has been anonymised, all statements and sentiments reflected in this report can be referenced back to documented interview notes.

In undertaking the interview process, we have been mindful of the structural proposals and aim of Government with respect to the reform. This provides critical context for the industry engagement process. In particular, the Three Waters reforms are expected to culminate in the establishment of a small number of WSEs in 2023 and to drive a material step up in investment in the sector.

The aims of reform expected to have implications for Affected Industries include:

- Significantly improving the safety and quality of drinking water services, and the environmental performance of drinking water and wastewater systems (which are crucial to good public health and wellbeing, and achieving good environmental outcomes);
- Ensuring all New Zealanders have equitable access to affordable Three Waters services;
- Improving the coordination of resources, planning, and unlocking strategic opportunities to consider New Zealand's infrastructure and environmental needs at a larger scale;
- Increasing the resilience of Three Waters service provision to both short and long-term risks and events, particularly climate change and natural hazards;
- Moving the supply of Three Waters services to a more financially sustainable footing, and addressing the affordability and capability challenges faced by small suppliers and Councils;
- Improving transparency about, and accountability for, the delivery and costs of Three Waters services, including the ability to benchmark the performance of service providers; and
- Undertaking the reform in a manner that enables local government to further enhance the way in which it can deliver on its broader "wellbeing mandates" as set out in the Local Government Act 2002.

By creating a small number of WSEs, the reforms intend to ensure:

- Entities are of significant scale to deliver benefits from aggregation over the medium to long-run;
- Entities have independent balance sheets to enhance access to capital and alternative funding instruments, driven by increased balance sheet strength; and
- Entities are specialist providers with a core focus on delivering drinking and wastewater services as a priority.

We note that Affected Industries include suppliers to water providers. While they form a critical part of the supply chain, they are broader than the water sector as defined for the purposes of our CGE modelling.

Affected Industries Stakeholder Engagement Process

Targeted stakeholder interviews were undertaken to understand the implications of the reform on a number of different industries.

There was generally a very good level of awareness of the proposed reform and stakeholders were highly engaged. Significant thought had been given by the industry participants interviewed as to how they would respond and the wider implications for their industry. Further, there was significant acknowledgement of the role DIA had played in ensuring a high level of engagement with industry.

A large share of the step-up in investment initiated by the reforms will be capital in nature i.e. investing in upgrading/enhancing the existing network and in new infrastructure. As such, this formed a significant part of our focus for the interview process. In line with this, we note that it is the "shock" created by a material step up in investment that is the focus of our CGE modelling. The Affected Industries workstream explored how capital programmes are delivered currently – with reference to the asset lifecycle. We then explored how delivery might change under a scenario which combines an industry restructure expected to enable clear market signalling of the medium to longer-term investment pipelines, and more sophisticated procurement alongside a significant increase in investment.

The other major area that we focussed on was the labour market impact from reform, including the capacity constraints, skill shortages and possible solutions to help meet the significant increase in workforce required. Labour represents the key factor input into the investment process, so access to a workforce at scale and with the skills necessary to deliver the investment programme is critical.

A schematic of the interview coverage is set out below:

Affected Industries

Industry / Sector Bodies: *E.g. Water NZ, Taituarā, Infracom*

The Regulator: *E.g. Taumata Arowai, Water Industry Commission for Scotland (WICS)*

Reform Perspectives: *E.g. Powerco, Australia, Watercare, Scotland*

In addition to the discussions held with industry participants, we interviewed representatives from industry bodies and those with perspectives of the experience in New Zealand both in Water and Electricity distribution, and in Water in other jurisdictions. This provided further evidence/insight as to how the combination of structural and regulatory reform could enhance the performance of the sector.

We also interviewed the New Zealand regulator (Taumata Arowai) and the Scottish regulator WICS, to understand perspectives on the anticipated process for New Zealand, and the actual experience in a jurisdiction that had undergone substantive reform.

Methodology

Targeted stakeholder interviews were validated against case studies, and four criteria: supply chain, labour market, access to capital, and innovation and productivity.

Targeted stakeholder interviews → Validate against case studies and criteria → Implications and considerations

Targeted stakeholder interviews

Targeted interviews were undertaken to assist with developing an understanding of the impact of reform on industries, and potential policy implications.

Interview questions were directed at assessing how stakeholders participate in the sector currently and how they are responding, or planning to respond, to the reforms. We also tested perspectives on potential efficiencies or opportunities that could arise, and challenges or constraints they envisage as a result of the reform.

We shared questions with participants in advance of the interviews to ensure a more informative and targeted conversation.

Testing and validating stakeholder information

We tested and validated the information collected through stakeholder interviews against local and international case studies, and criteria.

International case studies included water reforms in Australia and Scotland.

Local case studies included the New Zealand electricity sector reform, and the experience of Watercare in Auckland.

Taumata Arowai provided perspectives as to how it saw the role would impact investment priorities and, in particular, drinking and wastewater.

We considered the following criteria for each:

- Supply chain
- Labour market
- Access to capital
- Innovation and productivity

Implications and considerations

Information from stakeholder interviews was synthesised to develop a narrative of the consequences of reform.

The following slides discuss the implications of the reform on each criteria, and highlight key constraints and risks.

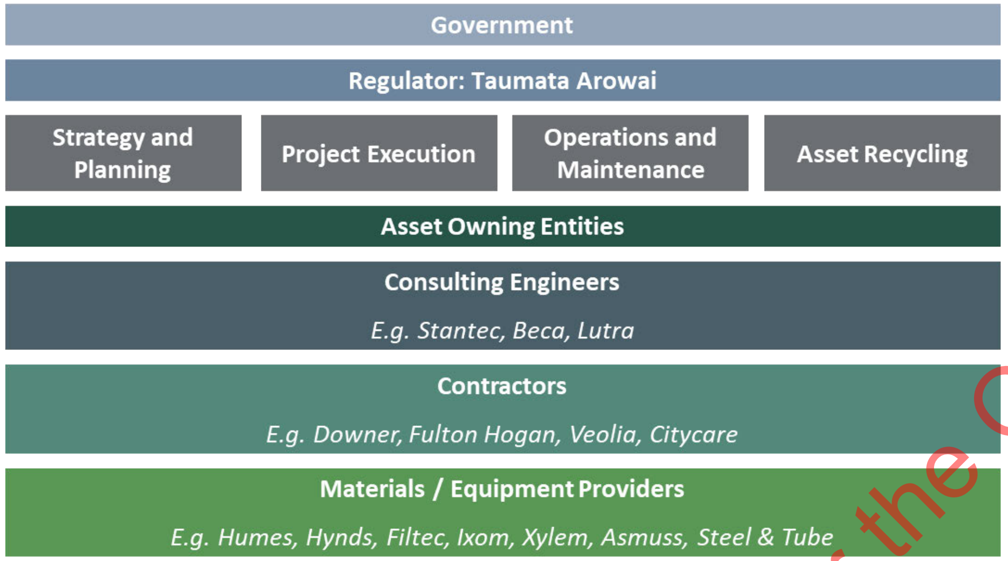
The narrative provided through the interviews has been developed to complement the economic impact assessment and highlight consequences for specific sectors.

11. Industry Structure

Overview of Post-reform Industry Structure

The water industry is comprised of many different participants, spanning multiple sectors.

Water industry structure



How will things change post-reform?

- Councils who participate in the reforms will no longer control water assets for their regions. For some, this will mean a significant change in their operating roles and reduction in workforce, and a risk that valuable water sector capability could be lost through the transition process. The local and regional impact of this is expected to be more than offset by the investment in regions by the new entities.
- Engineering firms will scale up the number of employees operating in the water sector, although there are issues with finding skilled labour (discussed further below). Clearer pipelines of work should allow these firms to have confidence investing in on-the-ground capabilities. There is some concern that fewer water entities could see more work overall but for a reduced number of consultancies. There is also some apprehension about the transition-period.
- Contracting firms expect to see a bigger workforce and a greater focus on compliance areas, given the new regulatory environment. Improved procurement processes will smoothe operations for these firms and allow work to get underway faster. International firms expect to draw on offshore expertise and technology, but will still need to deploy large numbers of people on the ground where the assets are.
- Material and equipment providers are already scaling up in some cases in preparation for reform, but are nervous about the transition process. There will be potential for better integration of the materials and equipment supply chain into the design process, aligned with more integrated contracting processes. This is likely to be particularly the case in relation to the more effective use of specialist equipment – for example the use of advanced telemetry equipment to detect network issues, and to facilitate the most efficient use of water.

Overview of Industry Structure

A step up in investment will affect the planning, building and operating stages of the asset lifecycle. Specialised entities with a specific water focus should deliver more cohesive pipelines of work and consistent investment.

Asset Decommissioning

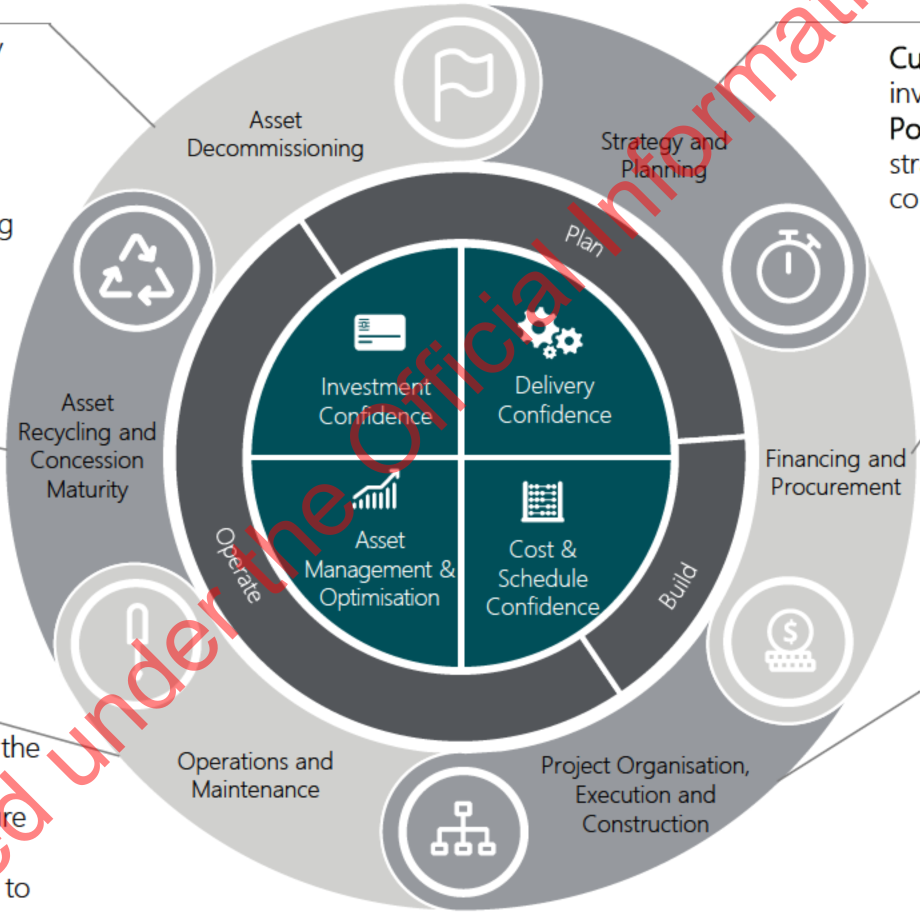
Current state: Highly fragmented and affected by capital constraints which sees assets retained beyond useful/consented life.
Post-reform: As new investment allows for the construction of new assets, it will be important to determine when and how to discontinue investing in old assets.

Asset Recycling and Concession Maturity

Current state: Poor transferability of assets.
Post-reform: As new assets are built, older assets may be able to be used in other regions, or for different purposes.

Operations and Maintenance

Current state: Large differences in maintenance levels across the country. Sophistication of operations also varies.
Post-reform: Clearer prioritisation and better funding to ensure assets are properly maintained. Maintenance of high priority assets will need to be undertaken before new assets are built to preserve the integrity of the network.



Strategy and Planning

Current state: Lack of pipeline visibility restricts broader investment in industry.
Post-reform: New WSEs will need to focus on a long-term strategy and prioritise capital works through asset condition assessments.

Financing and Procurement

Current state: Lack of procurement best practice and expertise. Ability to raise capital for investment limited, particularly for smaller regions.
Post-reform: Procurement processes are likely become more efficient as projects are consolidated. Financial capacity of the WSEs should increase pipeline certainty.

Project Organisation, Execution and Construction

Current state: Projects are being completed on an as needed basis, with a shortage of labour creating difficulties to complete projects in time.
Post-reform: A step-up in investment will require an increase in labour, and collaboration between engineering, project management, construction firms, and equipment and materials suppliers, to develop whole-of-life, rather than lowest cost solutions.

Overview of Industry Structure

Below is a list of companies and sector bodies we interviewed as part of the engagement process.

Entity	Profile	# Employees Globally	# Employees New Zealand	# Employees in Water Services New Zealand
Asmuss	Specialises in polyethylene and steel piping, fittings and valves.	N/A	230	N/A
Beca	Focused on long-term, sustainable solutions for Three Waters.	N/A	N/A	N/A
Citycare Water	Provider of construction, maintenance and management services across New Zealand.	N/A	1,450	N/A
Downer	Has a presence in the design, build and operation phases for the water sector.	N/A	13,000	450
Filtration Technology	Design advanced engineering systems and cost-effective solutions to water and wastewater problems.	70	60	60
Humes	Deliver smart, sustainable solutions for water by providing innovations in pipe manufacturing.	640	270	245
Ixom New Zealand	Chemical supplier predominately based in Australia and New Zealand.	1,000	300	75
Lutra	Suppliers for containerised treatment plants, and compliance reporting and monitoring tools.	N/A	30	30
Stantec	International professional services firm in the engineering design and consulting industry.	22,000	600	200
Steel and Tube	Providers of steel products.	N/A	1,000	N/A
Taituarā	National membership organisation for Local Government professionals.	N/A	N/A	N/A
Veolia	A mixed business mainly involved in the operation of plants, with a small focus on construction.	179,000	300	N/A
Water New Zealand	The industry body for the Three Waters sector.	N/A	N/A	N/A
Watercare	New Zealand's largest water supplier.	N/A	984	N/A
Xylem Water Solutions	Technology-based water solutions business providing UV disinfectant and biological water treatment solutions.	15,000	22	22

Overview of Industry Structure

The water industry is comprised of many different participants, spanning multiple sectors.

We have looked to map the participants interviewed to the ANZSIC classifications referred to in our economic modelling. The economic modelling aggregates the following classifications up to the sector level to determine gains/losses in each sector and region. We note that the activities of some participants – in particular, consulting engineers – will span a range of activities. The ANZSIC classifications align with those in our CGE model.

Stage of life cycle	ANZSIC classification	# of employees per classification	Sector level	Players
Strategy and planning	• Professional, Scientific & Technical services	• 189,000	• Professional services	• WaterNZ, Taumata Arowai. Watercare, Wellington Water
Financing and procurement	• Professional, Scientific & Technical services	• 189,000	• Professional services	• Local Councils, Watercare, Wellington Water
Project organisation, execution and construction	• Primary Metal and Metal Product Manufacturing • Machinery and Equipment Manufacturing • Water Supply, Sewerage and Drainage Services • Waste Collection, Treatment and Disposal Services • Construction Services • Heavy and Civil Engineering Construction	• 4,100 • 29,300 • 2,150 • 7,100 • 101,600 • 37,800	• Heavy manufacturing • Water • Construction	• Veolia, Ixom, Humes, Hynds, Xylem, Filtration Systems, Beca, Stantec, Lutra
Operations and maintenance	• Water Supply, Sewerage and Drainage Services • Waste Collection, Treatment and Disposal Services	• 2,150 • 7,100	• Water • Electricity	• Citycare, Fulton Hogan, Downer, Stantec
Asset recycling and concession maturity	• Waste Collection, Treatment and Disposal Services • Heavy and Civil Engineering Construction	• 7,100 • 37,800	• Water • Electricity	• Local Councils
Asset decommissioning				• Local Councils, Watercare, Wellington Water

12. Supply Chain

Supply Chain

The water supply chain comprises a mix of materials, plant and equipment and labour.

Project Pipeline typically involves a mix of:

- Simple renewals
- Complex renewals
- Pump stations / Treatment station upgrades
- Reservoir upgrades
- Major projects

Water Sector Supply Chain Breakdown by % of Cost

Labour

Consultants / Managers — Contractors

@ 50%

Materials

Materials / Plant / Equipment

@ 50%

Water Entity / Consultants Makeup of workforce
Graduate Engineer
Engineers
Senior Engineers
Principal Engineers / Senior / Advanced Specialists
Programme Leads / Project Managers
Project Directors / Senior Project Managers

30% to 40% of FTEs[1]

Contractors Makeup of workforce
Construction Manager
Construction Supervisor
Technicians
Heavy Vehicle Drivers
Skilled Labourers
Labourers
Trainee/Apprentices

60% to 70% of FTEs[2]

Materials / Plant / Equipment	Percentage of cost
Materials	50%
Plant and Equipment	50%

[1] Excludes procurement and wider back office admin and support FTEs.

[2] It is estimated that @35% to 40% of the workforce will comprise labourers/skilled labourers/trainees and apprentices

Supply Chain

Improved visibility of the work pipeline will lead to a scaling up of operations with associated benefits.

There is an expectation that the increased scale and related funding capability of the proposed new WSEs will change supply chain arrangements. We tested with industry participants the benefits of greater visibility to the pipeline of work, and the extent to which that would drive changes/encourage suppliers to scale up or innovate. We also discussed industry structure and the extent to which changes to the sector would encourage new entrants/overseas participants with a small footprint currently to scale up. We also canvassed issues of capacity constraints in the supply chain and the flow-on implications for costs and efficient planning.

As the industry model and procurement practices mature post the transition period, it is expected the following will occur:

- Industry consolidation is likely to happen through parts of the supply chain as the new WSEs increase the scale at which they procure and move to refine their supply chain arrangements;
- New entrants are likely, particularly major organisations which have a significant presence in Australia but who are not currently present in New Zealand ;
- The scaling up of local operations by participants with an existing presence in New Zealand – a number of major industry participants (Suez, Veolia etc) and international consultancies and service providers, have some footprint in New Zealand currently and all are well-informed as to the reform programme and the related implications/opportunities;
- While new/scaled up entities may bring new capability, it is likely scaling up could involve the acquisition of local entities or capability;
- New business models, particularly between the water entities and service providers;
- Scale benefits – higher spend across fewer/more standardised requirements;
- Standardisation of parts and materials used to improve purchasing power;
- Greater specialisation of procurement services; and
- The potential for smaller scale operators to be squeezed out as a result of the procurement processes that the WSEs might adopt, reducing diversity in the supply chain.

Short-term Covid-19 disruption

Some participants noted the supply chain disruption caused by Covid-19. These issues include extended lead times for materials; ports, freight and shipping issues; and increased prices for materials. While some of disruption is expected to be relatively short term, it has exposed a vulnerability in the supply chain for certain materials (e.g. it is difficult to get some chemicals involved in water purification). This could drive a preference to reduce reliance on offshore inputs. Consolidation of suppliers post-reform may increase vulnerabilities where reliance remains on, or shifts to offshore inputs.

Supply Chain

Changing procurement processes should help reduce 'lumpy' supply chains.

Opportunity to learn from the past

There are significant concerns with current government procurement processes in the water sector. The expectation is that current practices will not roll over into the new entities; otherwise gains anticipated from the establishment of the WSEs may be much harder to achieve.

Current procurement practices – with the heavy emphasis on cost as opposed to whole of life value – create significant risk. Similarly, the lumpy nature of the work programme makes it difficult for small to medium size organisations to maintain viability, notwithstanding the fact that some are considered critical to the overall supply chain.

As part of the interview process, reference was made to the ability of industry generally to respond to a material increase in demand. The response to the Christchurch earthquakes was cited as an example of a step-up in investment of a comparable scale to that envisaged by the water reform process. In this context, it was noted that given the urgency of the response, contractual arrangements/procurement practices were not always optimal. Lessons from this experience that can be applied to water reform, given its planned nature and longer timeframe.

Increased visibility of pipeline is the key driver of procurement improvements

A key expected benefit of reform from a supply chain perspective will be improved procurement and pipeline management processes, which the WSEs are expected to implement. The ability to contract at scale with certainty and over a longer timeframe has potential benefits in the form of inventory and working capital management, which in turn flows through to the efficiency of workforce management and project delivery.

Contractors don't want to be carrying/funding large stores of materials. However, they cannot afford to have parts of their workforce standing idle, because required materials or equipment is not to hand. The more certainty they have as to the timing and nature of the capital programme, the better they are able to coordinate their logistics, and in turn generate cost efficiencies and reduced capital requirements.

Interviewees were not concerned as to the ability of the supply chain to scale up from a materials and equipment perspective. Domestic capacity was not generally identified as an issue. However, a concern was raised as to the risk that some aspects of the domestic supply chain depend on a limited number of mid-scale providers, and if these entities exited the market there would be no domestic capability to fill the gap. However, lumpiness or uncertainty associated with the project pipeline was identified as a more significant issue, and a factor contributing to the potential loss of mid-sized domestic capability.

The water industry internationally is relatively homogenous from a materials and equipment perspective – there is nothing particularly unique that sets New Zealand's needs apart from that of other jurisdictions. Further, providers of materials and equipment have sophisticated inventory management and logistics arrangements in place, which should mean an ability to respond relatively easily to any step-up in demand.

New Zealand is a small market by international standards. A significant increase in investment in this market is unlikely to have any major impact on the ability to access materials and equipment, over and above the more generic challenges the country faces by virtue of its scale and location.

We note that the supply chain both domestically and globally will continue to evolve. For example, Veolia is currently seeking to acquire Suez. That transaction, if successful, would create a global entity comprising circa 250,000 people.

Similarly, as the industry works through near term issues with the transition and immediate capital priorities, there will be an increased focus on the more consistent adoption of new technologies and related equipment. This change in demand will flow through to the supply chain.

13. Workforce

Workforce characteristics

Reform provides an opportunity to address current workforce issues and to reposition the water sector as a strong career opportunity – but this will take time and there will be near term challenges

The delivery of water services and the related capital expenditure required to sustain and expand water infrastructure is labour intensive. The material rise in capital expenditure anticipated from reform is expected to have implications for both employment and the structure of the labour market.

As part of our interview process, we explored expectations around employment and the need for increased skills development and specialisation. We also discussed expectations and concerns in relation to capacity and capability constraints, productivity concerns, and the importance of being able to access offshore talent.

Workforce

The water sector workforce is complex, and spans multiple industries and disciplines, each with their own dynamic. Further, different structures currently apply across local authorities. In particular, all Councils use a combination of in-sourced and out-sourced provision, but the nature of those arrangements varies widely.

A significant part of local authorities' workforces and third-party contractors are deployed to support the sector currently. Estimates of the total workforce employed by Councils in the sector are in the range of 4,000 – 5,000. The Water New Zealand National Performance Review 2019-20 (the Review) provides the following analysis of the Council workforce dedicated to the provision of water services. Most, but not all, Councils participate in the Review. All the large Councils and specialist council-owned providers such as Watercare and Wellington Water participate.

Workforce Participant	Number
Full-time employees	2,745
Contractors	1,196
Total	3,941

Source: Water New Zealand

Labour and related direct costs – in their various forms – is the largest cost input into capital works by a substantial margin, representing an estimated 50% of total costs currently (excluding the labour content of the materials and equipment component of the supply chain, which is also significant).

A typical investment process involves the following four elements: investigation, concept, design, and build

It is only in the "build" phase that materials and equipment are a major input, although these represent a large cost component at that stage.

However, even in the build phase, the labour component is still likely to represent roughly 20% to 30% of the total cost, though this will vary significantly depending on the nature of the asset being created. Renewals and minor capital works – which comprise a large component of the immediate investment requirements of the sector are considerably more labour intensive than major capital projects. As such, a relatively greater proportion of that labour component is delivered on location.

A number of interviewees noted that even with the most efficient and innovative processes the need for a significant workforce on hand is unavoidable. Therefore, any significant step-up in investment will also require an increase in the size of a workforce that is already under pressure.

The sector is experiencing a workforce shortage, which is likely to be exacerbated given increasing regulatory pressures and community expectations, that will drive an uplift in Council expenditure.

The number of qualified staff needed to deliver capital works is already under stress due to a lack of overseas resources, increasing remuneration expectations and other opportunities in the wider construction sector. The contractor market is currently sized to reflect historic delivery requirements. The workforce is expected to be squeezed further as spending on Three Waters projects, shovel ready infrastructure projects, climate change and RMA reforms increase nationally.

Workforce composition and substitution

The change in the workforce required to deliver the investment envisaged under the modelled scenarios.

Information as to the composition of the current workforce is limited – complicated by the fact that the water sector supply chain comprises multiple industries. We understand there are projects underway that are expected to improve this understanding. This makes it difficult to accurately estimate the nature and scale of the expansion in the workforce required to deliver the capital investment programme envisaged by reform, and develop an appropriate response.

We have attempted to estimate the increase in the workforce required to deliver the projected investment under the core scenarios modelled. This estimate is illustrative only and intended to provide an indication of the scale of change.

Based on data and analysis derived from other water sector projects we have calculated a high level estimate that it takes approximately 800 FTEs to deliver $300 million of capital projects. On this basis and assuming an increase in annual investment by @ $1.4 billion to $2.9 billion – being the estimated annual average difference spend under the system transformation scenario versus the counterfactual – this could see the need for an additional 2,900 to 5,700 FTEs, on average, each year. This includes the water sector and the wider water supply chain. This assumes an average annual investment differential of $2.15 billion to deliver the capex envisaged, as set out in the table to the right.

It is important to note this is not the potential total increase in FTEs, but rather the difference between the system transformation and counterfactual scenarios (i.e. the average change in FTEs). Further, this is related to the estimated number of FTEs needed to deliver the increased investment programme, not to any flow-on employment impacts of reform.

The efficiency/substitution factor included in the table reflects an assumption that a combination of better workforce practices and substitution – i.e. workers moving to the sector from adjacent roles will partially offset the expansion in the workforce required.

One opportunity cited related to the Oil and Gas sector. While this sector has scaled back, there are several providers in areas such as Taranaki that have specialist piping skills and solutions that would be transferable to the Three Waters sector. However, there is a risk this capability could be lost if the step-up in Three Waters activity doesn't coincide with the scaling down of activity in traditional areas of focus.

Our Australian colleagues also noted that they have seen some success with shared services models across similar industries, for example sharing a workforce across electricity or fibre providers where sensible.

		Efficiency/substitution					
		100%	90%	80%	70%	60%	50%
FTE allocation by discipline/skill							
Planners / Consultants	30%	1,720	1548	1376	1204	1032	860
Managers / Contractors	70%	4,013	3612	3211	2809	2408	2007
Total		5,733	5,160	4,587	4,013	3,440	2,867

Workforce risks

The increase in the required workforce estimated in the previous slide does not fully reflect the scale of change that will occur, or the risks that need to be recognised and mitigated, through the transition.

While the skills of the current workforce will be needed, not all current roles will map neatly to those available in the new WSEs or industry. There may be a need for some in the sector to take up alternative roles and possibly shift locations. This factor, combined with the relatively older age profile of the Council workforce, creates a significant risk that capability could be lost through the transition process. In some regions, it is likely that considerable information on matters such as the location and condition of assets is held through the institutional knowledge of the existing workforce. There is a risk that knowledge will be lost through the transition process as the current workforce retires.

Further, there are other wider risks to smaller Councils that will need to be managed. For example, some technical and leadership roles are shared positions that cover a range of Council activities, rather than just water. A move to WSEs could see that capability lost either to the WSEs, Councils, or industry. Further, the supply chain that Councils engage with on water related matters brings innovation and capability that can have wider applicability across Council operations.

Based on experience in other sectors and jurisdictions it is expected the composition of the workforce will change. There is likely to be proportionally less employment in the WSEs, due to a combination of efficiencies that can be expected over time from the consolidation of management structures, and systems and processes, combined with efficiencies that will be expected from improvement in the performance of the underlying asset base as this is replenished/enhanced. On the other hand, it is expected that there would be a step-up, both proportionately and in absolute terms, through the supply chain in response to the increased level of investment anticipated.

There are concerns as to the capacity of the workforce to meet the demand signalled through the current Council LTP process. Further, providers have indicated a wariness about resourcing to meet that demand due to a concern as to the potential for a "boom/bust" cycle of investment, whereby following a burst of spending by Councils there is something of a hiatus as the new water entities work through their planning and prioritisation processes.

The most immediate pressure points are likely to be specialist water consultancy expertise, which is seen as scarce and "boots on the ground" labour. Several interviewees noted that migration policies (once borders re-open) could help mitigate skill shortages in the near-term, but 'growing our own' was viewed as preferential. Again, reference was made to the Christchurch experience and the significant reliance placed on imported labour.

Workforce: Career pathways

Industry participants and sector bodies consider that there is a relatively low awareness of career opportunities and little in the way of sector driven training and development.

Industry participants and sector bodies consider that there is a relatively low awareness of career opportunities and little in the way of sector driven training and development. This situation is compounded by the current industry structure and its fragmented approach to procurement. This restricts the ability to develop the industry standard competencies that various organisations such as Water New Zealand and Engineering New Zealand are currently working on.

While articulating career opportunities supported by a focus on training pathways could mitigate some labour supply challenges, there are significant risks in the near term that could dilute the benefit of these initiatives. In particular, as borders open – particularly with Australia – there is a risk parts of the trained/skilled workforce may move offshore to better remunerated opportunities. This situation could be compounded as borders with Australia have re-opened before those with other countries such as South Africa, the UK and Ireland, which have previously been large sources of both skilled and semi-skilled labour.

"In Victoria the creation of regional water entities created much better career paths for workers in the industry. It enabled them to specialise in the water industry (rather than being a Council employee and having to do to a bunch of other things) plus it meant that rather than having to move from one small Council to another to progress their career (which often meant relocating) career path opportunities within in new (larger) organisation became much more available."

A further issue is the changing nature of the skills required of the workforce. This is driven in part by the changing nature of the technologies required to run water utilities – including advanced monitoring and treatment technologies and information management systems.

Given the feedback from stakeholders around skilled labour shortages, we expect that the labour profile will be lumpier and less predictable than our core scenarios imply. There are clearly existing challenges in filling roles and meeting current demand in the workforce. However, we note that access to labour was not identified as a long-term constraint in any of the case studies referred to below.

Growth in the labour force is likely to take a number of years (Taituara estimates five to 10 years given the training pathways involved) to respond to increased demand, and absorb current skill shortages, in order to start seeing a meaningful step-change in employee numbers. This means that efficiency gains in the labour market may take some time to be realised fully.

Pressure on the water workforce is not just a challenge for New Zealand. There is evidence from other jurisdictions such as the US that there are critical staff shortages in the workforce that provides drinking water and wastewater services – a situation likely to be compounded as a relatively older workforce starts to retire. Initiatives are underway to address this issue which could be referenced as part of any process for developing a workforce plan for New Zealand. For example, America's Water Workforce Initiative is a combined initiative involving the Environmental Protection Agency and other federal agencies working with states, utilities, tribes, local government and other stakeholders to address workforce issues.

Reform provides an opportunity to take a more proactive and longer-term approach to addressing workforce challenges. A combination of a better articulation of career opportunities, the changing nature and increased sophistication of the roles/emerging roles available and the scale of the investment going in to the water sector creates the prospect of elevating the status of a career in the water sector. This would see a flow through to the ability to attract both domestic and international talent in both the core water sector and the associated supply chain.

14. Capital Requirements

Capital Requirements – New water entities

Access to capital is critical for funding the new entities. reforms should make it easier to fund water infrastructure in New Zealand.

Through the interview process we looked to assess the importance of improved access to capital as a mechanism for driving improved performance in the sector. Topics tested included the benefits of lower borrowing costs and increased balance sheet capacity, and the impact of this on stakeholders.

The interview process validated the premise that there is a critical interplay between funding certainty, and the ability to plan and execute at scale over time. That certainty creates the ability to build the commercial relationships that drive innovation and efficiency.

Funding certainty and scale were seen by industry as being critical to the WSEs' ability to develop strategic procurement practices and related supplier arrangements. Clarity around the level of expected investment, breakdown of spending, and processes for allocating work were all raised by stakeholders as key areas.

Long-term funding certainty for major infrastructure providers of water infrastructure, such as Councils currently or WSEs, is pivotal to achieving gains in the sector, and provides a range of benefits. The certainty provided enables an entity to take a long-term view of its investment programme. This allows it to develop a construction pipeline that can be funded through the economic cycle.

This increased certainty can facilitate the building of the strategic partnering arrangements which characterise sophisticated infrastructure providers – where partners are sufficiently invested in the relationship that they are willing to work with WSEs to develop optimised solutions.

Such relationships bring a multiplier effect in terms of the problem-solving ability and innovation available to the organisation. This can flow into related contracting and supplier arrangements, which can be streamlined to facilitate prompt activation.

Infrastructure providers operate in a complex ecosystem that integrates internal and external capability. That external capability includes consultants (engineers, suppliers), contractors (construction companies), and service providers (companies providing operations and maintenance and facilities management services). These in turn have their own ecosystem (sub-contractors, plant and labour-hire etc).

By way of illustration, we note that contracts awarded by Watercare for the period February 2020 to July 2020 involved 29 different organisations providing services including engineering design, planning and feasibility, specialised equipment and spares, and construction services. Suppliers ranged from local providers to major international organisations.

The certainty provided by a long-term pipeline of work enables the ecosystem to work effectively, and drive innovation and efficiency. Parties can invest with confidence leading to efficiencies which can be shared.

Capital Requirements – Service providers and contractors

Access to capital is critical for funding the new entities. reforms should make it easier to fund water infrastructure in New Zealand.

The contracting and consulting firms we interviewed conveyed that once these areas above were addressed, they did not foresee capital constraints as an issue for them in scaling up in response to the reforms. The main hurdles discussed were labour supply and certainty of water entity investment.

The financial capacity of the WSEs should enable the enhanced planning and procurement processes that then flow through to the financial capacity of the Affected Industries. The ability to contract at scale and over extended time periods with organisations possessing suitable financial capacity/creditworthiness will enable industry to scale up and access the capital necessary to do so.

We note that much of the supply chain is not particularly capital intensive. The real capital intensity in the sector sits with the WSEs who will own the water infrastructure. Much of the capital deployed through the supply chain funds working capital. More efficient procurement processes deployed by the WSEs should mean that the investment in working capital does not need to increase in proportion to the greater scale of investment.

Further, to the extent that an increase in funding is needed, the expectation is that this will be off the back of a secured programme of work underwritten by the credit worthiness of the WSEs, and commercial contracts ensuring suppliers do not wear an undue share of project risk or the cost of financing major works programmes (i.e. milestone payments based on progress will support cash flows).

Therefore, the large domestic entities in the supply chain – particularly those with access to public capital markets – and consultancies and contractors that are offshoots of major regional or international entities are unlikely to face challenges in terms of accessing capital. Further, established operators are likely to be able to access capital at competitive rates. There is a possibility that smaller domestic operators with less access to capital could be acquired as part of any industry consolidation process.

The more sizeable and certain cash flows associated with the step up in investment in the sector (backed by the scale and financial capacity of the WSEs) is likely to put downward pressure on the cost of capital across the sector – noting that many of the larger entities that form part of the supply chain will already have the scale and financial strength necessary to command a competitive cost of capital.

Smaller and mid-sized entities with more limited access to capital may be challenged if aspects of the supply chain start to consolidate. This situation could be exacerbated if lumpiness or uncertainty associated with the forward investment programme through the transition phase impacts cash flows, and the ability to invest or retain/attract key staff.

The structural changes proposed, combined with the scale of the anticipated investment into the sector over a long timeframe, will create an appetite for investment from the financial services sector. We would expect that private equity, sovereign wealth funds and other international investors would welcome the additional ability to invest in New Zealand infrastructure and are aware of parties who are already at an early stage of investigating that opportunity.

15. Innovation and Productivity

Innovation and Productivity

Significant productivity gains are achievable but come with risk.

Evidence in other jurisdictions indicates significant productivity gains are achievable over time with changed industry structure, and other parallel developments such as an enhanced regulatory regime. We tested with participants whether they saw reform driving increased research and development of new technology, or the wider development of current technology.

We also tested whether the reform process would likely enhance international partnerships and connections, and in that context, whether the small scale of the New Zealand industry would be an inhibitor.

There is considerable evidence from both the New Zealand and international experience that significant productivity gains are achievable in a sector with the right settings. In particular, the combination of scale and financial certainty allows organisations to take a strategic approach to procurement which can result in a range of outcomes that drive both productivity improvement and innovation.

Opportunities for productivity gains include:

- An immediate gain in developing an improved understanding of the asset base and its condition, which should inform better planning processes, and ensure the right investment decisions are being made and wasteful spending reduced;
- Making efficient investment decisions – for example, settling on the most efficient regional or cross regional waste-water plant networks;
- The ability to move away from current Council procurement practices which are seen as being fragmented, risk averse and too focussed on price as opposed to whole of life value in the tender evaluation process;
- Increased standardisation of componentry, which drives cost efficiency, specialisation and inventory management benefits;
- Increased use of intelligent componentry to reduce cost/improve performance;
- Reduction in overheads and administration costs as duplication is removed, economies of scale achieved, single IT systems can replicate multiple ones.
- A better appreciation of/willingness to use international best practice/assets rather than a "do it yourself" approach;
- The ability to attract specialist global capability. Watercare has done this with its Central interceptor project through its engagement of the Ghella-Abergeldie Harker joint venture (following a tender process in which three of the four short-listed parties were international consortium reflecting the benefit of scale);
- The ability to outsource work. It is important to note that Councils have already outsourced a very significant amount of activity to the private sector. Gains have been achieved through this process, but those gains have been diluted by a lack of scale and current procurement practices;
- The ability to construct provider panels that are prepared to invest in capability, bring innovation and offer cost efficiencies off the back of long-run, confirmed, and large-scale work programmes;
- The ability to build high calibre, internal capability in areas such as strategic planning and procurement; asset management; and contract and treasury management;
- A strongly held view that the combination of scale, financial capacity and long-term planning will drive efficiency and contribute to a significant upskilling of the workforce. Several stakeholders provided examples where such gains have been previously achieved; and
- Efficiency can be achieved when capital spend is aggregated into a programme of work that has the necessary scale to allow providers the flexibility to sequence delivery in the way that best deploys their capability, provided objectives are met.

Innovation and Productivity

Significant productivity gains are achievable but come with risk.

There is already a significant representation of major regional and global specialist water service providers in New Zealand. These providers draw on their global capability when serving the New Zealand market including specialist knowhow, and R&D capability. However, the ability to fully deploy that capability is affected by the challenges of scale, procurement practices and certainty of opportunity referenced above.

Despite the optimism around potential productivity gains, parties interviewed did express some concerns including:

- Not all of the gains evidenced in other jurisdictions will be as readily achievable/deliver gains to the same scale in New Zealand given the country's relative isolation from major centres of capability;
- While significant benefits ought to be achievable as a result of the consolidation of the sector into a limited number of specialised entities, gains could be lost if there is not a high degree of collaboration between the entities, particularly in relation to cross-boundary investment decisions; sharing of resource and intellectual property; standardisation (plant, equipment, asset definition/management); and workforce development;
- The risk that WSEs will place an early emphasis on the development of back-office systems and processes rather than adopting a "lift and shift" approach, using the best of what is currently available at least as an interim step;
- The risk that workflow for the industry slows through the transition period and struggles to get hit the ground running due to a lack of interim work; and
- Productivity gains will take time to accrue. It will only be after WSEs are through the early transition phase and have aggregated, interrogated and enhanced key asset information that the longer-term planning processes key to driving a improvement in sector performance will begin to emerge. Further, the WSEs will all inherit a myriad of commitments and contractual arrangements that will limit their freedom of operation in the near-to-medium-term.
- There were mixed views expressed around the gains available in the water sector from advancements in technology enabled asset management practices. There was a good level of awareness of the potential impact that, for example, the advance of digital technologies can make in the utilities sector more generally, with some of these technologies being adopted in the water sector. For example Scottish Water references success it has achieved in terms of customer service by integrating the capability offered by social media, mobile, data analytics and cloud computing.
- Some survey participants questioned whether access to new technologies/capabilities would have a material impact in the near-to-medium-term – in particular given the start point for WSEs in terms of asset information and quality, and the likely near-to-medium-term investment priorities.

16. Transition, Risks and Challenges

Constraints and Risks

Constraints and risks may hinder the realisation of efficiencies.

There are currently significant constraints in the system that will need to be addressed if industry is to be able to deliver the capacity, innovation and productivity gains anticipated through reform. These include:

- A coherent approach to workforce development including alignment between key government agencies (e.g. immigration, education sector), the water entities and industry/industry representative bodies;
- The financial capacity to fund long-term investment programmes – including the ability to access appropriate capital markets;
- Freedom to instigate and develop the skills necessary to execute a strategic approach to procurement;
- The ability to access the calibre of governance and executive leadership able to set-up and then run large, complex organisations with a challenging mandate;
- The ability to unwind existing contractual and other arrangements that, if these were to endure, could impose a significant handbrake on the ability to progress the new sector model; and
- Most of the embedded asset base/networks will not represent an optimal configuration from a systems performance perspective, so it will only be as the network is replaced/upgraded progressively over time that the full extent of potential gains can be captured.

The parties interviewed included a number who have been associated with major sector reform in New Zealand and overseas.

One of the main risks that stakeholders foresee is around the transition process. In particular:

- There is a relatively older workforce with significant institutional capability that is critical to the delivery of services currently. A disruptive sector transformation creates the risk of a loss of capability needed for the ongoing operation of water networks in the near-to-medium-term;
- New entities taking a disparate approach to the establishment process which sees wasted effort and resources;
- The need to avoid the situation that (as happened in some cases in Victoria) Councils took the opportunity to transfer ageing or lower performing staff to the newly created water business, and retained higher performing staff.
- New entities taking a competitive, rather than collaborative, approach resulting in duplication of effort and potentially raising prices;
- Concern around the potential for an investment hiatus through any transition process and disruption to current relationships (e.g. current panel arrangements), with suppliers nervous about overinvesting in capacity given that uncertainty; and
- One of the additional risks raised was that some Councils may choose not to participate which will dilute the impact of efficiency gains that the reforms are trying to achieve.

Transition Period

Care and planning needed to manage the transition impact on industry

Many of the stakeholders we interviewed expressed concern about the transition period over the next couple of years.

Key issues:

- A possible reluctance by Councils to spend money on assets that they then are going to hand over in a couple of years anyway, creating a high risk of deferred maintenance in the meantime.
- Increased uncertainty of work pipeline for contractors and suppliers.
- Concern that transition period will drag on for up to five years as entities are slow to establish and then new leadership needs to 'find their feet'. This could mean a lack of material investment for a longer time.
- Risk of borders fully re-opening in the near-term and workforce heading overseas, exacerbating labour shortages.

Possible mitigating actions:

- Regulation requirements around water safety standards may force Councils to invest in the interim. Several stakeholders mentioned the positive impact from Government investment post-Covid. Additional grants could help support the industry through the transition.
- Mandate for action for new entities and structuring organisations to enable them to get up to speed quickly. Handover processes need to be thought through carefully to ensure a smooth transition.
- Signalling of the expected pipeline of work so firms can invest in current talent and keep people on the ground. May need to look at importing labour once borders open to offset any 'brain-drain'. Could see wage pressure in the sector in response to skill shortages.
- The mandate, resourcing and associated powers of any transitional agency will be important – particularly in relation to the design and execution of any industry transformation plan including workforce strategy (with its likely key focus on managing workforce risk).

Current Challenges and Impact of reform

Engineers, suppliers, local Councils, and service deliverers will all be affected by the reform.

The table below summarises issues associated with the sector currently by industry segment and the likely response as structural reforms are implemented and investment steps up.

Industry segment	Current challenges	Impact of step up in investment
Peak bodies e.g. Water New Zealand	• Large numbers of job vacancies • Lack of new entrants to the sector	• Increased number of job vacancies • Smaller players may be crowded out
Local Councils	• Uncertainty around long-term pipeline • Inability to determine priority assets	• Will be a sense or urgency to get projects underway • Scaled-up projects
Consulting engineers	• Unsure whether to up-resource given the reform may result in a hiatus • Lack of local expertise (currently recruiting from South Africa and the UK)	• Ability to grow engineering firms to plan for the increased capability need • Potential for a hiatus while the new entities establish themselves • Competition for existing capability rather than a focus on adding capability
Material suppliers	• Import supply chain not operating well due to COVID disruption • Convincing Councils to invest in maintenance now	• Increase in supplies required • Requirement for supply changes to facilitate upgrades to meet new standards • Greater involvement in planning/design
Equipment suppliers	• Councils do not understand the extent of technologies available • Councils are worried about relinquishing control over assets if technology makes some functions automatic	• More consistent adoption of new technology • Better pipeline visibility facilitates better supply chain management • Greater involvement in planning/design
Service delivery	• Implementation of new technology requires higher skilled workers • Local faults are always going to require local workers on the ground	• Increased pressure to comply with new regulations which is going to require the industry to upskill workers • Significant step up in workforce required – competition for existing workforce

Current Challenges and Impact of reform

Engineers, suppliers, local Councils, and service deliverers will all be affected by the reform.

The table below summarises mitigations the sector can take to reduce the risk of issues arising as investment expands.

Industry segment	Mitigation
Peak bodies e.g. Water New Zealand	• Raise awareness of roles available for school leavers • Roll out national competency framework
Local Councils	• Prioritise asset condition assessments • Provide long term contracts to increase future certainty
Consulting engineers	• Roll similar projects into one procurement process to allow contractors to plan their pipeline • Give adequate time to the new entities to focus on understanding the legislation and educating the sector
Material suppliers	• Begin conversations about reform with Councils early
Equipment suppliers	• Education will be key – Councils and businesses need to understand that technology is able to be adapted to suit different needs. Primary focus should not be on original innovation, but rather on adapting what is already available. • Equipment suppliers should have input into the planning process.
Service delivery	• Increase training for current employees

17. Case Studies