

Arataki

Strategic context

September 2023 v1.1



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The September 2023 v1.1 release of *Arataki* includes updates to reflect the severe weather events of 2023 and correct minor errors. Most updates to the *Strategic context* are focused in the sub-section Drivers for future change - Climate change.

Arataki



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This version of *Arataki* provides a strong foundation for us to have ongoing conversations with our partners and others to co-create the plan. *Arataki* provides direction that will guide how we'll work together during the next 30 years to deliver the future land transport system needed to keep Aotearoa New Zealand moving.

As a foundation, *Arataki* uses the *Transport Outcomes Framework* developed by Te Manatū Waka Ministry of Transport. This framework sets a purpose for the transport system centred around the wellbeing of New Zealanders and making places great to live. It outlines five outcome areas to contribute to this purpose:

- inclusive access
- economic prosperity
- resilience and security
- healthy and safe people
- environmental sustainability.

These five outcomes provide certainty and consistency for future planning, but are flexible enough to inform current priorities and policy direction.

Arataki outlines what's needed for Waka Kotahi and the wider transport sector to progress towards achieving the five outcomes by:

- taking a system approach to outline a high-level plan for the land transport system over the 10-, 20-, and 30-years
- providing internal direction for integrated planning and external direction to the sector
- highlighting where effort should be focused to have the greatest benefit
- identifying emerging issues and gaps
- providing guidance on scale and location of the most urgent and high-priority challenges.

Inclusive access

Enabling all people to participate in society through access to social and economic opportunities, such as work, education, and healthcare.

Economic prosperity

Supporting economic activity via local, regional, and international connections, with efficient movements of people and products.

Resilience and security

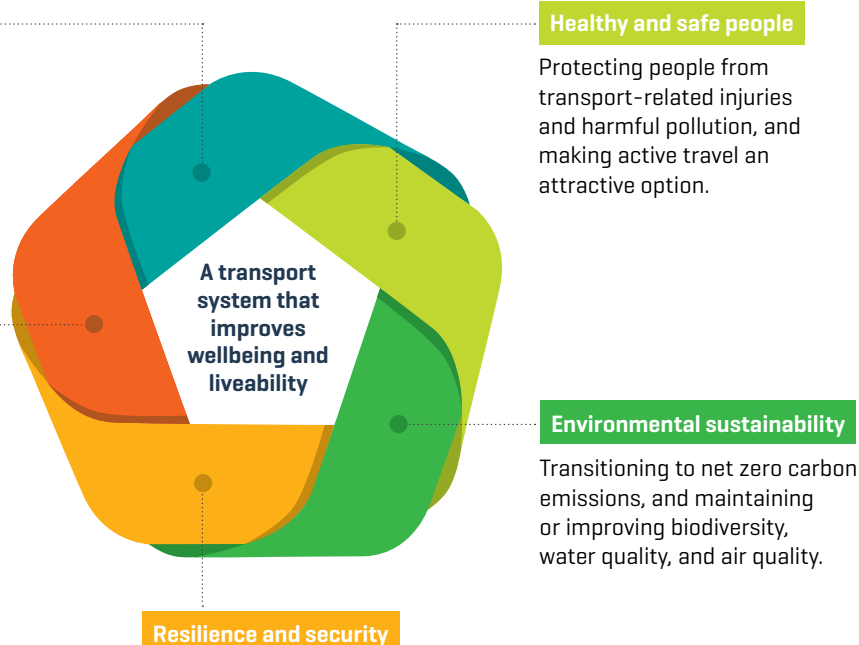
Minimising and managing the risks from natural and human-made hazards, anticipating and adapting to emerging threats, and recovering effectively from disruptive events.

Healthy and safe people

Protecting people from transport-related injuries and harmful pollution, and making active travel an attractive option.

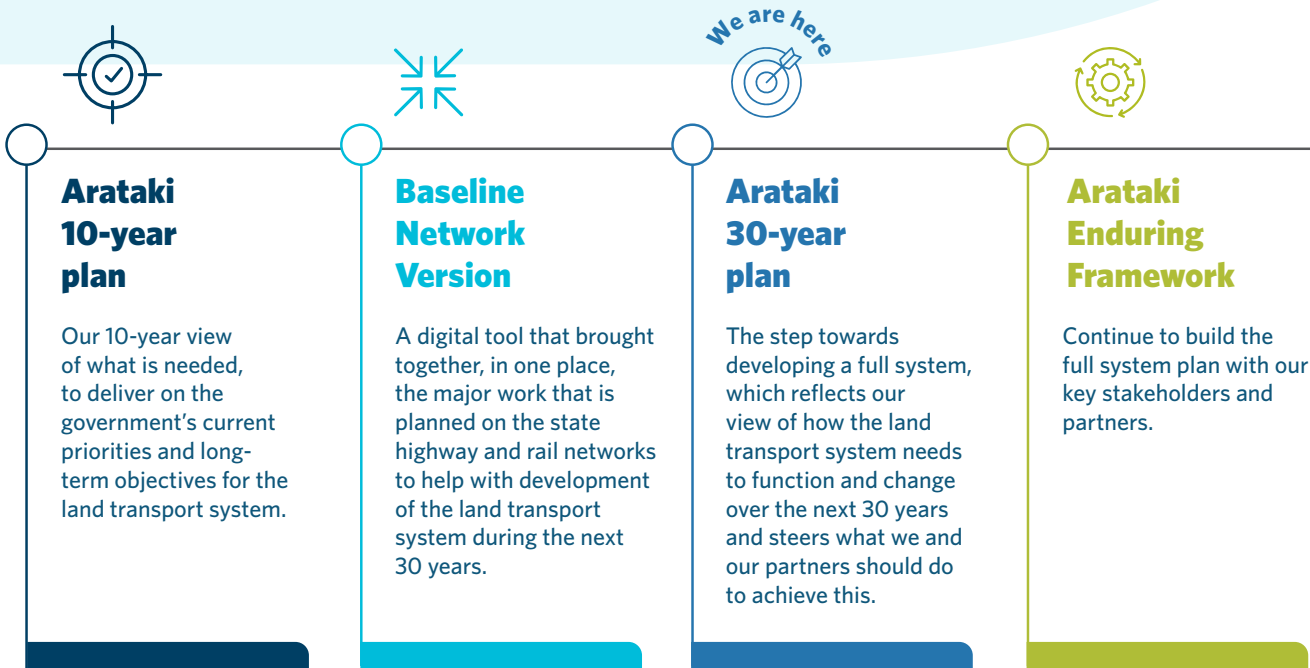
Environmental sustainability

Transitioning to net zero carbon emissions, and maintaining or improving biodiversity, water quality, and air quality.



Arataki is aligned with the *Strategy for Waka Kotahi - Te Kāpehu*. The strategy informs our work and shapes how we partner with others to implement the full range of levers available - from policy and regulation through to education, engagement, and awareness.

Arataki: The journey



Arataki: 2021-2031 was first published in 2019. It identified the significant shifts, known as step changes, needed to meet the government's short-term priorities and long-term outcomes. It also considered how Waka Kotahi should focus its efforts in each region.

Arataki Version Two was published in 2020. This release reflected the initial impact of COVID-19 on the land transport system. This work supported the Waka Kotahi response to the global pandemic.

In 2022, we took our first step towards a longer-term view with the *30-Year Plan: Baseline Network Version*, released as a prototype on a digital platform to support planning and investment decisions. It focused on the actions Waka Kotahi (in collaboration with others) may need to make to the state highway network to achieve priority outcomes and deliver a fit-for-purpose land transport system.

This release

The 2023 *Arataki* releases are the first steps towards developing a 30-year, whole-of-system plan across all Te Manatū Waka Ministry of Transport outcomes. It's a work in progress and will need further development over time with our partners and the wider sector.

For this version, we have prioritised work that will inform the future *Waka Kotahi Investment Plan*, and provide direction to the 2024–27 National Land Transport Programme (NLTP) and other Crown funding.

More specifically, this release:

- integrates *Arataki: 2021–2031* and the *30-Year Plan: Baseline Network Version*
- links outcome challenges (why), strategic approach

Step changes for *Arataki*

Current approaches may not be enough to achieve transport outcomes. Instead, some areas will require significant change, or step changes, to deliver transformational shifts in performance by:

- creating new ways of influencing the system
- broadening our understanding of the parties, behaviours and/or influences in the land transport system
- improving how we target multiple outcomes
- substantially changing the pace (or order) things are done or achieved
- removing historic barriers or limitations
- considering challenges and opportunities from a new perspective, for example iwi Māori.

Arataki: What's next

Waka Kotahi can't, and shouldn't, plan the land transport system alone.

Work to date has been done with Te Manatū Waka and KiwiRail. The focus now shifts to developing this plan further with our partners, iwi Māori, local government, and the wider transport sector.

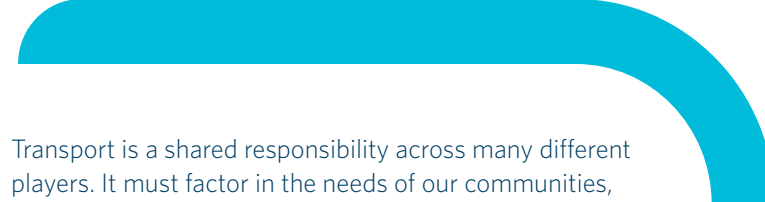
(how), and direction setting (what)

- provides clearer direction at a national and regional level to progress Te Manatū Waka *Transport Outcomes Framework*, and identifies priority areas for focused effort
- strengthens the evidence base to develop key insights, with an initial focus on reducing vehicle kilometres travelled (VKT)
- outlines the impacts of the transportation system on Māori aspirations and different population groups
- includes climate adaptation responses for our transport outcomes.

In 2019, *Arataki: 2021–2031* identified five step changes:

-  support regional development
-  transform urban mobility
-  improve urban form
-  tackle climate change
-  significantly reduce harm.

These step changes will be reviewed with our partners to provide further direction and identify where new transformations are needed.



Transport is a shared responsibility across many different players. It must factor in the needs of our communities, cities, and regions.

Transport must also align, and be part of, wider initiatives, such as reducing emissions across the whole economy.

Input from the transport sector will ensure an accurate and complete view of where effort should be focused. It will also build a shared and enduring direction of the change required to the land transport system over time.

Our transport challenges - now and in the future



What the land transport system could look like in 30 years

Transport enables us to participate in society, giving us access to whānau, places of learning, and employment.

It contributes to our economic prosperity and connects us with the rest of the world.

It impacts our health and environment, shapes how we use land, and influences how towns and cities grow and function.

The land transport system will evolve substantially over the next 30 years. While predicting the future is impossible, we will use trends and influences to understand how the future may be different from today.

To support positive wellbeing and great places to live in Aotearoa New Zealand, the transport sector will need to focus less on the physical movement of people and goods (mobility), and more on safe, sustainable access and connectivity for all. This shift will require integration with digital, urban development, energy, and other related systems.

A fit-for-purpose land transport system in 30 years will need to:

- provide affordable, convenient, safe, and sustainable access for everyone to social, cultural, health, and economic opportunities
- support efficient, resilient, and reliable connections that support economic activity and move goods to market
- deliver safe, healthy and low-emissions travel that avoids harm to people and the environment
- be multimodal (providing many ways of transportation)
- promote shared modes (like buses and trains) and active modes (like walking and cycling) as the first choice for most daily transport needs
- plan, design, build, maintain, and operate to minimise waste and use resources efficiently
- respond and adapt to disruption and the impacts of climate change
- contribute to the creation of great places
- respect and uphold the mana, taonga, and tikanga of tangata whenua
- minimise environmental impact, protect and enhance biodiversity, and ensure water quality
- enable strong social connections for those who are vulnerable
- ensure communities remain socially, economically, and digitally connected through periods of unplanned disruption.

Aotearoa New Zealand is changing because of many factors

Population

New Zealand's population is growing, ageing, and becoming more diverse. Most growth is expected to happen in urban areas. This will increase travel demand and require new infrastructure and services.

In areas with steady or declining populations, there may be challenges around maintaining existing infrastructure.

Additional transport options will be required to ensure an older, more diverse population can continue to participate fully in society.

Economy

The shift in New Zealand's economy from primary sector (like farming and forestry) to service industries (like health and transport) is expected to continue.

Freight volumes and movements are forecast to increase, with growth driven mostly by the need to service a growing population.

Changes in freight-supply chains, including international shipping and aviation connections, will affect how imports and exports move within the land transport system.

Infrastructure

The cost of maintaining and delivering infrastructure is likely to increase over time. This is because of:

- growing resource scarcity
- increasing network complexity
- growing impacts of climate change.

These challenges will drive innovation in how transport is delivered, but we won't be able to build our way out of every challenge. We'll need to carefully consider where to focus effort and the level of services provided over the long term.

Climate change and carbon reduction

We need to dramatically reduce greenhouse gas emissions and limit climate change as quickly as possible. This will transform our towns and cities, vehicle fleet, freight supply chains, and supporting infrastructure.

Light-vehicle travel in major urban areas will need to be much lower than today. This will fundamentally change how we manage travel demand.

Emission reduction in our economy will mean a shift to a circular economy over the coming decades.¹ A circular economy aims to reduce waste and pollution by using resources for as long as possible. Then materials are recycled or reused at the end of their lifecycle.

This shift could reduce future freight demand because of less primary materials and waste. The land transport system will need to be designed and maintained to support this transition.

We also need to adapt to the impacts of climate change that are already happening. Some communities will need to adjust or move. The location and type of economic activity, particularly primary production like farming, will also likely change.

Severe weather events will occur more often. This will threaten people's safety, disrupt transport services, and affect infrastructure. It will also impact the predictability and reliability of travel routes.

The transport sector will need to work with communities and infrastructure providers to understand the longer-term options for managing climate change impacts. This will mean looking at a different mix of transport options. For example, including more water-based travel as network backup to minimise downtime (redundancy) and system resilience.

Technology

New technology and big data will bring opportunities for land transport users, but also new risks.

Multiple devices, systems, and information will connect customers, operating systems, and physical assets in new ways. This will provide opportunities for new services, business models, and greater integration than ever before.

Technological developments have the potential to improve the efficiency and safety of the transport system.

Digital connectivity will allow customers to choose how they pay for their transportation. This will contribute to a reduced need for ownership of private motor vehicles.

Technological changes will need to be carefully managed to avoid unintended negative effects. For example, if people can't access or afford to connect digitally, they will be at a disadvantage.

Some vehicle technology advances, especially automation and connectivity, have slowed in recent years than previously predicted.

There are also fundamental technological challenges to overcome, like ensuring privacy and security, before we will see more transformational changes to the vehicle fleet.



How we move will be different

Ways of travel

People will be able to tailor transport services to their needs, abilities, and lifestyle.

In towns and cities, people will travel by a range of active and shared ways, or modes, that include:

- micromobility (like walking, cycling, scooters)
- e-mobility (like e-bikes, electric cars)
- public transport (like buses, trains, and ferries)
- shared mobility options (like carsharing, bikesharing).

Rural Aotearoa will also open up to more active and shared modes.

Vehicles

The light and heavy vehicle fleet will change.

Our light vehicle fleet will be smaller, safer, and lower emission. Heavy vehicles, including public transport vehicles, will also be lower in emissions.

Many vehicles will include sophisticated technology to make the system safer and more efficient with greater resilience to disruption.

Inclusivity

The land transport system will be fairer and more inclusive. More affordable and accessible transport options will be available to people of all ages, stages, and abilities.

There will be an emphasis on ensuring rural communities and lower-income households have access to transport options that suit their needs.

As digital and remote access to services increases, the need for physical trips will decrease.

Transport systems

Many parts of the transport system will remain important for moving and connecting people, communities, and freight. These parts include roads, rail, cycleways, footpaths, ports, hubs, and airports. However, the way these transport parts are used and managed will be more efficient.

New Zealand's challenging terrain and relatively long land-based travel times mean aviation (powered by low-emission fuels) will remain critical for longer interregional connections.

Interregional rail can, and will, support shorter passenger trips (one to three hours) between major population centres.

Coastal and rail shipping

Coastal and rail shipping will continue to play a vital role in the movement of goods, with volumes increasing as demand grows (depending on commodity).

Freight ports and hubs will enable swift transfer and integration between transport modes.

Urban freight

Urban freight will be delivered in many ways, like footpath robots, cargo e-bikes, and automated trucks.

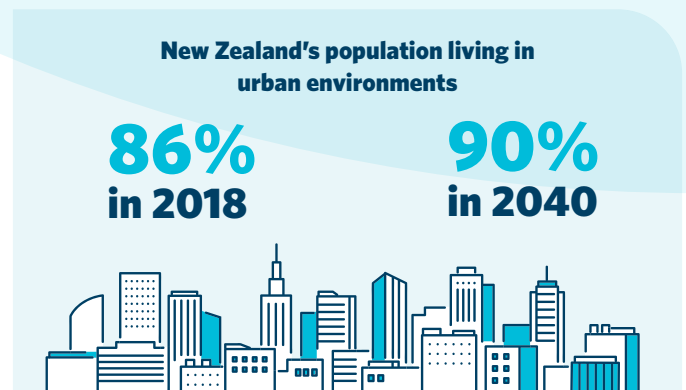
Short-haul air travel, including drones, may be used to transport high-value, time-critical goods. These movements may be overseen by freight hubs using digital connectivity, embedded sensors, and artificial intelligence.

Our towns and cities will continue to evolve

Urban population

The trend towards people moving to cities, known as urbanisation, is projected to continue.

In 2018, 86% of New Zealanders lived in urban centres.² This is projected to increase to over 90% by 2040.³



Mixed-use development

Our towns and cities will be more compact and mixed used. This means people can learn, work, and play closer to where they choose to live. This kind of development will:

- make better use of existing and new transport networks and services
- support more active and shared transport choices
- reduce trip lengths for all modes.

Transport networks

The future transport system will be integrated with land-use and urban form. This will support social, economic, and environmental wellbeing and resilience.

For example, transport networks will be actively managed in real-time. This will keep people safe as well as ensure efficient and reliable movement of people and freight.

How the system is maintained, operated, and developed will be different

Maintenance and operation

Maintenance and operation of the land transport system impacts peoples' level of access and safety. It also affects how efficiently freight is moved, levels of service, and resilience.

The land transport system will include sophisticated vehicle technology, integrated with digital and physical infrastructure. This will provide real-time management and monitoring for:

- efficient supply chains
- safe travel for people and freight
- reduced exposure to disruption.

Transport and electricity systems will be more interconnected with the roll out of charging networks for low-emission vehicles across Aotearoa.

Travel demand management, like pricing for transport use, will play a role in incentivising people and business to make informed choices about travel.

Real-time data and modelling will assess network conditions for greater system efficiency, sequencing, and improvements.

Development

Investment decisions will focus options that deliver the lowest whole-of-life costs. This means we will plan and invest to make networks more resilient and durable, like ensuring footpaths can cope with future users, such as mobility scooters, and weather events.

We'll aim for low emissions in the construction, maintenance, and operation of physical infrastructure.

We'll adopt a circular economy approach to make best use and re-use of resources. Safe-system principles will be embedded into the design and delivery.

The interaction between the land transport system and environment will be managed to protect and enhance biodiversity and water quality. Nature-based solutions will be used to adapt to climate change.

Our ways of working will be different

Collaboration

There will be consideration and collaboration across the transport sector, including spatial planning. This will allow integrated solutions while supporting broader government and community priorities.

Te Ao Māori, and strong enduring relationships with Māori, will be embedded in work practices and be part of all land transport activities. Māori will have a role in guiding strategic decision making for the transport system.

As the nature of climate change is better understood, the transport sector will work with communities to plan when to defend, accommodate, and retreat from the impacts.

Planning, management, and responses

The transport sector will actively manage uncertainty in a rapidly changing world. We monitor trends, plan, and prioritise responses that deliver value in many ways.

Thirty-year system plans are developed, adapted, and maintained collaboratively across the sector. These plans:

- guide where effort is prioritised
- ensure we are focused on the most important issues
- help us apply efficient and effective responses.

The way solutions are developed and assessed will avoid unnecessary work, yet still provide assurance and confidence that public money is being used wisely.

Solutions that cost less and are most effective will be used more often than major investment. This includes planning, demand management, and making the most of existing infrastructure.

Funding

Funding models will be different. A variety of revenue streams and pricing models across a range of funds (user paid, public, and private investment) will pay for the maintenance, operation, and improvement of the transport system in an integrated way.

Information and technology

Business information and practices will be digital and integrated with our partners, supply chains, and service providers. Transport information is clear and informs system governance and public accountability.

Demand for transport modes is captured in real time from many information sources, like data from vehicle systems and smart devices.

Real-time information capture and predictive analytics automate and enhance:

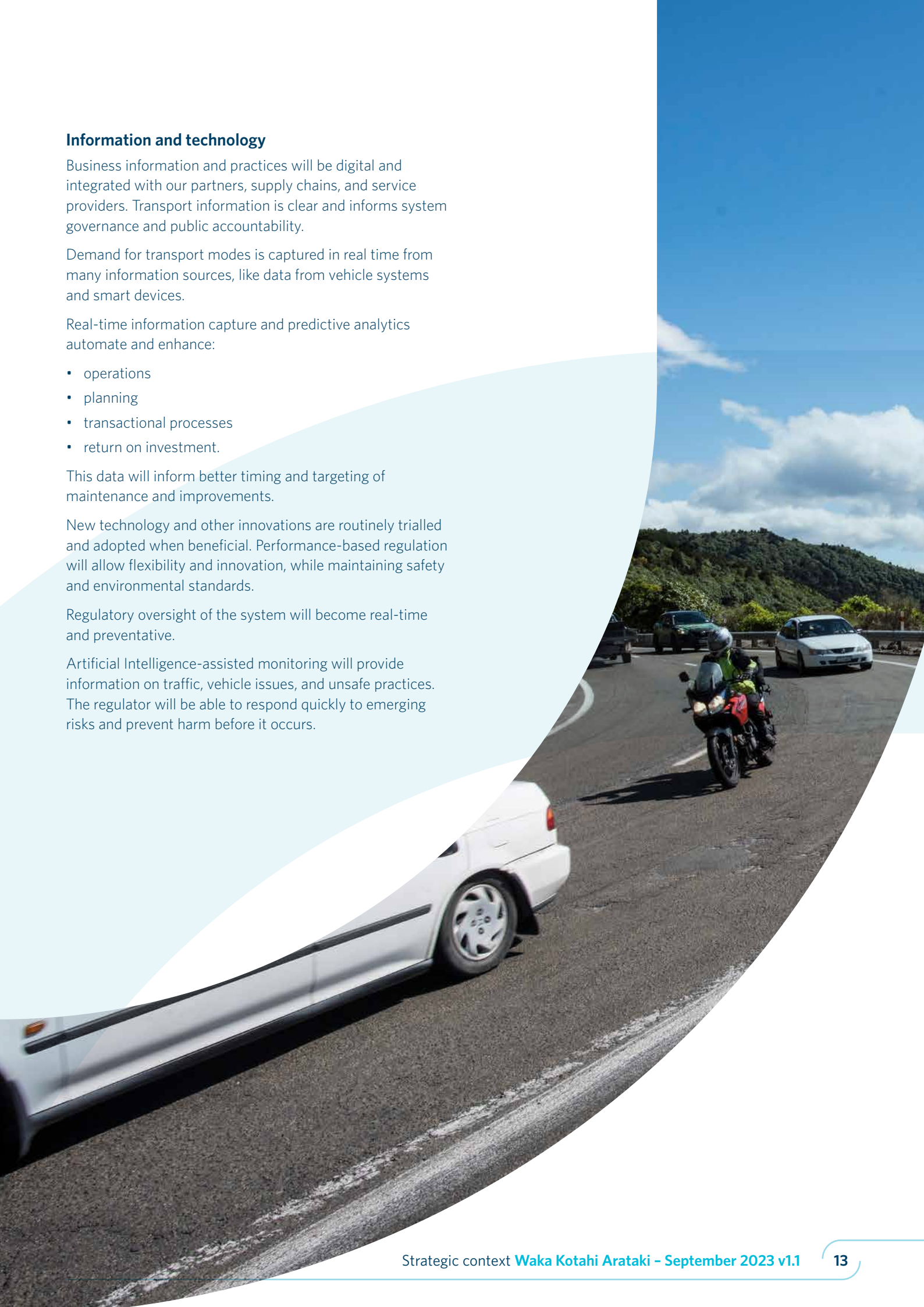
- operations
- planning
- transactional processes
- return on investment.

This data will inform better timing and targeting of maintenance and improvements.

New technology and other innovations are routinely trialled and adopted when beneficial. Performance-based regulation will allow flexibility and innovation, while maintaining safety and environmental standards.

Regulatory oversight of the system will become real-time and preventative.

Artificial Intelligence-assisted monitoring will provide information on traffic, vehicle issues, and unsafe practices. The regulator will be able to respond quickly to emerging risks and prevent harm before it occurs.



Drivers for future change

There are six key external factors, or drivers, that will shape and change the future land transport system: demographic change, changing economic structure, climate change, technology and data, funding and financing challenges, and changing travel patterns.

While we cannot predict the future, we can monitor these drivers and identify emerging trends that will affect the choices and trade-offs we need to make.



Demographic change

Population growth is a fundamental driver of transport challenges and opportunities.

A growing population means more people who need to get to places that matter to them, like work, education, and entertainment. It also means more goods need to be moved to these growing locations.

Business activity will ramp up to serve this rising population, resulting in more business travel.

Between 2006 and 2018, New Zealand's population grew by more than 750,000 people.⁴ This was mostly because of people moving from overseas.

From June 2021, population estimates show a lower growth rate in all regions than the previous year.⁵

International travel restrictions because of COVID-19 are a key reason for this, with lower rates of overseas migration, especially in travel-dependent industries like education.

COVID-19 border closures have slowed immigration.⁶ Despite this, New Zealand's population is still projected to rise from 5 million to 6.2 million by 2048.⁷

The location of population growth has also shifted in recent years. Since 2020, towns close to major cities have gained the most people.

Population growth in many major cities has slowed considerably, and even declined in places like Tāmaki Makaurau Auckland.

These changes seem related to changing work patterns during COVID-19 lockdowns. Remote working has allowed greater flexibility about where people choose to live and work.

It's uncertain if these patterns will continue over the medium- to long-term. We will monitor trends to understand whether the scale and location of population growth returns to pre-COVID-19 levels.

Growth factors

Immigration is projected to be the largest factor for population growth over the next 25 years.

The difference between births and deaths, also known as natural increase, has accounted for most population growth in the past.

However, from 2006 to 2018, there was a shift in population growth, as the difference between arrivals and departures, also known as net migration, rose in all regions except Te Tai o Poutini West Coast. This trend is projected to continue through to 2048.⁸

This means that population growth is largely because of immigration to Aotearoa New Zealand and people living longer.

Population concentration

Populations moving to cities, known as urbanisation, is a long-standing contributor to demographic change.

In 2018, 86% of New Zealand's population lived in urban environments.⁹ This is projected to exceed 90% by 2040.¹⁰

While COVID-19 impacted recent population growth patterns, long-term growth is expected in urban areas, particularly the Upper North Island.

Of the 1.3 million additional people expected to join the New Zealand population by 2048, 74% will be in Te Tai Tokerau Northland, Tāmaki Makaurau Auckland, Waikato, and Te Moana a Toi-te-Huatahi Bay of Plenty.¹¹

This growth will put pressure on transport networks across the Upper North Island, including freight movement around ports in Tauranga and Tāmaki Makaurau.

Projected population trends in smaller rural and remote areas

The number of people living in smaller, rural, and remote districts outside of urban areas will decline or remain the same.¹² This includes places like Waitomo, Ruapehu, Kawatiri Buller, Māwhera Greymouth, Te Waipounamu Westland, and Maruwai Gore.

The land transport system will play a critical role in supporting the economic and social wellbeing of these communities.

The changing age profile

The age of people who live in Aotearoa New Zealand impacts the transport network. Age can impact where people travel and the choices they have to get around.

People aged 25 to 65 years travel the most, about seven and eight and a half hours per week.¹³ Most travel is done by driving a car or van.

People under 15 and over 75 years spend significantly less time travelling. They are more likely to move on foot, or as a passenger in a car or van.

New Zealand’s population is growing older and living longer, because of better healthcare and declining birth rates.

By 2048, the percentage of people over 65 years in some areas is projected to exceed 35%.¹⁴ This includes Kaipara, Thames-Coromandel, Hauraki, Horowhenua, Kāpiti, Carterton, South Wairarapa, Te Tai o Aorere Tasman and Central Otago.

Moving around cities and towns will need to be safe and easy for young people, people with children, and seniors.

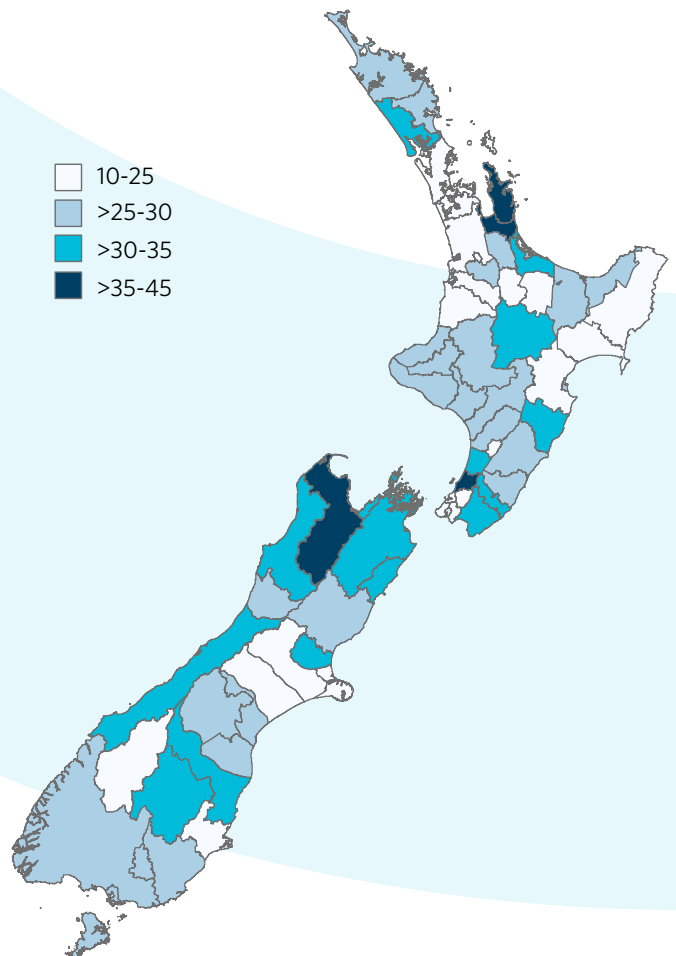
It will be important to ensure reliable and accessible transport options, well-maintained footpaths and road crossings, and safe speeds for vehicles.

New transport options could create both opportunities and risks.

For example, on-demand services could provide increased accessibility and choice for people who don’t have a license or access to a vehicle. However, more micromobility options, like scooters and bicycles, could increase risks for people who choose to walk.

Projected percentage of people over 65 in 2043 by territorial authority (Map Data Source: Stats NZ)

Figure 01





Changing economic structure

The economy is shaped by, and shapes, our land transport system. Economic changes impact:

- where and how many people are employed
- wages
- consumer demand
- prices of raw materials
- imports and exports.

Higher income growth often means higher consumer spending. This leads to increased business spending and demand for goods and services.

The performance of the land transport system can affect how easily businesses can deliver goods and services to market. It also affects how consumers access those goods and services.

Tourism directly impacts travel demand because of the movement of people at key entry points (like airports), and between major visitor centres and attractions.

Urban centres in Aotearoa face challenges of social deprivation in certain communities. This includes lower rates of employment, lower incomes, and less access to essential services.

Across Aotearoa, there are opportunities to:

- build a more inclusive economy
- lift productivity
- build economic diversity.

This can be done by identifying and addressing the constraints in each area. Then opportunities for growth can be pursued based on existing, adjacent, or new activities.

Over recent years, service industries have contributed more to New Zealand's economy than primary industries and manufacturing.¹⁵

Economic growth has been focused in large urban areas, especially Tāmaki Makaurau Auckland. More people are moving to cities, many from overseas, and there has been intense city development.

Urban growth and changing industries result in increased business travel and freight movement. This trend is expected to continue over the next 10 to 30 years.

Urban growth and changing industries result in increased travel for business travel and freight movement. This trend is expected to continue over the next 10-30 years.

Border closures because of COVID-19 hit international tourism hard and disrupted freight and industry supply chains.

However, New Zealand's economy has continued to prove resilient, with gross domestic product now exceeding pre-pandemic forecasts.¹⁶

The number of international visitors and workers entering New Zealand is expected to recover as border restrictions ease. Yet there is uncertainty about the timing and scale of recovery, including whether it will return to pre-COVID-19 levels.

Impact of climate change on our economy

Climate change is already being felt across New Zealand's primary industry sectors.¹⁷

All regions have experienced extreme weather events, such as flooding and drought. The severity and frequency of these events are expected to grow.

Over the coming decades, parts of the country will become wetter, or drier and warmer. This may lead to changes in the nature and location of primary production. It may also affect businesses and freight that support the primary sector.

Aotearoa is expected to move to a circular economy over the coming decades.¹⁸

A circular economy would mean:

- lower usage of primary materials
- significantly reduced levels of waste
- less freight movement.

It's important to make sure the transition to a low-emissions economy is just, fair, and inclusive for all New Zealanders.¹⁹



Tangata whenua are especially vulnerable to the effects of climate change.²⁰ There are particular risks and opportunities for the Māori economy, particularly because of asset dominance in natural resource-based sectors.

We know during previous recessions and COVID-19 lockdowns there was a greater impact on Māori.

Significant growth in Te Ōhanga Māori (the Māori economy) is set to continue. This will be seen in the proportion of Māori in the labour force, as well as a diversified asset base of Māori employers, entities, and self-employed Māori.



Climate change

Climate change is already impacting the land transport system and will continue to do so for decades to come.

Transport is one of the largest sources of greenhouse gas (GHG) emissions in Aotearoa. Emissions must be reduced to net-zero targets by 2050.

At the same time, the transport system will have to adapt to escalating impacts from climate change. This includes sea level rise as well as increasingly severe and frequent climate-related events like storms, droughts, and wild fires.

Climate change must be part of all decision making, ensuring the infrastructure and services we provide are:

- resilient to climate change
- enable emissions reductions
- continue to support the needs of New Zealanders.

Reducing greenhouse gas (GHG) emissions

Transport is responsible for 17% of New Zealand's gross emissions, and 39% of total domestic CO₂ emissions.²¹

We need to greatly decarbonise transport to reach net-zero emissions by 2050 and support global efforts to limit warming to 1.5°C above pre-industrial levels. Urgent action and system-wide changes are needed to put our transport emissions on the path to a low-emissions future.

The *Emissions Reduction Plan* identifies three focus areas for reducing transport emissions:

- reduce reliance on cars and support people to walk, cycle and use public transport
- rapidly adopt low-emissions vehicles
- begin work to decarbonise heavy transport and freight.²²

Delivering on the emissions and vehicle kilometres travelled (VKT) reduction targets is a huge challenge. It will require a transformation in urban travel choices and the vehicles we travel in.

However, achieving these targets will also have benefits. For example, it will deliver better transport for everyone in Aotearoa New Zealand. It also contributes to more vibrant, resilient, prosperous places to live, work and visit – and will reduce our reliance on unstable global energy markets.

Efforts to reduce emissions and VKT will affect a range of other transport challenges. For example, historical trends of population growth that drive increased transport demand won't be as relevant if we reduce light vehicle VKT. This means other transport modes will play a much greater role. This has implications for urban form, road space allocation, and network prioritisation.

The impacts of climate change on people in New Zealand

Severe weather events in Aotearoa New Zealand are already having significant impacts on the land transport system.²³

In January 2023, flooding, landslips, and storm damage meant road closures in Te Tai Tokerau Northland, Tāmaki Makaurau Auckland, and Waikato.

A month later in February 2023, flooding and landslips caused by Cyclone Gabrielle meant closures to road and railway lines in Te Tai Tokerau Northland, Tāmaki Makaurau, Waikato, Tairāwhiti Gisborne and Te Matau-a-Māui Hawke's Bay.²⁴

The impacts of climate change will continue for decades, even with aggressive strategies to reduce greenhouse gas emissions.

Changing weather patterns will continue to increase the frequency and severity of flood events and landslips. This will affect communities and the transport networks that connect them.

Most people in New Zealand live near water. Many are within a few kilometres of the coast, or next to rivers and lakes.

From 1901 to 2010, global sea levels rose an average of 19cm total.²⁵ Between 1990 to 2016, global sea levels rose an average of 3.4mm per year.²⁶

Rising sea levels won't be felt evenly around Aotearoa. Impacts will vary depending on a range of factors like topography, coastal processes, and vertical-land movement.

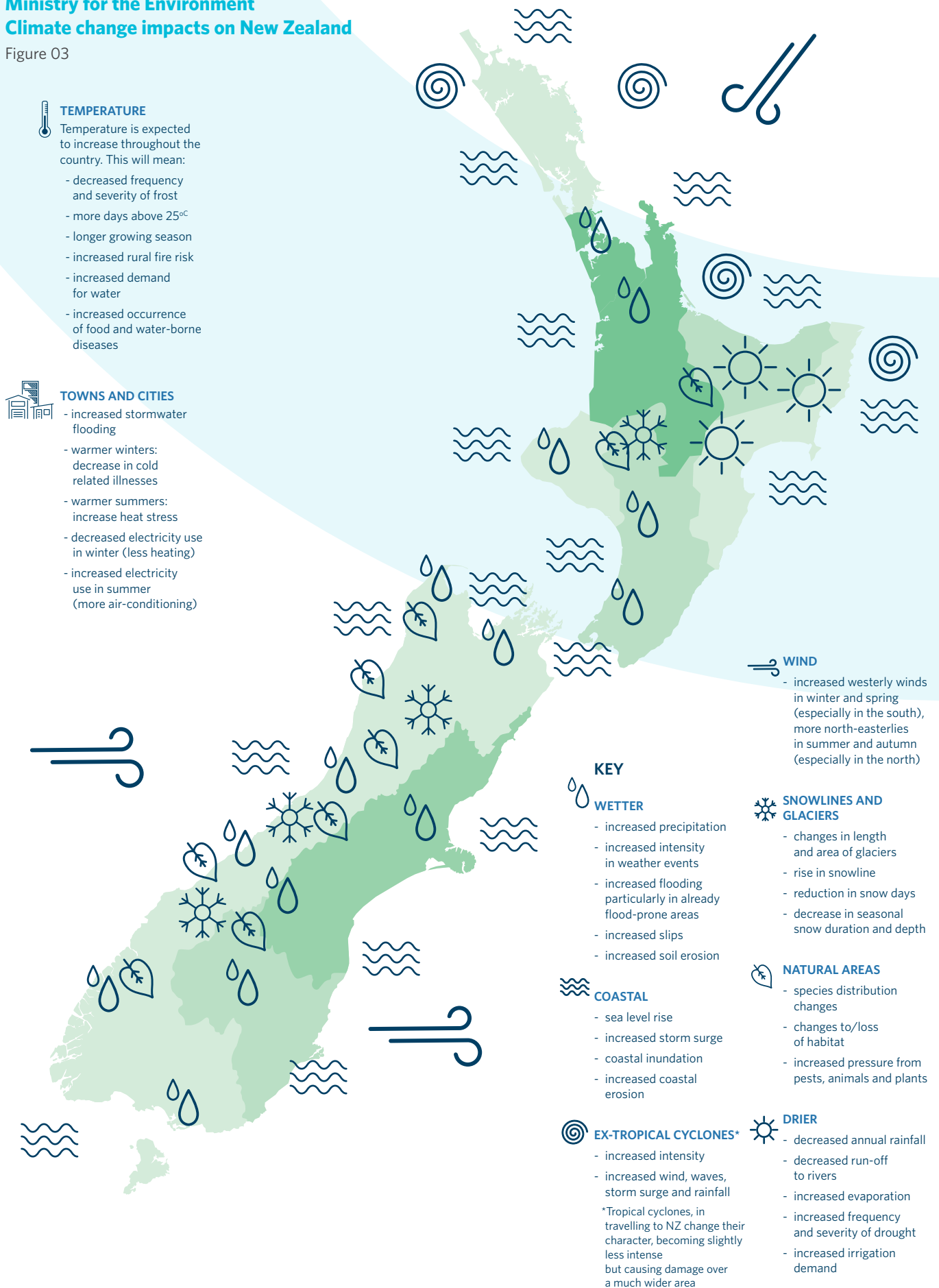
The most affected coastal areas will experience sea level rise of 30cm in 10 to 20 years, and one metre by 2060.

Rising sea levels mean tides, waves, storm surges and elevated groundwater will reach further inland. This will cause more frequent and extensive flooding in many low-lying areas.

Coastal communities and routes will be impacted by increased erosion and receding shorelines.

Ministry for the Environment
Climate change impacts on New Zealand

Figure 03



TEMPERATURE
 Temperature is expected to increase throughout the country. This will mean:

- decreased frequency and severity of frost
- more days above 25°C
- longer growing season
- increased rural fire risk
- increased demand for water
- increased occurrence of food and water-borne diseases

TOWNS AND CITIES

- increased stormwater flooding
- warmer winters: decrease in cold related illnesses
- warmer summers: increase heat stress
- decreased electricity use in winter (less heating)
- increased electricity use in summer (more air-conditioning)

WIND

- increased westerly winds in winter and spring (especially in the south), more north-easterlies in summer and autumn (especially in the north)

KEY

WETTER

- increased precipitation
- increased intensity in weather events
- increased flooding particularly in already flood-prone areas
- increased slips
- increased soil erosion

SNOWLINES AND GLACIERS

- changes in length and area of glaciers
- rise in snowline
- reduction in snow days
- decrease in seasonal snow duration and depth

COASTAL

- sea level rise
- increased storm surge
- coastal inundation
- increased coastal erosion

NATURAL AREAS

- species distribution changes
- changes to/loss of habitat
- increased pressure from pests, animals and plants

EX-TROPICAL CYCLONES*

- increased intensity
- increased wind, waves, storm surge and rainfall

*Tropical cyclones, in travelling to NZ change their character, becoming slightly less intense but causing damage over a much wider area

DRIER

- decreased annual rainfall
- decreased run-off to rivers
- increased evaporation
- increased frequency and severity of drought
- increased irrigation demand

Hotter temperatures and wildfires can damage transport infrastructure, causing buckled railway lines and damaged roads.

Rural and coastal communities may become increasingly isolated as:

- infrastructure damages become more frequent
- service outages last longer
- repair costs increase.

Residents in in these communities may have trouble accessing essential services such as health facilities, fuel, groceries, and emergency assistance. It might be difficult for businesses to access freight services as well as cater for tourism and recreational visitors. Many Māori communities in rural and coastal areas will be disproportionately impacted by these changes.²⁷

In urban areas, the impacts of climate change on multi-modal networks can be complex, widespread, and cascade across the land transport system. The closure of main roads because of weather events can lead to delays and congestion, which can spread if traffic shifts to alternative routes. Extreme weather can cause delays and cancellations of public transport, affecting its reliability and comfort for users. Disruption to transport can prevent access to other critical infrastructure in need of repair, such as power, water, or telecommunications.²⁸

On major transport corridors, the need for maintenance and renewal is likely to increase; this may result in further delays and costs diverted from other investments.

The risk of a major disruption will increase for interregional connections, and the economic and social interactions that rely on them. Freight detours and delays will have significant economic impacts, especially if these continue for a long time. Backlogs at airports, seaports, and freight hubs could impact the movement of exports and imports and disrupt supply chains. This could lead to product shortages for consumers or lost income for producers.²⁹

There are many uncertainties regarding the future impacts of climate change. We will monitor international efforts to reduce emissions and limit global warming.

Analysis of the potential impacts of climate change will also need ongoing work and updates for future planning and decision making.

Adapting to the impact of climate change will require refocused effort. This means not just building back what's there now following disruption but having a stronger eye to the future. This will require working with communities to find new ways forward and developing plans for when to defend, accommodate, and/or retreat.



Technology and data

Technological advances are changing how the transport system is used and managed.

New platforms, services and providers are changing how we regulate and manage access to the land transport network.

These are also allowing risk-based and intelligence-led regulation. This may lessen compliance costs for regulators and system users.

An individual's ability to access technology and data is also growing. This offers opportunities to tailor individual solutions and provide high-quality information in real time.

Mobile phone use and technology

A rise in mobile phone use has allowed new transport technology. From 2020–2021, there were 5.8 million mobile phone connections in New Zealand, more than one phone per person.³⁰

However, around 10% of households don't have access to a mobile phone.³¹ These are mostly older and poorer households.³²

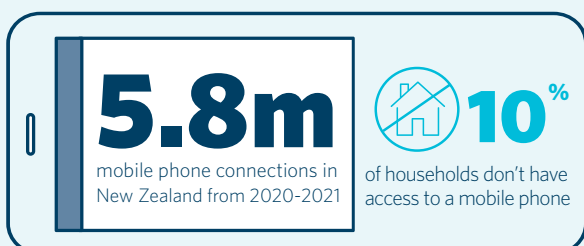
Big data from mobile devices, machine learning (machines that can learn without direct instructions), and artificial intelligence can help:

- make the most of existing networks
- provide real-time travel information
- manage unplanned incidents
- help maintain, operate, and improve the network.

Emerging technologies and transport

Some emerging technologies have the potential to transform our land transport system over the coming decade. These include:

- mobility as a service
- on-demand transport
- connected vehicle technologies
- automated vehicles.



Mobility as a service

Mobility as a service is usually enabled by a phone app. It brings together tailored travel options that allows a person to plan, book, and pay for an end-to-end journey. Options could include one or more types of transport, including:

- public transport
- on-demand transport
- ridesharing
- walking
- cycling
- micromobility (like e-bikes and scooters).

Connected vehicle technologies

Connected vehicle technologies allow vehicles to communicate with:

- other vehicles
- infrastructure
- road users.

As use of this technology increases, there is potential to integrate it with network management. This, in turn, may deliver benefits for both road safety and ensures we get the most from the existing network.

Automated vehicles

Automated vehicles have in-vehicle technologies and sensors that scan and navigate a vehicle's way as it is driving. This includes artificial intelligence and remote sensing methods like cameras and light detection and ranging (LIDAR).

Different levels of automation are possible, from adaptive cruise control to full automation.

Full automation means the vehicle can drive under all road and environmental conditions. Automation has the potential to deliver benefits for road safety.

Other forms of automated vehicles could also have an important role in freight movement and low-cost urban public transport.

The development and release of fully automated vehicle technology in recent years has been much slower than predicted. The timeframe for this technology remains highly uncertain.

Progress in automated freight and passenger services is developing faster because it is simpler to deploy.

More detailed information about technology and data, including in-depth background on the emerging technologies, is contained in *Arataki – Our 10-Year Plan: Technology and Data Background*.³³

Data and transport planning and management

Good data is essential for effective transport planning and management.

Over the coming decade, massive data growth is expected because of the decreasing costs of smartphones, signals, and sensors. The transport sector will not only use data, but it will also generate it.

Advanced analytics will help identify the most efficient travel routes and modes. Remote sensors, including those on vehicles, can reduce crash risk. They do this by analysing complex data to identify what contributes to crashes. They can also identify where preventative maintenance to road networks is needed.

Transport agencies and network operators will need to understand and invest in computing and data management infrastructure. This will allow them to collect, analyse, and gain helpful insights from data.

They will also need to transmit real-time information back to users of the transport networks. Governance and management of data will be important to ensure the security and privacy of individuals.

Using digital models to improve transport efficiency

Through digital engineering, it's possible to create fully detailed, data-rich, virtual models of everything we survey, design, and create across the land transport system. These virtual models are known as digital twins.

Analysing digital twins help the transport and construction sectors become more efficient by enabling:

- real-time asset and network management
- end-to-end digital lifecycle management
- resource optimisation.

Data use and analysis will unlock benefits for:

- construction
- operations and maintenance
- supply chain improvements
- system resilience
- productivity of investment
- network optimisation.

Insights from data analysis tools, like artificial intelligence (AI) and machine learning, will help us make better decisions. They'll improve many areas of transport, from long-term forecasting through to traffic signal operations.

Technology is evolving fast

It's difficult to predict which technologies and business models will emerge beyond the coming decade and how they might impact the land transport system.

It will be important to use foresight techniques and approaches, such as horizon scanning, to identify what might happen and share this information in a timely way.

This will help us:

- understand how the needs of the people who use transport could change
- identify the opportunities or risks for the land transport system
- respond appropriately.

Accessibility to new technologies

The land transport system will need to ensure people with less access to digital technologies are still able to use transport networks to get to education, employment, and essential services.

For example, people who can't access the internet or make electronic payments will need to be considered when designing and implementing transport services.

The land transport system will need to ensure there are enough workers with the right skills to develop, maintain, and operate new technologies.



Funding and financing challenges

It's getting more expensive for central and local government to pay for critical activities like maintaining and renewing infrastructure assets, and managing the impacts of climate change.

The costs of building infrastructure have grown faster than in other sectors because of increasing:

- property values
- costs of material and labour
- complexity of projects and costly consenting processes.³⁴

The level of land transport funding available to central and local government will also come under pressure unless action is taken.

Over time, usual funding sources, like fuel excise duty (FED) and road user charges (RUC), will lose value and be stretched because of competing demands.

Changes to transport funding are already happening. Government funding for land transport comes from a variety of sources beyond the National Land Transport Fund.

These include:

- previously committed Crown investment in the New Zealand Upgrade Programme
- urban development funds through Kāinga Ora
- the Climate Emergency Response Fund (CERF).

As Aotearoa moves towards emissions-reduction goals, traditional revenue sources, like fuel excise duty, will decrease per vehicle kilometres travelled. Yet demands on the network will remain.

Some districts face funding pressures because of population decline. These areas often have ageing populations on fixed incomes that can't afford significant rates increases.

Local government faces significant challenges that place pressure on available funding. For example, funding for the land transport system may be tight in coming years as the sector faces significant investment in other projects like three waters (drinking water, wastewater, and stormwater).

Some infrastructure dates to historical periods like the 1930's depression, when there was increased public spending to boost the economy.

Funding to replace older infrastructure assets can be challenging because of new cost factors. For example, planners must consider the impacts of climate change.

Many large cities have committed large-sum investment in new infrastructure to accommodate population growth. However, revenue hasn't kept pace with debt. This means many cities have nearly reached their debt ceiling, putting further strain on investment.

In the future, we'll need to look at the full range of funding and financing options to support a sustainable revenue system for local and central government.

As funding sources for the transport system become more varied, it will be important to provide a clear view about the most important issues.

In the future, we'll need to look at the full range of funding and financing options to support a sustainable revenue system for local and central government.



Changing travel patterns and preferences

How people travel is shaped by a wide range of factors like the:

- layout of rural areas, towns, and cities
- quality of options available
- individual needs and circumstances.

While these factors usually take a long time to change, technological development and major disruption can have a surprisingly dramatic effect on travel.

During the COVID-19 pandemic, public transport use decreased significantly as businesses encouraged flexible-working arrangements. As the country recovers from the pandemic, it appears these new patterns are here to stay.

Other shifts in travel patterns are happening and are expected to continue over time.

Major changes to planning controls are underway to support urban intensification around town centres and public transport hubs. As more people live in areas with good travel options and shorter trip lengths, they are likely to use public transport and active modes more often.

Technological advances are creating new transport options, such as e-scooters and e-bikes. Use of these modes is likely to grow as they allow longer faster journeys with less physical effort. E-bikes have the potential to carry more cargo than regular bicycles.

These transport options will need their own infrastructure, networks, and facilities, like secure end-of-trip parking and storage. They also need new legislation, like regulating the power and speed of e-bikes.

Online shopping is on the rise. This means fewer trips by buyers, but increased deliveries. This will continue to change travel patterns and require planning, like development of freight-management strategies.

Electric vehicle ownership is likely to increase, as vehicle range and services improve. This will require development of new fuelling networks across the country.

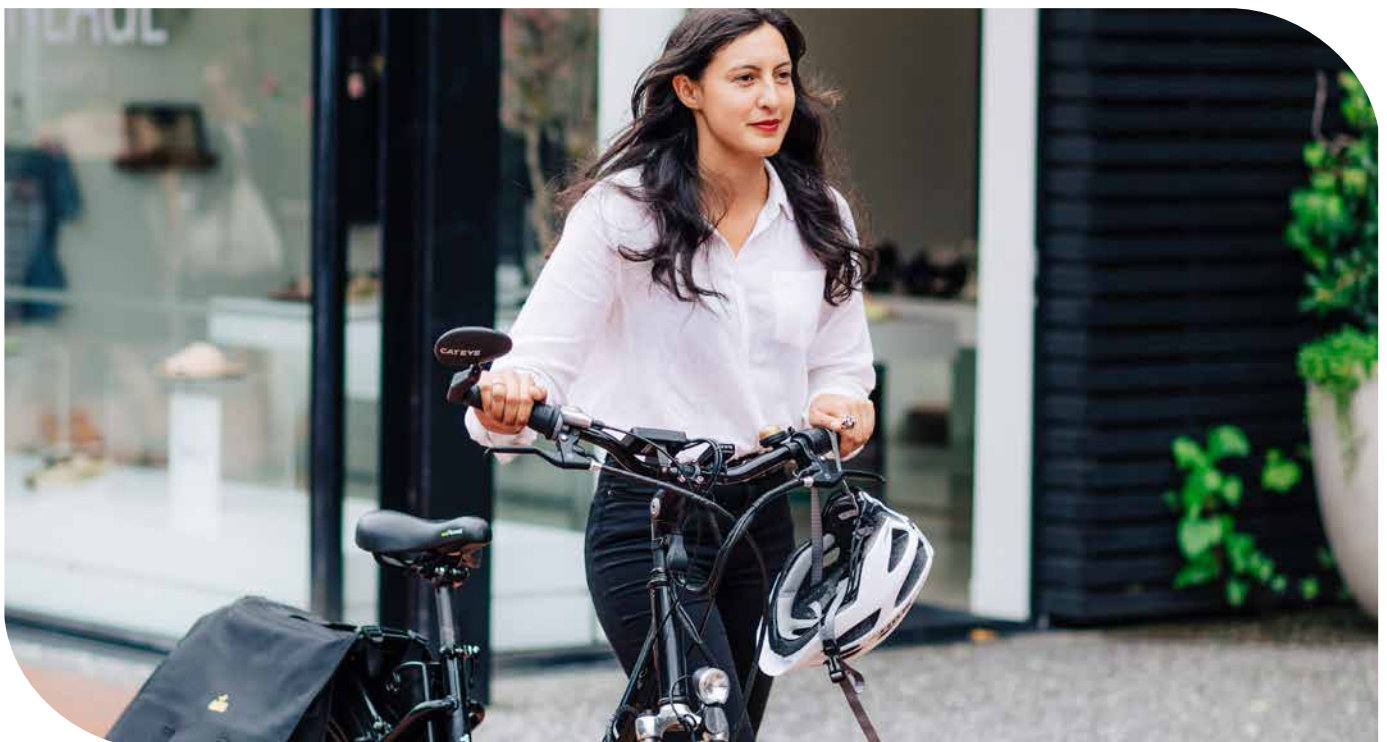
Impact of future drivers of change on Māori

Demographic change

The proportion of people identifying with Māori ethnicity is projected to grow in all 16 regions between 2018 and 2043.³⁵

In 2018, the Māori population was 17% of New Zealand's population, ranging from 54% of the population in Tairāwhiti Gisborne to 9% in Te Tai o Aorere Tasman and Ōtākou Otago.³⁶ That share is projected to increase to 21% nationally by 2043, ranging from 69% in Tairāwhiti to 12% in Te Tai o Aorere and Ōtākou.³⁷

The Māori population has relatively high proportions of tamariki and rangatahi, and a lower proportion of kaumatua. These different age groups and higher birth rates mean faster growth for the Māori population as compared with the total population.³⁸



Climate change

Māori as tangata whenua are particularly sensitive to climate impacts on the natural environment for social, economic, cultural, and spiritual reasons.³⁹

Many Māori communities are in rural and remote locations. These areas are particularly vulnerable to the effects of climate change on homes and infrastructure.

Changing climate also threatens sites of cultural significance like marae, urupā (burial grounds), wāhi tapu (sacred sites) and mahinga kai (food gathering sites).⁴⁰

Many Māori depend on primary industries for their livelihoods. In some places, climate change may alter patterns of use of mahinga kai (food-gathering sites) or rongoā crops (medicinal plants). Coastal impacts could disrupt access to marae or wāhi tapu.⁴¹

Impacts on Māori and wider economy could limit whānau access to:

- food
- electricity
- housing
- health services.⁴²

These limitations could compound existing inequalities of Māori wealth and wellbeing.⁴³

The socio-economic disparities between Māori and non-Māori communities mean sensitivity to climate change impacts and risks are higher for Māori society.⁴⁴

Many Māori communities are in coastal regions and adjacent to rivers. This means access roads to marae are often exposed to flooding, landslides, and coastal processes, like changing sea levels. Damage to the transport network could cut off marae and wider Māori communities more frequently.⁴⁵

Further evidence is needed to understand the:

- scale of the issue
- locations where impacts could be greater for Māori than other groups
- different possible responses required.

Changing economic structure

Māori are re-emerging to play a prominent role in the economy. Te Ōhanga Māori (the Māori economy) is key to the wellbeing of Māori and is a significant and important contributor to the wider economy of Aotearoa.

There has been significant growth in the Māori population and labour force (currently 300,000), that is projected to continue.⁴⁶ Māori will be a higher proportion of the future workforce, because of the higher proportion of tamariki and rangatahi.⁴⁷

In 2018, the increasingly diverse Māori asset base was estimated at \$68.7 billion.⁴⁸ The previous concentration of Te Ōhanga Māori in the primary sector has dispersed, spreading risk and increasing resilience.⁴⁹

Yet, the primary sectors continue to dominate Te Ōhanga Māori in agriculture, fishing, and forestry. This also includes sheep and beef farming, dairy farming, forestry, fishing and aquaculture, and other agriculture (including horticulture).⁵⁰

Given the dominance in the primary sectors, there are particular risks and opportunities for Te Ōhanga Māori as Aotearoa transitions to a low-emissions economy.



Impact of future drivers of change on freight

Many changes will influence freight and demand over the next 30 years including:

- population growth
- customer desires
- climate
- economic structure.

Funding and financing may be challenged by climate change. Safety concerns may be improved by technology and data. These changes may also affect the different ways for transporting freight.

Demographic change

Urban freight is expected to grow because of increasing:

- population
- demand for mixed-use neighbourhoods
- consumer expectations for more and faster deliveries.

More demand for urban freight may create increased congestion and emissions in cities. It may also present challenges for freight operations around their first-and-last-mile delivery routes.

Changing travel preferences

Increased online shopping and home delivery create a significant amount of traffic in cities.⁵¹ This trend shows no sign of slowing.

Freight vehicles often take up more space than cars and require areas to load and unload.⁵² This creates competition with private passenger vehicles for kerbside parking.

Freight carried along key urban corridors often causes noise or vibration. These could worsen as urban freight demand grows over time.

Increased demand for micro-freight, like low-powered electric vehicles and cargo bikes, might solve some freight challenges in urban areas.

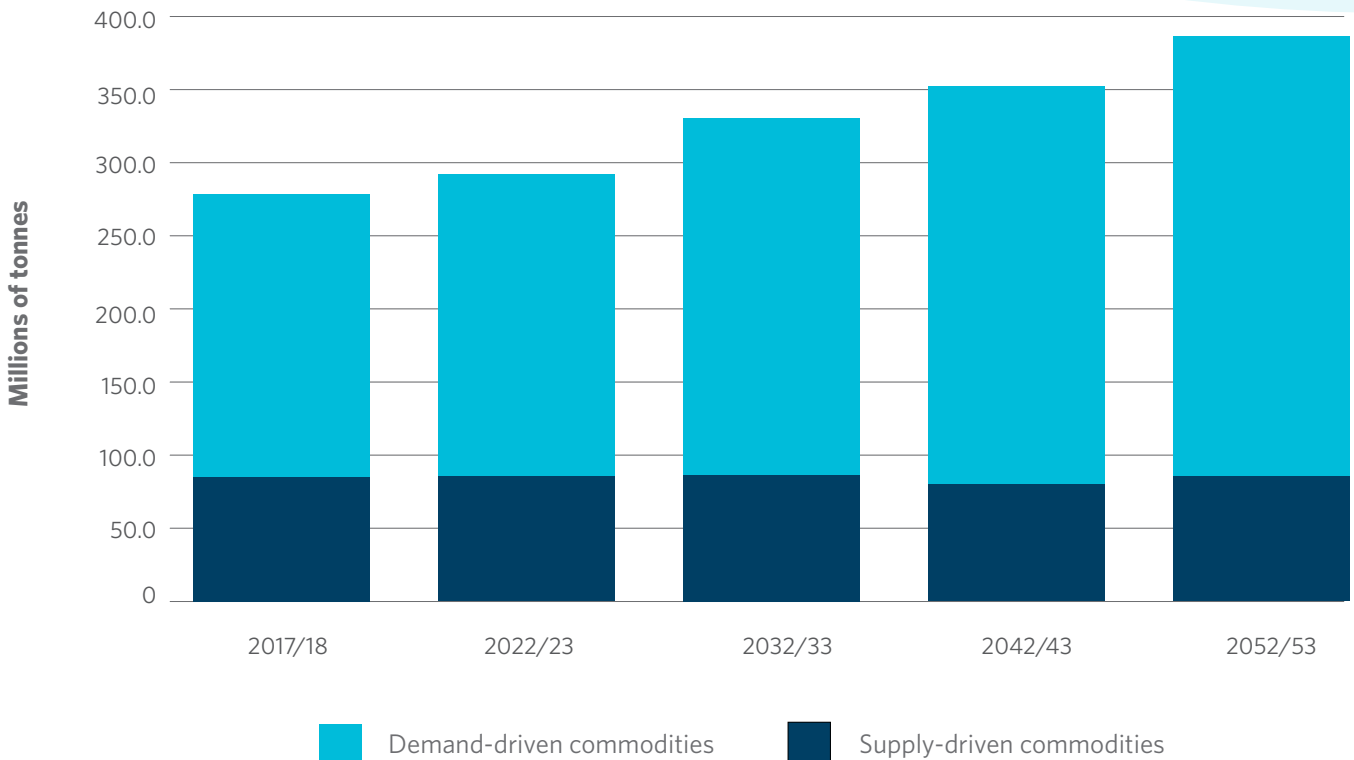
Future freight demand

Total freight volume is expected to increase 18% by 2033 and 39% by 2053.⁵³

Freight will be dominated by demand-driven commodities (like timber and coal), because of economic and population growth.⁵⁴ The volume of these commodities is expected to increase 26% by 2033 and 56% by 2053.⁵⁵

Estimates and forecasts of supply-driven and demand-driven commodities

Figure 04



Climate change

Climate change will reduce production quality and quantity across primary industries like horticulture, viticulture, agriculture, and forestry.⁵⁶

The amount of suitable land for primary industries will decrease as sea levels rise and low-lying coastal areas are affected by inundation and groundwater salinisation.

The volume of freight of supply-driven primary industries, like dairy and meat, is forecast to grow less than 2% by 2033 and 0.4% by 2053.⁵⁷

This will be driven by horticulture and a small cyclical peak in forestry. Other primary industries could face limitations on production or supply.

National freight and supply chain strategy

Government policies that encourage a mode shift from road to rail and coastal shipping could increase the need for intermodal freight terminals in New Zealand. Intermodal freight terminals can:

- provide efficient and effective transfers of freight between different modes
- improve productivity
- reduce negative effects from the movement of freight.

Te Manatū Waka is developing a *National Freight and Supply Chain Strategy*. This 30-year view will outline what government and industry want the freight and supply-chain systems to achieve, pathways and priority actions, and how government and industry will work together.⁵⁸

The strategy will inform investment decisions by central and local government. It will address key drivers for change like decarbonisation, resilience, productivity, innovation, equity, and safety.

Technology and data

New developments in technology and data will help businesses manage safety risks associated with freight movement. These include increasing vehicle automation and connected-vehicle technologies.⁵⁹

Autonomous vehicles scan and navigate their way as they are driving. As human error is involved in 90% of fatal and serious injury crashes, automated vehicles may offer the greatest improvement to road safety.⁶⁰

Connected vehicles can help with safety, like alerting drivers to cyclists or pedestrians, and vice versa. They also provide real-time information about weather and road conditions.⁶¹

Potential relocation of Ports of Auckland Ltd (POAL)

A key uncertainty over the next 10 to 15 years is the potential relocation of New Zealand's primary import gateway, Ports of Auckland Limited (POAL).

POAL's current downtown Auckland location in Tāmaki Makaurau has a capacity of about 30 years. There is a 10- to 15-year window to make a final decision on relocation.⁶²



New developments in technology and data will help businesses manage safety risks associated with freight movement.



9 0

PONU 808124 1
45G1

MAX. GROSS WT	32 500
TARE	3 540
PAYLOAD	28 960
CUBE	76.2

MSKU 158 561 5
45G1

MAERSK

GROSS WT	71 650 LB 32 500 KG
PAYLOAD	63 100 LB 28 620 KG
TARE WT	8 550 LB 3 880 KG
CUBE	2 700 FT ³ 76.4 M ³

MSKU 322 157 0
45G1

MAERSK

GROSS WT	71 650 LB 32 500 KG
PAYLOAD	63 100 LB 28 620 KG
TARE WT	8 550 LB 3 880 KG
CUBE	2 700 FT ³ 76.4 M ³

HYSTER

MSKU 142 219 8
45G1

MAERSK

GROSS WT	71 650 LB 32 500 KG
PAYLOAD	63 100 LB 28 620 KG
TARE WT	8 550 LB 3 880 KG
CUBE	2 700 FT ³ 76.4 M ³

MSKU 161 319 4
45G1

MAERSK

GROSS WT	71 650 LB 32 500 KG
PAYLOAD	63 100 LB 28 620 KG
TARE WT	8 550 LB 3 880 KG
CUBE	2 700 FT ³ 76.4 M ³

Our challenges and opportunities

Inclusive access

The transport system should be accessible by all people in New Zealand, regardless of disability, income, age, gender, sexuality, and ethnicity.

Access describes how easy it is for people to get the things they need and want. This is shaped by personal capabilities, cost, safety, travel options, and time.

Access is high when people can take advantage of many social and economic opportunities within a short amount of time and at an affordable cost.

Access across the land transport system isn't as inclusive as we would like. Some areas aren't tracking in the right direction.

Households are spending a higher proportion of their budgets on transport. Lower-emission transport options are not available for everyone. Public transport services are not a viable alternative for everyone because of coverage or frequency.

There is no agreed strategy or plan to support inclusive access. The land transport system is at the start of the process for delivering on this outcome.

However, government has set clear direction through the *Emissions Reduction Plan* to establish a need for a fair transition. *Arataki* focuses on the parts that support inclusive outcomes.

Why is this important?

The transport system in our towns, cities and regions should help make these great places to live. It should connect people to opportunities, no matter what their circumstances.

Yet, current transport often relies on private vehicle use. This limits the ability of some people to easily access opportunities to employment, education, and social, and cultural activities.

A transformational shift away from private vehicle travel will require offering safe, reliable, appropriate alternatives that are accessible to everyone. These alternatives are not currently in place in most parts of New Zealand.

For example, we need to better understand the travel preferences of women, young people, and certain ethnic groups, who still feel wary about using public transport and active modes, like walking.

Those on low incomes or in rural, isolated areas have fewer transport choices. The current offerings available may be different than what these groups want or need.

Access, timeliness, and affordability are barriers that need to be addressed.

What are we currently doing about this outcome?

Continue to partner with other agencies to deliver good urban form

Waka Kotahi supports, enables, and encourages quality, mixed-use, compact urban development that efficiently uses land, reduces travel distances, and lowers reliance on private vehicles.⁶³

Waka Kotahi partners with other agencies to play our part to deliver good urban form. We do this by:

- leading operational land transport planning with local urban development so decision making supports consistent land use and transport
- working with partner agencies to support ongoing integration between transport and urban development decision making, from long-term strategy through to delivery
- including investment conditions in urban development packages to allow prioritised, sequenced, and integrated activity.

As part of the Urban Growth Agenda, government is partnering on spatial-planning initiatives in the fastest growing urban centres: Tāmaki Makaurau Auckland, Kirikiriroa Hamilton, Tauranga, Te Upoko o te Ika a Māui Greater Wellington, Ōtautahi Christchurch, and Tāhuna Queenstown.

Waka Kotahi has an active role in these spatial-planning partnerships, which include the development of significant transport programmes in our cities.

Through spatial planning, we aim for well-planned and managed urban growth that improves environmental outcomes for existing communities.

Spatial planning should support improved travel choices, more affordable housing, and better access to jobs. This work recognises the importance of integrating land-use and transport planning.

Continue to encourage the use of public transport and active modes

Public transport is a key enabler of inclusive access.

Yet, public transport is not accessible across the country and for different groups.

Offering more public transport options in more places will improve access and affordability.

Active modes, like walking and cycling, help people make short local trips without a vehicle. Longer trips to work and education are also possible with high-quality networks.

The Community Connect Programme makes public transport more affordable and accessible. It offers a 50% concession on public transport services for community services cardholders.

Support access for a range of groups

There are challenges for accessing transport across a range of groups. Inclusive access to transport should be our end goal by providing accessible, affordable, and available transport for everyone.

There are access issues for a range of groups, including low-income people, those with mobility issues, new migrants, and Māori.

Some programmes have been developed, including the Total Mobility Scheme, that support people who can't use public transport to travel all or some of the time.⁶⁴

However, there is still more that can be done. This includes:

- providing more frequent public transport services to areas of need
- improving accessibility for wheelchair users and vision impaired
- ensuring low-emissions options are available for all groups
- supporting people to get driver licences
- improving access to safer vehicles.

Encourage licencing and safer driving

Access to driver licencing training is not consistent across Aotearoa. In many rural areas, there are no options for people to access testing services.

Not being able to legally drive means access to opportunities and jobs is restricted. This encourages people to drive without licences, putting themselves and other road users at risk, and potentially risking fines and infringement notices.

Some programmes encourage rural licencing and driver training.⁶⁵ For example, the Youth Driver Licence Scheme helps young people access free training and tests.⁶⁶



Helping young people become licensed also supports the vision of zero deaths and serious injuries on New Zealand roads.

This is particularly meaningful because young drivers between 15 and 19 who never held a licence were involved in 150 fatal or serious injury crashes from 2013 to 2017.⁶⁷

Access to safer and cleaner vehicles

Aotearoa has an older vehicle fleet compared to many other countries, and it's getting older.

Lower-income people are more likely to have older vehicles and drive further. This means they're at risk from serious harm in crashes.

As the fleet transitions to electric vehicles and other low-emission options, there will be cost barriers for people to access them.

Some programmes that provide access and financial incentives to support people into lower-emissions vehicles include:

- the Clean Car Discount
- social leasing
- Clean Car Upgrade, a scrap-and-replace scheme.

Additionally, providing a range of other transport options, including public transport and cycling, can minimise the need to drive.

Measuring progress

What targets have been set?

There is currently no hard target for inclusive access. However, Te Manatū Waka *Transport Outcomes Framework* indicates the transport system should increasingly enable people to access opportunities.

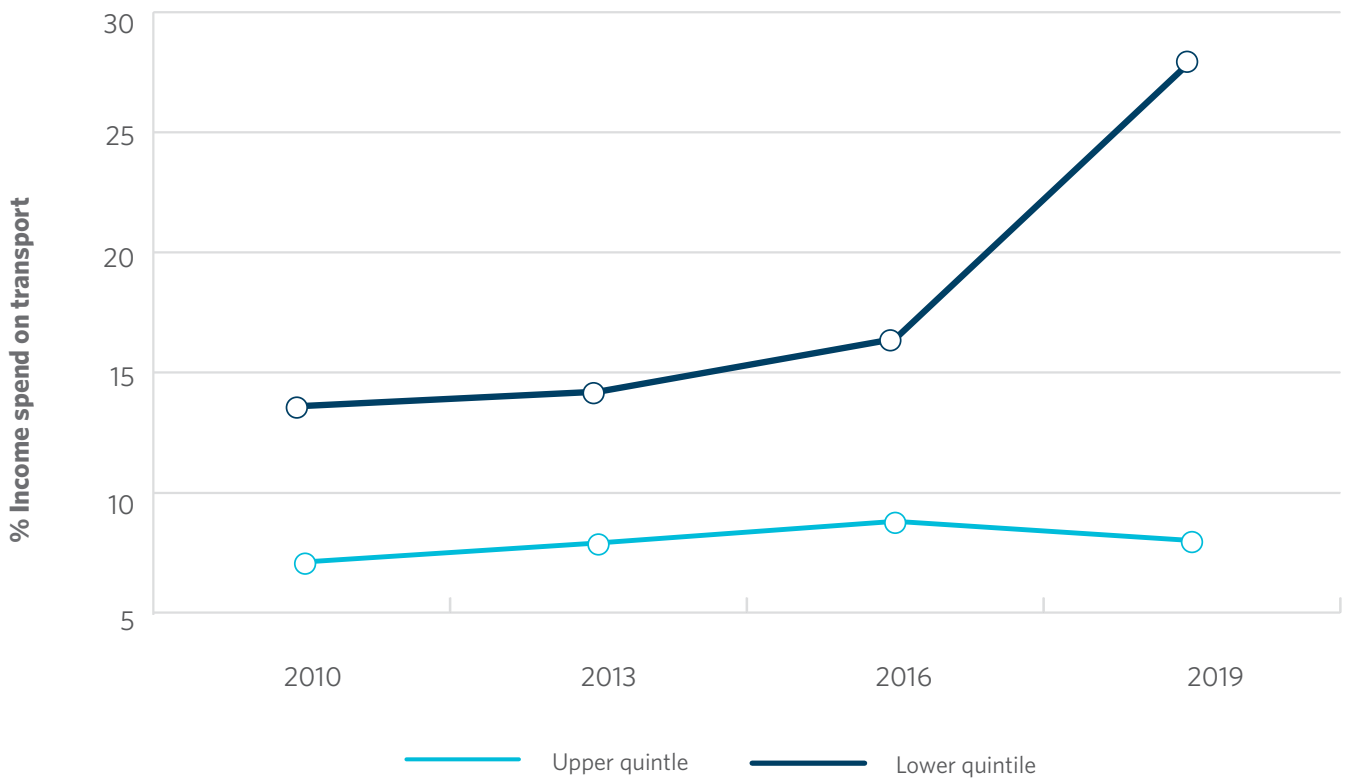
How are we tracking?

The percentage of adults unable to make a beneficial journey because of cost, time pressure, and/or lack of transport choice has reduced from 12% in 2018-2019 to 8% in 2020-2021.⁶⁸

Since 2016, the proportion of household income spent on transport has increased from 16% to 28%.⁶⁹ This means transport is becoming less inclusive for lower-income earners.

System indicator - Household spending on transport (2010-2019) ⁷⁰

Figure 05



Looking ahead, what are the key challenges?

Despite ongoing investment, there are access issues for people living in urban areas. In our largest cities, public transport doesn't reach everywhere and might not work for all trips. Cycling networks are also underdeveloped.

Growth and existing pressure in urban areas puts pressure on the land transport system to keep up. This means access can be reduced because of a lack of new services, even after significant investments are made.

Rural areas have access challenges like network resilience, a lack of alternatives to private vehicle trips, and access to driver licensing.

Those most likely to be affected by transport inequalities include Māori, Pasifika, people with disabilities, lower-income households, carless households, non-licensed individuals, children and young people, older people, women, LGBTQI, and minority ethnic groups.

While differences exist between these groups, many of the barriers we need to overcome to increase diversity are shared.

The four most common barriers to equitable transport in New Zealand are:

- cost
- accessibility
- safety
- practicality.

Access challenges are often greater for lower-income households and those without access to a motor vehicle.

Māori are more likely to experience transport-related social exclusion, like missing out on opportunities or engagements because of lack of transport access.

Improving long-term outcomes can have short-term impacts, especially for vulnerable communities.

What do we still need to work on?

Develop clear focus and targets

Waka Kotahi and Te Manatū Waka don't currently have clear focus areas for how to deliver this outcome.

Developing areas for focus would provide direction about what's needed in the land transport system to support inclusive access in urban, provincial, and rural areas. This should include measures to address the necessary scale of change.

Better integrate land-use and transport to improve urban form and the accessibility of key services

Shaping urban form, and the transport system that supports it, is one of the most lasting impacts on the environment we make.

The way our towns and cities are laid out has a tremendous effect on whether everyone can access opportunities in an easy, safe, and sustainable way.

Agencies shaping cities should ensure urban patterns created across New Zealand support long-term goals and challenges, as well as current lifestyles.

Growth and development over much of the past 75 years has increased pressure on housing supply and affordability. It has also affected the environment and the ability of people and businesses to move around in an easy and affordable way.

Current approaches to urban development have generally resulted in low-density, car-based development. They often don't give enough consideration to where people live, work, study, play, and how people connect to those places.

Central and local government, alongside iwi Māori, must work together to reshape our towns and cities. They must aim to design places that are easy to get around using a range of travel options, which are safe for all users, and are better places to live and work.

We also need to achieve win-win solutions to grow housing supply in a way that also allows wider access and sustainability benefits.

To do this, we'll need to continue playing an active government role in urban development, to shape how our towns and cities grow in the future.

With an enabled land-use planning system now in place, the focus needs to be on taking steps to support and encourage growth into highly accessible locations.

This will require active collaboration across the various parties involved in the urban development process.



Improving long-term outcomes can have short-term impacts, especially for vulnerable communities.

Shift from reliance on single occupancy vehicles to more sustainable transport solutions, particularly in our cities

During the past 75 years, New Zealanders have become reliant on private vehicles to meet their travel and freight needs.

While private vehicles are well suited for many trips, relying on private vehicles to meet so much of our travel needs has created a range of problems like:

- congestion
- poor quality urban environments
- pollution and increased emissions
- poor health
- high travel costs.

For urban areas to thrive, people need to move around easily and have a range of choices about how they get to work, connect with family and friends, and access services.

We need to build a modern transport system with a mix of reliable transport options that helps keep people and products safely moving.

It also means land use and transport need to support and encourage convenient trip options so more people can meet most of their needs locally and are less reliant on private vehicles.

The opportunity to encourage this shift is greatest in larger urban areas, giving us an opportunity to encourage more sustainable options.

Areas of future focus to improve this outcome

There are many ways to improve inclusive access across the transport system. Some areas for future focus are to:

- embed equity and safe-system principles into transport policy and planning processes
- develop more detailed strategic guidance on inclusive access
- enable more licensing and driver-safety schemes
- improve access to compliance requirements like vehicle warrants and vehicle testing, particularly for rural and low-income communities
- work with communities and partners to find an appropriate level and mix of services especially in areas where populations are declining
- expand public and shared transport options for those with few travel choices (for example, shift workers)
- support access for women, ethnic minorities, and LGBTQI people to reflect needs like safety, affordability, and travel with children
- identify ways to improve the long-term affordability of public transport
- support public transport services that provide accessible, affordable access to education and employment

- support services to improve mobility for senior residents
- use transport to improve access to employment, education, essential services, social, and cultural activities in higher-deprivation areas and isolated communities
- identify opportunities for network improvements and demand-management activities with a focus on mode shift
- promote greater-integrated land use and transport planning, including spatial planning for sustainable management of urban growth
- provide greater transport choice in urban and regional areas as an alternative to private car use
- support approaches, like standards for kerbs and intersections, to ensure streets have appropriate space for a range of users, including walkers, people with prams, wheelchair users, and mobility scooters
- improve services and infrastructure so people can get on and off public transport easily
- make sure everyone can access public transport infrastructure, like bus shelters and timetable signs
- manage and improve walking networks to allow safe and accessible trips for people
- continue rolling out cycling networks for a range of trips, and fill network gaps to support access
- support dynamic use of road space that allows flexible use, responding to changes to different modes, access requirements and changing mobility of people
- improve road quality in Māori communities (particularly rural areas) to lessen the burden on vehicles and finances.

Critical dependencies with other outcomes

Activities contributing to other outcomes can influence inclusive access outcomes.

Environmental sustainability:

- Encourage initiatives that reduce emissions and shift to low-emission modes, like public transport, walking, cycling, and electric vehicles, which will benefit public health and safety.
- Ensure our approach to emissions reduction and alternative modes support access for all.
- Support the implementation of the Avoid Shift Improve Framework while supporting access to transport.

Resilience and security: The safety of the transport network will likely be disrupted by extreme weather events, like high temperatures and sea-level rise. Waka Kotahi will need to make sure access is considered as part of our response.

Economic prosperity: Make sure freight and urban growth balance access for people.

Healthy and safe people: Make sure the land transport system takes an inclusive approach to keeping everyone safe.

/G=via Glen Innes /N=via Newmarket /LS=Limited Stops C=Cancelled *=Arrival due/departing



Healthy and safe people

There are four main ways the transport system can achieve the outcome of healthy and safe people:

- improve road safety by reducing the number of deaths and serious injuries on our roads
- improve rail safety by reducing accidents and incidents, particularly at level crossings
- reduce public health harms (such as air and noise pollution) caused by the transport system
- reduce the health impacts of low physical activity and encouraging greater use of active travel modes.

Our road safety focus is guided by the *Road to Zero Strategy and Action Plan*. At the heart of this strategy is a 40% reduction in the number of people killed and seriously injured in road crashes by 2030.

Rail safety can be improved through effective regulation and upgrades to infrastructure, like level-crossing removals and fencing off access to tracks.

Deaths and serious injuries on the rail network are thankfully rare, but critical risks remain and need to be addressed over time.

Reducing air and noise pollution is a considerable ongoing challenge that requires a holistic approach.⁷¹ This includes:

- reducing reliance on fossil-fuelled vehicles (especially diesel)
- improving emissions standards
- reducing exposure to poor air quality and noise through effective planning and investment, like noise walls.

Increasing the role of active modes, like walking and cycling, to boost physical activity levels will require:

- developing compact, mixed-use urban areas
- improving walking and cycling facilities and networks
- ensuring transport regulations enable and encourage these forms of movement.

Why is this important?

Between 2020–2021, there were:

- 333 deaths because of vehicle crashes
- about 2,395 people seriously injured on our roads.⁷²

In addition to this, an estimated social cost of \$4.6 billion was spent on injuries because of motor vehicle crashes.⁷³

As for health and air pollution in New Zealand:

- More than 3,300 adult New Zealanders die prematurely from air pollution, most of which is from diesel motor vehicles.⁷⁴
- Air pollution from motor vehicle emissions has increased by 10% over the 10-year period from 2006 to 2016.⁷⁵
- Each year, air pollution contributes to more than 13,000 hospital admissions, 13,200 cases of childhood asthma, and about 1.7 million restricted-activity days.⁷⁶

Noise is also a factor. About 38,000 people are exposed to elevated levels of noise from state highways and major local roads in New Zealand.⁷⁷

As for physical activity, just over half of New Zealand adults are defined as physically active (30 minutes of exercise, five days a week).⁷⁸

A lack of physical activity, and New Zealand's increasing levels of child and adult obesity, may result in premature deaths and increased pressure on the health system.



What are we currently doing about this outcome?

Improving road safety

We need a holistic approach to reduce the level of harm experienced within our land transport system.

The map across shows fatal and serious road crashes in the past five years. This remains a key challenge for New Zealand.

New Zealand's road strategy for 2020–2030, Road to Zero, starts to address these issues.⁷⁹

Along with a 40% reduction target, it commits to a shared vision of a safe transport system where:

- it's safe to drive, cycle or walk
- transport improves our health and wellbeing, creating great places for our communities.

Delivery is supported by a system-wide response involving Waka Kotahi, Ngā Pirihimana O Aotearoa New Zealand Police, Te Manatū Waka Ministry of Transport, Auckland Transport, Te Kaporeihana Āwhina Hunga Whara Accident Compensation Corporation, and Mahi Haumarū Aotearoa WorkSafe.

Road to Zero is underpinned by the safe system approach. This approach aims for a more forgiving transport system that acknowledges people make mistakes. It emphasises shared responsibility, decision-making, and accountability for those who design, monitor, enforce, and use the transport system.

Road to Zero focuses on a combination of interventions to achieve safety performance outcomes that include:

- improving roads through safety infrastructure (like median barriers and roundabouts)
- safe and appropriate speed limits
- strengthening road policing (like the roll out of roadside drug testing and additional safety cameras)
- encouraging people to buy safer vehicles
- improving vehicle standards
- strengthening road safety penalties
- improving access to driver training.

Road to Zero action plans will be delivered every three years to support the strategy. These plans will direct road safety partners to make progress towards the 40% reduction target.

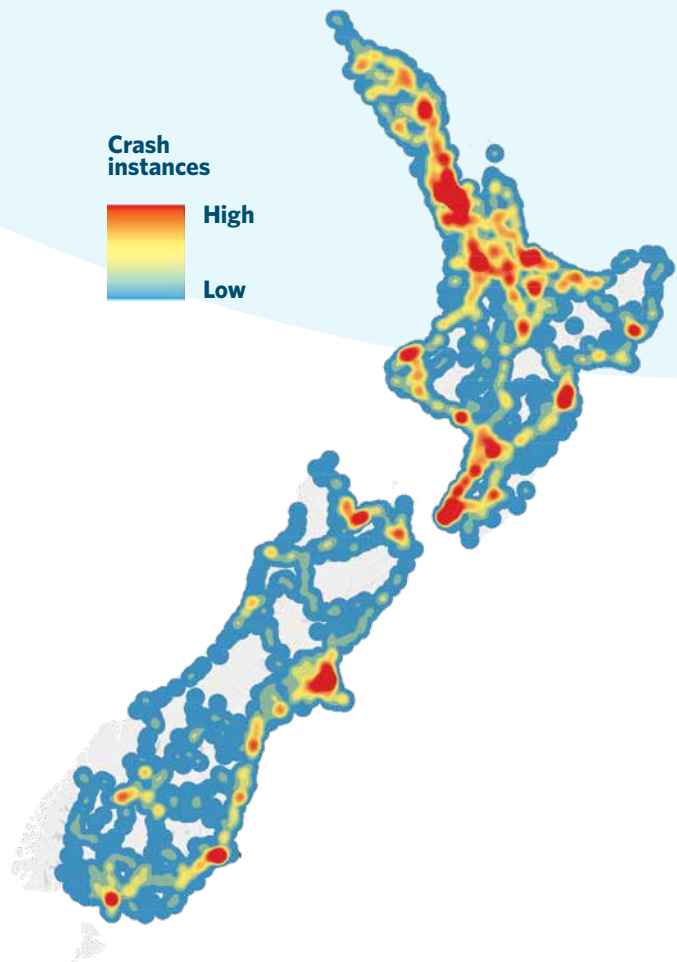
Waka Kotahi currently leads, or partners on, 15 actions across the five key focus areas:

- infrastructure and speed management
- vehicle safety
- work-related road safety
- road-use choices
- system management.

While Waka Kotahi is primarily responsible for delivering many of the actions in the current plan, we can't achieve these targets without our road safety partners.

Fatal and serious road crashes by region

Figure 06



Improving rail safety

For rail safety, Waka Kotahi:

- serves as national rail safety regulator
- monitors rail activities funded through the National Land Transport Fund (NLTF).

Waka Kotahi works with KiwiRail and other rail partners to make New Zealand's railway system safe for everyone.

The *New Zealand Rail Plan* outlines the government's vision and priorities for rail until 2030. It also outlines the investment needed to achieve it. This will happen through the Rail Network Investment Programme (RNIP), approved by the Minister of Transport.

We are developing partnerships to support delivery with the private sector, other government agencies, iwi/Māori, and local government.

Our regulatory strategy, *Tū Ake, Tū Maia*, will also be critical to achieving the 40% reduction.

Improving safety for Māori

We also recognise the need to reduce harm to Māori by the transport system. We are continuing to engage and build relationships with Māori to improve road safety by:

- better understanding context
- doing further research
- supporting Māori to design and implement initiatives.

We will look for opportunities to collaborate with other government agencies that are working with Māori (mana whenua and mataawaka) to use resources and learnings that contribute to road safety and wellbeing.

Improving safety in urban and rural areas

For urban centres, road safety we will focus on implementing the recommendations in the *Emissions Reduction Plan* (ERP). This will reduce emissions created by vehicle kilometres travelled (VKT) and improve safety across all modes.

For rail safety, our focus will be on reducing harm at level crossings nationwide and investing in improvements to urban rail networks.

Our road and rail safety interventions will continue to focus on improving safety in provincial or rural areas.

Improving public health

The current system-wide approach to lessen negative public health impacts from the land transport system is not delivering.

The *Waka Kotahi Environmental Sustainability Plan, Toitū Te Taiao*, outlines three objectives to improve public health by 2050:

- support physically active and healthy travel options
- no harm from land transport air emissions
- no harm from land transport noise.⁸⁰

Activities that aim to reduce greenhouse gas emissions and ease air pollution include:

- programmes like Clean Car Standard and Clean Car Discount
- discounted public transport
- walking and cycling improvements
- working with the sector to reduce freight transport emissions.

Current research is looking into the social costs of land transport noise and has identified priority locations where transport noise can be lessened.

We are also developing national walking and cycling plans that outline what's needed to achieve a dramatic increase in these travel options.

For urban centres, we anticipate the recommendations in the ERP to reduce VKT. This will increase the uptake of low-emission vehicles which will help improve air quality, though it may not be enough.

Noise, air, and water quality issues will be worsened by increased traffic along arterial transport routes, unless measures are put in place to reverse current trends. This matters because most population growth is expected in cities with transit-oriented development that aims to create vibrant, liveable, sustainable communities with accessible transport options.

For rural areas, we'll focus on enabling safe opportunities to access more active and low-emission transport options.

Measuring progress

What targets have been set?

Road to Zero aims for a 40% reduction in people dying or being seriously injured on our roads by 2030.

Targets have also been set for road controlling authorities to reduce speed limits near 40% of schools by 2024 and all schools by 2027.

There are also national standards for air quality set under the Resource Management Act 1991.

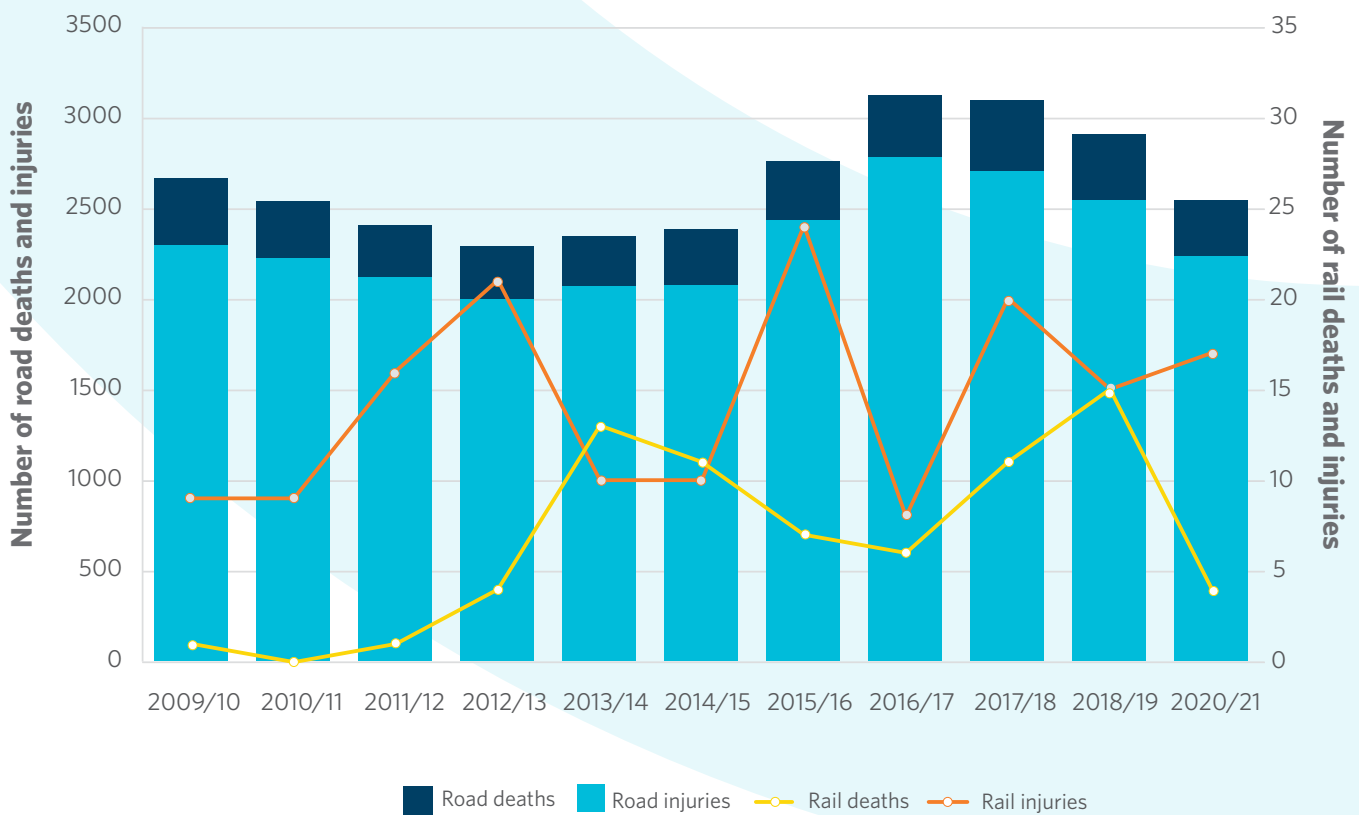
How are we tracking?

Some indicators of health and safety tracking are:

- 11% reduction in deaths and serious injuries between 2018 and 2021
- more people are travelling by active modes (walking and cycling)
- increased harmful effects from road transport emissions.⁸¹

System indicator number of deaths and serious injuries from road and rail transport 2011–2021 ⁸²

Figure 07



Looking ahead, what are the key challenges?

Some challenges to consider going forward:

- Most of New Zealand's roads don't have speed limits that are safe or appropriate for the:
 - design
 - infrastructure
 - adjacent-land use
 - modes of transport
 - types of crashes that could occur on that road.
- While harmful emissions contribute to over 3,000 premature deaths each year, they currently receive less focus than road and rail safety.
- A growing population means more people are using our transport networks – this increases risks and conflicts between different users of the transport system.
- Some people (like elderly, those with a disability and Māori) have difficulty accessing safe, reliable, and healthy transport options.
- Walking and (especially) cycling are often unsafe travel choices with poor facilities and undeveloped networks that discourage their use.

What do we still need to work on?

Considering our current and planned interventions, we still see several areas that can be worked on over the course of this 30-year plan:

- develop a whole-of-system approach to improve public health in transport services, with an increased focus on reducing air pollution
- provide cost-effective incentives that reduce private vehicle use to encourage public transport or active modes
- develop a work programme for rail safety beyond the three-year timeframe of the current Rail Network Investment Programme
- improve understanding of Māori-safety outcomes and programmes that reduce safety and public health risks for Māori
- develop a strategic direction to reach Vision Zero beyond the current strategy.

Areas of future focus to improve this outcome

Some areas of future focus to improve the health and safety outcome include:

- progress a stronger system-wide response to improve poor air quality caused by transport
- identify the barriers to reduce the number of people dying or being seriously injured on roads
- expand current evidence about Māori overrepresentation in death and serious injuries in road crashes
- identify and implement actions, partnerships, and new approaches to reduce the number of people dying or being seriously injured on roads
- develop an approach to lift rail safety beyond the current 10-year time horizon
- work with partners to research and plan for road safety, with a focus on equity and inclusive access
- enable road safety partners to achieve targets for national death and serious injury
- look at ways to reduce transport noise in priority locations
- ensure a multi-outcome approach (that includes equity and safe-system principles) is applied in programme delivery, including those to reduce the kilometres travelled in light vehicles
- enable iwi Māori to participate in transport planning, particularly for road safety
- use risk-based, localised responses to deliver road-safety improvements in high-risk areas
- require high-quality active mode infrastructure is included in new developments
- support initiatives to reduce speeds in urban areas
- support safe behaviour on regional roads
- improve or maintain physical access to marae (communal and sacred meeting grounds), papakāinga (collective residential areas), wāhi tapu (sacred sites), and wāhi taonga (precious sites).

Critical dependencies with other outcomes

Activities contributing to other outcomes can influence health and safety outcomes.

Environmental sustainability:

- Immediate high dependency on planned environmental sustainability initiatives also delivering health, safety, and fairness outcomes.
- Initiatives that reduce emissions and shift to low-emission modes (like public transport, walking, cycling, and electric vehicles) will benefit public health and safety.
- Need to better understand how safety may deliver outcomes such as inclusive access, economic prosperity, and resilience.

Inclusive access:


Negative public health impacts from the transport system are more prevalent:

- in certain places (like South Island urban centres for air quality)
- for certain people (like those on low incomes, for whom it's more difficult to upgrade to cleaner vehicles)

We need a stronger focus on achieving inclusive access outcomes from existing safety and public health interventions. For example, current efforts to improve access to driver licensing services and training in rural or low-income areas.

Resilience and security:

The safety of the transport network could be impacted by cyber-attacks.



Activities contributing to other outcomes can influence health and safety outcomes.

Environmental sustainability

The environmental sustainability outcome seeks to reduce the transport system's negative impacts on the environment. It has three areas of focus:

- reduce greenhouse gas emissions
- improve biodiversity and water quality
- improve resource efficiency and waste management.

Reducing greenhouse gas emissions requires a mix of actions to:

- avoid or reduce the number and length of trips people make
- enable and encourage people to shift to more sustainable transport options
- decarbonise the vehicle fleet.

Traditionally, the focus on biodiversity and water quality has been to avoid, remedy, or mitigate any negative impacts from the transport system. In the future, there will be an increased shift to:

- using transport corridors to support biodiversity
- finding opportunities to improve water quality.

The land transport system must continue to enable behavioural change, innovation, and ways of doing business to drive:

- sustainable sourcing and use of materials
- waste minimisation
- emissions reduction.

Why is this important?

Although Aotearoa is a small emitter by global standards, our per person emissions are amongst the highest in the Organisation for Economic Co-operation and Development (OECD). We're not yet pulling our weight in the global challenge to reduce emissions and reduce the scale of future climate change.

New Zealand has a goal of net zero emissions by 2050.⁸³ The *Emissions Reduction Plan* (ERP) outlines how transport emissions can be reduced by about 41% by 2035.

Efforts to reduce emissions can deliver wider benefits to New Zealand's communities like:

- reducing air pollution
- delivering improved public health and safety outcomes
- providing better transport choice
- reducing congestion
- supporting more vibrant, people-focused towns and cities.

New Zealand's indigenous biodiversity is in decline. Both land and water environments face significant pressures from human activities. This is worsened by climate change.

The land transport system is a substantial presence in the natural environment, crossing many sensitive ecosystems, habitats, and waterways. The transport sector must reduce the ecological effects of its construction, operation, and maintenance activities and protect and enhance biodiversity on road reserve land.

Building, maintaining, and operating the land transport system uses large quantities of fossil fuels, virgin materials such as aggregate, and other resources. This means high levels of carbon in the land transport system.

Construction and demolition waste represent about 50% of all waste going to landfill.⁸⁴ Land transport construction and demolition waste is not often recycled. The use of recycled or alternative materials in new builds is limited.

What are we currently doing about this outcome?

Reducing light vehicle kilometres travelled (VKT)

Reducing light vehicle travel is critical to reducing transport emissions. This is particularly true in our largest and fastest growing urban centres.

Our largest cities combined make up over 64% of the total vehicle kilometres travelled (VKT) on New Zealand's roads.⁸⁵

Reducing reliance on private vehicles requires a three-pronged approach to changing car dependency:

- Shape urban form by encouraging good quality, compact, mixed-use urban development that supports public transport, enables shorter trips, and provides safe, healthy, attractive urban environments where walking and cycling are encouraged.
- Make shared and active modes more attractive by improving the quality, quantity, and performance of public transport, walking, and cycling facilities.
- Influence transport demand and selection with a mix of incentives and disincentives (push and pull factors) to discourage private vehicle use or encourage people to try something new.⁸⁶



Reducing light vehicle travel is critical to reducing transport emissions.

Provincial (towns between 10,000 and 30,000 people) and rural areas (areas with populations <10,000) make up about 36% of New Zealand’s vehicle travel. Reducing vehicle travel in these areas is limited because of:

- fewer travel choices
- relatively low levels of population growth
- high reliance on private vehicles.

In provincial centres we’ll focus on:

- improving active-mode networks for shorter journeys, including micro- and e-mobility, like e-bikes
- improving public transport, on-demand, or shared services with a focus on accessibility
- supporting a national electric vehicle charging network.

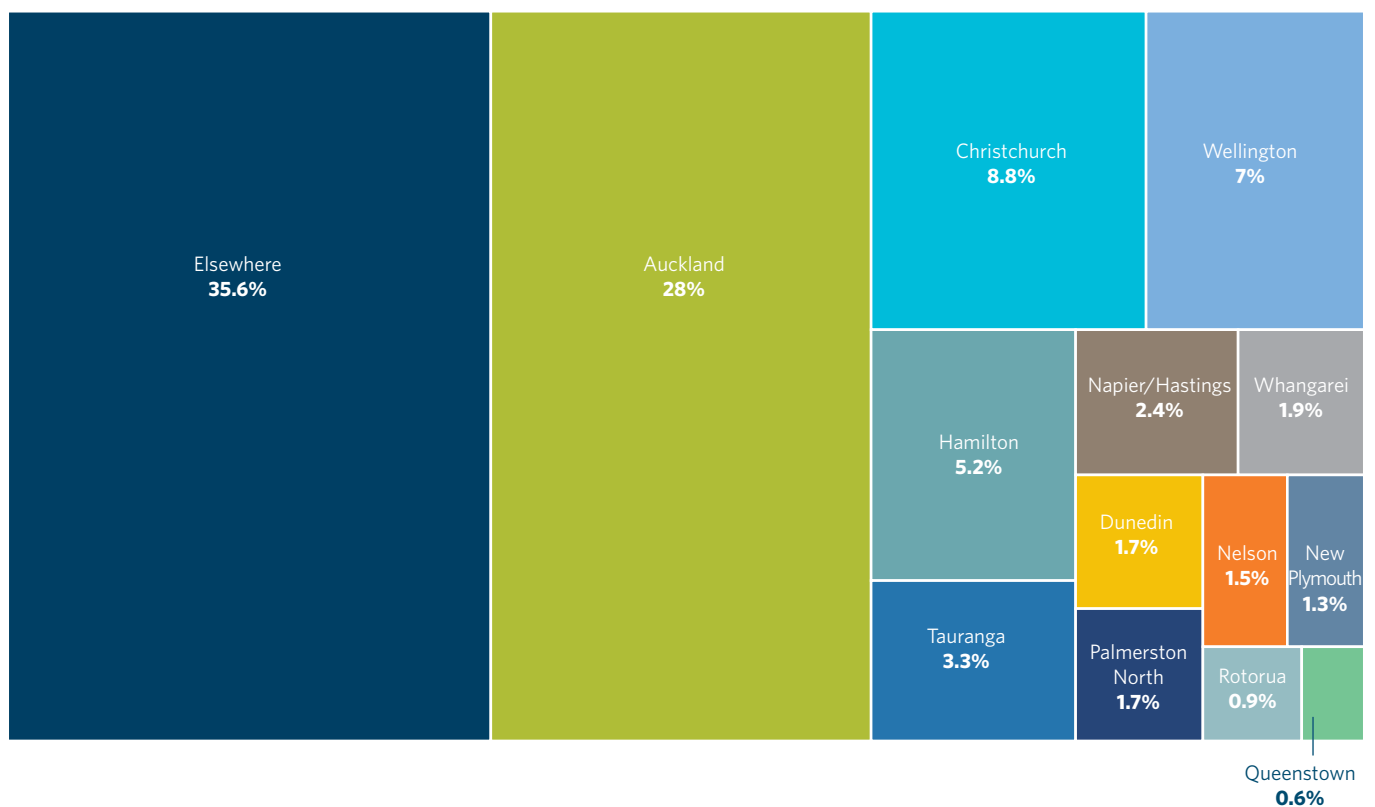
In rural areas, we recognise opportunities to reduce car travel and provide attractive alternatives are more limited.

In rural areas we will focus on:

- supporting use of safe and clean vehicles
- supporting a national electric vehicle charging network
- exploring ways to reduce long-distance travel to essential services, like shared services for hospitals and large employment hubs, or using mobile facilities to deliver services to remote communities.

Share of VKT (million per year) 2020 by functional urban area

Figure 08



Decarbonising freight transport

An integrated and multi-modal freight system is key to delivering on the ERP targets for freight transport. This will:

- enable goods to be transported by the most efficient modes
- support smooth connections between modes (such as inland ports and intermodal terminals)
- provide multiple back-up options for business continuity.

Over time, we need more freight moved by safer and lower emission modes, like rail and coastal shipping.

Emissions from road trucks (light and heavy) has grown steadily. Trucks now contribute to nearly 50% of road emissions.⁸⁷

This growth is because of more freight travelling by road. It also reflects that 'trucks' includes many personal vehicles, like vans and utes.

One of the actions in the *Emissions Reduction Plan* (ERP) is to develop a national freight and supply chain strategy. This strategy will take a long-term, system-wide view of the freight and supply chain. In collaboration with industry, the strategy will identify how to decarbonise the freight transport system to net zero by 2050, while improving the efficiency and competitiveness of the supply chain. The strategy will be delivered in 2023.

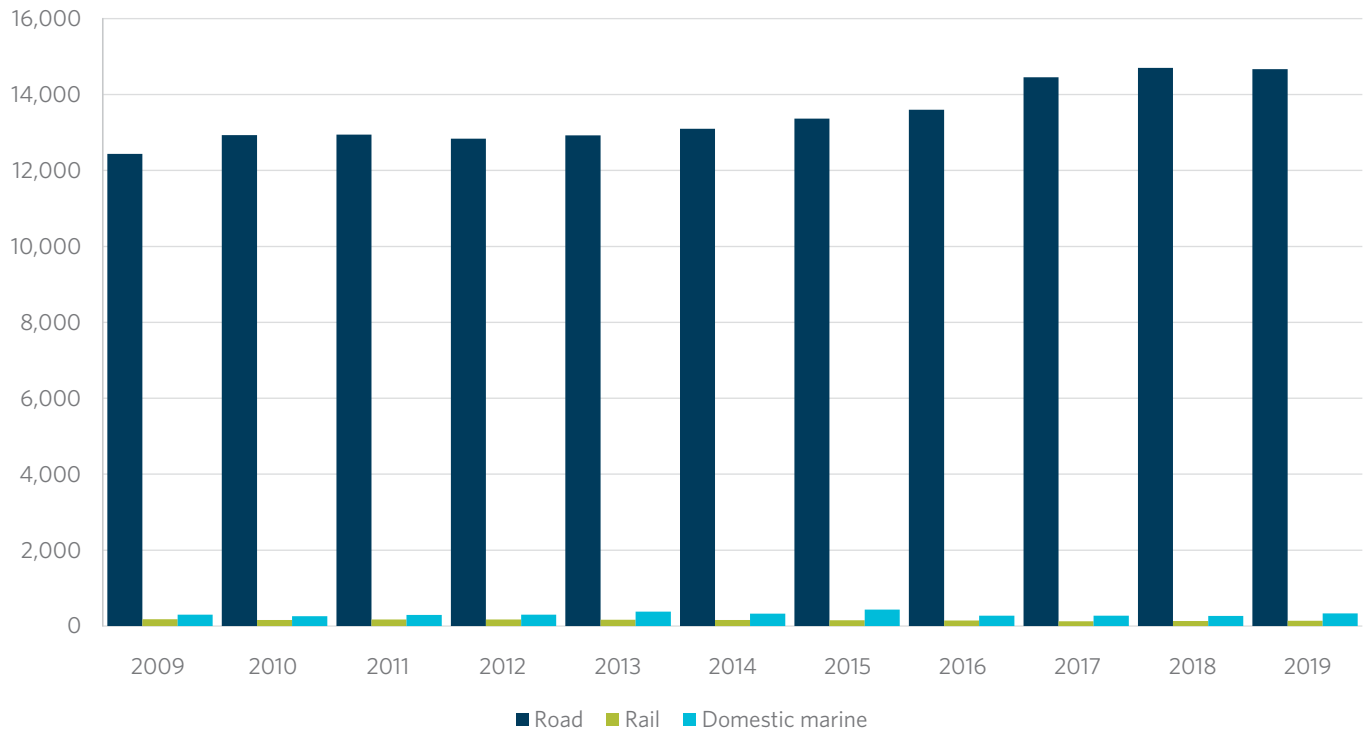
Rapidly adopt low-emissions vehicles

The ERP contains a range of actions to support the adoption of low-emission vehicles including:

- incentivise uptake through the Clean Car Discount Scheme
- implement the Clean Car Standard
- consider further measures (including regulatory, legislative, and tax settings) to improve the fuel efficiency of imported vehicles, and discourage the importation of high-emitting vehicles
- support trialling of social-leasing, and equity-focused Clean Car Upgrade, a vehicle scrap-and-replace scheme.
- develop a cross-agency work programme to deliver the EV charging network.

Percentage share of emissions cars versus trucks (note Ministry for the Environment calls light commercial vehicles 'trucks')

Figure 09



Biodiversity (including water quality)

Land transport's construction, maintenance, and operational activities impact biodiversity in many ways. This includes removing, degrading, and severing ecosystems and wildlife.

Transport corridors can provide important ecological functions and allow changes in land use and development.

Waka Kotahi key organisational directives for biodiversity are *Toitū Te Taiao: Our Sustainability Action Plan* and the *Environment Plan*.

A long-term outcome to 2050 is the land transport network is managed to support and enhance indigenous biodiversity.⁸⁸

Ecology objectives include 'no net loss of native vegetation, wetlands, critical habitat or endangered species.'⁸⁹

These are aligned with national directives around minimising effects and improving biodiversity.

Improving resource efficiency and waste

A strategic approach to improving resource efficiency and waste minimisation presents an opportunity to:

- achieve cost savings
- realise environmental benefits
- create a culture of resource efficiency in the delivery of land transport functions.

There are three focus areas to improve resource efficiency:

- sustainable sourcing and use of resources
- waste minimisation
- energy and carbon reduction.⁹⁰

Achieving our resource efficiency objectives will:

- reduce environmental impacts, including energy use, emissions, and waste sent to landfills
- deliver long-term cost benefits through whole-of-life considerations
- reduce exposure to changes in the supply of materials
- achieve improvements in broader sustainable outcomes including social, cultural, and environmental
- improve the service life of assets
- reduce the need for materials and energy
- preserve resources for future generations
- reduce and minimise embodied carbon in the land transport system.

Measuring progress

What targets have been set?

New Zealand has a goal of net zero emissions by 2050.⁹¹ The *Emissions Reduction Plan* (ERP) outlines how transport emissions can be reduced by about 41% by 2035.

The ERP identifies the following targets for the transport sector by 2035:

- reduce total kilometres travelled by the light fleet by 20% through improved urban form and travel options, particularly in our largest cities
- increase zero-emissions vehicles to 30% of the light fleet
- reduce emissions from freight transport by 35%
- reduce emissions intensity of transport fuel by 10%.


Delivery of the targets will be achieved through a set of over 70 actions for the transport sector. More than half of these actions relate to:

- reducing light vehicle kilometres travelled (VKT)
- improving urban form, public transport, walking, and cycling.

How are we tracking?

A few points about how New Zealand is tracking:

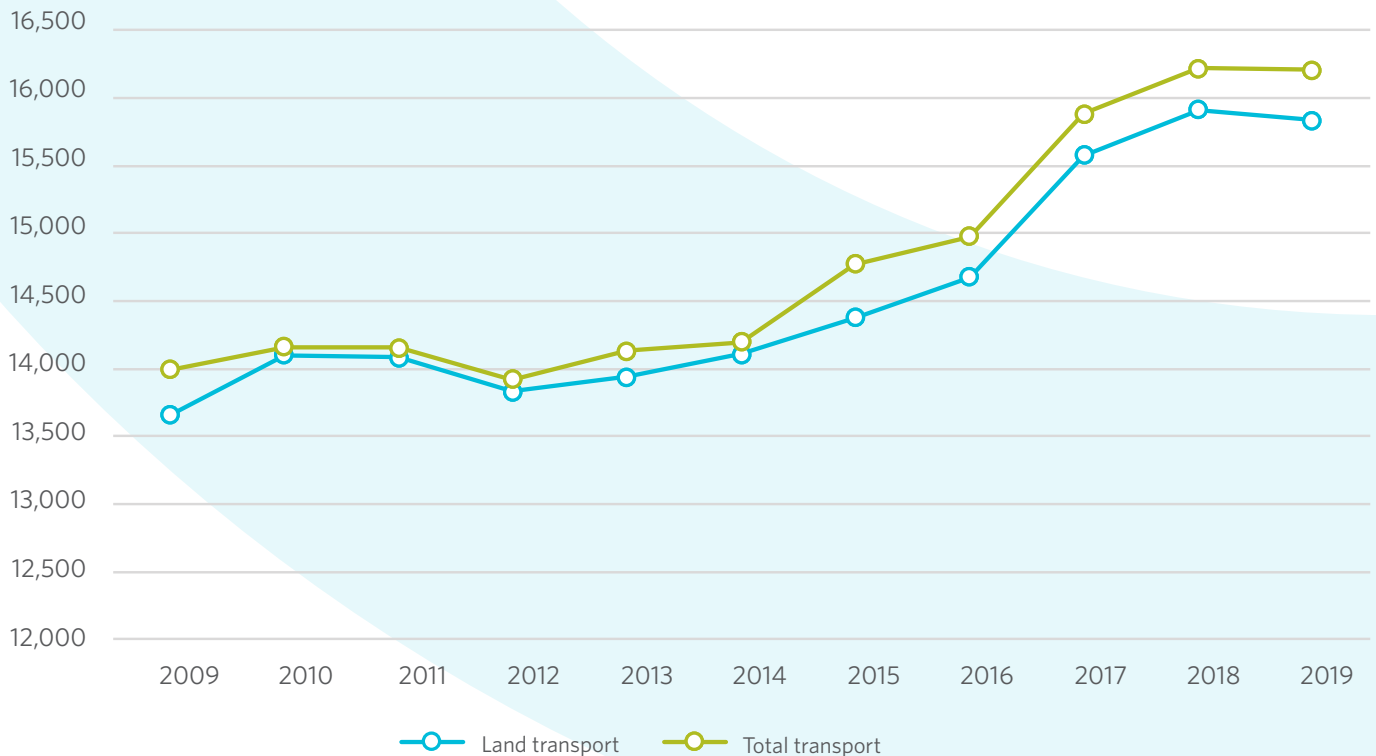
- Transport emissions have been increasing since 2012.
- New Zealand towns and cities have very high levels of car dependence, with low uptake of public transport, walking, and cycling.
- New Zealand's light electric fleet is growing.
- Re-use of materials in roading network improvements is growing (circular economy).⁹²



Reduce total kilometres travelled by the light fleet by 20% through improved urban form and travel options, particularly in our largest cities.

System indicator – Greenhouse gas emissions from the land transport system⁹³

Figure 10



Looking ahead, what are the key challenges?

Some key challenges for the future include:

- delivering emissions reduction at scale and pace given it's an immense task that relies on sustained, integrated effort across multiple sectors and organisations
- delivering emissions and vehicle travel reduction in a way that's equitable and doesn't restrict access to social and economic opportunities
- making the shift from car dependency in urban areas towards public transport, walking and cycling through urban form, transport choice, and demand-management approaches
- transforming the vehicle fleet, given Aotearoa has a relatively old vehicle fleet and we're entirely reliant on imported vehicles
- reducing reliance on road freight for transport without increasing costs or reducing sector efficiency
- building social license for rapid implementation and use of alternate modes without increasing transport inequities
- moving away from compliance-focused approaches to reduce negative effects on biodiversity and water quality, in favour of approaches where transport can make a positive difference
- continuing to refine standards and processes to ensure building, maintaining, and operating the land transport system is resource- and energy- efficient.

What do we still need to work on?

Reducing greenhouse gas emissions

While the current ERP sets targets to 2035, an on-going focus is required to meet government's commitment to achieving net zero carbon emissions by 2050.

Improving biodiversity (including water quality)

Stronger Waka Kotahi direction is needed, likely in the form of biodiversity policy. This would achieve biodiversity outcomes through our core functions of:

- investing in land transport activities
- managing the state highway network
- providing access to land transport.

The requirements of the *National Policy Statement for Freshwater Management* and *National Policy Statement for Indigenous Biodiversity* will affect how biodiversity is considered through Waka Kotahi projects and operations.

Efforts to support and enhance biodiversity by 2050 will likely be implemented in three stages:

- slowing decline
- stabilising
- building.

The first stage (slowing decline) is where foundational work has been and shall continue. This includes:

- incorporating biodiversity into our asset data management standard
- identifying ecological areas
- researching impacts and effects management
- developing guidance and tools.

Improving resource efficiency and waste

The *Waka Kotahi Resource Efficiency Strategy* assumes the adoption of a circular economy approach to the delivery and maintenance of transport system over the next 10+ years.

This circular economy approach means Waka Kotahi will need to:

- design to avoid waste and pollution
- keep materials in use
- regenerate natural systems
- reuse structure and heritage assets where possible.

Reducing embodied carbon

Maintaining and operating the land transport system uses resources and contributes to embodied carbon.

Waka Kotahi will need to reduce carbon emissions when:

- maintaining the network and operations
- choosing materials.

Areas of future focus to improve this outcome

Some areas for future focus to improve the environmental sustainability outcome:

- complete and maintain walking and cycling networks that are safe, convenient, and sustainable
- include resource efficiency and waste minimisation in design standards, procurement processes, and investment decision making
- plan and prepare guidance at the national level to deliver light vehicle VKT reduction targets and support urban VKT reduction planning
- establish an evidence base for significant natural areas and indigenous biodiversity to assist transport planning and delivery
- improve direction and management of biodiversity on the transport network, including use of nature-based solutions, maintaining water quality, and using transport corridors to connect greenspaces

- ensure planning and investment delivers the lowest, whole-of-life costs
- ensure a multi-outcome approach (that includes equity and safe-system principles) is applied to programmes, including those to reduce kilometres travelled by light vehicles
- partner with Māori on the climate response in the land transport system to incorporate Mātauranga Māori (Māori knowledge) and ensure an equitable, Māori-led transition
- promote effective integration of land use and transport planning, including spatial planning for sustainable management of urban growth
- maximise the existing transport system, and identify opportunities for network optimisation and demand-management activities with a focus on supporting mode shift
- implement regulatory change to reduce harmful emissions and encourage low-emission vehicle uptake
- improve public transport infrastructure and services to support mode-shift that is safe, convenient, and sustainable.

Critical dependencies with other outcomes

Activities contributing to other outcomes can influence environmental sustainability outcomes.

Healthy and safe people: Reducing emissions in our main urban centres needs a safe-system approach. To enable safe and convenient trips on foot or bike, mode share shift needs support from things like:

- infrastructure improvements
- speed management
- network prioritisation.

Inclusive access: Efforts to reduce emissions and VKT should seek a fair transition and not restrict access to opportunities or disadvantage communities.

Economic prosperity: Collaboration across the freight sector to understand opportunities to reduce emissions and make the most of supply chains and modes.

Economic prosperity

The land transport system supports economic prosperity in cities, towns, and rural areas by:

- connecting people to local places for work, shopping, education, and services
- connecting businesses to their workers, customers, suppliers, and other domestic businesses
- ensuring transport improves the attractiveness of cities as places to live, work, and visit
- providing trade routes from New Zealand producers to domestic and international markets, and for imports to enter the country
- providing the backbone for safe and low-emission tourist journeys throughout New Zealand on roads, trains, ferries, and cycleways.

Why is this important?

Economic prosperity is for the wellbeing of individuals, whanau, and communities.⁹⁴ A well-performing economy needs to be productive, sustainable, and inclusive.⁹⁵

Achieving higher productivity – producing more with what we have – means there is more to go around. Wages increase faster when productivity growth is strong.

After the Second World War, New Zealand experienced less productivity growth. The country has since gone from being one of the most productive economies to one of the least in the OECD.⁹⁶

Land transport provides access to education and employment opportunities. This is fundamental for people to live prosperous lives.

While many things can be done online, physical travel is still fundamental to a well-run economy where people live fully.

There is a strong relationship between the number of employment opportunities available and economic productivity.⁹⁷ Increased productivity benefits individuals and businesses through higher income.⁹⁸

Timely and reliable freight movement is important for keeping the cost of goods and services down. Delays and inefficiencies lead to extra costs that are ultimately passed on to everyone. Road congestion costs New Zealand's economy \$1.3 billion annually.⁹⁹

Rail has an important role in moving freight to and from ports and inland distribution hubs.

In cities, the transport network can have positive or negative effects on the attractiveness and convenience of a community. Transport can also impact where economic activities are located.

Land transport is necessary, but on its own, not enough to generate significant economic prosperity at both the national and regional level.¹⁰⁰

Roading networks play a critical role in supporting economic prosperity. Yet, our high dependence on private vehicles and low use of public transport means we're missing out on key productivity benefits.

For example, one study shows public transport increases productivity between 3% and 23% over other modes, as it can move more people quickly and reduce congestion.¹⁰¹

In busy urban areas, public transport gives people more convenient and efficient options and allows other traffic, like freight, to travel more freely.¹⁰²

Before the COVID-19 pandemic, tourism was New Zealand's biggest export industry. As New Zealand's border opened only recently, there's a need and opportunity to consider the recovery of the tourism sector and its implications for the land transport system.


What are we currently doing about this outcome?

Waka Kotahi implements and supports economic prosperity locally, regionally, and nationally.

To guide planning and investment for the land transport sector, Waka Kotahi regularly consults with the industry and freight sector to improve our understanding of:

- freight movements
- freight supply
- network constraints
- consumer demand.

Waka Kotahi is supporting Te Manatū Waka with the development of the *Freight and Supply Chain Strategy*.



Land transport provides access to education and employment opportunities. This is fundamental for people to live prosperous lives.



Moving more freight by rail and coastal shipping

The implementation of the Rail Network Investment Programme (RNIP) will support a resilient, reliable network and increase rail freight volumes.

The coastal shipping activity class enables investment in new or enhanced domestic services inter-modal links, and new or enhanced maritime infrastructure.

Waka Kotahi worked with partners in the *Future of Rail Review*, the *New Zealand Rail Programme*, and the legislative framework for heavy rail planning and funding.

Waka Kotahi has responsibility for regulation of the rail transport system, including rail operator licensing, and performance monitoring.

Continuing to improve freight productivity

More than 8,200 kms of New Zealand's 11,000 kms of state highways can be travelled by high productivity motor vehicles (HPMV).

HPMV, including 50MAX, are trucks that can operate above the current 44-tonne weight limit under permit.

50MAX vehicle combinations have one more axle than conventional 44-tonne vehicles combinations. This means overall truck load is spread further with no additional wear on roads per tonne of freight.

This means 50MAX gives operators an option to carry increased payloads on parts of the network that, while economically important to New Zealand, carry lower volumes of freight.¹⁰³

Continuing to support network resilience

Specific programmes support a resilient land transport system through:

- managing and optimising highway networks
- recovering from disruptive events
- providing alternative routes for key journeys
- investing in coastal erosion protection.

Contributing to good planning and urban form

Through joint work programmes on regional and local spatial planning, Waka Kotahi is supporting integrated growth and infrastructure plans, investment, and land-use decision-making.

The *One Network Framework* supports partners with transport network classification. It connects land use and transport together, recognising that streets not only keep people and goods moving, but they're also places for people to live, work, and enjoy. This allows consideration of economic activity and growth for the future.

Continuing to improve safe access to jobs

Driver licensing and education programmes in rural communities across Aotearoa are helping people access jobs and drive safely.

Measuring progress

What targets have been set?

While there are no hard targets, Te Manatū Waka *Transport Outcomes Framework* indicates the transport system should provide reliable, multi-modal options for the movement of people and goods.

How are we tracking?

Te Manatū Waka indicators show travel times for freight got less predictable on urban roads in most cities between 2019–2020 and 2020–2021.¹⁰⁴

Population growth and emissions reduction will increase network pressure. Monitoring predictability and reliability is vital for future planning at the local and regional level.

Travel time predictability for rail freight has been relatively stable for the past decade, but predictability has reduced slightly (from 90 to 88%) in recent years.

Travel time predictability for road freight shows good interpeak predictability on key freight routes. Yet, there are times of the year when predictability lessens.

The predictability of travel times is based on a comparison to the same times and locations as the previous year. In 2020/21, because of COVID-19 lockdowns the road network experienced a decline in demand. This made journeys freer flowing, particularly on state highways near urban centres. With the return to more normal journey times in 2022, we expect higher travel time predictability in 2022–2023.

Te Manatū Waka expects the freight task to increase by 0.86% per year over the next 30 years.¹⁰⁵

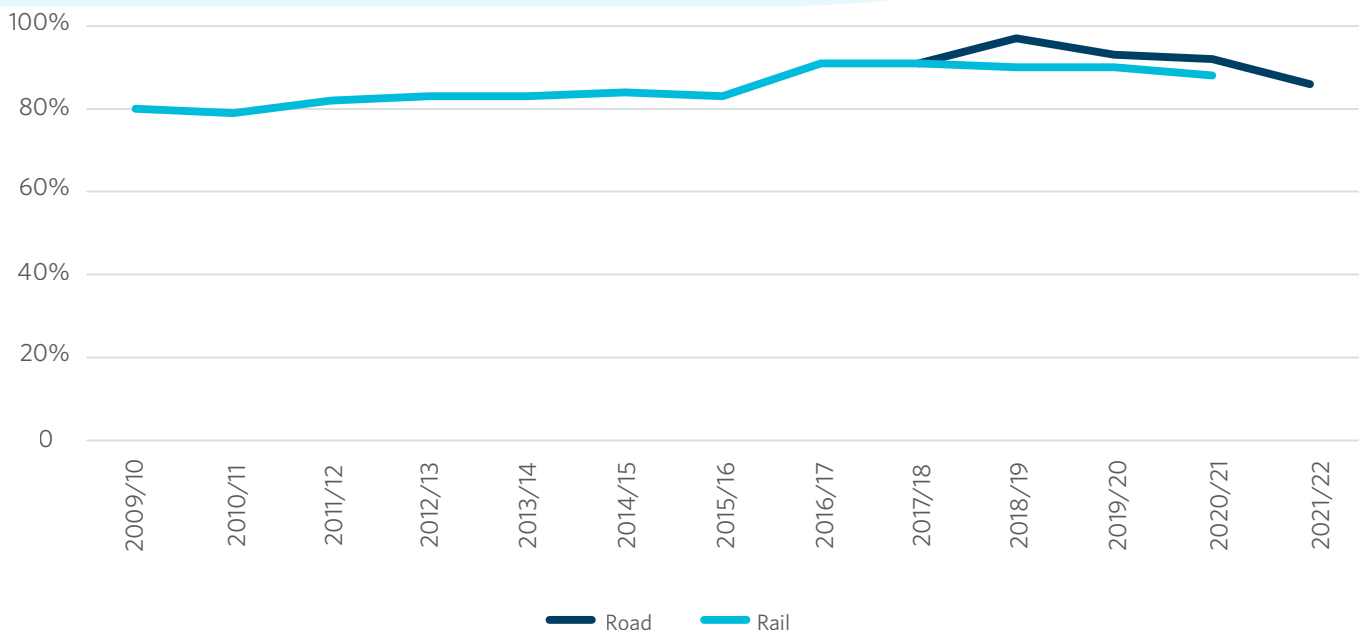
Looking ahead, what are the challenges?

Some key challenges are the lack of:

- travel time reliability/predictability for rail and road freight
- real-time data on the freight system, including the value of goods moving around the network, and data on barriers to achieve greater productivity
- sector-wide collaboration on solutions for freight
- evidence about the opportunities and challenges facing Māori entities, employers, self-employed, and employees in the transport sector.

System indicator - Travel time predictability for freight (rail and road)¹⁰⁶

Figure 11



What do we still need to work on?

New Zealand Freight and Supply Chain Strategy (Waka Kotahi support role)

Te Manatū Waka New Zealand Freight and Supply Chain Strategy will be published in 2023.

The strategy will identify what is needed to improve the system in the coming decades. It will provide direction to the transport industry and government agencies.

Waka Kotahi supports the strategy by providing evidence and insights from collaboration with the sector.

Along with the *Government Policy Statement on Land Transport*, the *New Zealand Freight and Supply Chain Strategy* will provide direction to Waka Kotahi. It will identify how to decarbonise the freight-transport system to be net-zero by 2050, while improving the efficiency and competitiveness of the supply chain.¹⁰⁷

Until the *New Zealand Freight and Supply Chain Strategy* is delivered, Waka Kotahi will continue to:

- progress with the levers identified in *Arataki 2020*
- progress actions identified in the *Emissions Reduction Plan*
- seek direction from the *Freight and Supply Chain Issues* paper.

Decarbonisation of freight (Waka Kotahi support role)

The equitable transition to a low-emissions economy is a significant opportunity to improve our economic prosperity.

The *Emissions Reduction Plan* has a target of reducing emissions by 35% from freight transport (trucks, rail, and ships) by 2035.¹⁰⁸

Targets for reducing the emissions intensity of transport fuel by 10% by 2035 will require increased use of lower emissions fuels, with potential cost implications.

Moving to a low-emissions freight transport system will help avoid the worst impacts of climate change.

Supporting resilience across road, rail, and coastal shipping will help:

- lessen disruptions from climate change
- ensure connectivity and performance of supply chains
- support the wellbeing of New Zealanders.

Densification in urban areas

New Zealand's population is expected to grow and become more concentrated, especially in urban areas.¹⁰⁹

Mixed-use development and increased freight will put pressure on our freight and supply chain system and urban networks. This includes first-and-last-mile freight delivery.

Consumer behaviour and the layout of urban centres determine the:

- distance people need to travel
- distance goods need to be moved between home, workplaces, distribution centres, and ports
- transport options for these movements.

Waka Kotahi will work with industry partners towards getting the right balance for the movement of people and goods through levers (ways of bringing about change).

Data, technology and digital

There are significant gaps in data for tourism, access to services, and interregional travel for people. The *National Freight Demand Study* was last done in 2018.

Going forward we need to improve the detail of available data, including collecting real-time data at a transactional level. We will focus on intelligent systems, like pulse analytics, to collect data and evaluate trends. Investing in digital infrastructure will help support economic prosperity.

Technology is rapidly changing and there is a risk of investing in out-dated technology.

Adopting new digital technologies has the potential to:

- transform the efficiency, safety, and sustainability of our local, regional, and global supply chains
- support tourism and accessibility.

Given the urgency of emission reduction, industry will need to respond faster than ever before.



New Zealand's population is expected to grow and become more concentrated, especially in urban areas.

Sector-wide collaboration

There is a lack of sector-wide collaboration on freight solutions. Work with the freight sector and industry is a focus area for Waka Kotahi. Coordination within the sector will improve efficiency and reliability, as well as reduce consumer costs.

Collaborative effort will help us to better understand:

- freight movements
- freight supply
- network constraints
- consumer demand.

This knowledge will improve planning and investment in the land transport network.

Areas of future focus to improve this outcome

Some areas of focus for this outcome include:

- deepening and broadening our analysis of this outcome
- ensuring the land transport system can use digital networks and tools to improve services, network management, and connectivity
- developing a shared freight evidence base across government and private sector, including collection of and improved access to high-quality data and information for better network management
- improving economic outcomes by collaborating with, and developing direction to, the freight sector
- building the evidence base about transport opportunities and challenges facing Māori entities, employers, self-employed, and employees
- implementing plans to reduce freight carbon emissions to net zero
- developing and implementing a stopping-places strategy
- planning to support amenity and infrastructure improvements
- moving to an integrated and multi-modal freight system where road, rail, and coastal shipping each play to their strengths and contribute to a safe, reliable, and resilient freight system that moves goods effectively with low emissions
- equipping appropriate remaining sections of the state highway network for use by high productivity motor vehicles (HPMV)
- supporting the development of business models and services that match goods and carriers for movement across all modes from origin to destination

- identifying the nature, scale, and location of damage to local roads from heavy freight vehicles, that pose funding challenges for affected local councils
- delivering transport infrastructure and services to maximise benefits
- ensuring regulation supports safe trialling and adoption of technologies, including new forms of mobility
- using transport to improve access to employment, education, essential services, social and cultural activities in higher-deprivation areas and isolated communities
- enabling development of key regional industries through transport investment
- ensuring availability of mobile coverage
- improving operational responses to disruptive events
- investing in metropolitan rail networks
- supporting amenity and infrastructure improvements to service international and domestic visitors
- managing rising transport costs so they don't have a negative impact on economic activity
- supporting resilient, reliable, and efficient freight and business travel
- supporting improvement of interregional passenger rail between cities
- separating freight and people on strategic networks to reduce movement conflicts
- supporting the development of intermodal freight terminals to facilitate transfers
- reducing interpeak congestion on freight networks.

Critical dependencies with other outcomes

Activities contributing to other outcomes can influence economic prosperity outcomes.

Resilience and security: Without climate adaptation to support transport system resilience, there's a risk of increased costs for people and freight. Ultimately, this will impact the economy.

Healthy and safe people: Road to Zero and *Tū Ake Tū Māia* will improve safety for people and freight with positive impacts on the economy.¹¹⁰

Inclusive access: With increased growth in urban centres, Waka Kotahi needs to work with industry and partners to achieve balance and fairness for the movement of people and goods.

Environmental sustainability: There are several focus areas within the *Emissions Reduction Plan* for which Waka Kotahi will lead or co-lead including supporting the decarbonisation of freight.



Resilience and security

New Zealand is a geologically active country. We often experience wild or extreme weather.

We face ongoing natural hazard events, like earthquakes and cyclones, that cause serious damage to infrastructure and communities.

Our transport system must anticipate both natural and human-made risks, and be prepared to recover from disruptive events.

The resilience and security outcome seeks to ensure communities can access economic and social opportunities regardless of unplanned disruptions to the transport system.

This outcome covers a range of issues and interventions for transport.

Resilience and security both deal with hazards and disruptions to the land transport system, whether they are natural (resilience) or human-made (security).

Challenges of resilience and security are vast and growing. Existing hazards such as seismic and volcanic activity remain. The risks and effects of climate change are rising.

New security risks could emerge as the transport system becomes more complex, interconnected, and integrated with digital systems.

There is no hard target for resilience and security. However, there is an expectation transport will support resilient and secure communities that can recover quickly and effectively from disruptive events.

This can be done across multiple activities, from strategies and plans through to delivery and operation.

Why is this important?

A well-functioning transport system is vital for responding to emergencies quickly. It helps communities and businesses resume activity after an emergency.

Planning for climate adaptation is critical to manage current and future vulnerabilities in the transport system.



Planning for climate adaptation is critical to manage current and future vulnerabilities in the transport system.

What are we currently doing about this outcome?

Improving resilience

Resilience risks are always changing.

Factors like a growing population, increasingly interconnected networks, and climate change affect distribution, frequency, and exposure to potential disruptive events.

Waka Kotahi has a range of activities to address resilience.

Waka Kotahi participates in the New Zealand Lifelines Council.¹¹¹ This council is made up of lifeline-utility organisations, like power companies, across government and sector boundaries. They work together to improve infrastructure resilience at a national and regional level.

The *Waka Kotahi Resilience Framework* outlines the strategic approach to land transport resilience.¹¹²

The *Resilience Framework* adheres to four principles:

- reduction of risk
- readiness
- responsiveness
- recovery.

It takes a holistic approach, covering the economic, physical, social, cultural, and impacts of risks and shocks.

One framework outcome is for communities to be less exposed to and better prepared for natural hazards and disruptive events.

The *National Resilience Programme Business Case* is an output from the *Resilience Framework*.¹¹³ It provides an evidence base for future planning and investment decisions. It identifies and rates current and future natural hazard risks to the land transport system.

High-priority risks need a range of responses. They also need a long-term view to consider the changing hazards of climate change.

An integrated-system response doesn't assume infrastructure will be maintained or upgraded to lessen risk – other interventions will be considered.

Response options include:

- **avoid** – avoid placing infrastructure in high-risk locations where possible
- **defend** – develop solutions to lessen the risk of disruption, like flood protection or slope stabilisation
- **accommodate** – plan for periodic disruption, like providing for rapid reinstatement, detour routes, and/or timely information
- **retreat** – re-route journeys away from the impacted area.

Adapting to climate change

Climate change (particularly sea level rise and more extreme/severe weather events) is increasing risks to the transport system.

Managing this risk will require adaptation across local and central government, communities, and iwi.

The *National Climate Change Risk Assessment* identified consequences for the land transport network because of temperature changes, severe weather events, and rising sea levels.¹¹⁴

The *National Adaptation Plan* focuses on:

- reducing vulnerability to climate change impacts
- enhancing adaptive capacity
- considering climate change in all levels of decision making
- strengthening resilience.¹¹⁵

This means infrastructure assets are made less vulnerable. This can be done by using renewal programmes to:

- improve adaptive capacity
- carry out preventative maintenance
- ensure new infrastructure is ready for climate change.

Waka Kotahi has developed *Tiro Rangi - Our Climate Adaptation Plan*. *Tiro Rangi*:

- shapes the Waka Kotahi response to the changing climate
- describes the role of Waka Kotahi in climate adaptation across the land transport system
- picks up the four National Adaptation Plan actions that Waka Kotahi leads or co-leads.

Tiro Rangi identifies priorities that underpin a Waka Kotahi adaptation response including:

- better understanding climate risks
- embedding climate adaptation into planning and decision making
- applying a Te Ao Māori worldview.

Improving security

As a crown entity, Waka Kotahi has adopted the *Protective Security Requirements*.¹¹⁶ These requirements outline expectations for:

- personnel
- information
- physical security
- security governance across public sector organisations.

Concerns about personal security can influence people's use of the land transport system, like active modes (walking and cycling) and public transport.

Some concerns might include being involved in an accident or being the victim of criminal offences, violence, or threats.

Issues can include:

- routes with poor visibility or lighting
- concealment spots
- lack of surveillance.

Early consideration of crime prevention through environmental design can help address these issues.

Waka Kotahi participates in the government's *New Zealand Crowded Places Strategy*.¹¹⁷ This strategy serves as a guide for owners and operators of crowded places. It advises on best practices for protecting people working in, using, or visiting public spaces.

Waka Kotahi has developed the Land Transport Security Programme 2022. The programme provides structure to prioritise, guide, and coordinate ongoing Waka Kotahi activities. It provides a strategic work programme to improve security of the land transport system, including people and assets.

Measuring progress

How are we tracking?

There are a few ways to measure how we're tracking and the progress being made.

The cost of emergency works on state highways is increasing, partly because of the increased number of storm events. This trend is expected to continue.

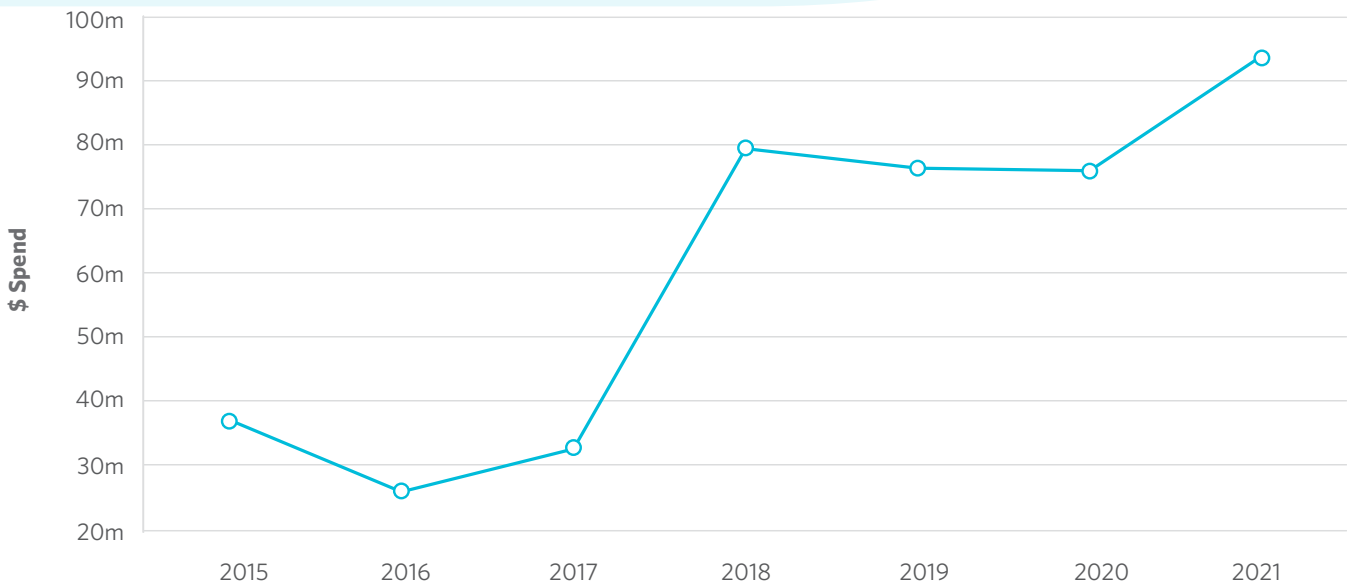
The *National Adaptation Plan* has highlighted the scale of the climate adaptation challenge and improved understanding of climate-related impacts.

Actionable data on climate impacts and resilience risks has improved through the *National Adaptation Plan* and the *National Resilience Programme Business Case*.¹¹⁸ This will inform future decision making.

System-wide action on climate adaptation has grown. This is because of national initiatives funded through the Climate Emergency Response Fund (CERF) and regional adaptation plans through local government.

System indicator – Annual cost of emergency works¹¹⁹

Figure 13



Looking ahead, what are the key challenges?

Some key challenges for this outcome in the future include:

- New Zealand is subject to significant seismic and geological risks.
- There is a lack of redundancy in parts of the land transport system – some regions rely on one or two critical lifelines to stay connected to neighbouring regions.
- Some existing corridors have a high risk of disruption. Climate impacts are expected to increase these risks.
- Climate change is already contributing to extreme and severe weather events resulting in more frequent flooding and bush fires. These events will happen more often.
- The rising costs of maintaining and repairing networks amidst growing disruptive events, like storms, flooding, sea-level rise, and high temperatures.
- Inconsistent and ad hoc approaches have been used across the transport sector to assess and respond to security risks.
- Māori communities in isolated rural and coastal areas will be disproportionately affected by the impacts of climate change.
- Further evidence is required on the locations of marae and their exposure to sea level rise, taking into account land movements from plate tectonics, volcanic activity, soil subsidence and other factors.

What do we still need to work on?

Improving resilience from natural hazards

An update to the *Strategic Resilience Framework* is underway and outlines key shifts for improving resilience:

- **Community-focused** – move away from asset or network availability towards community impacts. Improve understanding of different communities' tolerance and acceptance of risk, and how to maintain access to economic and social activities.
- **Collaborative** – work better with partners to improve transport resilience across the full transport system.
- **Comprehensive** – consider resilience across all hazards and risks and best ways to respond.
- **Pro-active** – be active and pre-emptive across the four principles of reduction of risk, readiness, responsiveness, and recovery. Consider a wide range of approaches to resilience risks.

The *National Resilience Programme Business Case* will aim to act and respond to priority risks. It will use the framework of avoid, defend, accommodate, retreat. It will consider and group risks according to region, corridor, and/or journey.

The programme of improvements in the *National Resilience Programme Business Case* include projects that will:

- reduce risk from natural hazards
- improve readiness of the transport system
- inform investment decision making for resilience.

Some improvements to be delivered include evaluating detour routes for key corridors and support plans for major risks, like seismic events.

We don't have shared data across the system about climate hazards and risk.

The *National Resilience Programme Business Case* does identify existing extreme and major risk sites along the state highway network. However, there's a lack of resource to address all sites. It also doesn't consider the locations of emerging risks.

Waka Kotahi is working on a resilience data platform. This will integrate data on historical risks and potential future impacts. It will help us understand current and future resilience challenges, including climate change.

This will help Waka Kotahi develop land transport resilience strategies, as well as social and economic assessment tools. These can be used to build resilient communities and infrastructure. They will assist land transport investment partners to prioritise effort and make informed decisions.

Adapting to climate change

The *National Adaptation Plan* has several actions across infrastructure and the built environment that will be lead, or supported, by Waka Kotahi.

As part of the development of *Tiro Rangi*, Waka Kotahi investigated nature-based solutions to climate adaptation.

The Climate Emergency Response Fund has funded the Māori Climate Action Platform. This will look into Māori-led responses to climate adaptation and mitigation.

Resource management reforms will inform future planning for resilience and climate change. Waka Kotahi will continue to work with local government on resilience and climate adaptation strategies. Future work will include looking at regional spatial strategies and managed retreat.

Our first *Tiro Rangi* laid the foundations for the next couple of years. Initially, actions build on existing initiatives. Those that unlock future action are prioritised.

Waka Kotahi will develop climate-change risk assessment tools specifically for the state highway network.

Improving security


The Land Transport Security Programme will initially focus on ensuring:

- security needs of land transport assets are met
- future assets are designed with protective security measures that are flexible and responsive to changing needs.

Like resilience, preparedness is a key component of land transport security. To improve our responsiveness and planning for emergencies, Waka Kotahi will create asset response plans to prepare for many security situations. This will take an all-hazards approach across the system and supply chain.

Waka Kotahi will continually update the security outlook for the land transport system. It will do this by ensuring:

- information is timely and effective
- intelligence flows internally for decision makers and partners.



Waka Kotahi is working on a resilience data platform. This will integrate data on historical risks and potential future impacts.

Areas of future focus to improve this outcome

Some areas of focus to improve this outcome:

- include climate adaptation in national and regional transport planning processes as part of a multi-outcome approach to build community resilience
- incorporate physical- and digital- security standards into all stages of building, management, and operations
- collaboratively build spatial tools to assess geological and hydrological risk so the transport sector can understand risk across the network
- make sure cybersecurity risks are safely managed across a connected transport system
- embed Te Ao Māori views into regional and local transport planning to work with communities on adaptation responses
- support the development of a digital resilience platform to understand risk across the transport network
- support planning and design work that prioritises natural hazards in high-risk areas with vulnerable communities and infrastructure
- plan and invest in extreme resilience risks on the state highway network
- use an adaptative planning approach to network disruption
- identify alternate places, routes, and modes to support resumed networks in times of disruption
- use local planning processes to prepare for climate issues
- plan with communities for when to defend, accommodate, and/or retreat
- better understand if access to Māori communities is more sensitive to climate-change impacts and where these impacts could be most felt
- better understand the locations of marae and their exposure to sea-level rise and other land factors like plate tectonics, volcanic activity, and soil subsidence.

Critical dependencies with other outcomes

Activities contributing to other outcomes can influence resilience and security outcomes.

Environmental sustainability: Activities that reduce carbon emissions can influence resilience. Reducing carbon emissions is critical to minimising climate impacts and helping climate adaptation.

Inclusive access: Equitable access to all modes and improved urban form can help communities take advantage of social and economic opportunities. This can help communities recover from disruptive events.

Economic prosperity: Improving the ability to move freight by rail and coastal shipping can:

- increase redundancy of nationally and regionally significant freight connections
- lead to less disruption of the transport system.

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