

# THE THIRTY YEAR NEW ZEALAND INFRASTRUCTURE PLAN

2015



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#### National Infrastructure Unit (NIU)

Located within the Treasury, the NIU has the overall responsibility for the Plan, working with the various agencies responsible for the different infrastructure sectors and ensuring a coordinated work programme is in place to deliver the Plan's vision. The NIU has a particular focus on the national perspective, looking across the different infrastructure sectors at the networks and interdependencies between them. The NIU recognises the critical role that local government and businesses play in the Plan. The majority of the work the NIU does is with the responsible agencies and decision makers at the policy stage, focusing on the Plan's outcomes and the new approach. The NIU leads a small number of items on the work programme, usually in conjunction with others, and typically where the issues cross infrastructure sectors and involve multiple agencies. The NIU also supports the National Infrastructure Advisory Board and, being located within the Treasury, provides advice to the Minister of Finance on spending and policy proposals.

Further information on the NIU, the Plan and the work programme is available at: [www.infrastructure.govt.nz](http://www.infrastructure.govt.nz)

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**PART 1:**

# **INTRODUCTION**

## Welcome from the Minister

The third Infrastructure Plan reaffirms the Government's long-term vision, first set out in 2011, that New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards. The Plan supports this vision in three ways - providing a better understanding of the services that will be needed in the future; improved information about, and management of, our existing assets; and ensuring we have the right settings to make better investment decisions in the future.

Infrastructure supports much of our daily lives - even if it isn't something we think about unless it is going wrong.

It is the roads we drive on and it delivers the electricity we use. Infrastructure provides the water we drink and farm with, and forms the backbone of social services through hospitals, schools and houses. It is a key driver of the economy, public services and the government's finances:

- > For businesses to invest another dollar and employ another person, they need to be confident that they will have reliable access to the right infrastructure.
- > Infrastructure underpins social service delivery. Ensuring that education, health and justice networks are fit for purpose gives the government the best chance of making a difference in the lives of New Zealanders.
- > Better management of the government's \$116 billion of existing infrastructure assets, and \$50 billion of forecast infrastructure spend over the next ten years, can deliver real benefits for the government's books.

The Government has committed to a significant and ongoing infrastructure investment programme over the past seven years. This includes:

- > over \$46 billion of property, plant and equipment added to the Crown's balance sheet;
- > a \$13.9 billion land transport programme between 2015 and 2018;
- > \$1.8 billion on local infrastructure and \$2.2 billion on Crown assets for the Christchurch rebuild;
- > over \$1.7 billion for the roll out of Ultra-Fast Broadband, and \$400 million for the Rural Broadband Initiative.

The infrastructure being planned for and invested in now will be around for a very long time - and it's also very expensive. That's why the *Thirty Year New Zealand Infrastructure Plan 2015*, the third of its kind, has been produced.

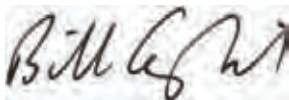
The Plan is intended to increase the understanding of how existing infrastructure can be better utilised, and to update plans for infrastructure needs over the next 30 years. This complements the more immediate focus of the Government's *Business Growth Agenda*.

The Plan shows that New Zealand's infrastructure will face a range of challenges and opportunities, including networks that will need expanding or renewing, the pressures of an aging, urbanising population, tight fiscal constraints and changing technology.

Meeting New Zealand's infrastructure challenges over the next 30 years, and taking advantage of the opportunities, will require coordination across a range of infrastructure partners and stakeholders - not just in central government but also from local government and the private sector.

This Plan reflects the work occurring across all of these stakeholders, led by the National Infrastructure Unit, to better understand the services that will be needed in the future; improve the information about, and management of, our existing assets; and ensure we have the right settings to make better investment decisions in the future.

The Government doesn't have a monopoly on good ideas, resources and expertise and I would like to recognise our partners for the progress that has been made, their engagement in developing this Plan and their commitment to help best meet New Zealand's infrastructure needs over the next 30 years.



Hon Bill English  
**Minister of Finance**

## Foreword from the National Infrastructure Advisory Board

Infrastructure, in its many forms, is critical to our economic performance and quality of life. *The Thirty Year New Zealand Infrastructure Plan 2015* adds to our understanding of New Zealand's infrastructure. By supporting long-term planning, it will help to ensure New Zealand has the infrastructure required to support our aspirations for an efficient economy and higher living standards.

The National Infrastructure Advisory Board (the Board) provides the Treasury's National Infrastructure Unit (NIU) and the Minister of Finance with advice and perspectives on infrastructure issues. Over the last three years, the Board has encouraged the NIU to seek out a range of views, and to work with agencies to develop shared objectives, a comprehensive evidence base and responses to key infrastructure challenges.

The infrastructure evidence base and the *Ten-Year Capital Intentions Plan* provide an overview of New Zealand's infrastructure. While we generally have a good base of national infrastructure, there are significant stress points and emerging future pressures which require attention. The Plan provides a framework to help infrastructure providers plan in a systematic, coordinated way. Smarter investment will get better results.

All infrastructure providers aim to provide efficient services. Competent asset management and strong data systems will be critical to meet future service needs. Disruptive technologies, economic and population growth, competition for resources and cost pressures will influence infrastructure development. To be effective, long-term planning

will need to consider a range of questions: does an infrastructure solution meet demand; is it compliant; is it fundable; does it add to resilience; is it affordable; does it meet aspirations for local, regional and national economies?

The Board is also an advocate within the infrastructure sector. We encourage infrastructure providers to shape behaviour through demand management initiatives; take a collective view of progress; advance best practice within the sector; and make evidence-based decisions.

Tackling the challenges ahead will require strong leadership demonstrating higher levels of collaboration in infrastructure planning, development and funding. Long-term plans help to support this by establishing clear goals, a shared understanding of the issues and opportunities, and an agreed way to approach big decisions. Getting it right will make a big difference for New Zealand.

### National Infrastructure Advisory Board

#### Current Board members:

Lindsay Crossen (Chair)

Matthew Birch

Margaret Devlin

Kathryn Edmonds

Edward Guy

Carl Hansen

Dr Terry Heiler

John Rae

#### Previous Board members:

Dr Rod Carr

Alex Sundakov

Dr Arthur Grimes

Sir Ron Carter

Rob McLeod



Lindsay Crossen  
Chair, National Infrastructure Advisory Board



## Strategic partners' reflection

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Lawrence Yule  
President,  
Local Government  
New Zealand (LGNZ)

LGNZ welcomes the 2015 Plan and is pleased to see a consolidated view of New Zealand's infrastructure.

Local government has a core role in owning, managing and investing in our country's major infrastructure including local and regional transport networks, the three waters, community-owned buildings and social infrastructure. Local government owns around \$120 billion of assets and manages all of New Zealand's drinking, waste and stormwater infrastructure and 88 percent of the country's roads.

While local and central government will not agree on everything, over the timeframe of this Plan LGNZ will continue to drive strategic performance improvements across its infrastructure including the three waters, roading and transport, as well as a new partnership with central government on risk management of local assets.

---

John Rae  
Chair,  
New Zealand Council  
for Infrastructure  
Development (NZCID)

Infrastructure is the platform that modern society is built upon.

As the peak infrastructure industry body the New Zealand Council for Infrastructure Development seeks an infrastructure planning, funding and delivery system that is integrated and supports national, regional and local development; where governance and decision-making processes are efficient, effective, fair and transparent; where funding is directly linked to strategy; where private capital is fully leveraged; where public agencies deliver high quality regulation and demonstrate advanced procurement and delivery capability; and there is clarity about the investment pipeline to provide confidence to investors and suppliers.

NZCID fully supports the 2015 Plan as an important milestone on that journey.

---

David Prentice  
Chair,  
BusinessNZ  
Infrastructure  
Sub-Group

BusinessNZ welcomes the 2015 Plan. Addressing the impediments to getting infrastructure where it is most needed and when can unlock economic growth. The Plan takes us on that journey. It shows the benefits of improved integration of the many components required to support a high-performing economy.

But much more needs to be done if we are to catch up with current demands and be in a stronger, more resilient position to a range of possible future scenarios.

The challenge posed is to move beyond the ideas in the Plan to new investment in a way that encourages and does not deter ongoing private sector participation.

Working to secure the linkages between the Plan's objectives and ideals to improved infrastructure outcomes will be the ultimate measure of the Plan's success and see it become a true roadmap for our future.

BusinessNZ looks forward to continuing to work with the NIU and other government agencies as we collectively strive to improve infrastructure for the betterment of all New Zealanders.

---

Peter Higgs  
President,  
Institute of Public  
Works Engineering  
Australasia (IPWEA)  
NZ

The introduction of the 2015 Plan is a significant step forward in the management of New Zealand's public works and infrastructure. The New Zealand division of the Institute of Public Works Engineering Australasia (IPWEA) NZ has been promoting best practice in asset management for 25 years through the development of tools, guidance documents and training. Over this time there has been reasonable but varied uptake of development of asset management plans across the public works sector. However the actual management of public works has been far from satisfactory. We need to further develop the skills and capacity of our people to properly manage our infrastructure.

So this Thirty Year Infrastructure Plan is timely and will be of great benefit to NZ Inc. It is not about fine words. It provides direction and actions to deliver on the Plan. IPWEA NZ welcomes this initiative and supports the Plan, and in particular acknowledges the collaborative approach taken in preparing the document.

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Barbara McKerrow  
President,  
Society of Local  
Government  
Managers (SOLGM)

SOLGM considers the 2015 Plan a significant step forward on its predecessors in terms of its recognition that infrastructure is a means to an end, and in its development of a credible series of overarching priorities.

We particularly endorse the Plan's focus on understanding and managing drivers of demand, and the opportunities that technology provide for improving asset management. Our organisation is working to improve understanding in these areas. We are also looking at overseas experience with managed retreat and how local authorities can have these discussions with communities on an informed and rational basis.

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John Pfahlert  
Chief Executive,  
Water New Zealand

Water New Zealand welcomes the 2015 Plan, and in particular the emphasis on the long term. Moving to 'a resilient and coordinated' infrastructure scenario will present challenges but is nevertheless a laudable goal. The Strategic Context described in part 2 of the Plan provides an excellent 'scene setter' for considering the current states of the particular infrastructure sectors. The description of the three waters sector is concise and highlights the key issues. The view of the current state of water infrastructure 30 years out identifies several scenarios for the future, a number of which we would expect to emerge well before 2045.

The Plan is an important step in fostering a more informed discussion on our critical infrastructure and we congratulate the Board on a well-conceived document.

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## Executive summary

Infrastructure is the foundation on which so much of our economy relies, whether it is reliable electricity, clean drinking water, or transport networks that allow us to safely get to work and live our lives every day. Over the next ten years, approximately \$110 billion is forecast to be spent on infrastructure. The Crown's infrastructure assets alone are worth more than a full year of total output from the economy.

Alongside assets like roads, gas pipelines and water networks, when we think about infrastructure we include social assets – schools, hospitals, prisons, libraries, swimming pools and so on. We include them because like other forms of infrastructure they are fixed, long-lived assets, they are in the government's domain, and the money spent on them influences the overall performance of our economy and New Zealanders' quality of life. Broadly speaking, New Zealand has a good national infrastructure base bolstered by the expenditure on infrastructure in recent years to address historic underinvestment. But over the next 30 years we face some big challenges. The purpose of the *Thirty Year New Zealand Infrastructure Plan 2015* is to help navigate our way through these challenges and grasp the opportunities they present. Our vision is that in 2045 New Zealand's infrastructure will be resilient and coordinated, and contribute to a strong economy and high living standards.

## Key challenges

**We have a number of aging infrastructure networks that will need renewing.** This is a simple consequence of when they were built; they are nearing the end of their life. For example, the schooling estate has an average age of 42 years and parts of our water network are now over 100 years old. Meeting the cost of infrastructure renewal and maintenance is even more challenging in areas with smaller rating and economic bases.

**There will be affordability constraints.** Local authorities are responding to community calls to manage debt and reduce rate rises, and central government is focussed on returning to surplus and reducing net debt to 20 percent of GDP by 2020.

**Our population is aging.** In 1996 no Territorial Local Authority had more elderly people than children, but by 2031, it is projected that there will be a 91 percent change to that ratio. The median age is projected to increase from 32.8 years in 1996 to 42.7 years in 2043. This has implications for the types of services New Zealanders will want, the infrastructure required to deliver those services, and available funding.

**Some of our regions will grow and others will shrink.**

By 2045 we expect another 1.2 million people to live in New Zealand. However, this increase will not be evenly spread across our country: 92 percent of this growth will be across just five regions, and over 60 percent is likely to be in just one region: Auckland. Several regions are expected to shrink over this period.

**To keep our economy growing, our infrastructure needs to support higher levels of productivity.** At home, we need to address a persistent productivity gap to make sure our businesses remain competitive on the world stage. Infrastructure will play a key role in lifting productivity and ensuring we can take advantage of opportunities in the global economy, including the ongoing growth in developing countries and Asia in particular.

**Technology is driving change everywhere.** It is behind many of the changes to our lifestyles, and is also transforming the way infrastructure providers deliver services. This provides exciting opportunities, but also brings challenges in the form of cyber security risks and the need to make sure our networks are flexible enough to adapt to new technological developments.

**Our growing economy will create infrastructure pinch-points.** The continued growth of New Zealand's economy will be more concentrated in certain regions, creating infrastructure pressures in housing, urban infrastructure, the three waters and roads. Between now and 2045 the pinch-points of growth will be felt most predominantly in Auckland which is forecast to grow by another 716,000 people over this time.

**The world's economic centre of gravity is shifting towards Asia.** Ongoing growth in developing countries, particularly Asia, will create opportunities for New Zealand to export our goods and services to these markets. This requires decision-makers to fully consider the needs of, and opportunities for, regional economies when forecasting infrastructure demand, and underpins the need for good international connections and effective roads, rail and broadband to link our regions to our cities and the global marketplace.

**Our climate is changing, and our natural resources are under pressure.** Rainfall patterns are changing, and sea levels are expected to rise by 30 centimetres by 2050. Flooding is our most frequent natural disaster with an average annual cost of approximately \$51 million. As a country we have a wealth of natural resources, but we are beginning to deplete some of our important natural resources and are reaching limits on some of the crucial inputs such as land and fresh water. These issues raise questions around how we develop and manage our infrastructure – it needs to be resilient to changes over time, and use resources efficiently.

## The response

In this context, we need to make a step-change in our approach to infrastructure planning and management. Simply building things to address our problems is no longer sustainable. We need a better understanding of the levels of service we want to deliver, more mature asset management practices and use of data, and more effective decision-making that considers non-asset solutions. The Action Plan attached to this document is intended to help us make this shift, with a particular focus on:

- > developing national, shared data standards for infrastructure;
- > establishing regional centres of excellence or similar arrangements to support decision-making;
- > investigating options to support long-term, integrated regional infrastructure plans;
- > more transparent infrastructure pipeline data;
- > investigating options for enhanced procurement governance for larger procurements;
- > a longer-term review of planning legislation and alignment;
- > updating the Resource Management Act (RMA) to improve the national planning framework; and
- > developing a trans-Tasman procurement market with Australia.

This shift will drive the two outcomes sought from the Plan – better use of existing infrastructure and better allocation of new investment.

## The purpose of *The Thirty Year New Zealand Infrastructure Plan 2015* is to:

- > set a marker for New Zealand's long-term infrastructure journey and the progress achieved;
- > advance the debate on long-term provision of infrastructure;
- > deliver a step change in our approach to infrastructure planning and management; and
- > provide confidence to businesses and people to invest in capital, develop skills and take risk.

## Development of the Plan

The 2015 Plan is the next step on the infrastructure journey. The first Plan (2010)<sup>1</sup> provided short-term priorities for infrastructure investment and regulatory reform. The second edition (2011)<sup>2</sup> set out a vision, principles and goals to provide an 'operating framework' for infrastructure decision-makers.

Specific goals in developing the 2015 Plan have included: be underpinned by a more robust evidence base of future need and current performance; mature the debate around future needs and responses; and have increased specificity about the action plan and future investment programme required to achieve the strategic direction. Most significantly, a priority has been to develop a more collective infrastructure plan by New Zealand Inc across the private sector, central and local government.

<sup>1</sup> The National Infrastructure Unit (2010). *National Infrastructure Plan 2010*.

<sup>2</sup> The National Infrastructure Unit (2011). *National Infrastructure Plan 2011*.

## Summary: The Thirty Year New Zealand Infrastructure Plan 2015

**Vision:** By 2045 New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards

**Desired outcomes:** better use of existing assets and Better allocation of new investment







## The vision

By 2045 New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards.

### What this means...

New Zealand has a **modern, integrated, and efficient infrastructure system** which underpins a **prosperous and inclusive society** with high-quality state services and a healthy and sustainable natural environment. Economic performance is strong with infrastructure that supports **international connectedness, increased productivity, movement up the global value chain, and more exports and growth**. It helps enable **all New Zealanders to reach their full potential** and play a meaningful role in the economy and society.

- > National decision-making is **integrated** with regional and local planning and considers the interdependencies between sectors...
- > Separate national, regional, and local entities **work together** to create an efficient and effective infrastructure network...
- > Our infrastructure investments provide clear **overall social, environmental, and fiscal benefits** that increase economic prosperity and living standards for all New Zealanders...
- > New Zealand has **stable and predictable regulatory settings**, with industries clear on the expectations and requirements of them...
- > We have **mature asset management practices** which provide a good understanding of intended levels of service and whole-of-life costs of investment, and these are effectively communicated...
- > There is widespread use of **shared infrastructure data standards** so that our infrastructure networks can be benchmarked and network interdependencies can be better understood...
- > Infrastructure providers **consider both demand and supply-side solutions** to infrastructure problems...
- > Where supply-side solutions are necessary, **appropriate funding options** are always considered and **advanced procurement tools** are being used across the country...
- > Our infrastructure is **resilient**...









**PART 2:**

# **STRATEGIC CONTEXT**

Infrastructure is the foundation to a prosperous economy. It provides electricity to our businesses – from our irrigation systems to our restaurant fridges, clean drinking water that protects our health, transport networks to connect our regions to the global marketplace, and broadband that allows us to do business anywhere.

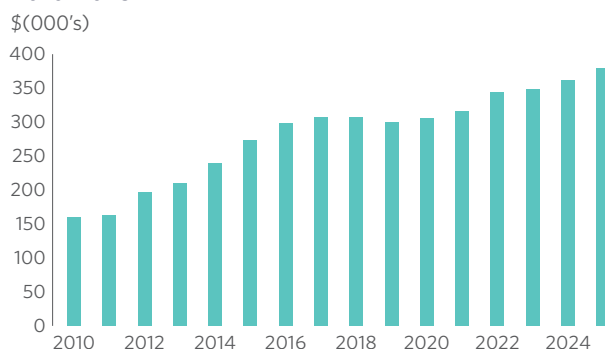
Infrastructure matters outside of the economy, too: it matters when we go home at night and Skype our family overseas, heat our homes, and drive our children to their Saturday morning sporting pursuits.

These daily benefits come from assets with long lives; many forms of infrastructure last for over 100 years. This means that we have to think ahead when we make our investment decisions. What pressures will our infrastructure face in the future? What does this mean for the way we deliver key services?

## Our infrastructure is aging and will need to be renewed...

Some of our biggest infrastructure networks face renewal pressures over the next 30 years, particularly in the social infrastructure, electricity distribution and three waters sectors. Our schooling estate has an average age of 42 years and over 50 percent of our social housing stock is over 42 years old. The estimated cost of renewing our three waters network (potable water, waste water, and storm water assets) over the next 15 years varies from \$30 billion to \$50 billion; in fact, one of the biggest challenges facing the sector is trying to understand what the true costs are and when they will be incurred.

### Actual and forecast asset replacement and renewal expenditure for electricity distribution businesses: 2010-2025



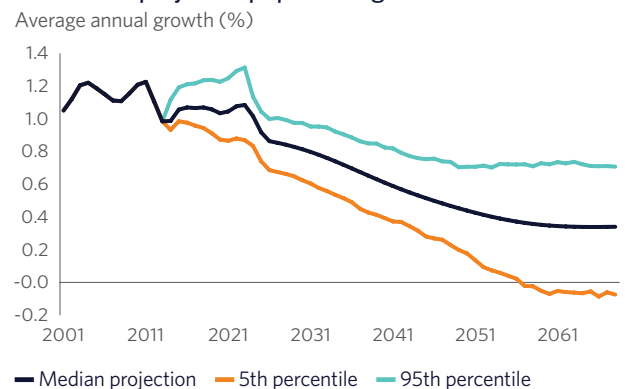
Source: Commerce Commission (2015)

These renewals are simply a result of the fact that many of the assets were built or put under the ground at the same time, and therefore need replacing at the same time. They will create funding challenges which make it sensible to explore solutions which do not rely on building new infrastructure, and infrastructure providers will need to ensure that any new investments are future-proofed.

## Affordability pressures will be compounded by our aging population, our growing cities, and some of our shrinking regions...

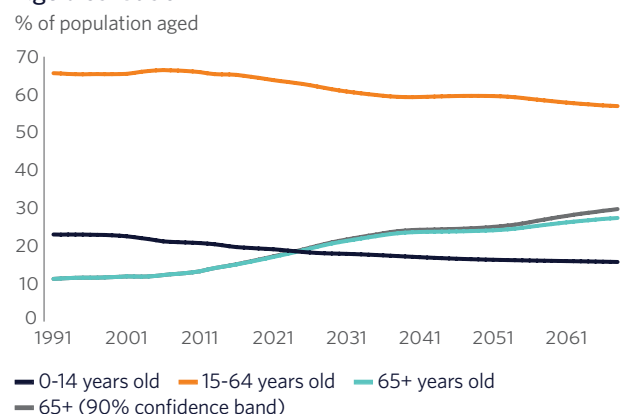
Affordability pressures over the next 30 years will challenge us to be innovative in our approach to managing infrastructure. Communities are increasingly calling on local authorities to manage their debt and limit rate increases, and central government has a strong focus on returning New Zealand to surplus and bringing the country's net debt levels back to 20 percent of GDP by 2020.

### Actual and projected population growth



Source: Statistics New Zealand (2015)

### Age distribution



Source: Statistics New Zealand (2015)

Over the medium and longer-term, affordability pressures will come from changes to our population. While New Zealand's population is expected to grow, it will do so at a slowing rate. This reflects an aging of the population resulting in a lower rate of natural increase, largely due to a higher number of deaths. This trend is not isolated; all regions will have a growing

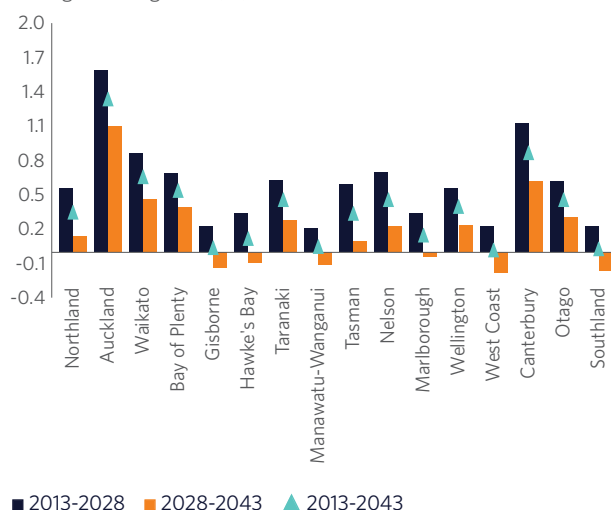
proportion of people aged over 65, including those that will enter periods of overall population decline. An aging population will place growing pressures on infrastructure services like hospitals, and the fixed incomes of older people will make it important to consider the impact of changes to charges and local rates to fund infrastructure investments.

Population growth will vary across the country; while all regions are projected to have larger populations in 2043 than they did in 2013, growth throughout New Zealand is projected to be slower in the second half of this period than in the first. Projections suggest that this second period of slower growth will be associated with population decline for over one third of regions.

The projected differences in population growth are even starker when examined at a local authority level, including the Auckland area boards, where 26 out of 87 areas are expected to have smaller populations in 2043 than they did in 2013.

#### Average annual regional population growth

Average annual growth (%)



Source: Statistics New Zealand (2015)

These population changes will mean that infrastructure providers in some areas will face growing demand for infrastructure while others will face stranded assets in shrinking areas or a smaller rate-payer base to maintain current infrastructure.

## To keep our economy growing, our infrastructure needs to support higher levels of productivity...

The New Zealand economy is forecast to continue its expansion with annual real GDP growth expected to average about 2.8 percent between 2015 and 2019; this is similar to the average for the past two decades.

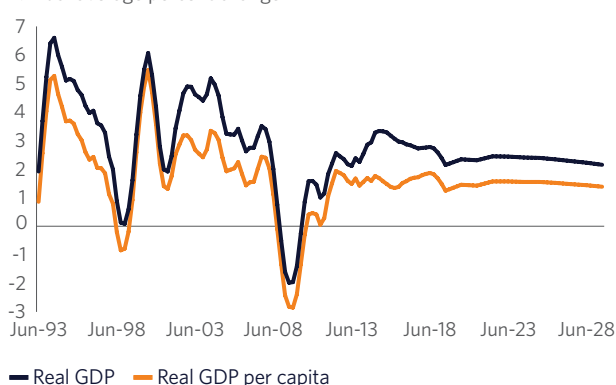
However, projections of economic growth for the 2020s decade average 2.3 percent per annum and end the decade at 2.2 percent. Projections over this period show

a lower rate of productivity growth in comparison to the past couple of decades, due to an increasing proportion of the population aged over 65 and slower growth in the working age population.

This is likely to mean that, in the future, we will need larger productivity gains which more effective infrastructure can contribute towards.

#### Past and projected economic growth

Annual average percent change



Source: Budget and Economic Fiscal Update 2015

## Technology is changing everything...

Technology and the use of data is transforming the way infrastructure providers deliver services, and the pace at which this is occurring is only likely to increase. This provides exciting opportunities, but also challenges in making sure our regulatory environments are ready and our networks are flexible enough to adapt to new technological developments.

Our increasing reliance on networked technology and information communication systems poses a cyber security risk. There will be an ongoing requirement to ensure that these increasingly complex systems are adequately protected from malicious actions or inadvertent human error.

While it is not possible to accurately predict the exact timing and extent of technological changes, the following trends are likely to continue or intensify:

- > increased use of 'sensing' technologies to collect real-time data throughout our infrastructure networks;
- > increased use of real-time data to expand consumer choice and improve government and business decision-making and asset management practices;
- > continued development and utilisation of intelligent transport systems;
- > continued advances in energy efficiency and battery technologies;
- > increased use of broadband for business, research, data-sharing, educational and entertainment purposes; and



- > changes to service delivery, especially within the social sector, which will have implications for the way we use long-lived assets like buildings; for example, how we use schools as communications technology advances virtual learning.

The growing potential to collect and use real-time data will empower consumers to play a greater role in determining the services they want, and how much they are prepared to pay for them. Real-time data on energy use is already available in the energy sector to give customers greater choice over what time of day they consume power, and therefore how much to pay. Growing consumer choice has implications for the way infrastructure providers define levels of service and for how we ensure that the most vulnerable users of infrastructure, who might be less likely to fully consider all available options, are able to benefit.

Effective, real-time data will also allow infrastructure providers to better understand their networks – from traffic flows to water use – as well as how those networks interact with other infrastructure networks. Promoting better use of data can therefore be a powerful way of achieving a joined-up approach to planning, but it requires data sharing between organisations and consistency in the way data is collected.

While a lot of technological advancements result in 'gradual' improvements to products, a number of potential 'disruptive' technological advancements have been identified over the next 30 years or so – innovations that reorganise existing markets and create entirely new markets. Examples include those in road transport like intelligent transport systems and new battery technologies, which have the potential to reduce congestion and mitigate the effects of climate change but could also render the internal combustion engine obsolete.

The emergence of disruptive technologies will always be hard to predict, but we can ensure we have responsive regulatory settings and infrastructure networks that can easily adapt to new technology.

## Our growing economy will create infrastructure pinch-points...

The continued growth of New Zealand's economy will be more concentrated in certain regions, creating infrastructure pressures in housing, urban infrastructure, the three waters and roads.

Between now and 2045 the pinch-points of growth will be felt most predominantly in Auckland which is forecast to grow by another 716,000 people over this time. Between now and 2040, Auckland will need to provide 400,000 more dwellings with supporting urban

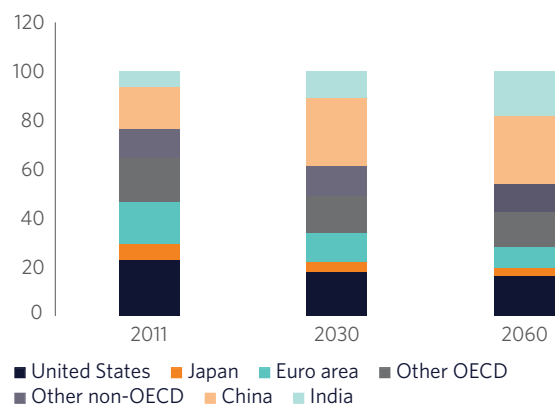
infrastructure, and will need to address significant congestion challenges. Modelling done by Auckland Council shows that, despite the additional investment in the *Auckland Plan*,<sup>3</sup> morning peak congestion is still forecast to be over 40 percent worse in 30 years' time than it is today.

## The world's economic centre of gravity is shifting towards Asia...

Ongoing growth in developing countries, particularly Asia, will create opportunities for New Zealand to export its goods and services to these markets. This requires decision-makers to fully consider the needs of, and opportunities for, regional economies when forecasting infrastructure demand, and underpins the need for good international connections and effective roads, rail and broadband to link our regions to our cities and the global marketplace.

### Projected changes in world economy

Share of world GDP (%)



Source: OECD 2012

Our primary industries will also put new pressures on our natural resources as they expand production to serve growing foreign markets. Resources like our freshwater systems need to be managed with good regulation, effective irrigation schemes, and technologies which enable water to be applied only where and when it is needed such as variable rate irrigation systems.

## Our climate is changing, and our natural resources are under pressure...

The Intergovernmental Panel on Climate Change (IPCC) Working group II report<sup>4</sup> concluded that Australasia continues to demonstrate long-term trends toward higher surface air and sea surface temperatures, more hot extremes and fewer cold extremes, and changed rainfall patterns. The combination of rising sea levels and increasing heavy rainfall have significant implications

<sup>3</sup> Details of the Auckland Plan can be found at <http://theplan.theaucklandplan.govt.nz/>

<sup>4</sup> Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects*. Available at: <http://www.ipcc.ch/report/ar5/wg2/>

for long-life infrastructure with increased inundation and erosion projected. With sea levels expected to rise by 30 centimetres by 2050, local authorities are noting that the rising water table is hastening the degradation of pipes. Changed rainfall patterns will bring challenges, not only for water storage, but also for flood protection of productive land and urban settlements as well as key transport networks that in our hilly terrain, can be impacted by slips and erosion. Flooding is our most frequent natural disaster with an average annual cost of approximately \$51 million.

As a country we have a wealth of natural resources, but we are beginning to deplete some of our important natural resources and are reaching limits on some of the crucial inputs such as land and fresh water.

These issues raise questions around how we develop and manage our infrastructure – it needs to be resilient to changes over time, and use resources efficiently.

## Infrastructure will need to support the growing role of the Māori economy...

The Māori contribution to the New Zealand economy is multi-faceted and includes the primary sector, natural resources, small and medium enterprises and tourism. The asset base of the Māori economy is growing quickly – this includes increasing Māori involvement in infrastructure, which is creating opportunities to deliver better social and economic outcomes.

Many Māori enterprises focus on long-term goals, with an emphasis on carefully managing assets for the benefit of future generations. Increasingly, Iwi are forming economic development partnerships and investing in new infrastructure. For example, He Mauri Ohoohe, the Māori Economic Development Strategy for the Bay of Plenty and Taupo areas was launched in February 2014. The first of its kind, it connects Iwi, Māori, business and government together to improve the wealth and wellbeing of Māori in these areas. The group is scoping and planning a range of projects covering a range of themes including helping Māori exporters and capital and investment.

In the Waikato, Tainui Group Holdings has over \$1.1 billion of assets and experienced 17.7 percent revenue growth over the year ended 2014; this is the result of two decades of targeted asset growth and value creation, beginning in 1995 with a Treaty of Waitangi settlement of \$170 million. With the first stage of the \$3.3 billion Ruakura inland freight hub in the consenting process, the hub is designed to take advantage of the rail line connecting Hamilton to the ports of Auckland and Tauranga, with the potential to take up to 65,000 truck

## What the future may hold...

In its 2013 report<sup>5</sup> on disruptive technologies, the McKinsey Global Institute identified what it defined as 12 disruptive technologies with the potential to transform the global economy:

- > Mobile internet – expected to exceed wired use. Potential to fast-track billions of people in developing countries into the connected world.
- > Automation of knowledge work – advances in artificial intelligence are making it possible to automate tasks that were previously regarded as impossible for machines to perform.
- > The internet of things – physical objects that are connected and able to monitor condition and performance, enabling better asset management and monitoring of health.
- > Cloud technology – enable the provision of computer services as and where needed.
- > Advanced robotics – enabling greater substitution of labour for robots in manufacturing as well as in a growing number of service jobs and for surgical purposes.
- > Next-generation genomics – with profound impact on medicine and agriculture.
- > Autonomous and near-autonomous vehicles – enabling enhanced safety, reduced emissions, more productive use of travel time and increased productivity in the transport sector.
- > Energy storage – advancements in battery technology enabling cost-competitive electric vehicles and enabling greater use of solar and wind power.
- > 3D printing – potential skipping of traditional manufacturing process and enabling on-demand production with implications for supply chains and stock levels.
- > Advanced materials – with different strength, reactivity and conductive properties.
- > Advanced oil and gas exploration and recovery – making extraction of previously uneconomic reserves possible.
- > Renewable energy – potentially supporting growth in countries with significant pollution issues.

journeys off the road each year and generate over 10,000 jobs.

Planning for future infrastructure provision needs to ensure that Iwi are appropriately engaged so that the full potential of all parts of the New Zealand economy are unlocked.

<sup>5</sup> McKinsey and Co (2013). *Disruptive technologies: Advances that will transform life, business, and the global economy*. Available at: [http://www.mckinsey.com/insights/business\\_technology/disruptive\\_technologies](http://www.mckinsey.com/insights/business_technology/disruptive_technologies)

## Local talk about infrastructure: Tūhoe

As part of developing the New Zealand Infrastructure Plan, we spoke to a number of Tūhoe about what they see as the real-life challenges and opportunities that infrastructure creates for their Iwi. This 'Local Talk about Infrastructure' reflects their insights, views and voices.

Te Kura Whare is the home of Te Uru Taumatua, the coordinating body of Ngāi Tūhoe Iwi in Tāneatua. But it is much more than that. The first project funded from the Crown settlement agreed in 2014, Te Kura Whare is a unique building. Tūhoe and a team from Jasmax architects (led by the late Ivan Mercep) designed it to meet the Living Building Challenge, "a building certification programme ... that defines the most advanced measure of sustainability in the built environment possible today" according to the International Living Future Institute. Tūhoe have been told that once accredited, after its first year of operation, it will be the only such building in New Zealand and one of less than thirty in the world.



At a formal visit to Tūhoe by a land trust from neighbouring Iwi Ngāti Tahu-Ngāti Whaoa, Iwi Chair Tamati Kruger talks to them about Te Kura Whare. *"To meet the challenge, we not only had to generate all our own electricity, but also recycle all our water. In fact we have no water main connection and ALL the water we use is filtered through settling ponds and then UV treated back to drinking standard and reused. The native timbers all come from dead trees from Te Urewera and the pine from our Kāingaroa Forest holdings. Everything we used in the building, every bracket, nut and bolt had to be certified that it did not in any way degrade an ecosystem, lead to the demise of a resource or produce a hazardous waste or toxin. We do things the hard way!"*

Iwi CEO Kirsti Luke explains, *"Te Kura Whare mirrors Tūhoe values and Mana Motuhake. It brings to life the idea that we must restore the spaces that we live in. We must live within our means: water use, materials, energy generation and consumption."*

Titles like Chair and CEO suggest authority, but Tamati is quick to clarify: *"We in Te Uru Taumatua are not the Iwi. The Iwi is out there on the marae, in hapū and in the tribal authorities. We have a saying here though – don't fall in love with the flash workspace, the laptops, the chairs, the cellphones. We are only here as long as we deliver to Tūhoe."*

## More than bricks and mortar

Patrick McGarvey is Chair of Te Komiti o Runga, the tribal authority based around the Rūātoki Valley. There are three other authorities based at Waikaremoana, Ruatāhuna and Waimana. Collectively they represent all the marae which make up Tūhoe. He explains, *"Te Kura Whare is more than bricks and mortar. It's an inspiration. It has given us the confidence, the knowledge that we can do great things. Because of what we've been through, a lot of Tūhoe were dispirited, fearful towards endeavour and didn't have the hope to aspire."*

*"Before we talked and dreamed. Now we are doing. We are building a nation,"* adds Terehia Biddle, General Manager of Te Komiti o Runga.

So what does the Tūhoe nation stand for? Stand on? *"Te Urewera! When we say our pepeha, when we acknowledge the mountains and rivers we spring from, these aren't just songs, not just entertainment! A Te Urewera that is whole, alive, well is vital to Tūhoe, it almost is Tūhoe!"* says Patrick.

Tamati adds, *"We plan to spend \$10million a year on infrastructure. Creating the basic facilities for Tūhoe to live and work, to do business. Each of the tribal authorities has now come up with their spatial plan which will determine the priorities for investment."*

Terehia explains, *"Te Komiti o Runga plan is about community development, housing, education, te reo and tikanga – all the infrastructure needed to thrive."*



## Independence through interdependence

*"Well, if we are talking about infrastructure it will be a long talk," says activist Huka Williams. "Te Urewera is degraded and polluted. Fifteen years as waste manager for the Tūhoe Festival means I know a bit about pollution. Taking gravel from the rivers messes up the habitat for tuna and inanga. The water table is thrashed, wetlands have been dried and silted up, possums are rampant. 1080 might be good for birds, but you don't want to be getting your kai where it's been used."*

Huka, like every other Tūhoe, has a say in Tūhoe decision making. *"But there's no voting," explains Tamati. "At the monthly Hapū meeting, you share your ideas. What comes out at the end is a consensus – the Hapū agrees. It's the Hapū who control the lwi not the other way round. Our job is simply to support them to be Tūhoe. Mana Motuhake means being independent. For Tūhoe, that means being independent by being interdependent. Mana Motuhake and Tūhoetanga are how we judge things."*

So Tūhoetanga? Being Tūhoe, what does that mean? Terehia says, *"It means Te Urewera! Our mountains, our rivers, that's who we are. Being just a part of the bigger being that is Te Urewera. Our young Tūhoe need to know how to BE in Te Urewera, how to find food, fish, live in and look after the place. Know how to be confident in their environment."*

*"That's why," says Tamati, "when it comes to our plans, our infrastructure spend, applying the Tūhoetanga test means asking – is this good for Te Urewera? What's the best way to generate energy? Deal with sewage? Telecommunications? Transport? Housing? What approach, what technology will meet the tests from the Living Building Challenge – degrade no ecosystem, deplete no finite resource, emit no toxins? What we learned from Te Kura Whare project is what we will apply across Tūhoe whānui – solar generation, water management, passive heating. We're also looking at how to build roads that don't leach stuff into the water table. We will innovate like our tupuna did so we can heal Te Urewera."*

## Healing Te Urewera, healing Tūhoe

*"Healing Te Urewera means healing Tūhoe," say Maringi Baker and Tikina Heremia. Both have come home to Te Urewera and work at Te Uru Taumatua. Maringi says, "When Te Kura Whare was going up, lots of Tūhoe turned up to volunteer. They'd say, 'Here's my CV. Not much of a CV dear, haven't had a job before, but I want to work.' We took them all on. There was heaps to do."*

*"Mud bricks provide a lot of the thermal mass in the building," explains Tikina. "Everyone was making bricks, putting their name on them. The accountant and the bank manager even got to make bricks before we did." Maringi adds, "Now Tūhoe have this sense of ownership, of pride – that wood's from our bush. We made those bricks."*

## Te Mana Motuhake o Tūhoe

One symbol of the healing is Colin McCahon's Urewera painting. Commissioned by Te Urewera National Park for the visitor centre at Waikaremoana, it's now installed at Te Kura Whare. It quietly proclaims Tūhoe's connection with Te Urewera, as Tamati explains to the visiting Tahu-Whaoa neighbours. *"We don't believe we have to fix everything straight away. I've done a bit of research and so far the human death rate is 100% – we're not on this earth for long. We don't have to be a saviour, we just have to make a contribution, leaving things for the next generation of leaders. We've been thinking and talking a lot about Mana. We think the best translation isn't 'prestige' or 'status' but 'responsibility'. Our system – collective, consensus, no vote, beyond democracy – means our leaders are responsible to Tūhoe. Honouring that responsibility builds Mana."*

Tamati adds, *"But that responsibility is broader than to the human Tūhoe. It extends to the entity within which Tūhoe exists. It extends to Te Urewera, the rocks, trees, fish, birds, water, soil and air. That's why we'll be spending our money on the infrastructure needed to make it well, to make it work."*

*"Sure, we could say that's the council's job, leave it to them. But that wouldn't be responsible!"*







**PART 3:**

# **THE CURRENT STATE**

New Zealand has a broadly good infrastructure base, bolstered by Government investment in recent years. However, our sectors need to be better prepared for the challenges over the next 30 years.

This section explores what the challenges and opportunities discussed in the last chapter mean for New Zealand's six infrastructure networks:

- > Transport
- > Telecommunications
- > Energy
- > Three waters (potable water, waste water, and storm water)
- > Productive water
- > Social infrastructure

## The state of our infrastructure

<b>10,886km</b> State Highway network	<b>83,703km</b> of local roads	<b>721,700</b> hectares of total irrigated land	<b>42,312 GWh</b> electricity produced	<b>12,000km</b> of national transmission grid
<b>75-80 percent</b> of electricity from renewable sources	<b>35,500</b> barrels of oil produced per day in 2013	<b>724,253</b> end users able to connect to Ultra-Fast Broadband	<b>239,150</b> rural households with access to wireless broadband	<b>4,000km</b> of rail corridor
<b>\$45.2billion</b> total replacement value of the three waters assets	<b>19</b> prisons	<b>2,532</b> schools	<b>38</b> public hospitals	<b>16</b> sea ports that export <b>37.7 million</b> tonnes a year
<b>308</b> public libraries	<b>52</b> municipal landfills	<b>371</b> community based police stations	<b>471</b> public museums	



## Infrastructure investment since 2009



Since 2009, the Government has added over \$46 billion of property, plant and equipment to the Crown's balance sheet.



Since 2009, the total value of infrastructure assets across social sectors (Education, Health, Housing New Zealand, Justice, and the Defence estate) has increased by almost \$7 billion.



The Government has instigated a \$13.9 billion land transport programme between 2015 and 2018.



Between 2009 and 2014, the Government spent \$3.3 billion on Roads of National Significance and both government and local councils spent \$8.8 billion on new and improved local roads. This includes \$5 billion outside of Auckland, Wellington and Canterbury.



\$3.2 billion invested in railways since 2009, included \$1.4 billion for the KiwiRail Turnaround Plan, over \$80 million on the Wellington Rail Metro Upgrade, and \$690 million on the Auckland rail development.



The Government's total contribution to the Christchurch rebuild since September 2010 is around \$16.5 billion, which includes \$1.8 billion on local infrastructure and \$2.2 billion on Crown assets.



Over \$1.7 billion has been provided for the roll out of Ultra-Fast Broadband and \$400m for the Rural Broadband Initiative. A further \$50 million has been provided for tackling New Zealand's blackspots.



\$5 billion invested through Transpower to update the National Grid and increase capacity, performance and reliability.



Since 2011 the Government has allocated over \$150 million for investment in irrigation development.



85 Special Housing Areas (SHAs) have been created in Auckland, 21 in Wellington, nine in Tauranga, and one each for the Western Bay of Plenty and Queenstown. Three developments totalling over 420 dwellings are also being progressed on publically-owned land in Christchurch.

In 2012, the Government established the Future Investment Fund which has provided almost \$5 billion of new capital spending including:



Almost \$1 billion in transport.



\$636 million in education.



\$684 million in health.



\$210 for extending Ultra-Fast Broadband.

## Infrastructure sectors

### Transport sector



Transport is important to all New Zealanders. Strong links between road, rail, shipping and aviation are vital for moving people and freight around the country and overseas.

#### Understanding future demand, revenue and investment

Forecasting demand across all modes of transport is challenging. Historic assumptions about future demand and future revenue from fuel taxes are being re-evaluated in light of uncertainty from international trends such as young people driving less, variable fuel prices, e-commerce, increasing fuel efficiency and alternative fuels.

A key opportunity is to consolidate gains from completed and planned investment, across all modes of transport, and to get the best possible performance from existing networks through demand management.

#### Regulation that enables new transport technologies

The increasing use of technology is already impacting on the design, operation and maintenance of transport infrastructure. However, it is essential that the benefits offered by innovative applications of technology are not stifled by unnecessary regulatory barriers.

A flexible, risk-based regulatory environment will promote New Zealand as an attractive location for testing new technology and enable easier widespread introduction of new applications. New Zealand is already becoming a testing ground for remotely piloted aircraft (drone) technology due to the favourable regulatory environment. However, more can be done to create a regulatory environment that can accommodate technological change.

### Keeping Auckland moving

Auckland Council estimates it would need an additional \$300 million per annum to deliver its preferred transport strategy, and has indicated it would like the Government to provide it with new transport funding tools. However, modelling shows that the proposed additional investment is only expected to deliver modest improvements in the areas that matter most to Aucklanders – addressing congestion and driving greater public transport use.

To address these issues, the Government and Auckland Council have agreed to work together to identify an agreed approach to developing Auckland's transport system. This work will involve testing whether better returns from transport investment can be achieved, particularly in relation to the following objectives:

- > To support economic growth and increased productivity as Auckland's population grows.
- > To reduce congestion, in particular travel time and reliability, to ensure congestion does not become widespread during working hours.
- > To improve public transport's mode share, where it will address congestion.
- > To ensure increases to the financial cost of using the transport system deliver net benefits to users of the system.

### Supporting New Zealand's export economy and international connections

The transport system has a critical role in supporting our exporters by connecting them with the global marketplace. Our geographical isolation is a major competitive disadvantage – but we can help to overcome this by ensuring that we have an efficient freight network and policy and regulatory settings which support growth in the land, aviation and maritime sectors. Opportunities exist to optimise the performance of the freight network and to continue achieving productivity gains in the freight transport sector. This will involve ensuring that our freight transport and distribution assets are optimised to support increasing international connectivity and an export-driven economy.

## Auckland Airport – New Zealand’s gateway to the world

Auckland Airport connects New Zealanders and visitors with Auckland and the world. It is New Zealand’s second largest cargo port by value. In 2015, Airbus forecast Auckland will become an aviation ‘megacity’ joining 90 others that handle more than 10,000 long-haul passengers a day. Effective planning and engagement with stakeholders is key to making the aviation megacity a reality.

Efficient and affordable airport infrastructure is crucial for New Zealand to take advantage of future travel and trade opportunities. The number of passengers using the airport every year is expected to almost triple from 14 million in 2013 to 40 million in 2044, while the annual number of aircraft is expected to almost double from 150,000 to 260,000 over the same period.

In April 2014, Auckland Airport announced a 30-year vision<sup>6</sup> to act as a guide on how the airport can accommodate this expected passenger and aircraft growth. The vision is to deliver infrastructure that is planned, affordable, implementable and allows for future change. It provides for a combined domestic and international terminal and an initial second runway for short and medium haul destinations – with a possible extension to that runway in 30 years or more.

One of the themes of Auckland Airport’s transport strategy is to promote a shift between modes of transfer, including greater use of public transport for passengers and employees accessing Auckland Airport. Auckland Airport will continue to actively engage stakeholders to improve public transport connections to the Airport.

Auckland Airport operations and its neighbouring activity contributes \$3.5 billion to regional GDP and provides 33,100 jobs. Auckland Airport’s 30-year investment in infrastructure is expected to increase regional GDP by \$2 billion and create a further 27,000 jobs.



## Transport – how might the current trends play out in 2045?

- > Gradual improvements in the fuel efficiency of cars slowly erode the effectiveness and fairness of Fuel Excise Duty as a means of collecting revenue from transport users.
- > Advances in technology enable road users to be charged based on how far they travel, where they travel, and when they travel. This will improve information about infrastructure and help manage congestion.
- > Increased automation in the vehicle fleet lowers the road toll.
- > Transport’s percentage share of greenhouse gas emissions per capita falls as more vehicles are powered by electricity and hydrogen and freight productivity improves vehicle utilisation rates.
- > Most of our international freight is moved through a few large ports. Larger ships dominate the movement of New Zealand’s exports and imports.
- > A large proportion of aircraft used for specialised activities in New Zealand are likely to be operated remotely.



<sup>6</sup> Available at <http://airportofthefuture.co.nz/>

## Telecommunications sector



Telecommunications play a key role in connecting New Zealanders domestically and to the rest of the world.

The internet is featuring more and more in business and our daily lives. This is changing user expectations about where they want to send and receive data. By 2019, there is forecast to be at least 35 million devices in New Zealand connected to the internet - more than seven per person.

Protection of New Zealand's telecommunications infrastructure in order to avoid vulnerabilities and disruptions to service, including cyber risks, will be increasingly important.

## Getting regulation right

Convergence in the telecommunications sector is occurring across the traditionally separate markets of telephony, internet, broadcasting, information media and computing. Regulation has tended to be specific to each of these markets and, as a consequence, there is a risk that regulation will not keep pace with changes to technology and markets. The major challenge at this time for the telecommunications sector is ensuring optimal regulatory settings that are fit for purpose and do not constrain market development.

The stability of regulatory pricing for basic wholesale services is a key issue of concern for the effectiveness of telecommunications markets. The wholesale pricing arrangements for copper-based and fibre-based services is fundamental to how the telecommunications markets will evolve to supply New Zealand's connectivity.

## Expanding network capacity

Telecommunications capital expenditure is currently at a relatively high level on a historical basis and is bolstered by the investments made through the Ultra-Fast Broadband (UFB) and Rural Broadband (RBI) programmes. These programmes are delivering a major upgrade to New Zealand's telecommunications network infrastructure, and are being extended to bring fast broadband to more New Zealand businesses and households.

The data transfer speeds that telecommunications users now expect to have available through their broadband connections continues to increase with an ever-growing range of digital applications. Users are expecting to send and receive larger amounts of data, and expansion of network capacity is eventually required to facilitate increased data flows and avoid deterioration of the service performance experienced by users. Arrangements for the funding of industry investment to expand network capacity need alignment to fully recognise the contribution of revenue from chargers to users. Stronger links between these elements can better ensure that investment in network capacity continues to be commercially sustainable to meet the demand from users for networks to carry greater amounts of data.



### Leveraging Ultra Fast Broadband (UFB) infrastructure upgrade for business growth

Many businesses have had opportunities open up to them as a result of UFB connections; for example Melita Farley and Kevin Double of *Double Farley Whanganui*.

Melita Farley and her husband Kevin Double run their film and education company, Double Farley, from Whanganui, yet much of their work comes from out of town.

They say their business operates successfully because of UFB.

"With our UFB connection it's very easy to build and maintain relationships, because communication via video conferencing and email is so immediate," says Ms Farley.

Ms Farley and Mr Double recommend UFB to other Whanganui businesses because it allows them to live in a smaller community while still developing national and international links.

"You can build your business with UFB, and you don't have to travel as much." It has meant the couple can work on online projects at the same time.

"Previously we had to consider what each of us were doing, as we couldn't perform tasks that require a lot of data at the same time," says Ms Farley. "Large downloads would time out and fail, so we'd have to start over. We are now able to work more efficiently. Kevin can be on a video conference while I am downloading large files and working on shared documents online. There's no limit" she says.



### Telecommunications – how might the current trends play out in 2045?

- > The internet is fully integrated into business and personal life with the 'internet of things' concept now a reality.
- > Broadband connections to homes and workplaces by fibre are the norm, with dependence on 'always on' devices for uploading and downloading data.
- > 'Spot markets' for data traffic have developed to optimise the time of day network usage for the data flowing through internet connections.
- > The traditional telephone network (PSTN) has disappeared.
- > Legacy networks for broadcasting through the airwaves have ceased, with all audio and video content distributed via the internet through landlines or mobile devices.
- > The last remnants of the copper landline network have been decommissioned in urban areas and have been displaced by radio-based technologies in many rural areas.
- > Public and private networks are now indistinguishable with the agglomeration of networks and users pooling network capacity.

## Energy sector



The New Zealand energy system is in a sound overall condition with sufficient energy available and adequate management of resources. However, there are challenges for the electricity, gas, oil and coal networks and the networks contain interdependencies. There is a need to better understand the desired levels of customer service to strengthen system performance and resilience.

Protection of New Zealand's energy infrastructure in order to avoid vulnerabilities and disruptions to service, including cyber risks, will be increasingly important.

### Electricity

Within the electricity network, the sources of generation are changing; thermal (coal and gas) generation is transitioning from forming part of the base energy generation mix to only contributing during peak times. New Zealand's high proportion of renewable electricity helps give New Zealand a competitive advantage exporting products to markets that value sustainability.

Recent investments in the national grid (Transpower) provide significant capacity for growth in most regions. Between 2008 and 2013, electricity distributors improved the reliability of the electricity they distributed, with an exception in 2014 when reliability deteriorated due to the impact of large events.

However, the outlook for electricity distribution is challenging. It is a dynamic market, with uncertain indicators on future demand and there are aging assets, changes to quality expectations and emerging technologies such as households installing solar panels. Opportunities exist with smart grid initiatives to enhance service delivery and use.

### Oil

In oil, while there is little spare capacity built into the system, the sector frequently demonstrates its ability to respond to changes in demand and world markets. Storage capacity in the South Island is reaching capacity which increases the risk of interruptions to supply. Standards across the oil system are in accordance with international best practice.

### Gas

Gas transmission capacity, including into Auckland, is generally sufficient for short- to medium-term supply and demand scenarios. The next step-change in investment is likely to be from a significant discovery of a new gas field. Gas is produced from numerous fields and distributed by pipeline in the North Island and liquefied petroleum gas (LPG) networks in the South Island. LPG distribution occurs via coastal tanker, rail and road.

### Coal

Coal supply is critical to a range of household, industrial and institutional consumers. Supply chains require stockpiling coal by both the supply-side and demand-side participants. Road transport is the main option for domestic supply, and the Midland rail line is a critical component for exporting coking coal. An increasing issue is the quality and reliability of thermal coal meeting end-user specifications.

### Other

Energy from geothermal and biomass sources also make a sizeable contribution to industrial process heat.

New Zealand is self-sufficient for electricity and gas, but is almost fully dependent on imported oil. Domestically-produced oil is exported as it can attract a higher price. New Zealand is largely self-sufficient for coal, but at times has imported it to generate electricity.

The majority of energy companies are privately-owned and operated. Some electricity distribution businesses and gas pipeline businesses are subject to price-quality regulation by the Commerce Commission. There is also regulatory oversight by the Electricity Authority and the Gas Industry Company.

There are multiple interdependencies with other networks, such as transport and telecommunications. A topical issue is the ability to recruit and retain skilled people particularly in ICT for any of the networks.

The Minister of Energy and Resources is due to decide by February 2016 whether the current New Zealand Energy Efficiency and Conservation Strategy (NZECS) is to be replaced.

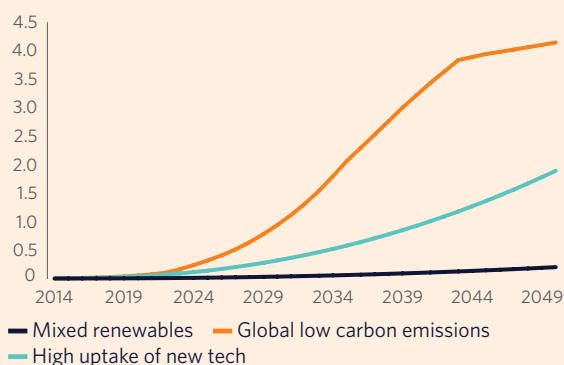
## The Smart Grid Forum

The Smart Grid Forum, established in 2014, promotes awareness of electricity network technologies and the potential to improve the way energy meets the needs of consumers. Over the past year the Forum has explored how electricity network technologies are trending and the potential benefits from adopting these new technologies in the New Zealand environment.

The Forum has modelled how technology may affect the power system in particular, from electric vehicles, solar panels and battery storage. The diagram illustrates the difference between the adoption of electric vehicles under various scenarios, including if battery costs were to fall at the exponential rate they have for the last 30 years (orange).

This high uptake scenario projects that every new vehicle entering the NZ light fleet from 2030 will be electric and that the entire fleet would be electric by 2043.

**Electric vehicle uptake under different scenarios**  
millions



Source: New Zealand Smart Grid Forum (2014)

## The energy sector – how might the current trends play out in 2045?

- > With improved fuel efficiency, vehicles increasingly powered by electricity and hydrogen, and improved freight productivity, liquid fuel use per kilometre of travel is substantially less than 2015 levels.
- > Heavy vehicles, machinery and shipping are starting the transition to alternate energy sources.
- > Light vehicles have largely transitioned to alternative energy sources.
- > The Whangarei oil refinery has been refurbished to contribute to ongoing supply security for liquid fuels and ensure the product mix is fit for the changed environment.

- > As the quality of building stock has improved, energy demand for heating and cooling has declined.
- > With an aging population, bigger cities and some shrinking regions, energy demand has been redistributed and is likely to have declined on a per capita basis.
- > Liquid fuels storage facilities largely remain at current locations and capacities.
- > The existing electricity generation and distribution network has largely remained, with increasingly sophisticated control systems for demand management and integration of distributed generation.
- > Some of the existing thermal electricity generation has been decommissioned and largely renewable options in the top half of the North Island have been established to supplement generation requirements.
- > Distributed electricity generation and storage contribute strongly to meeting demand most efficiently. Clusters of energy supply and demand are developing.
- > Solar energy is expected to feature prominently together with smart grid technologies. The popularity of electric cars has created additional demand for electricity but this has been partly offset by the increased number of homes that have adopted solar panels and high-capacity domestic batteries for energy storage.
- > Buildings where electric cars are parked have substantially higher delivered electricity capacity.
- > Natural gas continues to be brought to market from the Taranaki region at similar levels. There is increased gas storage capability. LPG to distribution networks and bottled gas continues to meet demand.
- > Energy from geothermal and biomass sources increasingly contributes to industrial process heat requirements which in turn gain from significant improvements in efficiencies.
- > Increased integration of infrastructure services results in many dual benefit applications such as regenerative braking, biogas production at waste water treatment plants and gas fuelled micro-turbines for heating and cooling cogeneration.
- > Energy systems are resilient to natural hazards including flooding and earthquakes.

## Three waters sector



The three waters network refers to drinking water, waste water and storm water. Infrastructure for the network is a key social and economic enabler: a precursor for any significant residential, industrial or commercial development and a significant input for any agricultural, processing or manufacturing enterprise. Water is a vast and diverse sector, characterised by a large number of providers managing a large number of assets across a wide geographic spread, heavily influenced by topography and natural features such as drinking water sources and discharge options.

The three waters have a large asset base, with approximately 66 percent of costs fixed and significant levels of expenditure planned over the next 10 years, including 1,167 projects (excluding those under \$1 million) totalling over \$15 billion.<sup>7</sup> Expenditure is driven by population and economic growth, renewals and requirements to meet standards and to ensure networks are resilient.

A key challenge is ensuring adequate investment in three waters infrastructure for regions experiencing high levels of growth.

### Effective data and mature asset the management

The last few years have seen a dramatic improvement in the quantity of information available, including the 3 waters project and the National Information Framework led by LGNZ; increased regulatory reporting requirements; Office of the Auditor General (OAG) reports; and a greater number of local authorities participating in the Water New Zealand National Performance Review.

This information has enabled a more informed conversation on the quality of services and provided insight on some long-standing questions. This is

a very significant first step and recognises LGNZ's leadership in this area. It has also reinforced the need for a common set of data standards to build capability (especially on asset management maturity and data analytics), strengthen decision-making and deliver better outcomes for end users.

The variability of data is reflected in the differing levels of asset management maturity across the sector with a number of local authorities lacking foundational practices such as risk, renewal and funding profiles for critical assets.<sup>8</sup> Strengthening capability across the full spectrum of asset management, from forecasting through to procurement, is a key challenge as there is only a small pool of skilled asset managers available in New Zealand.

### Regulation

Complying with regulatory standards is a significant issue. In many cases, fewer than 50 percent of local authorities comply with conditions set by resource consent for waste and storm water.<sup>9</sup> The caveat on this statement is that the seriousness of the breaches is not detailed and some will be minor or technical in nature. Regardless, the focus on environmental issues and increasing standards is likely to make compliance an increasingly significant issue.

### Understanding the renewals challenge

About 45 percent of the potable and waste water networks are categorised as “ungraded” (52 percent for stormwater).<sup>10</sup> Although there is no expectation that 100 percent of assets will be graded, the scale of the unknown age profile and asset condition has driven concern around the future affordability of renewing the networks. The new data has validated this concern but is not yet at the stage of quantifying the investment required and therefore the extent and scale of the challenge.

### Governance opportunities

At present, there is some variation in the governance models used by water providers but the majority of services are provided ‘in-house’, especially for rural and provincial local authorities. Improvements to service levels and savings by Watercare in Auckland and the findings of the Waikato Waters Report prepared by Cranleigh<sup>11</sup> suggest value in exploring whether alternative governance and service provision arrangements would realise significant efficiency gains.

<sup>7</sup> National Infrastructure Unit (2015). *Ten-Year Capital Intentions Plan 2014/15*. Available at <http://www.infrastructure.govt.nz/plan/evidencebase>

<sup>8</sup> Local Government New Zealand / NZIER (2014). *Three Waters Services, Results of a Survey of Council Provision*.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> Cranleigh (2015). *Business Case for Water Services*. Available at <http://www.waterstudywaikato.org.nz/technical-reports>



## Wellington Water

Wellington Water is a council-controlled organisation (CCO) that manages the three waters (drinking water, wastewater and stormwater) services for its five shareholding councils: Hutt City, Porirua City, Upper Hutt City, Wellington City and Greater Wellington Regional.

Wellington Water is a unique model in the local government landscape in New Zealand in that it is a jointly-owned management company whose shareholder councils maintain individual asset ownership. The company is overseen by a board of independent directors which itself is responsible to a 'Water Committee' of shareholder representatives.

The company is only young, but there are early signals that benefits to shareholders and their customers will accrue through progress in:

- > implementing a regional approach to four initiatives that require a step change for the region: regional asset management, resilience (including seismic resilience), freshwater quality management and community education (which includes initiatives to improve water conservation). This includes a new investment framework to help councils ensure they are investing to achieve their outcomes;
- > working with councils to review three waters policies and by-laws to increase consistency (where appropriate) across the region;
- > recruitment to support pathways of excellence in specialist three waters asset management knowledge and advice;
- > building an information directorate that will lift the quality of data and information collected and how it can be used by both the organisation and councils to improve decision-making;
- > taking advantage of economies of scale through functions such as standardised contracts and bulk procurement;
- > increasing alignments with other utility organisations; and
- > introducing professional methodologies to improve accountability and transparency, for example Better Business Case methodology and increased focus on customer (end user) engagement.

## Three waters – how might the current trends play out in 2045?

- > Proliferation of micro-treatment plants to service small communities, suburbs and individual houses.
- > Purification and recycling of water is standard practice.
- > Alternative energy will fuel larger plants.
- > Range of intelligent robotics undertaking underground inspections and work.
- > Granular and detailed user charges accurately reflecting composition and volume of use.
- > Consumers have an appreciation for water conservation and environmental protection.
- > Large-scale water operators service multiple catchments and regions beyond traditional local authority boundaries.
- > Effective allocation models ensuring water is allocated to its highest value use.
- > Long-term programme being implemented to ensure resilience against inundation and more intense rainfall patterns.

## The LGNZ 3 Waters project

The LGNZ 3 Waters project aims to lift the performance of our potable water, wastewater and stormwater services and infrastructure. The project established a National Information Framework survey in 2014. Seventy Councils provided extensive data that created for the first time a clear picture of the state of New Zealand's three waters infrastructure. The data analysis has revealed the system is not broken. An issues paper, *Exploring the issues facing New Zealand's water, wastewater and stormwater sector*, was released in October 2014.

## Productive water sector



Irrigation infrastructure, including storage, can help to enable the sustainable use of freshwater and is key to primary industry and therefore to economic growth; in 2011/12, for example, irrigation contributed \$4.8 billion to GDP.<sup>12</sup>

Irrigation projects have been progressing steadily over the last few years. Since 2010, eight irrigation upgrades have been commissioned and three new projects and one upgrade have entered the construction phase. Each has been financed privately, and one received partial investment from Crown Irrigation Investments Ltd (CIIL) – *Central Plains Water Stage 1*.

Water quality and quantity limits are driving efficiencies and allowing new technology to develop. These changes allow New Zealand's primary industry to continue to perform in a competitive global environment.

## Irrigation schemes could progress more quickly

Nevertheless, irrigation schemes take time to develop. Few schemes have taken less than seven years to develop, and some schemes have taken over ten years to develop. There are several reasons for the long timeframe including:<sup>13</sup>

- > *Uncertainty in the science underpinning nutrient limit-setting.* Farmers need to manage their nutrient run-off and meet water quality limits established under the National Policy Statement for Freshwater Management (NPSFM). However, irrigation schemes require farmers to intensify their land use for the scheme to be financially viable, which has implications for nutrient run-off and local water quality. The science underpinning these limits is still being developed and does not provide answers with a broad consensus; and
- > *Uncertainty and delay created by the RMA.* Protracted RMA processes, court proceedings, resource consenting and plan change processes can lead to long delays.

These two specific challenges add to the timeframes facing irrigation development because they make it difficult for interested parties to agree a shared approach to irrigation investment and do not provide an effective, fast mechanism to resolve disputes where they exist.

<sup>12</sup> NZIER and AgFirst Consultants NZ Ltd (2014). *Value of irrigation in New Zealand: An economy-wide assessment*. Report prepared for the Ministry for Primary Industries.

<sup>13</sup> National Infrastructure Unit (2015). 2015 National Infrastructure Evidence Base. Available at: <http://www.infrastructure.govt.nz/plan/evidencebase>

## The Southland Economic Project

The Southland Economic Project takes a collaborative approach to develop tools to understand the possible economic impacts of water catchment limits for water quality in Southland. It is an initiative between DairyNZ, Beef + Lamb New Zealand, the Ministry for Primary Industries, Southland Chamber of Commerce, Department of Conservation, Te Ao Marama, and Environment Southland. It also includes the territorial authorities in Southland: Invercargill City Council, Gore District Council, and Southland District Council. Other organisations involved include: Deer Industry New Zealand, Southland Deer Farmers' Association, Foundation for Arable Research, and Horticulture New Zealand.

The project was established to generate a long-term view of the economic impacts of policy options on people's jobs, businesses, and on communities. The work seeks to go beyond understanding the effects of land use activities and discharges on water bodies. It will explore the economic value of different land use activities, the cost-effectiveness of actions available to mitigate discharges, how the costs of mitigation actions could flow through the economy, and how these could translate into community outcomes.

The Project is an opportunity for these organisations to work together to understand the economic implications for policy and decision-making.

## Productive water – how might the current trends play out in 2045?

- > Our primary industries support Asian economies – particularly India and China. Growing demand for dairy and meat place pressure on our industry to intensify, which must be balanced against protecting our natural environment.
- > Technological developments promote more efficient water use – particularly those that collect and use data.
- > Climate change continues to create uncertainty in rainfall patterns, making water storage schemes more important.
- > Irrigation schemes with broader economic, social, and environmental benefits grow in importance as local communities search for solutions to the pressures of climate change and ways to continue to protect local waterways. Scheme sponsors and the economic models governing the management of new schemes reflect the broader beneficiaries of those schemes.
- > Environmental regulations better address the pressures on New Zealand's natural environment; meeting them requires stronger governance of irrigation schemes and stronger asset management skills.

## Social infrastructure sector

Social infrastructure is vital to the delivery of public services and includes social housing, health, education, justice (including police, courts, and corrections), and elements of defence infrastructure. This is reflected in the value of New Zealand's social asset base; the Crown's property, plant, and equipment assets in the health, education, justice, social housing, and defence<sup>14</sup> sectors were valued at \$44 billion as at 30 June 2015.<sup>15</sup> This includes 2,532 schools, 19 prisons, and 38 public hospitals. Correspondingly, local government is estimated to have over \$12 billion of land and buildings<sup>16</sup> – much of which may be classified as social or community infrastructure such as halls, reserves, sports centres and 308 public libraries.

### Institutional incentives and harnessing capability

Individual social infrastructure sectors face their own challenges to using assets more effectively, which require policy responses that tackle capability gaps and ineffective institutional incentives.

The schooling estate, for example, faces large capital pressures over the next ten years. The estate has an average age of 42 years, around half of all schools have surplus classrooms and a significant number require additional capacity, which suggests large potential to manage assets more effectively at the network level. However, reconciling this remains difficult because there is a fundamental tension between network efficiency objectives, which would see greater collaboration between schools over the use of their assets, and effectiveness objectives, which may point to policies to encourage greater parental choice and school competition.

In defence, much of the estate was built during World War Two and is degraded and incurring increasing compliance challenges, including meeting seismic strengthening requirements. The Defence 2010 White Paper<sup>17</sup> stated that the defence estate is “generally in average condition, but facing a significant risk of rapid deterioration” (p.68). The Paper noted that the cost of running the estate was substantial but less than what was needed to maintain it; this affordability pressure increases the importance of effective capital planning across the portfolio rather than fragmented planning at a base level.

The health estate is of variable quality: most hospital sites have a mix of recent builds and aged, degraded facilities. The older facilities make it difficult to achieve

operational efficiencies. Some sites have seismic or other building competency issues that will need to be addressed given the function of hospital sites in disaster recovery. Some sites in major centres face space constraints, which will become more challenging as population pressures increase.

Specialist healthcare and capital expertise are unique capabilities which must be deployed as effectively as possible within a small population such as New Zealand's. The health sector also has a reliance on community and GP facilities, which are not controlled by District Health Boards (DHBs) and further supports the importance of collaboration across the sector.

With the roading and water network assets making up the vast majority of local government assets, social infrastructure is a small part of the balance sheet. However, these social assets – including libraries, swimming pools, recreation facilities, museums and civic buildings – make a key contribution to social wellbeing. Renewing these in a climate of fiscal constraint will pose challenges for councils, especially those in areas of population decline and demographic shifts, resulting in less ratepayers and a higher proportion on fixed incomes.

### Mature asset management

Better incentives and increasing capabilities will only succeed if an important prerequisite is in place; mature asset management practices across the social sector, including performance metrics that measure the services being provided by the assets. This will enable an understanding of how infrastructure contributes to service delivery and what future decisions need to be. This should be the more immediate focus over the near term.

In recent years, government has had a growing focus in the way it manages its capital assets and there have been some corresponding improvements. These include continual development of the Government's Better Business Case (BBC) process to optimise decision-making, and innovation in the way assets are managed and procured – demonstrated in the commencing of six public-private partnership (PPP) procurements since 2010.

However, the Treasury's 2014 *Investment Statement*<sup>18</sup> highlighted that the social sector still needs to do more to improve the way it manages its existing assets for the pressures ahead which include demographic changes, aging infrastructure and disruptive

<sup>14</sup> We do not include specialised military equipment (SME).

<sup>15</sup> With the exception of District Health Boards, for which May 2015 figures were used because June 2015 figures were pending at the time of writing.

<sup>16</sup> 2011 statistics from Statistics New Zealand as reported by the Local Government Infrastructure Expert Advisory Group, 2013.

<sup>17</sup> NZDF (2010). Defence White Paper 2010. Available at <http://www.defence.govt.nz/reports-publications/defence-white-paper-2010/contents.html>



technologies. Inefficient management runs the risks of pressured assets in growing areas, stranded assets in shrinking areas, a growing number of asset renewals and outmoded means of service delivery as technology expands.

Several reports have underscored the conclusion that asset management maturity across social infrastructure sectors remains weak, including:

- > the OAG's 2013 *Managing Public Assets* report;<sup>19</sup>
- > an independent report on asset management maturity commissioned by the Treasury in 2011/12; and
- > more recent work across individual government sectors.

In both local and central government, findings show gaps between current and target levels of asset management maturity, varied maturity of planning and asset management systems, varied reporting of condition assessment, and large variation in the degree to which asset management plans were being followed.

### Public Private Partnerships (PPP)

In the New Zealand context, a PPP is a long-term contract for the delivery of a service, where provision of the service requires the construction of a new asset, or enhancement of an existing asset, that is financed from external (private) sources on a non-recourse basis, and full legal ownership of the asset is retained by the Crown.

PPP procurement has been implemented in New Zealand for the primary purpose of improving the focus on, and delivery of, whole-of-life service outcomes from major infrastructure assets. The competitive PPP procurement process, minimal input specifications and constraints, appropriate risk allocation and performance-based payment mechanisms work together to optimise the incentives and flexibility for private sector participants to deliver innovative and effective solutions.

Six PPP procurements have commenced since the Programme began in 2010. To date, PPP procurement has been implemented in the corrections, education and transport sectors. The Treasury Standard Form PPP Project Agreement is used for all projects, with the risk transfer and outcomes sought in each sector to date including reduced rates of recidivism, improved whole of life asset maintenance, customer satisfaction, and improvements in road safety, travel time and resilience.

### Social infrastructure – how might the current trends play out in 2045?

- > Sensing technologies and the use of data have new implications for urban design and service delivery. 'Smart cities' change the demands we place upon our social infrastructure; for example, technology that allows the monitoring and improvement of pollution levels and road safety change demands placed upon healthcare infrastructure, and sensors that light up areas suffering anti-social behaviour change the demands placed upon police.
- > Disruptive technologies re-shape the delivery of key public services. In some sectors, this is more readily prepared for:
  - The growing importance of virtual learning in schools holds important implications for the capacity of school buildings and the preparedness of our communications network to host virtual learning environments.
  - Our police conduct more of their work while out serving the community through tablet devices and mobile phones, transforming police cars into mobile offices and reducing the need for stations.
  - Our Justice system is less reliant on paper and advances in communications technology allows more court proceedings to occur without long waits for free courtrooms.
- > In other sectors, such as health, technology is evolving so quickly that predicting the future state of service delivery is more difficult; for such sectors, it is important to ensure long-lived assets like hospital buildings are adaptable.
- > Increased movement of people to urban areas creates a higher risk of surplus assets in non-urban regions and pressured assets in cities, which necessitates more collaboration between sectors; for example, emergency services precincts to bring together justice and emergency services, or schools, local councils, and parts of the defence estate sharing the use of local playing fields and swimming pools.

<sup>18</sup> Treasury (2014). *The 2014 Investment Statement: Managing the Crown's Balance Sheet*. Available at: <http://www.treasury.govt.nz/government/investmentstatements/2014>

<sup>19</sup> Office of the Auditor General (2013). *Managing Public Assets*. Available at: <http://www.oag.govt.nz/2013/managing-public-assets>

## The Housing challenge

Poor-quality housing has adverse impacts on health, education and other determinants of living standards. A well-functioning housing market is important for both economic performance and social wellbeing. High housing costs reduce labour mobility and divert investment from more productive economic activities.

The Social Housing Reform Programme is a cross-agency approach to increase the diversity and supply of social housing in New Zealand and provide better housing services to tenants. The goal is to provide more New Zealanders with quality and affordable housing. The programme is in part a response to the challenges facing our social housing infrastructure, where around one third of the \$18.7 billion Housing New Zealand portfolio is in the wrong place or of the wrong type to meet current needs. The challenges reflect changes to population and family size from the 1950s and 1960s when much of the state housing network was built, as over 50 percent of the housing stock is over 42 years old.

Alongside social housing is the challenge of affordable housing and its impact on the national economy. The Productivity Commission *Using Land for Housing* draft report<sup>20</sup> noted that housing supply in many cities has been sluggish in response to population growth and struggled to keep pace with increasing demand. As the Commission reported, in December 2012, Auckland Council estimated an existing shortfall of between 20,000 and 30,000 dwellings, and a need for a further 13,000 dwellings each year. Extrapolated out, this equated to 46,000 new homes by the end of 2014. However, from 2012 to 2014, only 14,052 dwellings were consented in the city. The cumulative effect of this shortfall will continue to grow and even if the targets in the Auckland Housing Accord are met, Auckland will still be 26,500 dwellings short by the end of 2016.

Infrastructure is a key determinant in meeting this demand, both in terms of providing infrastructure to greenfield sites, and enabling densification and new uses of brownfield sites. Forward planning to integrate land use and infrastructure is critical to deliver outcomes over the long term, focus on densification around transport hubs and protect freight routes.

The benefits from ensuring infrastructure is not a constraint to land supply is recorded by the Commission which cites the 2014 McKinsey Global Institute report<sup>21</sup> that “unlocking land supply at the right location is the most critical step in providing affordable housing” (p48) and estimates that in the world’s least affordable cities, including Auckland, unlocking land supply could help to reduce the cost of housing by between 31 and 47 percent. The Commission noted a further reduction in the cost of housing of 12 to 16 percent could be gained from productivity improvements in construction by taking advantages of scale or taking an industrial approach to construction. The Commission also reported on 2015 research by Hsieh & Moretti<sup>22</sup> suggesting that releasing land and lifting barriers to urban growth could raise GDP in the United States by up to 9.5 percent with much of the gain coming from workers being able to locate and work in cities that offer higher-productivity and higher-wage jobs.

As well as the supply of land and the provision of infrastructure, the Government is working with councils to address the other three factors that impact on the cost of housing: regulation, the cost of building materials and productivity in the construction sector.

<sup>20</sup> Productivity Commission (2015). *Using Land for Housing* draft report. Available at <http://www.productivity.govt.nz/inquiry-content/2060?stage=3>

<sup>21</sup> McKinsey Global Institute (2014). A blueprint for addressing the global affordable housing challenge. Available at [http://www.mckinsey.com/insights/urbanization/tackling\\_the\\_worlds\\_affordable\\_housing\\_challenge](http://www.mckinsey.com/insights/urbanization/tackling_the_worlds_affordable_housing_challenge)

<sup>22</sup> Hsieh, C-T., & Moretti, E. (2015). *Why do cities matter? Local growth and aggregate growth*, NBER Working Paper, no. 21154. Cambridge, Massachusetts: National Bureau of Economic Research.

## International perspective and evidence

Studies and data providing international comparisons of the quality, cost, and benefits derived from infrastructure are relatively limited. Partly this is because infrastructure responds to differences in geography, climate, population density and natural resource availability both across and within countries.

The annual Global Competitiveness Index (GCI) produced by the World Economic Forum<sup>23</sup> includes infrastructure comparisons. New Zealand ranks relatively highly on overall competitiveness, but less so on the infrastructure measures, both reflecting and possibly reinforcing businesses' perceptions on the state of infrastructure.

While advancing the discussion on infrastructure in New Zealand, we do not believe that high-level measures, such as the GCI, should be used as an assessment of the relative state of New Zealand's infrastructure. This reflects both the relatively narrow set of measures used and the methodology of the measures which bias against countries with small populations such as New Zealand. For example, the use of the absolute (rather than a population adjusted) number of air seat kilometres pulls down New Zealand's infrastructure score.

A further problem is that changes that would have the greatest impact on raising New Zealand's infrastructure score are often not ones that would boost welfare or economic performance.

The updated infrastructure evidence base<sup>24</sup> incorporates several indicator-based international comparisons of the performance of New Zealand's infrastructure. New Zealand ranks mid-pack in the OECD for road fatalities per million vehicles – acknowledging the fact that the quality of our roads is only one influence on the road toll. Our cities show a similar level of road congestion to those in Australia.

In terms of internet technology, New Zealand ranks 30th in the percentage of connections above 4 megabits per second (Mbps), 43rd in connections above 10Mbps and 39th in connections above 15Mbps. New Zealand's average speed in the December quarter of 2014 was 7.3Mbps – 43rd in the world and almost identical to Australia's 7.4Mbps. However, the rate of change in users with higher-speed and average-speed connections places New Zealand amongst the fastest growing countries.

## Regional perspective

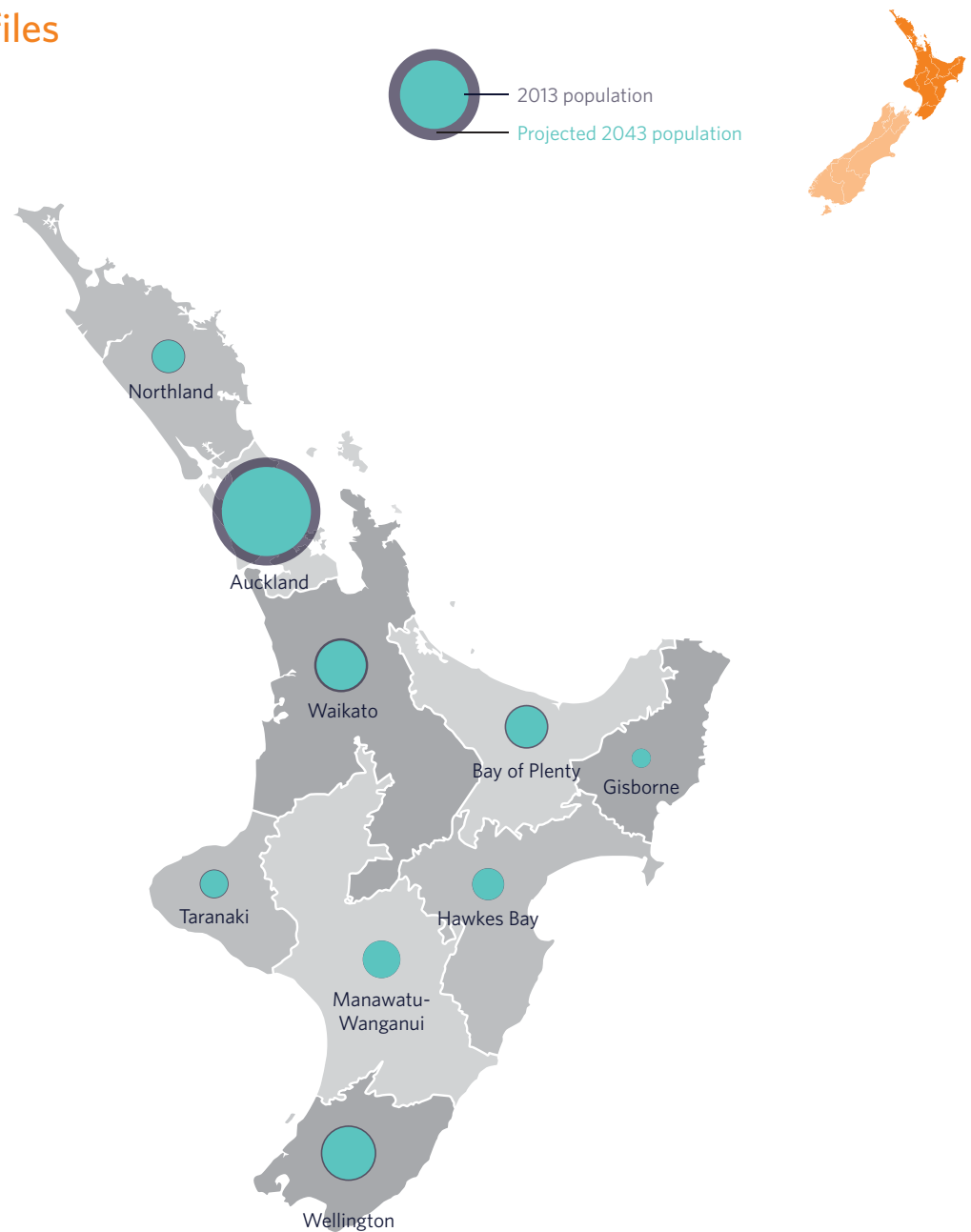
New Zealand's economy is made up of diverse regions, each of which specialises in different activities depending on natural resource endowments, infrastructure and people. All regions make an important contribution to the national economy, and they face different outlooks in terms of demand and the levels of service from infrastructure. To date there is no collated metric that assesses the state or performance of each region's infrastructure network, but the table on the following pages provides an overview of selected data.

<sup>23</sup> Details of the World Economic Forum's 2014-15 *Global Competitiveness Report* can be found at <http://www.weforum.org/reports/global-competitiveness-report-2014-2015>

<sup>24</sup> National Infrastructure Unit (2015). *2015 National Infrastructure Evidence Base*. Available at: <http://www.infrastructure.govt.nz/plan/evidencebase>

## Regional profiles

### North Island

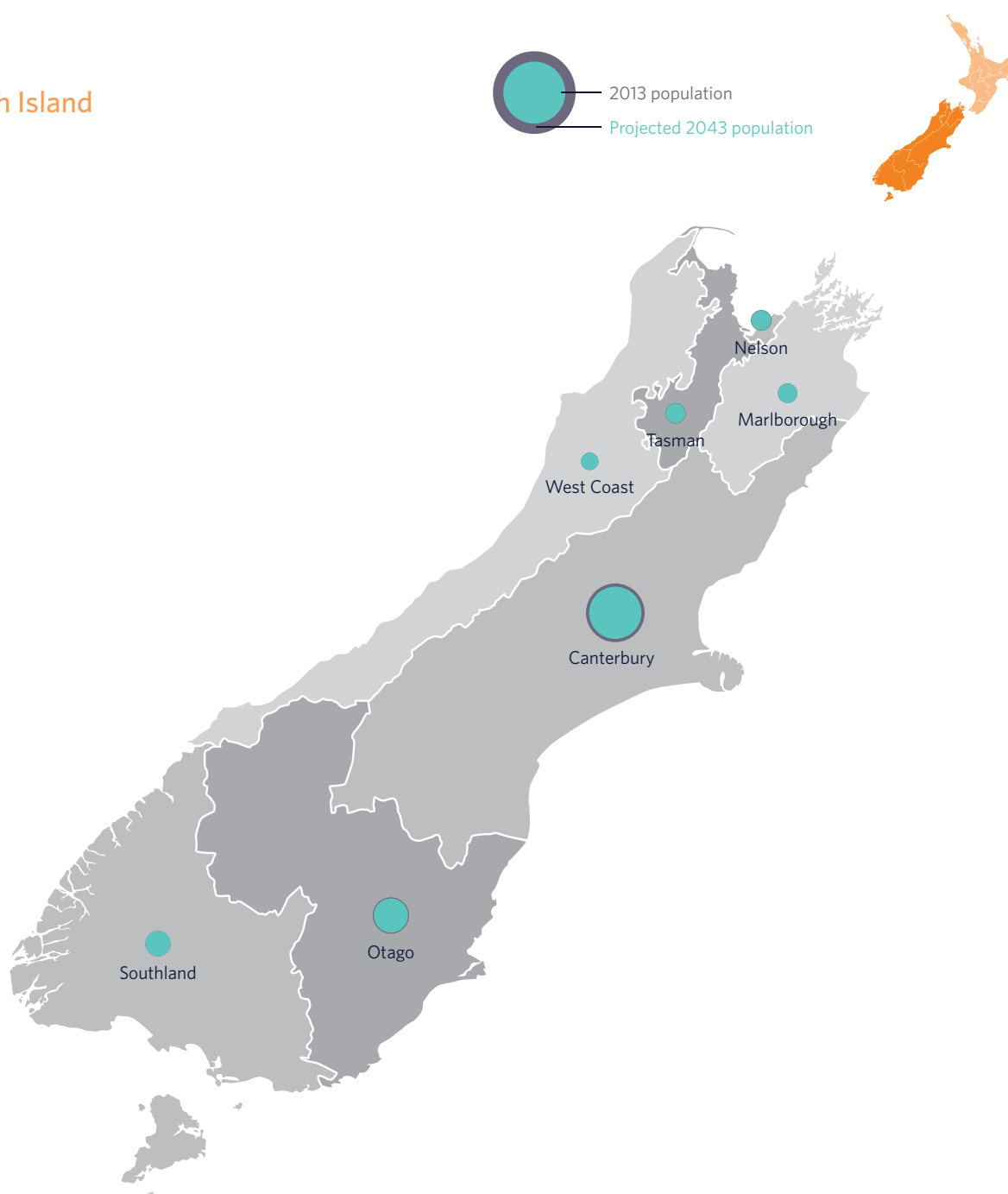


Region	2013 Population	2013 Population as % of national total	Projected 2043 Population	Projected % change from 2013 to 2043	GDP (\$m)	GDP per capita (\$ per capita)	Central Government expenditure (\$ per capita)	Vehicle kilometres travelled (m)	Fast Broadband Deployment*	Irrigable land	Schools	Public hospital beds
Northland	164,700	4%	182,900	10%	5,760	34,825	19,014	1,672	100%	7,800	151	334
Auckland	1,493,200	34%	2,229,300	33%	81,186	53,759	16,839	12,717	30%	5,700	541	3,592
Waikato	424,600	10%	517,400	18%	20,576	48,098	17,450	5,364	80%	21,000	306	907
Bay of Plenty	279,700	6%	328,700	15%	11,862	42,213	18,952	2,713	80%	11,600	159	672
Gisborne	47,000	1%	47,600	1%	1,626	34,602	21,364	390	17%	4,500	51	125
Hawkes Bay	158,000	4%	164,000	4%	6,354	40,091	18,493	1,474	41%	26,000	125	374
Taranaki	113,600	3%	130,200	13%	9,170	80,297	17,136	1,036	76%	6,500	94	207
Manawatu- Wanganui	231,200	5%	234,700	1%	9,147	39,442	18,924	2,404	61%	21,700	204	497
Wellington	486,700	11%	548,400	11%	30,335	62,021	17,699	3,507	34%	16,600	248	1,003

\* UFB connectable premises as % of UFB eligible premises



## South Island



Region	2013 Population	2013 Population as % of national total	Projected 2043 Population	Projected % change from 2013 to 2043	GDP (\$m)**	GDP per capita (\$ per capita)	Central Government expenditure (\$ per capita)	Vehicle kilometres travelled (m)	Fast Broadband Deployment*	Irrigable land	Schools	Public hospital beds
West Coast	33,000	1%	33,200	1%	1,721	52,306	19,825	506	12%	2,300	36	191
Canterbury	562,900	13%	729,200	23%	30,204	53,054	19,092	5,470	46%	444,800	293	1,515
Otago	208,800	5%	239,800	13%	9,813	46,684	18,647	2,196	49%	93,900	145	710
Southland	96,000	2%	96,800	1%	5,502	57,135	17,334	1,133	51%	17,200	86	0
Tasman	48,800	1%	54,000	10%	4,180	42,695	16,555	***	NA	12,000	35	***
Nelson	48,700	1%	55,900	13%	**	**	16,942	1,316	49%	****	23	343
Marlborough	44,700	1%	46,700	4%	2,282	51,051	16,937	***	100%	29,800	30	***

\* UFB connectable premises as % of UFB eligible premises

\*\* Nelson is combined with Tasman

\*\*\* Combined figure for Marlborough/Nelson/Tasman

\*\*\*\* confidential

## Focus on Christchurch

Since the earthquake series of 2010 and 2011 the government has worked with its recovery partners (local authorities, Environment Canterbury and Te Rūnanga O Ngāi Tahu) to create the right environment to enable recovery and to catalyse growth. The Crown has introduced a range of critical interventions, such as new land-use zoning, new regulations and codes to give direction and confidence to the finance, investment and construction sectors, and has partnered with Christchurch City Council to rebuild key community assets and horizontal infrastructure.

In the Budget Economic and Fiscal Update 2015,<sup>26</sup> Treasury assumed investment associated with the rebuild following the Canterbury earthquakes to be around \$40 billion in 2011 prices (rounded to the nearest \$5 billion) spread across residential property (\$18 billion), commercial property (\$9 billion) and infrastructure and social assets (\$11 billion). To effect the horizontal infrastructure (three waters and roads) rebuild, the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) was formed in September 2011: an alliance of three funders (CERA; NZTA and Christchurch City Council) and five large construction firms. The priorities are set by the Horizontal Infrastructure Governance Group (HIGG) which is made up of the three funders with an independent Chair. One hundred percent of the 702 SCIRT projects have been approved into concept or detailed design by HIGG. Eighty-nine percent have been approved into construction. There are currently 31 projects with funding uncertainty which are subject to discussions between the Crown and Council.

There are currently 11 public sector agencies responsible for 62 rebuild projects totalling \$6.84 billion. As at June 2015, 15 percent (\$1.02 billion) of the \$6.84 billion public sector rebuild programme had been delivered.

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**\$40 billion**

investment associated  
with the rebuild

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Christchurch continues to be the South Island's powerhouse and main service provider to the strong rural economy, and is the main South Island international gateway. Although construction remains a key contributor to the region's growth, as the rebuild approaches its peak in 2016, the underlying (non-rebuild) sectors are becoming important as drivers of the future local economy. The region's economy continues to thrive with GDP growing at a healthy rate above the New Zealand average. Canterbury accounts for 12.5 percent of national GDP and growth was estimated at 4.3 percent in the year to March 2015. Christchurch city's share of national GDP has exceeded pre-quake levels, now 8.6 percent of national GDP, and was estimated to be growing at 4.7 percent to June 2015.

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**702**

Stronger Christchurch  
Infrastructure Rebuild  
projects approved  
into design

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Business confidence in the region is robust. It is expected that Canterbury will remain a region of economic opportunity over the next two to three years. In addition, since the earthquakes, Christchurch has become world-renowned as a place where anything is possible; a place that is open to new ideas, new people and new ways of doing things.

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**15%**

of the public sector  
rebuild programme  
has been delivered

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To continue to maintain momentum through the phases of recovery and to ensure sustainable growth into the future, it will be imperative to:

- > Create the right environment to evolve from centralised recovery leadership to supporting local institutions to lead the recovery into the next regeneration and growth phases. In July 2015, the Minister for Canterbury Earthquake Recovery publicly notified the draft Transition Recovery Plan and written comments are currently being considered.<sup>27</sup>
- > Implement credible and sustainable financial and land-use strategies and implementation plans that will stand the city in good stead for tackling all the challenges that still lie ahead.
- > Develop the right capacity, capabilities and tools (such as fit for purpose legislation and delivery vehicles) to enable the regeneration of affected areas of the city as well as continued rebuild of the identified key community assets in the central city and health, housing, education and horizontal infrastructure assets across the city.
- > Create the framework for a long-term partnership and conversation between the Crown and the local authorities to align future strategies and investment priorities.

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**4.3%**<sup>25</sup>

Canterbury regional  
economy growth rate

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<sup>25</sup> Annual average growth rate for year ended March 2015, source: Infometrics.

<sup>26</sup> The Treasury (2015). *Budget Economic and Fiscal Update*. Available at <http://www.treasury.govt.nz/budget/forecasts/befu2015>

<sup>27</sup> Details available at <http://cera.govt.nz/recovery-strategy/leadership-and-integration/transition-recovery-plan>

## Focus on Auckland



With a population of 1.5 million people in 2013 and the prospect of another 716,000 people over the next 30 years, Auckland faces challenges and opportunities for infrastructure.

This population growth means that over the next 25 years, Auckland will need to provide 400,000 more dwellings – almost doubling the current housing stock – and the associated infrastructure to support three new cities the size of Hamilton.

With a forecast \$18.7 billion capital spend over 2015 – 2025, well-designed urban form and integrated land-use planning with infrastructure will be critical to deliver good outcomes. The opportunity cost of poor selection, timing and delivery will add to the existing \$250 million per annum cost of congestion Auckland already faces.

Reflecting the scale and consequences of decisions, a number of initiatives are underway:

- > The establishment of *Development Auckland* and the integration of projects to create scale, reduce costs, and increase the use of private capital.
- > The proposed *Auckland Unitary Plan*, due after September 2016.
- > The *Future Urban Land Supply* Strategy currently under development that will take a 30-year view of future urban land and allow coordination of infrastructure.
- > The engagement between Auckland Council and central government on the long-term transport programme.
- > The Housing Accord and Affordable Housing work programme.
- > Delivery of major transport projects including Waterview and the Puhoi to Warkworth Roads of National Significance.
- > Major public transport improvement projects to support future growth, such as the City Rail Link project and the roll-out of the new bus network.

Source: Auckland Council Long-Term Plan 2015-2025. Available at <http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/plansstrategies/longtermplan2015/Pages/home.aspx>

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Auckland's population is  
**4 times**  
that of our next largest city,  
Christchurch, and

**10 times**  
the size of Hamilton,  
the closest city

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**51.7%**  
of New Zealand's  
population growth between  
2006 and 2013 occurred in  
Auckland

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**\$18.7 billion**  
Projected capital spend  
between 2015 and 2025

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Home to  
**60%**  
of New Zealand's  
top 200 companies

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## Local talk about infrastructure: North Otago

As part of developing the New Zealand Infrastructure Plan, we spoke to a number of people in the North Otago community about what they see as the real-life challenges and opportunities that irrigation creates for their region. This 'Local Talk about Infrastructure' reflects their insights, views and voices.

**"WATER MAKES THIS TOWN TICK."** Fraser McKenzie

Oamaru is a bustling little town. The cafes and restaurants are busy and, even with winter approaching, there are still some tourists roaming the streets, lined with their extraordinary collection of Victorian stone architecture. It's not just the buildings, there are the little blue penguins and Steampunk. Oamaru, New Zealand capital of Steampunk! But many people believe that what's really making this town buoyant is irrigation.

**"THIS PLACE HAS ALWAYS BEEN SPECIAL, PEOPLE ARE TAKING NOTICE NOW."** Mark Rawson

Locals may feel that it's only in the last decade or so that Oamaru and North Otago have started to get their mojo back. Mark Rawson grew up here. Now he owns and runs an electrical contracting business. With 30-odd staff based in Oamaru and teams in Timaru and Waimate, Plunket Electrical is a substantial operation. Mark believes the area has always been special, and now it's steaming ahead with new levels of productivity and diversity. He says the business owes a lot to the North Otago Irrigation Company scheme, for which it's the lead electrical contractor.

*"We have nine or ten apprentices on the books and take on two or three new ones each year. Local lads mostly, keen to stay or come back to their roots. Isn't it great to see careers being forged by our young ones in their own back yard."*

**"THEY WERE THE BIGGEST PUMPS SOUTH OF THE EQUATOR."** Ben Stratford

Ben Stratford lives and breathes irrigation. He's the Technical Manager of the North Otago Irrigation Company. *"When stage one of the North Otago Irrigation scheme went in, in 2006, they said the pumps were the biggest in the Southern Hemisphere."*

Ben says, *"The scheme will have the capacity to pump 8 cumecs of water 160 metres up from the Waitaki River and distribute it across the North Otago downlands. According to the North Otago Irrigation Company's economic and social impact assessment, land use before stage one was mainly for dryland sheep and beef. Now it's mainly for dairy and dairy run-off."* It's estimated that the scheme has contributed \$48 million to the Waitaki District's GDP and 274 full-time jobs.

**"WE SIMPLY DON'T ACCEPT OUR POPULATION WILL DECLINE."** Gary Kircher

Gary Kircher is the Mayor of Waitaki District Council. He says, *"The council district covers more than 7,000 square kilometres. There are about 21,000 residents, 13,000 of whom are in Oamaru town. Between the last two censuses we've been growing by 136 people a year."*

At the start, the Council loaned the scheme \$10 million so that they could over-build the basic infrastructure for a second stage. This was controversial at the time, but Gary believes that on the whole, the majority of the community now see the benefits the scheme has delivered. *"Well you can see the new houses on the farms, the new people in the supermarket, the schools growing, sports numbers increasing – it's obvious!"*

Stage two of the scheme is underway. *"The irrigation company will repay the balance of the original loan and the Council will loan the scheme a total of \$17 million towards this second stage. The local economy will grow and more jobs will be the result!"*



**“BUSINESSES MOVING HERE IS A GOOD SIGN.”** Fraser McKenzie

Fraser McKenzie bought an accountancy practice and moved to Oamaru 15 years ago. He's also Chair of the Waitaki Irrigators Collective which covers five irrigation schemes including North Otago.

Fraser says, *“They've been talking about irrigation in the district since 1880. Not much happened until the first large schemes were put in, in the 60's, 70's and 80's. These were initially simple, gravity-fed, run of the river schemes with border dykes bringing the water to the flat land. North Otago is altogether different – pressurised water pumped up to downland farms. On each farm, centre pivots or K lines, some with digital variable rate systems, enable precision farming. Irrigation has taken a lot of the volatility out of the local economy, generated more investment and greater confidence in the whole region. We are seeing national firms and organisations wanting a presence in the district – Rabobank and Crowe Horwath opening up here reflects the underlying strength of the local economy.”*

**“DOES THE REGION NEED IRRIGATION? WILL YOU JOIN US?”** Leigh Hamilton

Leigh Hamilton was farming the downlands before the scheme went in. As Chair of the company that owns and runs the scheme, he's been busy getting support for the stage two expansion which he says will extend the scheme to over 20,000 hectares. *“The new land covered is to the south, stretching into the Kakanui river valley. Approximately 110 kilometres of new pipe will give shareholders here the same service as the stage one shareholders. It took a restructure of the company's constitution and financing to achieve it, but getting it so that everyone was receiving the same deal as well as the same physical service was what it took to get buy in.”* Leigh adds, *“I appreciate the support that the company has been given, many have been prepared to take the leap, not just because it's been good for them, but also because it's good for the region.”*

*“It's thinking about a whole lot of things differently,”* says Leigh. *“Like, I now think about the value being in the water, with the land being just how you make it work. The right land to put under that water and the right farming activity – a real paradigm change.”*

*“180 farmers linked by a pipe is a new level of community. It's this community of farmers and the community beyond the farms that's key to the success of North Otago now and in future.”*

**“I REALLY LOVE THIS JOB.”** Robyn Wells

North Otago Irrigation Company CEO Robyn Wells really does love her job. With stage two prescribed, funded and getting underway you might think the road ahead is now more routine, more leisurely. *“What's exciting me is the long term potential – how much better this operation can become.”*

Like her Chair, Leigh, she absolutely understands the vital community underpinnings of the whole deal. *“To get stage two off the ground people had to believe it was fair,”* says Robyn. *“This fairness needs to apply not only to farmers or shareholders but to the whole community. Most people in town recognise the economic benefits and what the scheme has done for the region. Young people coming back, and coming in. A more diverse population. More children taking on family farms. All good stuff.”*

But there are concerns too – the management of nutrients, controlling run-offs, river flow levels. People also wonder about the changing landscape. *“These concerns are real,”* Robyn says, *“but what motivates me is building the irrigation community's ability to creatively overcome the challenges.”* She explains, *“Every irrigated farm has to have a plan dealing with irrigation, effluent, soil, nutrients and riparian management. Audits and ever-increasing standards provide a classic continuous improvement loop. The evolving technology of irrigation allows farmers to measure, monitor and control their operations on the basis of rich data.”*

*“North Otago can become a centre of innovation. Strong, healthy and vibrant links between the farm and the region will ensure that innovation drives outcomes for everyone.”*









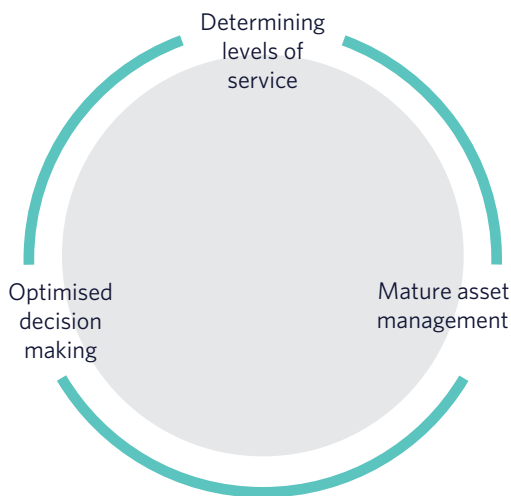


**PART 4:**

# **THE RESPONSE**

To respond to the challenges and realise the opportunities infrastructure provides, we need to better understand the services to deliver in the future, improve how we manage our existing assets, and ensure we have the right settings to make better investment decisions in the future.

This is a more sophisticated approach to planning, developing and managing our infrastructure with an overriding focus on the outcomes we want to achieve, rather than the assets used to deliver them. Successfully implementing this new approach will take us a long way towards a resilient, coordinated infrastructure base that contributes to a strong economy and higher living standards for New Zealanders.



## Increasing understanding of levels of service and future drivers of demand

People and businesses value infrastructure networks for the services they provide, not because they like roads, cables and pipes. The effectiveness of infrastructure depends on providers and funders understanding who they are catering for, and the services and quality levels these people are seeking.

But large parts of our infrastructure network planning remains 'asset-driven', with assets designed and built without fully considering the service being delivered. In roading, for example, studies have shown that in many parts of the country we have 'over-capitalised' our network – in some cases by greater than 30 percent – by building roads based on past behaviour without considering wider factors influencing the service demanded such as the local economy and changes in society.<sup>28</sup> In response the transport sector is now starting to explore approaches like taking a more holistic view of the network to inform road investment.

Similar approaches are beginning to gain traction in other sectors like productive water.

There are many factors involved in determining levels of service, but to become more effective we need to:

- > **Collaborate effectively:** Infrastructure assets often form part of a wider system that can span different parts of the economy and geographic boundaries. Taking a 'system' view of service delivery outside of any individual infrastructure sector requires close collaboration between infrastructure providers and other relevant stakeholders; this includes working together at the local, regional and national levels. The *Productivity Commission's* recent report cites the benefits of greater regional collaboration,<sup>29</sup> and the business case for the Waikato Plan highlights the benefits of bringing together and aligning over 640 non-RMA strategies, policies and plans.
- > **Better integrate land use planning:** There remains a need to more adequately align key pieces of planning legislation with wider urban development, housing and infrastructure plans. This includes the Resource Management Act, the Local Government Act, and the Land Transport Management Act and is particularly relevant to transport. The Upper North Island Freight Study, for example, suggests that existing or proposed industrial land developments in the Upper North are well in excess of what is actually needed, despite the high infrastructure costs associated with them, because local councils are not joined up in their planning.
- > **Have a clear and detailed vision:** Dropping down from the national vision that the Plan establishes, infrastructure decision-makers at all levels need to have a clear vision to guide investment decisions. This vision needs to balance specificity with enough flexibility to respond to changing external factors. It needs to be worked through with communities and needs to set expectations and levels of service to enable cohesive national, regional and local plans to be developed to deliver these.
- > **Ensuring clear alignment between individual investment decisions and economic goals:** There needs to be greater understanding of the factors that impact on economic growth in each region to ensure that infrastructure decisions support

<sup>28</sup> Maughan, A & Barnes, E (2015). *Investing in the future – Changing the culture of investment decision-making: Transport infrastructure*. Presented at the IPWEA Annual Conference, Rotorua, 9 June 2015.

<sup>29</sup> New Zealand Productivity Commission (2015). *Using land for housing*. p. 71.



economic development opportunities. Individual investment decisions need to be subject to a robust analytical process and well aligned with the region's broader economic priorities. Better alignment and timing of investment decisions may also help mitigate boom-bust cycles in the construction industry which can have major impacts on productivity, skills and innovation within the sector.

- > **Consider whole-of-life infrastructure costs:** Decision-makers need to take into account the whole-of-life costs of infrastructure and ensure that the overall level of these costs, and timing of them, is consistent with likely demand scenarios. It is likely that in some instances this will result in the need to explore other options and technologies for delivery, or for further engagement with communities to clarify what is affordable.

## Strengthening asset management practices

Good asset management is vital to ensuring our infrastructure assets are making the best possible contribution to high quality services, and that they are replaced at the right time and in the right way.

Effective asset management is not just about maintaining assets: it is fundamental to making good decisions about how services are delivered. It should bring together key disciplines beyond engineering, including financial and spatial planning, so that organisations can plan within affordability limits and optimise urban planning. Asset management standards ISO 5501<sup>30</sup> and the *International Infrastructure Management Manual*<sup>31</sup> offer good frameworks for mature asset management practice.

But despite its importance, evidence suggests that the way assets are managed across infrastructure sectors varies considerably and asset management needs to improve in key sectors such as the social and three water sectors if they are to adequately tackle the challenges ahead. For those entities facing the biggest challenges, there is a poor understanding of the assets they have, the condition they are in, and how they contribute to the services they are designed to provide. In turn, analysis of new investment needs remains poor.

Our asset management practices also need to include a stronger understanding of the resilience of our infrastructure networks at a national, regional and local level, especially key pinch-points and the degree to which different parts of networks are critical to overall performance. There is a need to increase the sophistication of how we think about resilience,

### Understanding and improving local government services

Local Government New Zealand recently undertook independent research to understand customer perceptions of the value of local government services. The survey of close to 3,000 citizens and businesses found that although people agree that local government is important to New Zealand, many citizens and businesses are unaware of the broad range of services that councils provide (including core infrastructure) and that there are areas of perceived low performance.

LGNZ and its membership councils are now embarking on a new long-term Performance Uplift Programme to lift the value of services delivered to communities by local governments. LGNZ will work with councils across New Zealand on six priority areas, including: governance and strategy; financial performance and transparency; asset management and infrastructure; and building a stronger relationship with central government. The Programme will have a strong focus on metrics and benchmarks that enable councils to demonstrate and deliver high performance.

This Programme builds on other LGNZ initiatives, including:

- > a partnership between LGNZ and the Institute of Directors to lift the standard of governance;
- > the 3 Waters project to lift performance of potable, waste and stormwater services and infrastructure;
- > the partnership between LGNZ and the New Zealand Transport Agency to ensure consistent investment and service levels across our roading network; and
- > the work LGNZ is undertaking with the Treasury to investigate the business case for a local government risk agency.

shifting beyond a narrow focus on shock events or infrastructure failure and thinking more about interdependencies, levels of service and community preparedness. A longer-term view needs to be taken with increased focus on adapting to slower changes over time, including climate change. The graphic over the page shows key elements of resilience.

Importantly, increased resilience is not necessarily about making things stronger or investing more, and is quite often achieved by operational changes.

<sup>30</sup> Details available at: [http://www.iso.org/iso/catalogue\\_detail?csnumber=55089](http://www.iso.org/iso/catalogue_detail?csnumber=55089)

<sup>31</sup> Details available at: <http://www.nams.org.nz/pages/273/international-infrastructure-management-manual-2011-edition.htm>

## Resilience attributes



There are many factors involved in best practice asset management, but to become more effective we need to:

- > **Get the incentives right:** Institutional incentives play a key part in achieving good asset management practice, including encouraging organisations to appropriately couple their strategic asset management functions with their financial management functions. For example, as the 2014 Auditor General's report on water and roads management observed,<sup>32</sup> at the local level "asset management results were better for roading than for three waters assets" in part due to the fact that local authorities receive funding towards capital expenditure on roading through New Zealand Transport Agency (NZTA) subsidies (p.8). This funding lever allows the NZTA to incentivise local authorities to adhere to a certain set of common standards and practices; the water sector, by contrast, does not have a similar central coordinating body.
- > **Apply asset management capability wisely:** Asset management is a specialist discipline. We need to make sure we make good use of the relatively small number of skilled asset managers in New Zealand. It may be more effective to manage some networks at the regional rather than the local level if doing so would allow skilled asset managers to apply their knowledge and capabilities more widely. Capable asset managers must also operate within organisational structures that recognise the implications of their analysis, including in financial planning.

- > **Collect the right kind of data using shared data standards:** Data is foundational to understanding pressures on networks, the likely timing and cost of future investment, and expected future service needs. A number of reports have concluded that data should be more effectively used in New Zealand's infrastructure decision-making, but this is in part a reflection of less mature organisational asset management practices in sectors like the social and three waters sectors. Once asset management capability is improved, organisations can ask the right questions and therefore collect and use the right data.

The right kind of data also needs to be collected in a consistent and comparable way so that infrastructure condition and performance can be meaningfully compared and benchmarked, and infrastructure providers can understand network interdependencies. Shared data standards across organisations responsible for similar types of assets like roads or the three waters infrastructure is important to help facilitate this.

## Optimising decision-making

**"Institutional and governance arrangements for the provision of much of Australia's public infrastructure are deficient and are a major contributor to unsatisfactory outcomes."**

*Lead finding from the Australian Productivity Commission inquiry into Public Infrastructure, July 2014*

To shift towards a more sophisticated approach to infrastructure development and management, we need effective decision-making processes. This includes having the right governance and management structures in place, an effective regulatory regime, and new ways of engaging with communities on decisions, levels of service and the trade-offs inherent in any decision.

The importance of quality decision-making was reinforced by the extensive inquiry the Australian Productivity Commission undertook into public infrastructure in 2014. One of the key findings was "selecting the right projects is the most important aspect of achieving good outcomes for the community from public infrastructure... If governance and decision-making processes are not reformed, more spending will simply magnify the cost of poor project selection."<sup>33</sup>

<sup>32</sup> Office of the Auditor General (2014). *Water and Roads: Funding and Management Challenges*. Available at <http://www.oag.govt.nz/2014/assets>

<sup>33</sup> Australian Productivity Commission (2014). *Inquiry into Public Infrastructure*. p. 75 and p.265.

Evidence around the effectiveness of project management and governance also reinforces the scale of the problem and the need for a new approach. In New Zealand, a survey conducted in 2012 showed that only 29 percent of respondents consistently delivered projects on-time and only 33 percent consistently delivered on-budget.<sup>34</sup> Another Australian study found that on average 48 percent of projects failed to meet their baseline time, cost and quality objectives and that “the inconvenient truth is that, despite the massive effort expended by industry and Government, it is estimated that only a 10 percent improvement has been achieved in 20 years.”<sup>35</sup>

Similarly, where government is the funder, as with many of our social assets, the system is not set up to optimise decision-making from a whole-of-government perspective. As the Treasury’s *Investment Statement* notes, “the public sector management system has some of the features required for effective capital decision-making. However, even where individual agencies are making rational decisions from their perspective, they may not be ideal from a whole-of-government perspective.”<sup>36</sup>

There are many factors involved in optimising decision making, but to become more effective we need to strengthen:

- > **Governance and tools:** We need to ensure that we have the right governance/ownership structures and it is clear where accountabilities lie and what outcomes are being sought or delivered. We are missing opportunities to better utilise the private sector and better equip our decision-makers to have this discussion. There is widespread recognition that we need to develop better tools for decision-makers to engage with communities on these decisions and tools for decision-makers to better understand how to derive benefits from networks and prioritise investment across sectors. In some cases, the tools exist but our ability to use them is variable.
- > **Demand management:** We need to shift away from our traditional focus on building new infrastructure and first look at how existing assets might be better used through behaviour change; for example, New Zealand is fortunate to have the basis of a road pricing system to build on for the future. Road pricing has had successful demand management outcomes in other jurisdictions. Singapore successfully implemented an Electronic Road Pricing system in 1998 which led to a 15 percent reduction in traffic volumes and a 34 percent reduction in multiple trips to the restricted zone.

This was in addition to having already experienced a 25 percent reduction in traffic volumes following a similar, though non-electronic, scheme.

- > **The regulatory system:** We need to ensure that a predictable regulatory system provides businesses and people with the confidence to innovate, invest in capital, develop skills and take risks. A long-standing regulatory issue that will significantly contribute to the new approach is better aligning the various planning instruments and legislation – all of which currently have different processes and timeframes.
- > **Funding, financing and procurement:** We need to consider the full range of tools when decisions are made to invest. This has been an area of focus with the introduction of PPPs, new Government Rules of Sourcing, efforts to build greater procurement capability in government, and the establishment of a pool of commercial experts to help government agencies with complex and significant procurements. Despite these initiatives, there are widely differing levels of investment capability across government, which results in inefficient processes for both customer and supplier. Procurement is often done in isolation, and treated as a ‘once in a generation’ asset purchase, which means we potentially lose the benefits from considering programmes of work, economies of scale and sequencing that gives the market the best opportunity to respond.

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Potential annual global savings from  
using three main levers:

**\$200 billion**

Improving project selection and optimizing  
infrastructure portfolios

**\$400 billion**

Streamlining delivery

**\$400 billion**

Making the most of infrastructure assets

*Conclusion of the McKinsey Global Institute, Infrastructure Productivity:  
How to save \$1 trillion a year, 2013.*

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<sup>34</sup> KPMG (2013). *Project Management Survey Report*.

<sup>35</sup> Caravel (2013). *A Review of Project Governance Effectiveness in Australia*.

<sup>36</sup> The Treasury (2014). *The 2014 Investment Statement: Managing the Crown’s Balance Sheet*.

## Demand management

Asset-driven solutions are only one way of tackling our infrastructure problems; non-asset solutions such as demand management offer innovative ways of making better use of our existing networks which means efficiency is increased, unnecessary expenditure is avoided, and appropriate levels of service are maintained.

We already use a demand management tool in roading; road-users currently pay for building and maintaining New Zealand's roads through fuel taxes. In water, it is already universal practice for councils to meter large water consumers and there are multiple councils that have installed water meters for wider water users such as those in Auckland, Whangarei, Tauranga, Nelson, Kāpiti Coast and Central Otago.

What this means is that we have the foundational systems in place to better use *demand management* mechanisms in transport and water in the future; we now need to refine them to become even more targeted to individual users.

Evolving technology is offering greater opportunities to achieve this. For example, intelligent transport systems (ITS) apply information, data processing, communication, and sensor technologies to vehicles, transport infrastructure and users to help make transport more efficient.

However, as this Plan reinforces, it remains important that demand management strategies are not considered in isolation. Infrastructure planning is an end-to-end process, which requires an understanding of the levels of service being delivered and how the whole infrastructure network is used to provide them. Demand management is therefore a tool within a broader infrastructure strategy, and should not be deployed simply as a revenue-raising mechanism or without consideration of the wider network outcomes.

Getting this right is key. That is why in Auckland, our biggest city, the Government and Auckland Council have already started an engagement process to reach alignment on the city's 30-year strategy for transport.

## The role of government

The government plays a variety of roles in the provision of infrastructure. In some areas, government acts as a regulator, while in others it acts as infrastructure funder and owner.

Where possible, the government will favour private markets for the provision and ownership of infrastructure. Private providers subject to the market disciplines are generally accepted as achieving greater efficiency and better outcomes. Government plays a supportive role in providing the legal framework for markets to operate efficiently.

Any government needs to take care when considering direct investment but in certain circumstances, a government can play a direct role through intervening in a market, funding services or owning infrastructure. Government has such a role where:

- > there is an unambiguous market failure (e.g. where the private sector is unwilling to provide services). In some circumstances, the nature of the infrastructure goods and services mean that a private market cannot flourish (these circumstances are generally where the infrastructure has the characteristics of 'public goods'); or
- > distributional and equity objectives are better achieved by direct Government provision rather than through a market mechanism.

Given the risks of government provision, such interventions will be rare and any government should transparently set out why and when it is departing from favouring market provision.





## The Action Plan

This is the first Infrastructure Plan that details a comprehensive suite of actions that will be undertaken to deliver on the new approach. In some cases the work is underway, whereas other actions are the start of a work programme that may take a number of years to deliver results.

The actions are focussed on what central government, local government and infrastructure peak bodies will do, reflecting the collaborative effort required to change how infrastructure is planned, developed and managed in New Zealand.

A number of larger actions represent a major shift, and anchor the new approach to infrastructure. While exciting, they are just the start: significant policy work and consultation will be required to develop the detail.

New approach	Action	Next steps and timeframe
Strengthening Asset Management Practices	A. Develop national metadata standards for roads, water and buildings to ensure a consistent base to build evidence, undertake forecasting and deepen capability.	Central and local government to finalise metadata standards for three asset types (roads, water infrastructure, and built assets) by mid 2016 including an implementation plan.
Strengthening Asset Management Practices	B. Establish regional centres of excellence or similar arrangements for collating and making available the data obtained through shared metadata standards. This initiative will also explore the costs and benefits of any new entity providing the necessary analytics to interrogate the data and support local decision-making.	Central and local government will work through the arrangements established under the action on <i>shared data standards</i> above to build this capability and the necessary governance structures.
Increasing Understanding of Levels of Service and Future Drivers of Demand	C. Investigate options to support long-term integrated regional infrastructure plans, potentially with legislative recognition incorporating central and local government objectives.	The NIU will work over the next 12 months with local and regional government to determine the best way to implement this action considering the large amount of work underway in the RMA and housing policy areas.
Optimising Decision Making	D. Changes to the Resource Management Act to improve the national planning framework and enable more responsive and efficient infrastructure and housing supply.	These changes will be captured in the Resource Management Bill planned to be introduced in 2015.
Optimising Decision Making	E. Commitment to the longer-term review and alignment of planning legislation.	This will be sequenced to follow the implementation of the Resource Management Bill to be introduced in 2015. Work is expected to start on this action in 2017.
Optimising Decision Making	F. Strengthen the transparency and quality of infrastructure pipeline data through the annual production of the Ten-Year Capital Intentions Plan and increasing the level of detail available in years one to three, including timing and planned procurement methodology.	The NIU will work with agencies to develop and enhance current data collection and reporting and publish in the NIU's 2016 Ten-Year Capital Intentions Plan.
Optimising Decision Making	G. Investigate options for enhanced procurement governance of large/significant procurements – developing scale and building capability – including market engagement, coordination, risk pricing and the use of more sophisticated procurement tools with a focus on innovation and outcomes.	MBIE and NIU will investigate options over 2015/16 with changes implemented from 2016 onwards. Potential scope to include local government can be considered, possibly as a later phase.
Optimising Decision Making	H. Expand and develop the trans-Tasman procurement market with Infrastructure Partnerships Australia and the Global Infrastructure Hub.	The NIU and MBIE will progress discussions with our Australian partners with a view to having an initial version in place by mid-2016.

## Local talk about infrastructure: Gisborne/Tairāwhiti

As part of developing the New Zealand Infrastructure Plan, we spoke to a number of people in the Gisborne/Tairāwhiti community about what they see as the real-life challenges and opportunities that Ultra-Fast Broadband creates for their region. This 'Local Talk about Infrastructure' reflects their insights, views and voices.

*"Gisborne, Tairāwhiti relies on the traditional F words – Forestry, Farming and Fishing," says Gavin Murphy, General Manager of Business Development at Eastland Group, which runs the port, the airport, the local lines network and the inner harbour precinct. Driving up 'The coast' on State Highway 35, the forestry story is easily read – empty log trucks heading north and full ones heading south to Gisborne's port. "The log trade is great for the port, but selling logs offshore keeps the least possible value in New Zealand and Tairāwhiti," says Gavin.*

At Ngāti Porou Seafoods it's a different story. Ken Houkamau loves his work. Surfing and fishing enticed him to study marine science and the job back home in the lwi fishery is a dream. Ken describes his role as *"applying the best science available in support of Ngāti Porou local knowledge."* The company says that their assets have grown from \$1.8 million to \$40 million in eight years – a busy time. *"Our unique smoked fish brand is blowing sales targets out the water and we have a number of exciting development plans coming up,"* explains Ken. So what's the internet connection like? *"Oh it's c@@p! We can't keep security cameras rolling. If we upload too many files the whole place shuts down. Ultra-Fast Broadband is critical for our business."*

The internet is also critical for farming says Ingrid Collins, Chair of the Whangara Farms Board. *"This isn't old-style farming. We're using science, technology data and striving constantly to improve returns and nurture the land. Stock have electronic tags that track them from birth to the table. We're experimenting with alternative grazing crops and uploading weather information every 15 minutes which is sent to Palmerston North. Every house on the farm has the internet – we want all our team and their families to be connected up and computer literate. One of our team is a full-time technician just managing our data."*

### The Mayor's vision

Meng Foon is into his fifth term as Mayor of the Gisborne District, which had over 43,000 people at the 2013 Census, down 1.8% since 2006. Meng talks about his main ideas to counter this slow erosion. *"We're all about primary industries but we need to add more value here, not ship it out of town. One of the opportunities we're looking at is called Wood Engineering Technology, which we think has the potential to create up to 150 jobs. Another idea is to create a tertiary fee-free zone. 'Learn to Earn' is the slogan. Tourism is the other investment area – we have ideas ranging from creating cycling experiences to enriching cruise ship visits with great local experiences."*

### So what about fast internet?

Gavin Murphy was part of the team that put together Gisborne's entry into Chorus's Gigatown competition. *"The prize of \$700,000 of investment and a reduced rate for gigabit speed broadband was worth going for, but Gisborne narrowly lost to Dunedin. Looking back on it though, the real prize might well have been the galvanising effect the competition had on the locals."* In Gavin's view, *"Gigatown brought the whole community together. A whole cross section, the haves and the have nots, got right in behind it. But I wouldn't say we were banking on fast internet. We see other sectors like food products and wood products as being just as important for the region's growth."*

Russell Holland is Chair of the Tairāwhiti Technology Trust. He agrees that fast internet is not the solution for the region's growth, but it's a good step. *"Sure there will be lots of benefits when Ultra-Fast Broadband is rolled out. In the past we've been dependent on a single microwave link. With fibre in from the south and now the north too our connection is more secure. Fibre is less vulnerable to disruption and data caps are way higher."*

But Ultra-Fast Broadband isn't only for residents in town. People in the community say that Evolution Wireless and Gisborne Net have been doing a great job with wireless internet. Aidan Kirk leads Evolution Wireless and explains, *"The thing about ultra-fast fibre and the whole Gigatown thing is that it only really benefits those in town. Out of town and up 'The coast', the answer is still wireless. Interestingly, out on the farms, internet is critical, and not just for on-line farm systems, crop diaries and the like. Staff and their families want to be online too."*

## Up the coast

Sitting on the balcony of the Te Puka Tavern looking out over Tokomaru Bay, Ngarangi Walker, Ivan Lomax, Manu Caddie and Darylene Rogers are animated about the plight of the coast. *"We have among the lowest population density, the greatest levels of deprivation and the longest roads of any New Zealand region – or something like that,"* says Manu.

Ngarangi is the East Coast Area Officer for Gisborne District Council. She's recently returned home to the coast. *"Living in the cities you can easily take broadband access for granted. At Hiruhārama, Hīkurangi Takiwā Trust was running a wānanga by skype. Everyone had to disconnect from the marae wifi so we didn't lose the link."*

Ivan connects locals and 'Computers in Homes' families up using Gisborne Net's wireless infrastructure. He says, *"We can put in a wireless station for about \$5,000 and the users have to foot that bill."* Manu adds, *"There are lots of places here where getting ten users off one station is challenging. When your household discretionary spend is only \$10 a week, finding \$500 is virtually impossible."*

Manu explains, *"There's a trial going for distance healthcare connecting with the doctor via the internet instead of driving all that way or simply not going. But the lack of good cheap internet limits its effectiveness."*

They all agree that, *"For Ngāti Porou on the coast, the internet is essential to a fully participating connected life – it's just that so many can't afford it."*

Back in Gisborne, Russell Holland says, *"It's paradise. Who wouldn't want to live here? And it's a place you can do business. 60% of my clients, as high as 80% some years, aren't based here. The thing that's a problem though is the cost of internet. Not for businesses but for households. Lots can't afford it, and they and their kids are missing out and falling further and further behind."*

At the Te Puka Tavern, Steve Aspden sidles up to the table and sums it all up nicely. *"Hope you don't mind me joining in, but I taught primary school for 15 years, 28 years farm fencing and I've been in Tokomaru Bay for 11 years – so I think I know a bit about it. Like electricity in the old days, the internet is an essential."*

All these locals agree. *"Fast internet is not a strategy for a region's development – it's an essential enabler. Every business, every school, every household needs it to be in the game – the region needs it simply to be on the same playing field as the big cities."*

## What does the Action Plan mean for asset management?



The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > A **holistic investment management approach** will have been adopted to asset portfolios and capital investments across central government, **agencies will make effective use of long-term investment plans** to shape future investment choices and agencies will have a **sound understanding of how their assets contribute to service delivery**. A significant step towards achieving this will be made through the recent introduction of Cabinet Circular CO(15)5 by the Treasury, which will ensure that:
  - agencies must produce 10-year Long-Term Investment Plans to be reviewed every three years;
  - agencies must report on relevant asset performance indicators in annual reports; and
  - an Investor Confidence Rating will take account of a range of lead and lag organisational performance indicators such as asset performance, asset maturity and several other factors that will ensure that agencies make more effective use of long-term investment plans to shape future investment choices.
- > Local government will have a **long-term view of their investment requirements** to make more informed decisions. The Local Government Amendment Act 2014 is a step towards this, which requires councils to prepare an infrastructure strategy for at least a 30-year period; the first reports were completed this year. 30-year infrastructure strategies will expand the horizon over which to consider future local government liabilities and investments, facilitating important discussions about how to tackle them.
- > Across New Zealand's three main asset classes – water assets, roads, and buildings – infrastructure providers will develop a more sophisticated approach to understanding the **condition** of those assets, the **timing of renewals**, and how they are **performing in comparison to similar networks**. This will be progressed through the establishment of shared metadata standards across roading, the three waters, and government built assets (NZTA, LINZ, MBIE, NIU, local councils). They will also open up new opportunities by allowing decision-makers to **defer asset renewals** where appropriate, make **better long-term investment decisions**, **automate data upkeep**, and **reduce consultant/contractor expenditure**. If used effectively and collaboratively, they will also lead to **joint procurement initiatives** or **shared services arrangements** between entities as well as **open digital environments** that enable innovation to develop.
- > Decision-making will no longer be fragmented; infrastructure providers will be able to understand **how their networks interact** with other infrastructure networks as well as **the implications for land use planning and the end user of infrastructure services**. Central government along with local government and other key partners will explore the establishment of regional centres of excellence or similar arrangements to collate data obtained through shared metadata standards, and the potential to provide the necessary analytics to support local decision-making.
- > Individual sectors will progress specific programmes to improve their asset management maturity including:
  - the establishment of a programme to enhance the capability, productivity and leadership in asset management throughout the public sector in New Zealand by IPWEA New Zealand and the NIU;
  - the establishment of the Education Infrastructure Service within the Ministry of Education, who have recently produced an Eight-Point Plan to tackle challenges facing the schooling estate;
  - the Investing in Justice (IJJ) expenditure review, which includes consideration of the Ministry of Justice's capital asset management and long term infrastructure plan;
  - the establishment of a cross-District Health Board Health Asset Management Improvement group (HAMI) to coordinate and drive asset management improvement across the sector; and
  - development of a Transport Domain Plan by the Ministry of Transport and Statistics New Zealand, which will identify the gaps in knowledge required to answer key enduring questions about transport.



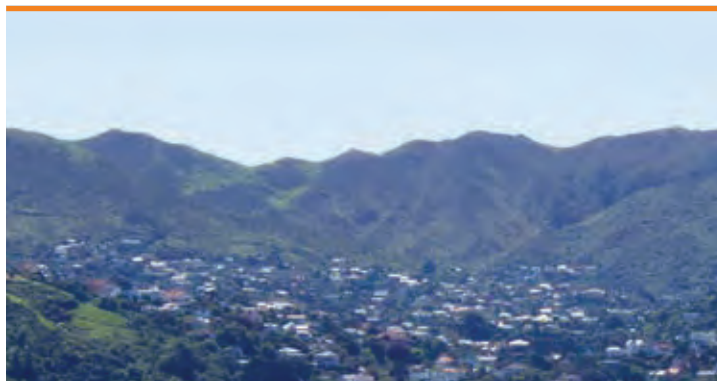
## What does the Action Plan mean for the housing challenges and land use integration?

In the short term, current initiatives underway, such as the Special Housing Areas, are designed to fit within existing infrastructure capacity or where capacity can be improved to a sufficient level during development.

Looking ahead to 2045, the focus will be on **future understanding of demand** and **optimising decision-making**. Actions to achieve this include:

- > The Resource Management Reform Programme, which will seek to ensure that local authorities are enabling sufficient and responsive supply of land for urban development. The core components of this package were announced in January and include improved planning processes, clearer and more balanced national direction, the introduction of a national planning template, new consenting rules and processes to improve timeframes, and changes to ensure local authorities are enabling sufficient and responsive supply of land for urban development. These will be included in a Resource Management Reform Bill to be introduced in 2015. The legislative changes to ensure a sufficient supply of land will be supported by a comprehensive programme of national direction and guidance.
- > *The Future Urban Land Supply Strategy* being developed by Auckland Council in order to maintain a pipeline of development capacity across Auckland. It will sequence structure planning and live zoning of the future urban areas to achieve the best outcomes for the provision of housing, employment, community facilities, open space and infrastructure, including transport. The strategy is being developed as a collaborative project including involvement by infrastructure providers recognising the importance of aligning infrastructure delivery with planning. The Strategy will be complete by October 2015 with implementation following.

A key challenge will be to ensure planning is not totally consumed by the housing situation and that business and industrial land, which are the sources of employment, are integrated in both planning of land use and freight transport networks.



The *Future Urban Land Supply* and the proposed *Auckland Unitary Plan*, along with the *Resource Management Act* reforms, the *Auckland Transport Alignment Project* and the wider work on the 2018 *Government Policy Statement on Land Transport* provide the opportunity to **coordinate and deliver the long-term integrated planning** required across land use and infrastructure provision.

In the social housing sector:

- > The *Social Housing Reform Programme* reflects this Plan's approach, both through **collaboration** between central government, local government and the private or community sector and in considering different ownership options and the attraction of private capital. One of the components of the programme includes the transfer of Housing New Zealand houses and tenancies to Community Housing Providers. The proposed initial transactions would involve 1,000–2,000 houses and tenancies in Invercargill and Tauranga during the coming year.
- > The partnership programme with the private sector aimed at building positive communities will continue. The Tamaki and Hobsonville redevelopments are two examples. In all, there are 24 redevelopments projects underway across Auckland. Further opportunities at large scale are being explored that can deliver multiple outcomes, including social and affordable housing and wider positive social outcomes. Key to realising these opportunities will be density controls and zoning set by the Auckland Unitary Plan, linking back to the importance of land use planning. Changes to these could unlock development capacity for a further 39,000 additional dwellings on current Housing New Zealand land over the next 30 to 50 years.

## What does the Action Plan mean for procurement?



The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > Central government **procurement governance arrangements will be strengthened** and a **portfolio approach to procurement will be adopted**. Since 1 July the Government has reset the procurement (Government Rules of Sourcing) and investment rules for government agencies which will lead to an improvement in the way those major infrastructure investments are delivered. Implementation of the new requirements will be staged, with key actions including:
  - tightening planning requirements with 10 year long-term agency investment plans (Treasury); and
  - introducing a new Investor Confidence Rating that includes an assessment of long-term investment plans, project delivery and delivery of benefits and asset performance (Treasury).
- > The government's **future investment intentions will be more transparent**, and a **trans-Tasman procurement market will be developed**. This will be achieved through:
  - The annual publication of NIU's Ten-Year Capital Intentions Plan, which has a particular focus on years one to three (NIU).
  - MBIE's National and Canterbury Construction Pipeline reporting which provide a consolidated picture of current and future construction activity (MBIE).
  - The NIU and MBIE's work with Infrastructure Partnerships Australia and the Global Infrastructure Hub to expand and develop the Trans-tasman procurement market (NIU/MBIE).
- > **Government will be more capable procurers**, which will be achieved by:
  - Developing a pool of construction project expertise and developing guidance for construction projects covering complexity and capability, contracting modes, use of Building Infrastructure Modelling (BIM), and balancing risk and benefits (MBIE).
  - Implementing the Procurement Capability Index for government agencies, with links to the new Investor Confidence Rating and State Services Commission Leadership Success Profile processes (MBIE).
  - An investigation into the options for enhanced procurement governance of large/significant procurements – developing scale and building capability – including market engagement, coordination, risk pricing and the use of more sophisticated procurement tools (MBIE/NIU).

## What does the Action Plan mean for regulation?

The first Plan acknowledged the role of regulation in **enabling efficient deployment without causing uncertainties** that reduce investor confidence. This Plan continues to recognise that effective regulation is critical to ensuring the right type of infrastructure is available at the right time and in the right place. This will be ensured through:

- > Government responding to the issues raised by the Productivity Commission, which highlighted several shortcomings in the way that regulation is developed and managed in New Zealand. In essence the response is about moving to a **stewardship approach to regulation** that is proactive and focuses on the lifecycle of regulation (Treasury).
  - > Specific regulatory reforms which respond to particular issues concerning infrastructure sectors. The following regulatory reviews are underway, or are planned, to ensure the structure and rules of the regulatory regimes are fit for purpose going forward:
    - A review of competition law provisions relating to the abuse of market power (MBIE).
    - A review of the Resource Management Act to generally improve decision-making, increase national consistency, reduce the cost of regulatory compliance for development, and streamline planning processes taking account of the need for resiliency and management of natural hazards (MfE).
- A review of the Telecommunications Act focused on what settings will be needed post-2020 to ensure competition is promoted while incentives for investment and innovation can be protected (MBIE).
  - An investigation of the impact that current pricing methodologies and other regulatory requirements have on incentives for efficient investment in new generation, storage and demand management technologies (Electricity Authority).
  - A review of the regulatory arrangements for private land access by telecommunications network operators and revision of the National Environmental Standard for telecommunications to bring national consistency to a greater range of planning requirements (MBIE).



## What does the Action Plan mean for the transport sector?



The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > Our roads will become more efficient and remain affordable as **non-asset solutions** such as **demand management** become more commonplace. This will be achieved through:
  - An assessment of the potential of demand management tools, including road pricing, to improve the estimation of demand for infrastructure and optimise the use of infrastructure (MoT).
  - The Transport Analytics Governance Group's work to develop shared metadata standards across roads to support decision-making and collaboration between authorities (consortium of NZTA and local councils).
  - The recently established One Network Road Classification (ONRC) which will allow road controlling authorities to make more strategic decisions on how roads are used (NZTA/LGNZ).
- > Auckland will be less congested and there will be more public transport options as a result of **greater collaboration** between central government, Auckland Council and Auckland Transport. This will be achieved through:
  - Development of the engagement process between central government, Auckland Council, and Auckland Transport to agree a 30-year transport strategy for Auckland (central government, Auckland Council, and Auckland Transport).
- The Government's Auckland Transport Package (NZTA).
- Managing and developing the road network to serve multiple modes, users and activities to encourage more compact, accessible land use development (Auckland Transport).
- Auckland Council's *Future Urban Land Supply Strategy* which will ensure transport projects are planned in a way that is integrated with land use planning (Auckland Council).
- > Our roads will become less congested and our air cleaner as Intelligent Transport Systems (ITS) are deployed; the government will assist this through the Intelligent Transport Systems Action Plan which includes identifying and tackling **regulatory barriers** (MoT).
- > **Greater regional integration and collaboration** will allow us to connect our regions to the global marketplace and to our cities. This will be achieved through the Government's Accelerated Regional Roads Package (NZTA).
- > Our transport network will support **international connectedness and a strong export economy** through:
  - The continued negotiation of new air services agreements, both bilaterally and multilaterally, to provide more access to our key and future trade markets (MoT).
  - The maintenance of the National Freight Demand Study to provide up-to-date forecasts to guide freight infrastructure investment and land-use planning decisions across the public and private sectors (MoT).
  - The review of the Civil Aviation Act, which will improve the framework for regulating competition in international air services and allow the industry and government to be more responsive to technological changes (MoT).



## What does the Action Plan mean for the telecommunications sector?

The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > **Regulatory settings** will be more fit-for-purpose to cater for the growing convergence of telephony, internet, broadcasting, information media and computing. This supports reduced compliance effort, increased confidence for investment and greater flexibility to support efficient deployment of infrastructure facilities. This will be achieved through:
  - Reviewing the Telecommunications Act to ensure that regulation for the telecommunications sector is fit for purpose. A key focus of the review is the price setting arrangements for wholesale services (MBIE).
  - Reviewing land access arrangements for telecommunications lines to support efficient UFB connections (MBIE).
  - Reviewing the National Environmental Standard for Telecommunications Facilities to bring greater national consistency across environmental planning rules for deployment of broadband infrastructure (MBIE).
- > Our communications networks will be **more resilient**. This will be achieved through:
  - The development of an ICT resiliency framework for emergency services (MBIE).
  - The development of a strategy for the future role of the emergency calling system (MBIE).
- > Barriers to the uptake of Ultra-Fast broadband will be identified to **ensure the adoption of UFB is maximised for realising productivity benefits** (MBIE).



## What does the Action Plan mean for the energy sector?



The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > New Zealand will operate a smart electricity network that will **use data** to empower consumers to make better decisions and allow decision-makers to improve **asset management, resilience, and demand management**. This will be achieved through the progress of the Smart Grid Forum (MBIE with the support of the Electricity Networks Association).
- > Auckland will be a greener, more prosperous, liveable, low carbon city, powered by more efficient, affordable, clean energy. This will be achieved through Auckland Council's *Low Carbon Auckland*, which sets out a 30-year pathway and a 10-year plan of action (Auckland Council).
- > **Data quality** and **asset management** practices across gas and electricity lines businesses will continuously improve through review of asset management plans and analysis of related information (Commerce Commission).
- > Our electricity networks will be **more resilient**. This will be achieved through:
  - The Electricity Networks Association's improved understanding of their future investment environment including adding to levels of resilience through the use of models such as "Transform" (ENA).
  - The continued security of domestic liquid fuels through MBIE's publication of the Oil Emergency Response Handbook and work on greater transparency of regional storage capacity (MBIE).
  - Protection of New Zealand's energy infrastructure in order to avoid vulnerabilities and disruptions to service, including cyber risks where advice has been developed in conjunction with the electricity sector for the protection of industry control systems (MBIE).
- > **Demand management** will grow in importance leading to greater energy efficiency and the avoidance of unnecessary expenditure on grid upgrades. This will be achieved through:
  - The Development of Transpower's demand response programme, which pays participating consumers to reduce demand during critical peak periods when doing so defers transmission investment (Transpower).
  - The gas industry's development of a demand-response solution to congestion management on parts of the gas transmission system (Gas Industry Company).
  - The development of a framework for electricity demand-side management (Electricity Authority).
  - The development of minimum energy performance standards for electricity appliances (Energy Efficiency & Conservation Authority).
- > There will be greater competition within electricity markets and more **fit-for-purpose regulation** able to deal with changing market conditions through:
  - A review of the principles governing the pricing of electricity transmission and distribution services, including the connection of distributed generation (Electricity Authority).
  - Promoting competition in electricity markets by providing consumers with better access to information and tools to make decisions between retailers (Electricity Authority).
  - The review of input methodologies for the economic regulation of gas and electricity lines businesses to ensure regulatory instruments remain fit for purpose and respond to changing market conditions (Commerce Commission).
  - Analysis of Electricity Distribution Businesses' information disclosure (Commerce Commission).

## What does the Action Plan mean for the three waters sector?

The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > The sector will be recognised for its mature **asset management practices** across all providers, underpinned by **reliable and accurate data** on the state and performance of the network to support better decision-making. A key focus is **optimising the existing three waters network**. This will be achieved through:
  - Developing national metadata standards for water infrastructure to ensure a consistent base to build evidence, undertake forecasting, deepen capability (LINZ, NIU, local authorities, and sector bodies).
  - Establishing centres of excellence responsible for collating the data obtained through the shared metadata standards, providing the necessary analytics and supporting local decision-making (NIU, sector bodies, and local authorities).
  - *EquiP LP*, Local Government New Zealand's centre of excellence, is developing a Governance Development programme and an Organisational Performance programme to assist councils in raising the standard of governance, performance and asset management (LGNZ).
  - The LGNZ 3 Waters project to lift the performance of our potable water, wastewater and stormwater services and infrastructure. The project established a National Information Framework survey in 2014 and the issues paper released in October 2014 explores the issues facing New Zealand's three waters sector. LGNZ will be releasing a position paper in 2015 to outline what a well performing three waters sector should look like and propose options for a sector led approach to improving performance in the future.
- > Infrastructure providers **collaborate more effectively within and across regions**, taking a long-term view and **ensuring adequate investment in high-growth communities**. This will be achieved through:
  - Investigating options to support long-term integrated regional infrastructure plans, potentially with legislative recognition incorporating central, regional and local government objectives (NIU).
  - The *Future Urban Land Supply Strategy* being developed across Auckland, sequencing structure planning and live zoning of the future urban areas to achieve the best outcomes, including housing and infrastructure. It is a collaborative project and will be completed by October 2015. It recognises the importance of aligning infrastructure delivery with planning (Auckland Council).
  - Cross-boundary study between Hamilton City Council, Waipa District Council and Waikato District Council to determine how each council should manage water, wastewater and stormwater services across the subregion. Three options are currently being considered (Waikato Councils).



## What does the Action Plan mean for the productive water sector?



The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > New Zealand will have led the way in advancing the **management system** underpinning water use and nutrient limit-setting through:
  - The development of guidance material by the Ministry for Primary Industries (MPI), Ministry for the Environment (MfE), regional councils and industry on the use of OVERSEER (a strategic management tool to manage nutrients on farm) by regional councils (MPI, MfE, regional councils).
  - The Land and Water Forum's advice to Government on the development of the National Objectives Framework and on implementation of the National Policy Statement for Freshwater Management (Land and Water Forum).
- > Catchment limits will have been established through collaborative processes that encourage the support of all regional stakeholders and take account of the economic and social effects of cost mitigation. Mechanisms for doing this will include:
  - The National Collaboration Group for Farm Plans project to identify opportunities and leverage existing work to support the successful development and implementation of farm plans (MPI with support from MfE).
  - Collaborative regional approaches to water nutrient limit-setting including the economic implications, such as Environment Southland's Economic Project (various regional bodies).
  - The development of guidance and professional development in collaborative processes and economic analysis of options for water quality and quantity limits and how they can be achieved (MfE).
- > The **regulations** governing water use and nutrient limit-setting will provide clearer and more balanced national direction, greater national alignment, and simple consenting rules and processes to improve timeframes through:
  - The Resource Management Reform Bill to be introduced in 2015 (MfE).
  - An independent review of the National Policy Statement for Freshwater Management, scheduled to begin in 2016, which will be an opportunity to assess the reforms and their results (MfE/MPI).
- > Effective regulation will protect New Zealand's natural environment and make our primary industries amongst the most efficient water users in the world by driving **demand management** amongst water users through the uptake of new technologies.



## What does the Action Plan mean for the social infrastructure sector?

The Action Plan provides the first steps to achieving the 2045 vision. This means:

- > **Asset management** across the social sector will have evolved to a mature level, including advanced asset management planning processes, consistent collection of **data**, and the use of performance measures in decision-making. This will be achieved through:
  - The new Cabinet Office Circular which came into effect on 1 July 2015. The new policy features an Investor Confidence Rating that takes account of factors such as asset performance and asset maturity (Treasury).
  - The development of shared national metadata standards for built assets (MBIE with stakeholders from across the public sector).
  - Sector-specific actions, including the Ministry of Education's 8-Point Plan and the establishment of a cross District Health Board Asset Management Improvement Group in health (various departments).
- > Central and local government will **collaborate more effectively across regions**, ensuring planning is joined up. This will be achieved through:
  - The establishment of regional centres of excellence or similar arrangements, with the potential to support local government and central government decision-making with the necessary analytics (NIU, sector bodies, local authorities).
  - Sector-specific initiatives will also progress collaboration; in defence, for example, the Estate Regeneration Strategy will maximise efficiency and utilisation across the Defence Force and consider benefits on a whole-of-government basis, including exploring different ownership models, increasing the number of multi-use facilities and greater use of commercial providers. Estate planning will also be coordinated with major equipment replacement projects to ensure Capability and Estate initiatives are aligned (various departments).
- > Government will use a **broad range of funding, financing and procurement mechanisms** and procurement across central government will be joined up. This will be achieved through:
  - The new Government Rules of Sourcing and investment rules for government agencies that came into effect on 1 July (MBIE/Treasury).
  - Improved pipeline reporting such as the 10-Year Capital Intentions Plan (NIU).
  - Investigating options to develop scale and capability for large/significant procurements (NIU/MBIE).
- > Many of the institutional arrangements that prevent more **effective investment decision-making** will have been addressed; for instance, the tension to both collaborate and to compete across the schooling network will be improved as new initiatives in the Ministry of Education to encourage school collaboration – such as those within the Ministry's 8-Point Plan – are rolled out (various departments).



## A forward view of significant infrastructure investments

The table below identifies some key local and central government led infrastructure investment initiatives. The NIU publishes an annual Ten-Year Capital Intentions Plan with details of all identified projects. This report is available at [www.infrastructure.govt.nz](http://www.infrastructure.govt.nz)

Type of infrastructure	Infrastructure project/programme	Budgeted cost (million)	Period
Transport	Auckland Waitematā harbour crossing	\$4,500	From 2025
	Auckland City Rail Link (CRL)	\$2,500	To 2025
	Auckland Western Ring Route - Waterview road connection	\$2,250	To 2020
	Wellington Transmission Gully road	\$1,500	To 2020
	Panmure corridor road	\$1,097	To 2035
	Hamilton Eastern Bypass road	\$982	To 2019
	Puhoi-Wellford State Highway	\$755	To 2026
	Christchurch northern arterial road	\$215	To 2019
	Wellington integrated public transport ticketing system	\$32	To 2022
Telecommunications	Ultrafast Broadband Programme	\$1,500 + \$210	To 2020
	Rural Broadband Programme	\$300 + \$100	To 2020
	Mobile Black Spots Fund	\$50	To 2020
Health	Christchurch Hospitals redevelopment	\$600+	To 2019
	Dunedin Hospital campus redevelopment	\$300	To 2025
Education	New Schools and Kura Programme	\$1,000	To 2022
	Greater Christchurch Education Renewal Programme	\$1,140	To 2022
Housing	Upgrade Programme for social houses	\$2,004	To 2022
	Expansion Programme for social houses	\$2,312	To 2022
	Christchurch City Council Social Housing Rebuilds	\$34	To 2017
Water	Auckland Central interceptor waste water system	\$965	To 2025
	Waikato Water Treatment Plant No.2 and Watermain	\$400	To 2025
	Huia Water Treatment Plant Upgrade, Auckland	\$241	To 2023
	Waiari Water Supply Project (stage 1), Tauranga	\$65	2017-2021
	Lyttelton Waste Water Treatment Plan	\$52	To 2022
	New Wanganui Waste Water Treatment Plant	\$32	2017-2020
	Dunedin Stormwater trunk mains	\$36	To 2024
	Christchurch Northern Trunk Sewer	\$35	To 2020
	Waikiwi Reservoir, Invercargill	\$34	2040-2045
	Hamilton replacement of water mains	\$33	To 2022
	Coastal Tasman Water Supply Pipeline	\$32	2032
	Waihou Piako pump renewal programme, Waikato	\$31	To 2045
	Palmerston North water pipe replacement	\$28	To 2025
	Hastings stormwater works	\$22	To 2022
	Waimea Community Dam, Tasman District	\$25	To 2020
	Whau Valley Water Treatment Plant, Whangarei	\$19	To 2018
Other Facilities	Earthquake strengthening of Wellington City Council buildings	\$49	To 2022
	TSB Stadium redevelopment, New Plymouth	\$27	To 2025
	Flatbush pools and leisure space, Auckland	\$27	From 2020
	Aquatic centre building, New Plymouth	\$21	To 2022
	Development of Porirua landfill	\$17	To 2025

## Next steps

Agencies, peak bodies and local authorities will focus on the delivery of their actions in the Action Plan. The NIU will monitor implementation and report to the infrastructure community through the publication of an annual State of Infrastructure report which will be made available through [www.infrastructure.govt.nz](http://www.infrastructure.govt.nz)

Building from the publication of a *National Infrastructure Evidence Base* in 2014 and 2015,<sup>37</sup> the NIU will continue to develop the evidence base on the state and performance of our national infrastructure.

There are several areas that are growing in importance which the NIU will explore further in the near term. These include:

- > The impacts of climate change and the infrastructure response, especially inundation and sea level rise, changing rainfall patterns and flood protection.
- > Long-term delivery of services and infrastructure provision in areas of population decline.
- > The role of the Māori economy and its importance to national infrastructure.

## Partnerships and collaboration

The development of the Plan and the work programme over the past few years has been a collaborative process across infrastructure sectors and stakeholders, including multiple series of regional workshops over 2014 and 2015 and the first New Zealand Infrastructure Forum in March 2015.

Reflecting the step change necessary to bring about a new approach to infrastructure, continuing to develop and mature this collaboration and build strong relationships will remain a priority.

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**“The challenges remain but we see things moving in the right direction with good collaboration and relationships developing, resulting in a strong willingness to engage in the hard discussions.”**

*National State of Infrastructure Report 2013*

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## Research

Data and information are critical to making good decisions. Research related to infrastructure and the services provided is integral to meeting this need. The Plan encourages a research strategy based on four guiding principles; promoting world-class excellence, focussing on priorities, fostering partnerships; and enhancing accountability.

As well as promulgating the large body of research that has emerged from Christchurch in resilience and natural hazards, the Plan provides a guide to other key questions that research can help shed light on.

<sup>37</sup> National Infrastructure Unit (2014, 2015). Both are available at <http://www.infrastructure.govt.nz/plan/evidencebase>



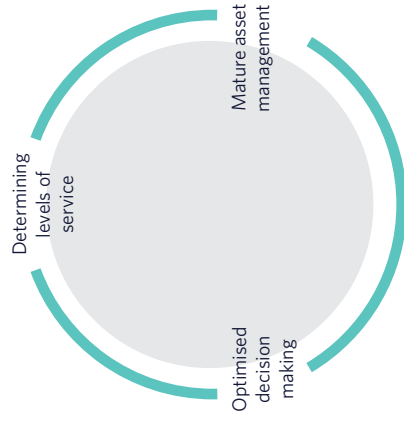




## **APPENDIX 1:**

# **ACTION PLAN**

## The response framework



## Transport

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Implementation of the National Airspace & Air Navigation Plan: The plan enables the introduction of new technologies and will ensure major and provincial aerodromes are collaborating on demand forecasting and the airport infrastructure necessary to support this demand. Modernisation of the aviation system will bring an additional \$2 billion to the economy by 2025. Policy advice in 2015; implementation of necessary regulation and introduction of new technologies in 2016-2018; full use of new technologies 2019-2023.	✓	✓	✓	MoT	✓	✓	✓
Intelligent Transport Systems (ITS) Technology Action Plan 2014-18 outlines the government's strategic approach to encouraging and enabling ITS in New Zealand. The Action Plan contains 42 government actions that will play a major part in enhancing the operation, use and experience of the transport system, and contribute to the government's objectives for safer, more efficient, more resilient and more sustainable transport systems.	✓	✓		MoT	✓	✓	✓
Partnership between LGNZ and the NZTA to ensure consistent investment and service levels across the country's roading network. This has included work on the Funding Assistance Rates (FAR) review (2014) and establishment of the One Network Road Classification (ONRC) to standardise data and create a classification system which identifies the level of service, function and use of road networks and state highways.	✓	✓		LGNZ/NZTA	✓	✓	
The Auckland Port Future Study: A Stakeholder Reference Group is being formed to carry out the study, and will include representatives from a range of sectors such as business, marine recreation and heritage groups, environmental organisations and Māori. Over the next 12 months, these stakeholders will consider the social, environmental, economic, and cultural impacts of a wide range of options for the port's future development. This will include understanding the wider context of the role of the port in relation to Tauranga and Northport.	✓			Auckland Council	✓		
The continued negotiation of new air services agreements, both bilaterally and multilaterally, to provide more access to our key and future trade markets.	✓			MoT	✓		

## Transport

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
The maintenance of the National Freight Demand Study to provide up-to-date forecasts to guide freight infrastructure investment and land-use planning decisions across the public and private sectors.	✓			MoT	✓		
The accelerated Regional Roadway Package includes the construction and investigation of 12 key regional State highways.	✓	✓		NZTA	✓		
The Auckland transport package announced in 2013 included accelerating projects within three key motorway corridors and announcing next steps on the top three transport priority projects in the Auckland Plan.	✓	✓	✓	NZTA	✓		
Evaluation of the Public Transport Operating Model. A new framework for the operation of public transport services is being implemented in NZ, intended to increase competition and the commerciality of public transport services and drive innovation. The Ministry of Transport will report on implementation in December 2015 and on how it is operating in 2017.	✓			MoT	✓		
Tairāwhiti Roads - a joint collaboration between NZTA and Gisborne District Council to manage roads as one network.	✓			IPWEA	✓		
Preparation for the Government Policy Statement (GPS) on Land Transport 2018 involves continued work on understanding patterns in demand, as well as sector and regional needs. GPS 2018 will make use of many other transport actions including the domain plan, ITS, and performance monitoring.	✓	✓		MoT	✓		
30 year vision for State Highways. The NZTA is developing a 30 year vision for State Highways, taking into account expected growth in Auckland and other regions.	✓			NZTA	✓		
Development of a Transport Domain Plan: Domain Plan will identify the gaps in knowledge required to answer key enduring questions about transport. It will then make recommendations about what is needed to address those gaps. Publication in 2015.	✓			MoT and Stats NZ		✓	
City Centre Integration Project: A combination of transport infrastructure and service improvements are required to improve access to and within Auckland's City Centre in a way that supports Council's vision for the City Centre. This includes the CRL, an optimised new bus network supported by high quality bus interchanges and much higher quality cycling and walking facilities.	✓	✓	✓	Auckland Council	✓	✓	✓
A Research strategy will be developed for the transport sector by November 2015. This will outline the priorities for research in the transport sector as a whole as well as providing a framework for commissioning new research that reaches the sector's goals. It will also put in place a structure from which the Domain Plan can be implemented.	✓			MoT		✓	
The Transport analytics governance group (TAGG) has been established and is building a roads metadata standard for implementation across New Zealand.	✓	✓		NZTA and councils		✓	
Roadway Infrastructure Management Support Group (RIMS) Body of Knowledge review and update.	✓	✓		IPWEA		✓	
Climate change work programme: A programme of work to provide advice to Ministers and other departments about potential opportunities to reduce greenhouse gas emissions from the transport sector.	✓			MoT		✓	
Implementation of the National Land Transport Programme 2015-18, giving effect to the Government Policy Statement on land transport for 2015/16 - 2024/25. The NLTP was released in June 2015 and is the programme of investment managed by the NZTA in partnership with local government. The NLTP signals the potential activities for land transport investment over a three year period.	✓	✓	✓	MoT/NZTA			✓

## Transport

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Review of NZTA's Investment Decision-Making system: identify areas for improving the transparency and confidence of the current investment decision-making process. The Investment Decision-Making Review is intended to give stakeholders confidence that the investment decision making process, and considerations within it, is fit for purpose, aligned with international best practice and will deliver the right transport outcomes for New Zealand. The Review is a collaborative effort with the Treasury, the MoT and representatives of local government. Recommendations are due in October 2015.	✓			MoT, NZTA, Treasury			✓
A demand management and road pricing project is planned for 2015/16. The objectives are to improve the estimation of demand for infrastructure, and optimise the use of infrastructure.							
The first phase will be completed in 2015/16 and is likely to focus on problem analysis including consultation. Advice will go to Ministers on the feasibility and design of a heavy vehicle trial in 2015/16.	✓	✓	✓	MoT			✓
The second phase will be completed in 2016/17, and is likely to focus on objectives and refined problem analysis following consultation.							
Improving vehicle productivity by reviewing Vehicle Dimension and Mass rules, supporting High Productivity Motor Vehicles. This is expected to be completed late in 2016.	✓			MoT			✓
Review of the Civil Aviation Act 1990 and the Airports Authorities Act 1966: A review of the Acts to ensure that a number of economic, safety and security issues relating to these Acts are fit for purpose and meet New Zealand's future needs. Recommendations will go to Cabinet in November 2015 with a Bill introduced to the House mid-late 2016.	✓	✓		MoT			✓
NZTA will explore innovative revenue, pricing and financing approaches over 2015-16 that enhance the value delivered by land transport investments.	✓			NZTA			✓

## Telecommunications

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Coordinating the Digital Economy programme of policy activities across New Zealand's ICT sector which maximises benefits from ICT technology to New Zealand businesses and growing the economy. The programme includes identifying opportunities to leverage ICT capabilities for productivity improvements.	✓			MBIE	✓		
Involving local authorities in designing the UFB and RBl extension programmes and the Mobile Black Spot Fund through digital enablement plans.	✓	✓		MBIE	✓		
Set longer-term targets for broadband connectivity in New Zealand beyond 2020 taking account of requirements for regional economic development and other public interest imperatives.	✓			MBIE	✓		
Regular reporting on infrastructure deployment under the UFB and RBl programmes. Quarterly reports are published by MBIE showing progress with the deployment of facilities funded under the UFB and RBl programmes.	✓	✓		MBIE		✓	
Develop a publicly accessible database tool which displays information by location on all types of broadband available (fibre, copper and wireless).	✓			MBIE, Internet NZ	✓	✓	



## Telecommunications

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Develop an Emergency Services Resiliency Framework to support the greater robustness of ICT facilities through which emergency services are delivered. This is a joint project across Police, Civil Defence, and other emergency service providers. The Framework is expected to be finalised in 2015.	✓			Police, MBIE		✓	
Develop a plan detailing the future role and requirements for the initial answering of 111 emergency calls.	✓			MBIE, Emergency Service Providers	✓	✓	
There is increasing reliance on international data cables for digital connectivity which is critical to linking New Zealand with the rest of the world. Monitor and report on the capability of international cable systems to fulfil the public interest requirements of New Zealand for international digital connectivity in relation to security, capacity and resilience.	✓			MBIE		✓	
Undertake market research to identify the drivers of UFB demand and barriers to uptake from a demand-side perspective. Complete research in 2015.	✓			MBIE			✓
Telecommunications Carriers Forum (TCF) industry guidelines to foster national consistency of practices for property owner consenting to land access which supports efficient UFB connection.	✓	✓		TCF/MBIE			✓
Reviewing the telecommunications regulatory regime. A discussion document on proposed regulatory changes is expected to be released in 2015. A key focus of the review is the price-setting arrangements for wholesale broadband services.	✓	✓	✓	MBIE			✓
Review of the National Environmental Standard for Telecommunications Facilities. Amendments are proposed to expand the activities covered by the standard to increase national consistency in environmental controls for a greater range of telecommunications facilities, and to refine existing standard requirements. A regulatory change proposal is expected to be finalised in 2015.	✓	✓		MBIE			✓
Reviewing regulatory arrangements to enable efficient land access for telecommunications connections. A regulatory change proposal is expected to be finalised in 2015.	✓	✓		MBIE			✓
Pilot a new ICT procurement approach based on a competitive proof of concept stage through the project for upgrading the Emergency Response System to enable identification of mobile caller location.	✓			MBIE			✓

## Energy

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Promotion of regional renewable energy hubs.	✓			EECA	✓		
Promotion of petroleum and minerals exploration and development.	✓	✓	✓	MBIE	✓		
The New Zealand Energy Strategy 2011-2021 incorporating the New Zealand Energy Efficiency and Conservation Strategy 2011-2016 (NZECS) was published in August 2011. By February 2016 the Minister determines whether to refresh the NZECS.	✓	✓	✓	MBIE, EECA	✓		
Smart Grid Forum (led by MBIE and ENA) considering challenges and opportunities for NZ's electricity system, which faces changing demand patterns and new technologies.	✓			MBIE, ENA	✓		

## Energy

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Investigate the impact that current pricing methodologies and other regulatory requirements have on incentives for efficient investment in new generation, storage and demand management technologies.	✓			EA	✓		
Low Carbon Auckland sets out a 30-year pathway and a 10-year plan of action to transform towards a greener, more prosperous, liveable, low carbon city, powered by efficient, affordable, clean energy and using resources sustainably. The plan addresses travel, the built environment, green infrastructure, waste, forestry and agriculture.	✓	✓	✓	Auckland Council	✓		
Support continuous improvements in asset management planning practices by gas and electricity lines businesses through review of asset management plans and analysis of related information.	✓	✓	✓	Commerce Commission		✓	
The National Policy Statement for Renewable Electricity Generation 2011 includes recommendations to monitor, evaluate and report on its effectiveness by May 2016.	✓	✓	✓	MfE, MBIE		✓	
ENA members use the model 'Transform' and other methods to help better understand the future investment environment.	✓			ENA		✓	
The Electricity (Hazards from Trees) Regulations 2003 were designed to protect the security of the supply of electricity, and the safety of the public by prescribing rules and responsibilities for managing trees in the proximity of electricity conductors. MBIE will investigate the effectiveness of the regulations governing management of trees near power lines.		✓		MBIE		✓	
Implement the new extended reserve arrangements to help improve the management of the risk of blackouts by December 2015.							
Review low and high voltage fault ride-through Asset Owner Performance Obligations (AOPO's) to ensure they are fit for purpose with the changing generation mix, and implement any necessary changes.	✓	✓	✓	EA		✓	
Review stress testing arrangements designed to demonstrate spot price risk to consumers arising from electricity system stresses.	✓	✓		EA		✓	
Further review the operation of the spot electricity market to:							
> ensure slow-start forms of generation are treated equally with fast-start generation (slow-start thermal generation can be a key source of energy supply during dry year events); and	✓	✓	✓	EA		✓	✓
> improve opportunities for consumers to vary their demand in response to wholesale electricity prices.							
Review whether there are long-term net benefits for consumers from introducing cap contracts in the electricity futures market to achieve robust and transparent pricing of generation and demand-response capacity and improve the resilience of generation and demand-response capacity.	✓	✓		EA		✓	
Continue to implement actions that Cabinet agreed to following the Oil Security Review 2012, including developing an Oil Emergency Response Handbook, and improving transparency of regional storage capacity by December 2015.	✓			MBIE		✓	
Identify opportunities to reduce dependency on imported liquid fuels.	✓	✓	✓	MBIE		✓	
Review the National Civil Defence Emergency Management Fuel Plan, which provides a readiness planning framework and response operations for fuel sectors and CDEM in New Zealand – Review complete by December 2016	✓			MCDEM		✓	
Consider options for incorporating Transpower's demand-side response (DSR) mechanism into the spot electricity market to ensure efficient response to Transpower's DSR mechanism, and implement preferred option.	✓	✓		EA			✓

## Energy

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Develop Transpower's demand response programme for transmission investment deferral, which is used to defer investment in grid upgrades by paying participating consumers to reduce demand during critical peak periods when doing so defers transmission investment.	✓			Transpower			✓
Gas industry development of a demand-response solution to congestion management on parts of the gas transmission system.	✓			GIC			✓
Development of minimum energy performance standards for electricity appliances to support demand management.	✓	✓	✓	EECA			✓
Review input methodologies for the economic regulation of gas and electricity lines businesses to ensure regulatory instruments remain fit for purpose and respond to changing market conditions.	✓	✓		Commerce Commission			✓
EA to review principles governing pricing of electricity transmission and distribution services, including the connection of distributed generation. Investigate the market impact of regulations requiring low fixed electricity tariff options for households.	✓	✓	✓	EA, Transpower, Electricity Distribution Businesses			✓
The EA will promote competition in electricity markets by providing consumers with better access to information and tools to make decisions between retailers.	✓			EA			✓
Commerce Commission will conduct an analysis of Electricity Distribution Businesses' (EDB's) information disclosure.	✓			Commerce Commission			✓

## Three waters

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
Cross-boundary study between Hamilton City Council, Waipa District Council and Waikato District Council to determine how each council should manage water, waste water and stormwater services across the subregion. Recommendation is for a council-controlled organisation (CCO) for water and wastewater outsourced on a cost recovery basis, with councils retaining ownership of stormwater assets.	✓	✓	✓	Hamilton City Council, Waipa District Council and Waikato District Council	✓		✓
If the three Councils agree with the study recommendations to form a CCO, there will be a public consultation process and they will implement the CCO including creation of a waters centre of excellence that will be able to share expertise with other water authorities in the region on a cost recovery basis.							
Implementation of new planning and reporting requirements in the 2015 Long Term Plans, including non-financial performance, asset value and asset management, and the first 30-year infrastructure strategies to support planning and dialogue and conversations with communities on future levels of service.	✓			Local Authorities	✓	✓	
Analyse local council's 2015 long-term plans including 30-year infrastructure strategies to assess investment plans for next 10 years, impact on levels of service, overall direction of travel and scope of issues unaddressed.	✓			DIA	✓		
The LGNZ 3 Waters project to lift the performance of our potable water, wastewater and stormwater services and infrastructure. LGNZ will be releasing a position paper in 2015 to outline what a well performing three waters sector should look like and propose options for a sector led approach to improving performance in the future.	✓	✓		LGNZ		✓	

## Three waters

	Timeframe			Area of Response Framework		
	2015-2016	2017-2019	2020+	DLoS	MAM	ODM
LINZ, several sector bodies and local councils will develop shared metadata standards for water infrastructure over 2015-16.	✓			LINZ, LGNZ, Water New Zealand, IPWEA, local councils	✓	
The University of Canterbury and Water New Zealand will develop <i>Levels of Service Performance Measures for Seismic Resilience</i> .	✓			University of Canterbury EQ Centre / Water New Zealand	✓	
The Treasury, MCDEM, and DIA will review disaster recovery funding arrangements over 2015-16.	✓			Treasury, MCDEM, DIA	✓	
Rainfall, runoff, river channel flows, flood protection and related infrastructure are strongly correlated contributing to a wide range of outcomes including productive water requirements, urban water requirements and natural hazard risk management. The opportunities and threats are substantial. Concerns have been expressed across a broad spectrum from governance, to technical assumptions and community preparedness. The intent is to develop from previous work by central and local government, Crown Research Institutes and the private sector to establish a programme of activities to prioritise endeavours and coordinate across stakeholders.	✓	✓	✓	NIU, sector bodies and local government	✓	

## Productive water

	Timeframe			Area of Response Framework		
	2015-2016	2017-2019	2020+	DLoS	MAM	ODM
<p>The next stage of the freshwater reforms includes work on maximising the economic benefits from water that is available for use within limits, and addressing Iwi/hapū rights and interests in water in appropriate ways. The Land and Water Forum (LAWF) has been asked to:</p> <ul style="list-style-type: none"> <li>➤ provide advice to government on how to maximise the economic benefit of fresh water while managing within water quality and quantity limits, including transitional arrangements (September 2015); and</li> <li>➤ contribute to the further population of the National Objectives Framework and provide advice on ways to aid implementation of the NPS-FM (September 2016).</li> </ul> <p>The LAWF will provide a review of the overall changes to water policy and its implementation, lessons learned, and the further work required to achieve the overall objective of improved water management in New Zealand in December 2017.</p>	✓	✓		LAWF/MfE/MPI	✓	
MPI with support from MfE have initiated the <i>National Collaboration Group for Farm Plans</i> project to support the successful development and implementation of farm plans. Three meetings were held in the first half of 2015 with stakeholders from across primary industries and related industries such as irrigation companies, training providers, regional councils, farmers and growers. A final report with practical actions and recommendations that will be supported and endorsed by members of the group is expected by mid-2015. A comprehensive Good Management Practice work programme will be implemented collectively by the relevant parties from end of 2015-2017.	✓			MPI/MfE	✓	
Continue to develop collaborative regional approaches to water nutrient limit-setting including the economic implications. e.g. Environment Southland Economic Project.	✓			Local Councils, MfE	✓	



## Productive water

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
MfE is providing support for regional councils, lwi and sector organisations to improve management of freshwater and setting limits on water quality and quantity. Development of guidance and professional development in collaborative processes is initially targeted at regional council staff. Support for regional councils to build economic capability to undertake robust analysis of options for limits will continue over the next four years. Guidance for councils on outstanding freshwater bodies and dealing with over-allocation will be completed by 2017.	✓	✓		MfE	✓		
MPI is working with Regional Councils, industry, and MfE to develop guidance material on the use of OVERSEER (a strategic management tool to manage nutrients on farm) by Regional Councils. The objective is to develop a nationally consistent approach for using OVERSEER in regulation, including protocols for data management and managing uncertainty in the outputs. This will provide guidance for councils on the principles of using OVERSEER rather than being prescriptive. The material produced will include information on OVERSEER's capabilities, assumptions and limitations, and will be written in easy-to-understand language for a non-technical audience.	✓			MPI/MfE		✓	
Regional Councils have begun implementing the National Policy Statement for Freshwater Management (NPS-FM) 2014 to set water quality and quantity objectives and limits. In some cases, communities are including water infrastructure in the options considered, to assist with meeting catchment objectives e.g. when water storage can reduce extraction pressure and improve water quality in groundwater and lowland streams. Incentives for adoption of efficient irrigation scheduling and application methods have increased in some cases e.g. where nitrogen discharges per hectare are capped in regional council rules to ensure quality limits are achieved.	✓			MfE			✓
Resource Management Reform Bill to be introduced in 2015 which will include improved planning processes, clearer and more balanced national direction, the introduction of a national planning template, new consenting rules and processes to improve timeframes, and changes to ensure local authorities are enabling sufficient and responsive supply of land for urban development.	✓			MfE/MPI			✓
MPI/MfE to support Councils to implement the National Policy Statement for Freshwater Management (NPS-FM) 2014 including the use of economic modelling approaches in understanding the impacts of choices made. Amendments to the NPS-FM 2014 will enable further population of the National Objectives Framework potentially in 2016 and 2019.	✓	✓		MfE/MPI			✓

## Social infrastructure

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
The Government is working with local authorities and the private sector to identify areas where Crown or Council owned land can be used for housing, or where the Government can progress regulatory options to help free up private land for housing developments, particularly in Auckland.	✓	✓		MBIE	✓		
In Auckland, there are approximately 500 hectares of vacant or underutilised Crown land with zoning that could support housing. A development agreement on the first parcel of land is expected by the first quarter of 2016.							
MBIE are exploring the feasibility of establishing a methodology for calculating 'development capacity' in areas of high urban growth that is agreed between developers and local planners and providing advice by the end of 2016.	✓			MBIE	✓		

## Social infrastructure

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
The Treasury has established a transactions unit and is working with MSD and MBIE to facilitate the growth of the community housing sector through the transfer of housing stock and subsidised tenancies to non-government providers.	✓	✓		Treasury	✓	✓	
Tāmaki Transformation Programme: In April 2015 the Government agreed to the transfer of 2,800 Housing New Zealand Corporation (HNZC) properties – and responsibility for tenancy and property management – to the Tāmaki Redevelopment Company (TRC), by 31 March 2016. As part of the next stage of the TRC's rejuvenation of the Tāmaki area, these houses will be progressively redeveloped into 7,500 new social, affordable and at-market homes. The Government has also approved a \$200 million loan facility for TRC, to be made available ahead of the transfer of the homes in order to allow TRC to progress its planning and to take advantage of early development opportunities. A business case will be developed by the Government, Auckland Council and TRC over the second part of 2015 that will look at how future developments will be best undertaken in the area.	✓	✓	✓	Treasury, MBIE	✓		✓
In July 2015 the national Māori Housing Unit was established in Te Puni Kōkiri (TPK) with the key role of providing practical assistance for Māori housing projects and administering Crown funding for Māori housing programmes. MBIE will continue to engage with relevant TPK staff to introduce key building standards and provide policy advice to Iwi for pre-post Treaty settlements.	✓	✓	✓	MBIE			✓
Land supply has been identified as a key issue for affordable housing. The Housing Accords and Special Housing Areas Act passed in 2013 created a framework for further housing developments with councils, by enabling streamlined consenting processes for residential developments in Special Housing Areas (SHAs). Accords can also provide for cooperation on non-regulatory matters. So far, the Government has agreed accords with Auckland Council, Christchurch City Council, Wellington City Council, Queenstown-Lakes District Council, Tauranga City Council, Western Bay of Plenty District Council, Nelson City Council and Tasman District Council. As of 1 August 2015, 85 SHAs have been created in Auckland, 21 in Wellington, 9 in Tauranga, 1 each for the Western Bay of Plenty and Queenstown, and three developments are being progressed on publicly owned land in Christchurch.	✓	✓		MBIE			✓
Continued deployment of the Eight-Point Plan to improve school property services. This includes better procurement to enable faster delivery of national programmes, providing schools with incentives to collaborate and providing greater transparency about the costs and condition of school property.	✓	✓	✓	MoE	✓	✓	✓
The Ministry of Education is proactively engaging with Auckland Council and with HNZC to identify demand from SHAs in Auckland.	✓			MoE	✓		
MoE have conducted early stage work with some communities to address their declining populations and over-provision of infrastructure. The work is at a very early stage and focuses on student/community outcomes rather than network/service provision.	✓			MoE	✓		
MoE will develop an estate strategic plan that considers broader government intentions; the initial work will be completed in 2015.	✓	✓	✓	MoE	✓		
MoE's asset management system "HELIOS" is under development and will increase the accessibility of property data and the associated level of accuracy/assurance.	✓			MoE		✓	
MoE are investigating the provision of property data to Open Data.	✓			MoE		✓	
The School Property Programme Business Case is developing the MoE's asset management maturity. It provides a whole-of-network approach and identifies a 10 year timescale of investment requirements.	✓	✓	✓	MoE			✓
MoE have launched the School Property Disposal Incentive Scheme to increase the rationalisation of surplus school property and free up funds that could be re-invested in modernising school facilities.	✓			MoE			✓

## Social infrastructure

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
MoE have established the National Transportables Framework to supply transportable classrooms for schools as and when required for student roll growth, temporary accommodation during building works, and during disaster recovery. This will yield greater conformity of transportable units and should achieve cost efficiencies compared to current arrangements, whereby schools procure their own transportable classrooms.	✓			MoE			✓
Defence will develop an Estate Plan to provide the detailed direction for regeneration, whole-of-government integration and maintenance of the estate out to 2030. This will increase transparency of the management and utilisation of the Estate, how it contributes to the generation of outputs, and its use by other agencies.	✓			NZDF			✓
The project to refresh infrastructure data across the Defence Estate has been completed. NZDF are advancing asset management maturity by introducing the Building Information Modelling principles (aligning with the Ministry of Business Innovation and Employment), including: creating data standards, three dimensional modelling for larger projects, document control, linking systems to provide reporting functionality, and maintaining data integrity.	✓			NZDF		✓	
The NZDF is actively considering resilience in current planning. The analysis informing the planning is likely to consider interdependencies and community preparedness alignment with core resilience requirements on NZDF camps and bases.							
Work is underway to identify resiliency threats across the Defence estate. For example, seismic events, sea level rise, energy continuity, urban encroachment, bush fires, flooding and wind storms.	✓			NZDF		✓	
There is a long-term mitigation programme across the Defence estate for earthquake prone buildings.							
There is currently a housing and accommodation assistance review being undertaken by Defence. This review will help to confirm the future strategic direction for Defence housing and accommodation facilities.	✓			NZDF		✓	✓
Governance of the estate is being aligned with the new NZDF Governance Framework. This will allow Defence to better manage the significant change in culture and practice from historic management and planning for individual Camps and Bases to one of management and planning for the Estate on a pan-Defence and whole-of-government basis.							
In 2014 Cabinet approved indicative capital and corresponding amounts of operating funding to recapitalise and regenerate the Defence estate to ensure it is fit for purpose and compliant with health, safety and security requirements by 2030.							
Different ownership models, increasing the number of multi-use facilities and greater use of commercial providers will be explored. Estate planning will be coordinated with major equipment replacement projects to ensure Capability and Estate initiatives are aligned.	✓			NZDF			✓
MoJ are continuing the development of a programme to modernise the court system.	✓			MoJ			✓
MoJ are working to improve the flow of information through the justice sector - including between police and courts.	✓			MoJ		✓	
The Investing in Justice (IJ) expenditure review seeks to support MoJ's response to funding pressure over the next four years. IJ has two streams. The first is examining MoJ expenditure to ensure it is as efficient and effective as possible within current policy settings. The second stream is a review of those policy settings, looking to further improve the value for money of the New Zealand justice system. These review streams include consideration of the MoJ capital asset management and long term infrastructure plan.	✓			Courts		✓	
Corrections will review the prison network configuration to maximise value for money and results over 2015-16.	✓			Corrections		✓	

## Social infrastructure

	Timeframe			Area of Response Framework		
	2015-2016	2017-2019	2020+	DLoS	MAM	ODM
20 DHBs recently undertook asset management maturity self-assessments – nine of these were selected for independent review by an expert practitioner (AECOM). These assessments will be used as a baseline for improving asset management maturity across the sector and will support the requirements of the new Cabinet circular on central government capital asset management. A cross-DHB Health Asset Management Improvement group (HAMI) has been established to coordinate and drive asset management improvement across the sector.	✓				✓	

## Cross-cutting initiatives

	Timeframe			Area of Response Framework		
	2015-2016	2017-2019	2020+	DLoS	MAM	ODM
Develop national metadata standards for roads, water and buildings to ensure a consistent base to build evidence, undertake forecasting and deepen capability.	✓	✓		NIU, LINZ, NZTA, MBIE, sector bodies and local government	✓	
Explore the establishment of regional centres of excellence or similar arrangements for collating and making available the data obtained through shared metadata standards. This initiative will also explore the costs, benefits, and funding implications of any new entity providing the necessary analytics to interrogate the data and support local decision making.	✓	✓	✓	NIU, LINZ, NZTA, MBIE, sector bodies and local government	✓	
Investigate options to support long-term integrated regional infrastructure plans, potentially with legislative recognition incorporating central and local government objectives.	✓	✓		NIU	✓	
Collaboration across local and central government organisations to develop the Waikato Plan.	✓			Waikato Mayoral forum	✓	
The Future Urban Land Supply Strategy is being developed in order to maintain a pipeline of development capacity across Auckland. It will sequence structure planning and live zoning of the future urban areas to achieve the best outcomes for the provision of housing, employment, community facilities, open space and infrastructure, including transport. The strategy is being developed as a collaborative project including involvement by infrastructure providers recognising the importance of aligning infrastructure delivery with planning. The Strategy will be complete by October 2015 with implementation following.	✓	✓	✓	Auckland Council	✓	
The Sport and Recreation Strategic Action Plan is a sector-wide plan for Auckland's sport and recreation sector. The plan lays out the common vision for improving recreation and sport across Auckland, the actions to be taken to get there and the role the council and other organisations will play. A key focus of the plan is infrastructure – developing access to open spaces and harbours, coastlines and waterways and a fit for purpose network of facilities enabling physical activity, recreation and sport.	✓	✓	✓	Auckland Council	✓	
Investigate options to tighten the link between financial planning and strategic asset management planning at the central and the first local government levels, pending the effects of forthcoming central government asset management reforms and the first local government 30 year Infrastructure strategies produced this year.	✓			NIU/DIA	✓	
Develop an earthquake-prone buildings register to list all earthquake-prone buildings in 2015-16.	✓			MBIE	✓	



## Cross-cutting initiatives

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
IPWEA New Zealand and the NIU will establish a programme to enhance the capability, productivity and leadership in asset management throughout the public sector in New Zealand. They will establish and lead a collaborative cross-sector programme to enable: increased understanding of asset management amongst public sector capital asset owners; the wide collection, development, synthesis, and dissemination of exemplary practice standards, manuals, guidelines and other resources across the public works sector; the integration of investment and optimised decision-making processes and tools in asset management planning and long-term infrastructure planning.	✓	✓		IPWEA/NIU		✓	
Update of the International Infrastructure Management Manual in 2015.	✓	✓		IPWEA NZ/ NAMS with IPWEA Australasia		✓	
Update of the Property Manual in 2015.	✓			IPWEA NZ/ NAMS		✓	
Update of the Valuation and Deprecation Guidelines in 2015.	✓			IPWEA NZ/ NAMS		✓	
Hamilton City Council has developed a corporate improvement programme for asset management and is aiming towards creating a cross-organisational Asset Management 'centre of excellence'. In order to allow developers to progress ahead of council timing, a growth funding policy has been adopted that allows developers to fund necessary infrastructure to advance their developments. Council also has a development contributions policy and model that allows council to recover a percentage of the costs of growth from development (approximately 50 percent).	✓	✓	✓	Hamilton City Council		✓	
Wellington City Council has completed a preliminary economic yield analysis on core infrastructure assets. This is designed to maximise the use of existing assets. The potential savings in capital investments to maintain and grow its infrastructure base suggest very large financial benefits at this stage.	✓			Wellington City Council		✓	
Guidelines to be published in 2015-16 on insuring public infrastructure assets against damage caused by natural disasters.	✓			IPWEA NZ/ NAMS		✓	
Cyber security work led by the National Cyber Policy Office (NCPO) in the Department of Prime Minister and Cabinet (DPMC) and Government Communications Security Bureau (GCSB), to ensure that New Zealand's most significant information infrastructure - public and private - are protected from cyber risks. This includes providing targeted cyber protection, delivering timely mitigation advice, initiatives to improve the cyber security capability of the corporate sector, including critical national infrastructure, and on-going engagement through the Connect Smart partnership ( <a href="http://www.connectsmart.govt.nz">www.connectsmart.govt.nz</a> ).	✓	✓	✓	DPMC, GCSB		✓	
Land Information New Zealand (LINZ) are developing tools such as "Forward Works" and advanced geospatial sourcing and information systems to add to improve decisions on resilience.	✓			LINZ		✓	
Complete the New Zealand Geospatial Research & Development Strategy to encourage appropriate geospatial research to support infrastructure and hazards management, March 2016.	✓			LINZ		✓	
The NIU to make available tools for businesses to ask their infrastructure service providers resilience questions and achieve more focused assessment of interdependencies and priorities.	✓			NIU		✓	

## Cross-cutting initiatives

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
<p>Lifelines to progress initiatives to improve resiliency in NZ:</p> <ul style="list-style-type: none"> <li>&gt; work with sector co-ordinating entities and researchers to benchmark and improve network and organisational resilience;</li> <li>&gt; review status of Regional Vulnerability Assessments by December 2015;</li> <li>&gt; drive a more consistent approach across regional Lifelines groups with a unified methodology;</li> <li>&gt; work with MCDEM and New Zealand Lifelines Committee to improve the extent to which infrastructure service providers meet their obligations under the CDEM Act.</li> </ul>	✓	✓	✓	Lifelines		✓	
Review the Government's National Civil Defence Emergency Management (CDEM) Strategy, which sets out the vision, values, principles and goals for civil defence emergency management in New Zealand for a period of 10 years – Review complete by December 2017.	✓	✓		MCDEM		✓	
Review the Lifeline Utilities and CDEM Director's Guideline, which provides guidance to lifeline utilities on meeting their requirements under the CDEM Act and supports collaborative partnership with CDEM Groups.	✓			MCDEM		✓	
Periodically review the CDEM Plan and supporting Guide, which set out the roles and responsibilities of lifeline utilities and other entities across the 4R's of risk reduction, readiness, response and recovery requirements.	✓	✓	✓	MCDEM		✓	
Resilience-related research projects progressing across NZ include QuakeCore, National Science Challenge, Resilience to Natures Challenges, and National Science Challenge Better Homes, Buildings, Towns and Cities.	✓	✓		Multiple agencies		✓	
The MBIE-funded Economics of Resilient Infrastructure project will be completed in 2015-16.	✓			MBIE		✓	
MBIE will establish a nationally available Geotech Database, hosted by MBIE. MBIE intends on working with the private sector and local government to continue to grow the database to provide national coverage.	✓			MBIE		✓	
MfE will publish updated climate projections for New Zealand and updated guidance to local government on coastal hazards and climate change in 2015-16.	✓	✓		MfE		✓	
The Department of Conservation will conduct an effectiveness assessment of the NZ Coastal Policy Statement in 2015-16.	✓			DoC		✓	
Joint work between LGNZ and Treasury to investigate the business case for a local government risk agency. The objective of the agency, if set up, is to improve the risk management maturity of local authorities, by providing a suite of risk management services. The business case and structure of the agency, if financially viable, will be completed by June 2016.	✓			LGNZ, Treasury		✓	
The Natural Hazard Risk Management Action Plan (NHRMAP) is an Auckland Plan initiative to help build a city that is resilient to the effects of natural hazards. It will ensure that Auckland Council has a coordinated risk management approach embedded in its work practices while also delivering best practice solutions in a cost effective manner.	✓	✓	✓	Auckland Council		✓	
The NIU will report on the progress of the 2015 Plan through an annually published <i>State of Infrastructure</i> report.	✓	✓		NIU			✓
Equip LP, LGNZ's centre of excellence, is developing a Governance Development programme and an Organisational Performance programme to assist councils in raising the standard of governance, performance and asset management. Equip offers diagnostic and service review tools that assesses current performance levels, supports service excellence and the sharing of best practice. In partnership with the Institute of Directors, Equip offers a professional development package for elected members and council officers with a focus on improving 'best practice' governance and capability.	✓	✓		LGNZ			✓
The NIU and government agencies will conduct a review of planning legislation and alignment to ensure fitness for purpose.	✓			MfE, DIA, MoT, NIU			✓

## Cross-cutting initiatives

	Timeframe			Lead	Area of Response Framework		
	2015-2016	2017-2019	2020+		DLoS	MAM	ODM
The Resource Management Act (RMA) Reform Bill will be introduced in 2015 and improve the national planning framework and enable more responsive and efficient infrastructure and housing supply.	✓	✓		MfE			✓
MBIE is working on initiatives to deliver a single point of access to authoritative building code and related documents, and a building levy funded program of standards development for those standards that are considered most important to the building code.	✓			MBIE			✓
MBIE has carried out a current state assessment of the building consent system across New Zealand and has defined a package of interventions to resolve the problems identified. MBIE is considering improvements to the Regulator's capability to monitor the building performance system and respond to issues and risks.	✓			MBIE			✓
NZCID will commission research into the quality of environmental outcomes being delivered by the Resource Management Act with a view to further discussion on whether the RMA is achieving its core function.	✓			NZCID			✓
Strengthen the transparency and quality of infrastructure pipeline data through the annual production of the Ten-Year Capital Intentions Plan and increasing the level of detail available in years one to three, including timing and planned procurement methodology.	✓	✓		NIU and MBIE			✓
Investigate options for enhanced procurement governance of large/significant procurements – developing scale and building capability – including market engagement, coordination, risk pricing and the use of more sophisticated procurement tools with a focus on innovation and outcomes.	✓	✓		NIU and MBIE			✓
Expand and develop the Trans-tasman procurement market with Infrastructure Partnerships Australia and the Global Infrastructure Hub.	✓	✓		NIU and MBIE			✓
The third National Construction Pipeline report was released in July 2015 drawing on updated data from Statistics NZ, projections by Pacifecon NZ Ltd based on their comprehensive database of non-residential building projects, and forecasts by BRANZ covering both residential and non-residential building.	✓			MBIE			✓
Develop procurement guidance for construction projects covering complexity and capability, contracting modes, use of BIM, and balancing risk and benefits.	✓			MBIE			✓

## List of abbreviations

AECOM	Architecture, Engineering, Consulting, Operations, and Maintenance
BBC	Better Business Case
CCO	Council controlled organisation
CDEM	Civil Defence and Emergency Management
CERA	Canterbury Earthquake Recovery Authority
CHP	Community Housing Provider
CIIL	Crown Irrigation Investments Limited
DHB	District Health Board
DIA	Department of Internal Affairs
DoC	Department of Conservation
DPMC	Department of the Prime Minister and Cabinet
EA	Electricity Authority
Ecan	Environment Canterbury
EDB	Electricity Distribution Business
EECA	Energy Efficiency and Conservation Authority
ENA	Electricity Networks Association
EQC	Earthquake Commission
FAR	Funding Assistance Rates
GCI	Global Competitiveness Index
GCSB	Government Communications Security Bureau
GDP	Gross Domestic Product
GIC	Gas Industry Company
GPS	Government Policy Statement
GWh	Gigawatt Hour
HAMI	Health Asset Management Improvement group
HIGG	(Christchurch) Horizontal Infrastructure Governance Group
HNZC	Housing New Zealand Corporation
ICT	Information and Communications Technology
IJJ	Investing in Justice
IPWEA	Institute of Public Works Engineering Australasia
ITS	Intelligent Transport Systems
LAWF	Land and Water Forum
LGA	Local Government Act
LGNZ	Local Government New Zealand
LINZ	Land Information New Zealand
LPG	Liquefied Petroleum Gas
LTMA	Land Transport Management Act
MBIE	Ministry of Business, Innovation and Employment
Mbps	Megabits Per Second
MCDEM	Ministry of Civil Defence and Emergency Management
MfE	Ministry for the Environment
MGM	Matrix of Good Management farming project



MoE	Ministry of Education
MoJ	Ministry of Justice
MoT	Ministry of Transport
MPI	Ministry for Primary Industries
MSD	Ministry of Social Development
NAMS	National Asset Management Support
NCPO	National Cyber Policy Office
NHRMAP	Natural Hazard Risk Management Action Plan
NIAB	National Infrastructure Advisory Board
NIU	National Infrastructure Unit
NIWA	National Institute of Water and Atmosphere
NLTP	National Land Transport Programme
NPSFM	National Policy Statement for Freshwater Management
NZCID	New Zealand Council for Infrastructure Development
NZDF	New Zealand Defence Force
NZEECS	New Zealand Energy Efficiency and Conservation Strategy
NZES	New Zealand Energy Strategy
NZIER	New Zealand Institute of Economic Research
NZTA	New Zealand Transport Agency
OAG	Office of the Auditor General
OECD	Organisation for Economic Cooperation and Development
ONRC	One-Network Road Classification
PPP	Public-Private Partnership
PSTN	Public Switched Telephone Network
RBI	Rural Broadband Initiative
RIMS	Roading Infrastructure Management Support Group
RMA	Resource Management Act
RoNS	Roads of National Significance
SCIRT	Stronger Christchurch Infrastructure Rebuild Team
SHA	Special Housing Area
SME	Specialised Military Equipment
SOLGM	New Zealand Society of Local Government Managers
TAGG	Transport Analytics Governance Group
TCF	Telecommunications Carriers Forum
Three waters	Potable water, wastewater, and stormwater networks
TLA	Territorial Local Authority
TRC	Tāmaki Redevelopment Company
UFB	Ultra Fast Broadband

