Arataki

Land transport modes and strategic networks

September 2023 v1.1

WAKA KOTAHI
NZ TRANSPORT
AGENCY

Te Kāwanatanga o Aotearoa
New Zealand Government

Contents

The September 2023 v1.1 release of *Arataki* includes updates to reflect the severe weather events of 2023 and correct minor errors.

Land transport system | modes

The land transport system refers to the movement of people and goods. It affects individuals, households, businesses, and communities. It includes all institutions, networks, purposes, and ways of travel (modes). It excludes pipelines, and separate but related parts of the wider transport system including aviation, maritime, and outer space.

There are several modes in the land transport system. These ways of moving play different roles based on their strengths, locations, networks, levels of service, and user preferences.

Historical user preference for road-based modes for moving people and goods as well as population changes have led to relatively high investment in road networks over time, an approach referred to as 'predict and provide.'

The mix of modes will change in the future as we reduce emissions, make the most of existing networks, and encourage use of public transport modes, like rapid transit and public transport.

This reflects a 'decide and provide' approach by proactively planning the desired future we want, then consistently making decisions based on what's needed to achieve this.

However, there are challenges to work through, like how we manage different modes and how they interact (such as cycling on busy roads). There are long-standing safety issues to address, such as with a road network that doesn't forgive drivers' mistakes. There are conflicts of place and movement where highways pass through communities that need to be resolved.

Walking, cycling, and micromobility

Walking and cycling are the most affordable modes of transport. These healthy and sustainable travel choices support vibrant towns and cities.

Sixty-five percent of all trips are under 5kms, within reach of a short walk or bike ride for most people.[1] As populations grow and become more concentrated in our largest cities, the role of walking and cycling for short trips will become more important.

In 2018, walking made up 10% of total time travelled and 12% of all trips.[2] Older and younger people walk more than those aged 25 to 64 years old.[3] Those more likely to walk also include people on a lower income, without a driver's licence, and without access to a vehicle.[4]

Walking and cycling trips to work have been in decline over the last 50 years. Walking trips dropped from 14% in the 1970s to 7% in 2013 – cycling went from 4% to 3% respectively.[5] Cycling makes up only 1% of trips nationwide, because of safety risks and concerns.[6]

Use of walking and cycling varies greatly around the country because of:

• land-use patterns
• quality of networks
• levels of service (like comfort, safety, and convenience).

While current walking and cycling numbers are relatively low, there is high demand for better infrastructure for both. In urban centres, 75% say they would cycle more if the network better met their needs.[7]

The 2014–2018 Urban Cycleways Programme was designed to fast-track cycling network development in urban areas and improve safety (and perceptions of safety) for people on bikes.

This investment of over $333 million is already showing results. For example, since the 2012 development of the north-western cycleway in Tāmaki Makaurau Auckland, the number of people cycling has quadrupled.

Manatū Hauora Ministry of Health is looking closer at the benefits that result from walking and cycling. Their findings help the transport system support positive health outcomes instead of compounding them through road trauma, air and noise pollution, and physical inactivity. In 2010, the annual national cost of physical inactivity was $1.3 billion.[8]

Micromobility is growing in our towns and cities. On-demand and private e-scooters, electric skateboards, and other small electric devices, are helping people move. They can be especially useful for the first and last parts of a trip, like from home to public transport and then to work. Mobility scooters for older people and electric wheelchairs also help people get around.

Challenges

Safe cycling networks are still extremely underdeveloped. Existing infrastructure is often disconnected, making safe journeys impossible.

In June 2022, only 17% of cycling networks in the largest centres provided safe, connected journeys to key destinations.[9]

Further investment and decisions about land use are necessary to provide safe and convenient travel choices. This will improve access to key places like schools, workplaces, urban centres, recreational facilities, and public transport hubs.

There are challenges to integrating new cycling infrastructure into existing road and pedestrian networks.

In urban areas, there are often competing priorities for parking, vehicle movement, and people. Multimodal transport networks in high-quality environments with lots of walking and cycling can conflict with vehicle movement.

Walking and cycling rely on safe, convenient, and easy to use routes. This requires careful integration between transport networks, land-use, and urban design.

There are also conflicts of different modes on footpaths, like between pedestrians, e-scooters, and other small electric devices. As walking and micromobility continue to grow, we need to consider how these modes can share space safely and efficiently.

Government is working to simplify the process for making changes to street layout. This will allow more dedicated street space to prioritise active modes.[10]

Five short-term focus areas for cycling are:

- target the rapid completion and promotion of strategic networks in urban centres (including facilities to make journeys easier) with a focus on short journeys for everyday purposes, using road space allocation as first preference
- continue to grow and connect safe urban cycling networks in regional centres
- promote economic development through safe on-road links between the New Zealand Cycle Trail Great Rides and other cycle trails
- encourage activities that maximise use of cycling infrastructure, such as engagement, education, and promotion
- lift the confidence and capability of cyclists, especially young cyclists entering the transport system for the first time.

Investment in walking follows similar principles to cycling. This focuses on safe and easy access to public transport hubs. It supports local journeys within and around activity centres.

The future

Growth in e-bikes and micromobility devices, like e-scooters, is:

- changing how people get around
- improving access to cycling
- changing the cycling experience.

Electric bike sales have doubled year-on-year since 2013.[11] Bikeshare schemes have launched in Tāmaki Makaurau Auckland, Te Whanganui-a-Tara Wellington, Ōtautahi Christchurch, and Tāhuna Queenstown. These activities feed into future mobility as a service and travel-demand management.

These transport devices may require new regulation and policy to manage conflicts and support users. For example, footpaths may need to widen to cope with two scooters passing. Kerb design and new services, like charging stations, may need consideration and management.

Cycle counters monitor the number of people using the cycling network. Counters enable smart, targeted investment and behavioural change.

Investment to encourage new users of active modes and improve road-user behaviour will continue to be important. A national cycling education system is in place to provide bike-handling skills.

Walking is expected to grow in urban areas and around concentrated activity centres. Here the focus is to create high-quality public spaces and provide safe, enjoyable walking facilities.

Additional focus areas are:

- supporting walking trips to and from school
- integrating walking with other modes, like public transport
- getting the transport network set up well in new development areas to create walkable neighbourhoods
- providing neighbourhoods with more route choices, direct routes, and routes that are close to key destinations
- designing walking infrastructure in towns and cities for universal access so all users can move around safely and easily.

Public transport

Public transport provides mobility to a large and diverse range of people. It is a space-efficient, sustainable travel option ideal for journeys that are too far to walk or cycle. Public transport doesn't require private vehicle ownership or use.

To make public transport an attractive travel option for a growing number of journeys, it needs to be:

- affordable
- accessible
- frequent
- reliable
- safe
- efficient.

Use of public transport grows when it's integrated with walking and cycling networks. This also helps people get physical exercise as part of their everyday routine.

Challenges

Key challenges for public transport in Aotearoa New Zealand are:

- past under-investment in public transport services and infrastructure – despite recent efforts, public transport often remains an unattractive travel choice
- insufficient corridor space in some parts of Tāmaki Makaurau, Te Upoko o te Ika a Māui Greater Wellington, and Ōtautahi to allow growing demand for peak-period bus services – this impacts service reliability and efficiently, as well as the comfort and quality of public spaces
- attraction and retention of bus drivers to offer a reliable service
- fleet transition from diesel to electric
- dispersed land-use patterns in urban areas that make it difficult to deliver attractive and efficient service
- quality and convenient services to attract and retain customers that factor in comfort, safety, accessibility, and other network connections
- regulation and funding keeping pace with change and innovation
- financial viability of public transport in areas with small populations and dispersed land – services have low users, high subsidies, and struggle to compete with car use in areas of little traffic and affordable (or free) parking
- traditional public transport services focused on larger vehicles travelling on fixed schedules along set routes – this doesn't necessarily meet peoples' travel requirements, like accessing essential services in ageing, rural communities.

The future

Public transport needs to play a much greater role in meeting travel demand. This will help Aotearoa achieve its goals of emissions reduction and inclusive access. It will also reduce congestion in major cities.

Public transport needs to move away from providing basic access and peak-time commuting. Instead, services should aim to be an attractive travel choice for a greater number, and wider variety, of journeys.

This will require:

- scaling up existing modes
- providing services to education, health, and employment centres
- taking advantage of developing technologies.

In growing cities, new public transport networks will act as the spine of future networks to support growth patterns.

Electric and faster ferries will play a role in improving connectivity. They'll transport people from further afield, like Te Tara-O-Te-Ika-A-Māui Coromandel to Tāmaki Makaurau. Ferries and water taxis will also support resilience, like after a weather event or where maintenance is difficult.

Key factors for future public transport planning are:

- making significant improvements in large and fast-growing cities to encourage mode shift, reduce vehicle travel, ease congestion, and shape urban form
- integrating land use and transport planning from the beginning, ensuring public transport supports growth and land use
- looking for opportunities for transit-orientated development
- exploring opportunities to improve public transport service coverage and reliability as new modes and approaches become available
- planning focused on the sequence and priority of improvements, to improve service frequency, and reallocate road space to improve efficiency and reliability
- providing access as the population ages and fewer people hold a driver's licence and own a car
- meeting increased customer expectations for personalised journeys
- ensuring ongoing improvements to facilities to meet customers' needs
- delivering a better, more efficient service using developing technologies, like payment systems, real-time customer information, and driverless options
- developing and integrating new types of public transport, like mobility as a service, integrated ticketing and payments, and bikeshare schemes.

Rapid transit

Rapid transit forms the backbone of public transport networks in Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington. It provides fast, frequent, and reliable access for large numbers of people. It uses strategic corridors that are separated from other modes and unaffected by traffic.

Rapid transit plays a key role in the wider transport networks of these large urban areas especially in:

- connecting and providing access to major high-density employment centres
- allowing large volumes of people to travel quickly, efficiently, and reliably.

However, developing, upgrading, and operating these networks cost billions of dollars and can take more than a decade to complete.

The high costs, extreme complexity, and wide benefits of rapid transit mean investments need careful planning to deliver value for money.

Rapid travel also needs to consider how factors like ageing populations and the rise in remote working will affect future use and demand.

Challenges

Rapid transit infrastructure and services have several significant challenges.

Unlike state highways, there is no clear policy, funding, or delivery framework for rapid transit. A lack of clarity about roles and responsibilities, planning processes, funding arrangements, and decision-making processes means key issues need to be resolved on a project-by-project basis.

Historic under-investment in public transport, especially during the second-half of the 20th century, means rapid transit networks are under-developed in many cities, especially Tāmaki Makaurau, when compared internationally. Significant investment is needed to bring existing networks up to standard, like passenger rail in Tāmaki Makaurau and Te Upoko o te Ika a Māui, let alone meet future needs.

Decisions around corridors, mode, and timing have become highly politicised in recent years as there is no policy framework nor has network planning been done. The high cost and profile of rapid transit projects has also been a contributor. There remains significant risk of churn in progressing key investments. We need to clearly define when rapid transit is and isn't required.

Achieving value for money and realising the scale of potential benefits from rapid transit projects require strong integration with growth and urban development decision making. Current processes for achieving integration are generally unclear or undeveloped.

The role of Waka Kotahi in Transit Orientated Development (TOD) projects needs more clarity and is likely to be location specific.

For example, Waka Kotahi could be an investor in major transport infrastructure that unlocks a TOD partnership or could facilitate urban development by influencing partners at the planning and investment stage with minimal investment in the transport system.

Working out where, when, and how to use rapid transit requires dedicated planning. This work must factor in the complex changes to key drivers, like demographics, technology, and travel patterns, as well as the scale of change needed to achieve outcomes, like emissions reduction.

The future

In recent years, rapid transit planning has progressed in many large cities.

In Tāmaki Makaurau, a 30-year rapid transit plan is being developed to:

- confirm the rapid transit corridor needs over the next three decades
- provide an overview of the full network as the starting point for more detailed project development
- indicate how improvements should be phased over time.

Project planning work is underway for many corridors, alongside construction of the City Rail Link, Eastern Busway and other network upgrades.

Working out where, when, and how to use rapid transit requires dedicated planning.
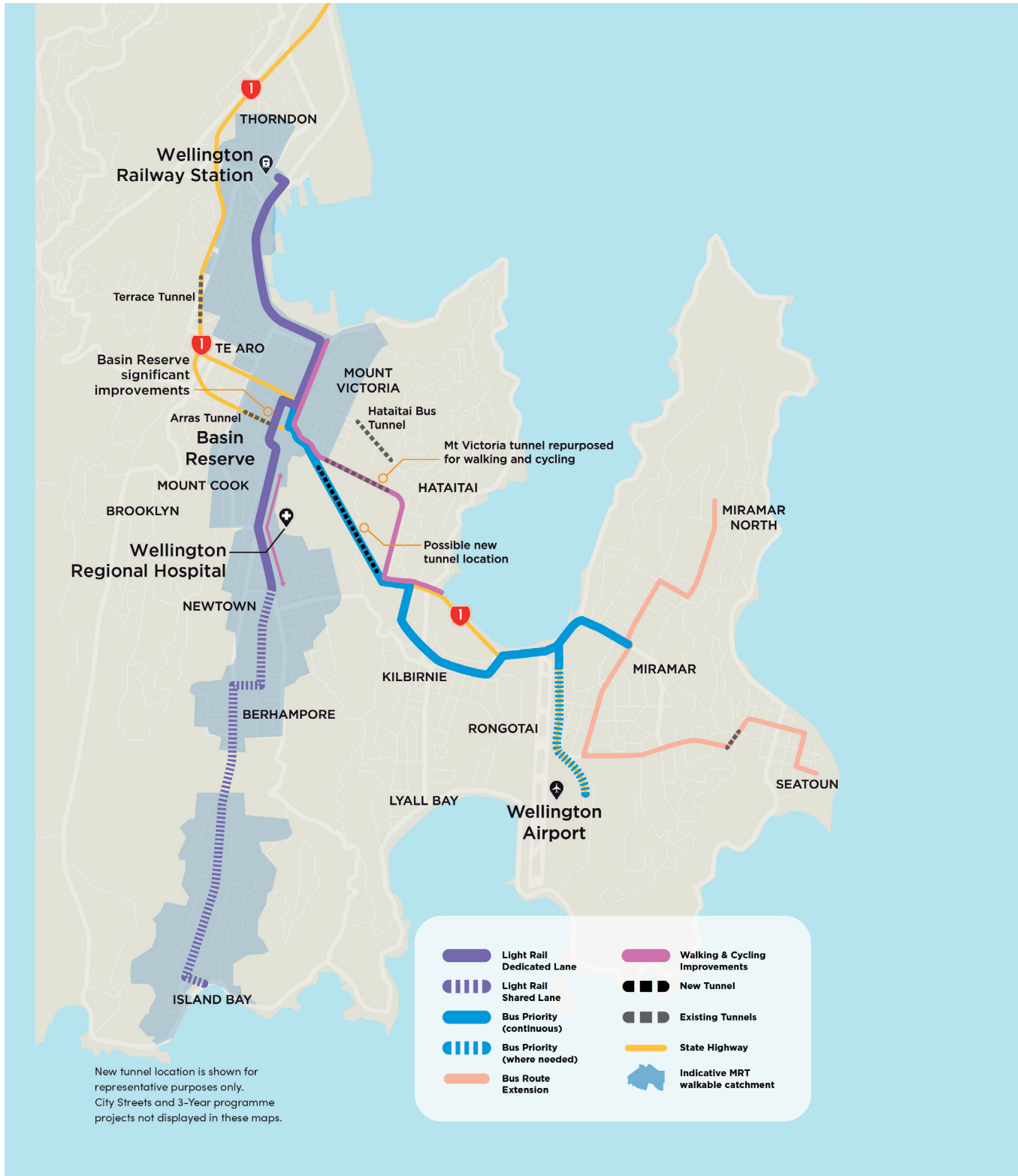
Draft Auckland rapid transit network blueprint

LIKELY MODE

- ▬ Bus Rapid Transit
- ▬ Light Rail
- ▬ Heavy Rail
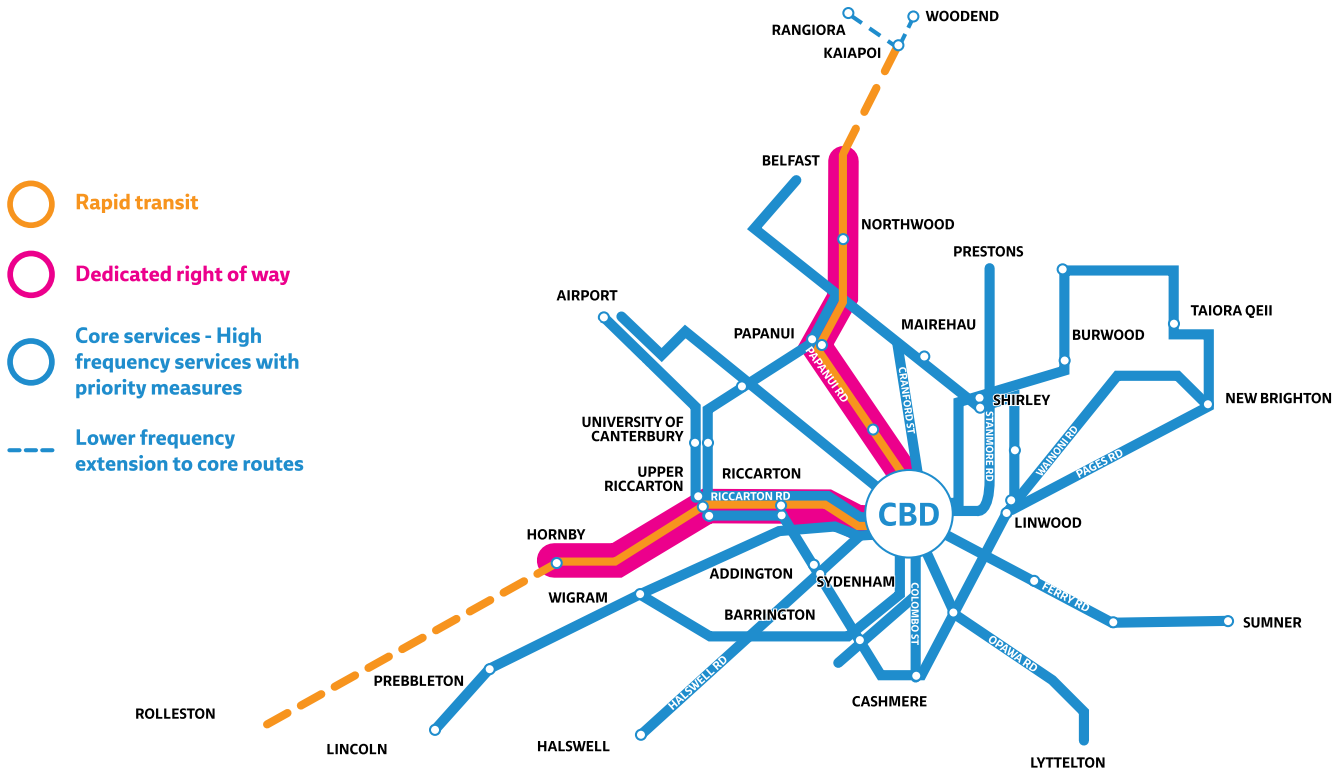- •••• Route and mode to be confirmed

I008359_08.03.23

In Te Upoko o te Ika a Māui Greater Wellington, planning and improvements to the rail network continue to meet current and future needs. The Let's Get Wellington Moving programme has identified a new rapid transit corridor to the south of the city centre.[12]

Let's Get Wellington Moving preferred option

THORNDON

Wellington Railway Station

Terrace Tunnel

TE ARO

Basin Reserve significant improvements

Arras Tunnel

Basin Reserve

MOUNT VICTORIA

Hataitai Bus Tunnel

Mt Victoria tunnel repurposed for walking and cycling

MOUNT COOK

BROOKLYN

HATAITAI

Wellington Regional Hospital

MIRAMAR NORTH

Possible new tunnel location

NEWTOWN

BERHAMPORE

KILBIRNIE

MIRAMAR

RONGOTAI

SEATOUN

LYALL BAY

Wellington Airport

ISLAND BAY

Legend:
- Light Rail Dedicated Lane
- Light Rail Shared Lane
- Bus Priority (continuous)
- Bus Priority (where needed)
- Bus Route Extension
- Walking & Cycling Improvements
- New Tunnel
- Existing Tunnels
- State Highway
- Indicative MRT walkable catchment

New tunnel location is shown for representative purposes only. City Streets and 3-Year programme projects not displayed in these maps.

In Ōtautahi Christchurch, long-term public transport and spatial planning work have identified the need for new rapid transit corridors to the north and southwest of the city.[13]

Proposed Christchurch public transport network

Legend:
- Rapid transit
- Dedicated right of way
- Core services - High frequency services with priority measures
- Lower frequency extension to core routes

In other major urban areas, like Kirikiriroa Hamilton and Tauranga, spatial planning has identified the potential need for future rapid transit corridors. These will deliver key transport outcomes and shape the future urban form of these cities.

Te Manatū Waka Ministry of Transport is developing a *Rapid Transit Framework* to provide a clearer, nationwide approach to planning, funding, and delivery of rapid transit.

Once in place, the framework will allow work on rapid transit to progress in an efficient and effective manner.

In the meantime, effort is focused on:

- planning to protect future corridors
- delivering several in-flight projects around the country.

Heavy rail

The rail network consists of the main trunk line stretching from Tāmaki Makaurau Auckland to Invercargill. It's connected across the Cook Strait by ferry with spurs to Te Tai Tokerau Northland, Te Moana a Toi-te-Huatahi Bay of Plenty, Taranaki, Te Matau-a-Māui Hawke's Bay, and Te Tai o Poutini West Coast.

Rail serves all ports except Northport (Marsden), Tairāwhiti Gisborne, and Whakatū Nelson.

Double-tracked lines run from Tāmaki Makaurau to Kirikiriroa Hamilton, along most of the metro lines in Tāmaki Makaurau and Te Upoko o te Ika a Māui Greater Wellington, and some lines around Ōtautahi Christchurch. The remaining network is single track with passing loops.

Most of the rail network is used for freight. Rail transports around 25% of New Zealand's exports and has a natural competitive advantage for moving heavy goods over longer distances.[14]

Rail provides a lower-carbon alternative for freight transportation when compared with road, with 66% fewer carbon emissions per tonne of freight moved.[15]

Nearly half of freight tonnage is carried by rail in the golden triangle between Tāmaki Makaurau, Kirikiriroa, and Te Moana a Toi-te-Huatahi. Rail is a critical part of the freight supply chain to the Port of Tauranga, New Zealand's largest export port.

The Tāmaki Makaurau and Te Upoko o te Ika a Māui rail networks are electrified, as is the section of the North Island Main Trunk Line between Kirikiriroa and Papaioea Palmerston North. The remainder of the network is operated by diesel locomotives.

In Tāmaki Makaurau and Te Upoko o te Ika a Māui, commuter rail services are an important part of the rapid transit system, particularly in and out of city centres.

Rail offers some of the most acclaimed luxury tourism journeys in the world through The Great Journeys of New Zealand. Rail carries an increasing number of tourist passengers each year. The three long-distance passenger services are:

- Tāmaki Makaurau to Te Whanganui-a-Tara Wellington (Northern Explorer)
- Ōtautahi to Māwhera Greymouth (TranzAlpine)
- Waitohi Picton to Ōtautahi (Coastal Pacific).

Challenges

Current operational challenges for rail include:

- continuing the Main North Line rebuild effort (Kaikōura coast) to move goods in the South Island, reconnect communities, and ensure Aotearoa New Zealand has an efficient rail network across both islands
- servicing growing commuter and freight demand on urban networks, particularly in the Tāmaki Makaurau Auckland region
- maintaining a strong focus on safety, including improvements to level crossings with higher frequency train movements, particularly in Te Upoko o te Ika a Māui Greater Wellington and Tāmaki Makaurau
- building network resilience, like planning for extreme weather events and climate change
- maintaining aged rolling stock – many parts of freight rolling stock are past end-of-life and require significant maintenance that can limit capacity in some areas.

Rail also faces several strategic challenges:

- increasing mode share, and encouraging rail as a sustainable transport solution and alternative to increasing traffic congestion in urban areas
- working across the transport sector to integrate transport planning and maximise the value and usefulness delivered by each mode.

The future

Rail will play a key role in supporting export trade and providing resilience to the broader transport network.

Points of difference are likely to remain:

- separate corridors
- unobstructed access to key freight hubs
- low-carbon emissions.

Rail also plays a key role in

- reducing road maintenance and upgrade costs
- easing traffic congestion
- providing an alternative transport mode for resilience purposes.

The ability of rail to provide additional freight capacity on key routes across the network is an opportunity for future growth.

In the short-to-medium term, it's expected rail will provide support to meet future demand for rapid transit in Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington. In South Auckland, there will be scope to extend commuter services to support population growth.

Rail for interregional tourism and interregional passenger services should be explored for future opportunities and offerings, especially for the choice and efficiencies that can be gained for customers.

Coastal shipping

As an island nation, coastal shipping and ports are vital to our transport system.

Ports are the access point for much of the country's imports and exports. Coastal shipping moves bulky items, particularly for longer interisland journeys.

The Cook Strait ferries are a critical link between the North and South Islands for:

- passengers
- freight-carrying trucks
- freight-carrying trains on roll-on roll-off (RORO) ships.

Coastal shipping provides longer interregional journeys within Aotearoa to move large, bulky items like logs, cement, containerised goods, and fertiliser.

Coastal shipping carries around 14% of all freight-tonne kilometres travelled in Aotearoa and 2% of tonnage.[16] Coastal shipping adds resilience to the overall transport system by providing options and capacity.

Major coastal ports include:

- Northport (Whangārei)
- Port of Tauranga
- Port of Auckland
- Lyttelton Port.

Land transport port connections are some of the most important corridors in the transport system.

Inland ports continue to develop in Aotearoa and play an important role in:

- sorting and distributing freight away from seaports
- freeing up constrained port land for maritime activities.

Key inland ports include Southdown (Penrose, Auckland), Wiri (South Auckland), Ruakura (Hamilton – currently under construction), and Rolleston (Christchurch).

Inland ports influence the type of transport mode freight is distributed on. This means it is vital inland ports are in the right place to allow use of different transport modes, like road freight, rail, or air.

Ports are important for the movement of people. Aotearoa currently has commuter ferries in Tāmaki Makaurau Auckland, Tauranga, Te Upoko o te Ika a Māui Greater Wellington, and Ōtautahi Christchurch.

These ferries reduce peak-hour congestion by moving people who might otherwise travel on roads. The country's ports also provide a key tourism channel for visitors on cruise ships.

Challenges

Current operational challenges for coastal shipping include:

- addressing labour shortages and an ageing workforce, particularly as the sector grows following investment through the Coastal Shipping Activity Class, and with several companies launching a new coastal shipping service
- competing with international shipping services for domestic cargo, and import and export cargo transhipment when freight is transferred between ships or different forms of transport
- handling supply-chain disruption, like the effects of COVID-19, felt at ports that handle large volume imports and exports.[17]

Coastal shipping also has several strategic challenges including:

- increased mode share
- the role of coastal as a sustainable transport solution
- work across the transport sector to integrate transport planning
- work to maximise the value and utility of each mode
- changes to and pressures on international supply chains
- the ability for port facilities to service larger vessels.

The future

There's an opportunity for coastal shipping to play a greater role in moving freight around the country. This could support:

- additional resilience in the supply chain
- smaller ports and regions connected directly to their markets
- re-prioritisation and locations of existing ports
- making the most of the existing freight network and existing connections, like rail.

Investments made through the Coastal Shipping Activity Class in the 2021–24 National Land Transport Programme will make coastal shipping a viable alternative to strengthen and diversify our domestic supply chain.

Road transport

Roads are the most important element of our domestic transport system. Roads enable journeys by:

- private motor vehicle
- heavy vehicle
- bus
- bicycle
- foot.

Road corridors support other important infrastructure like:

- water
- power
- gas
- telecommunications networks.

Road transport makes up 84% of freight land movement. Road tonnage per kilometre has increased over time, from 19 billion tonne km in 2005–2006 to 30.1 billion tonne km in 2017–2018.[18]

Goods vans, trucks, and utility vehicles make up 15% of the total Aotearoa vehicle fleet.[19]

The New Zealand road network is made up of two broad classifications: state highways and local roads.

The state highway network connects all main population centres, seaports, and airports. It is one of the country's most important pieces of infrastructure. The state highway network makes up 12% of New Zealand's total road network, but carries 50% of vehicle traffic.[20]

Local roads are administered by city and district councils. They range from low volume residential streets to large arterials that move high volumes of people and goods.

The local road network provides coverage across urban and rural areas. Most journeys start and end on the local road network. The local road network is critical to enabling local journeys. It also connects the primary sector to wider distribution networks.

In 2020, there were over 4.4 million registered motor vehicles that were driven 46 billion kilometres.[21] Of this fleet total, just over 90% are light vehicles.[22] Seventy-seven percent of the light fleet is petrol engine.[23]

The heavy fleet consists of trucks and buses. The remaining categories include motorcycles and unclassified vehicles, like agricultural equipment.[24]

While the national average of light vehicle ownership is high, there is significant regional variation. For the last decade, Te Upoko o te Ika a Māui Greater Wellington and Tairāwhiti Gisborne had the lowest ownership rates per capita.[25]

South Island regions, except Ōtākou Otago, are well above the national average.[26] In the North Island, only Te Moana a Toi-te-Huatahi Bay of Plenty is consistently above the national average.[27]

While cars have become more efficient, we're buying larger vehicles and driving further. This means emissions reduction is less than expected.

In 2020, the average CO_2 emissions of light vehicles entering the fleet was 191 g/km, a 19% decrease from 2005.[28]

In 2022, 21% of passenger vehicle imports were reduced-emission vehicles.[29]

The average age of the vehicle fleet is getting older. In 2020, it was 14.3 years.[30] This means a higher proportion of cars on the road are without the latest safety features. This increases the risk of people dying or being seriously injured in road crashes.

Cars provide a vital role in the transport system. Each year, 82% of time spent travelling is either as a driver or passenger in a car or van.[31] Drivers cover 37,629 million km per year, or 63% of all distance travelled.[32]

Cars are also an essential role for:

- tourists
- provincial and rural communities
- carpooling or sharing a car journey on a regular or ad hoc basis
- private transport in urban areas like taxis, on-demand car hire, and short-term vehicle rental schemes.

In 2020, there were over 167,000 heavy vehicles registered that were driven 3.3 billion kilometres.[33] Trucks, carrying freight, are a major contributor of heavy vehicle travel.

Ageing trucks and used imports result in an older truck fleet.[34] While 66% of trucks in the 2020 fleet were new, less than half of the new trucks were made in the last 10 years.[35]

> **The state highway network makes up 12% of New Zealand's total road network, but carries 50% of vehicle traffic.**

Challenges

Current challenges facing road transport in Aotearoa include:

- reducing harm and fatalities on our roads
- reducing light vehicle kilometres travelled (VKT) by 20% by 2035
- increasing zero-emissions light vehicles to 30% by 2035
- supporting residential development in high-growth urban areas that are affordable and great places to live
- rising transport demand from population growth and increased economic activity, including tourism
- ensuring interregional routes have an appropriate level of service that is reliable, resilient, fit for purpose, and safe – despite challenges of topography, geology, and seasonal impacts
- allocating urban road space to different modes
- matching road space to the function of the road, like street parking
- maintaining networks and services given pressures from population growth or decline, and climate change
- maintaining networks and services for active modes and mobility users where facilities haven't been provided.

The future

Population growth will increase demand on the transport system. Growth will be greater in some parts the country than others.

By 2043, New Zealand's population is expected to reach 5.9 million people, with most growth in urban centres.[36]

An ageing population that continues to work could mean more older drivers. Younger people may drive less, as the rate of applying for a driver's licence has slowed over recent years.

Technological changes will have a significant impact on how the road network is used in Aotearoa New Zealand. Timeframes depend on many factors, like the country's slow rate of private vehicle turn-over.

In the short term, increased technology use could help us get more out of our existing roads through better network management. This includes asset management and renewal, as well as providing real-time information to users.

Personal access to data is allowing customers to plan travel and make informed choices. Options like mobility as a service (MaaS), automated ticketing, and ride sharing will give customers many options based on time, cost, and quality.

In the long term, connected and autonomous vehicles may make travel time more productive – though these vehicles could also result in increased travel demand. Safety-related technologies could bring significant benefits to road users. Electric vehicles will need new infrastructure, such as charging stations.

Climate change is expected to affect the road transport network. In line with the *Emissions Reduction Plan*, we expect an increased consumer demand for:

- low-carbon transport
- electric vehicles
- public transport services
- walking and cycling facilities.[37]

Climate change may require a review of the location of some roads because of flooding and landslides from weather events. With sea levels forecast to rise, coastal erosion and inundation in low-lying coastal areas will increase the need for repairs, relocation, and preventative measures.

International maritime and aviation transport

While *Arataki* is focused on the land transport system, it should include an understanding of the current and potential role of international maritime and aviation transport.

Ports and airports are key demand drivers for the land transport system. For example, drones are likely to play an increasing role in moving people and freight.

Arataki isn't the appropriate document to discuss and determine the future direction of international maritime and aviation transport, but it will be informed by available insights.

International maritime transport

The coastal shipping network in Aotearoa is part of a wider maritime supply chain.

There is a growing global trend of using larger ships to move international freight. That trend has been seen in Aotearoa and is expected to continue. This may change patterns of port use around the country as import and export freight functions, particularly containerised freight, are consolidated in fewer ports.

This means some export freight will need to move longer distances (either by land or coastal shipping) to fewer destinations, like larger consolidation centres and major container ports.

Currently, most imports arrive through the three northern-most ports: Te Tai Tokerau Northland, Tāmaki Makaurau, and Tauranga. This is expected to continue given these ports are closest to our trading partners and are well positioned to serve the largest domestic markets in the Upper North Island.

Aviation

Air transport is suited to freight that is high-value, low-volume, and time sensitive.

While air freight accounts for 1% of freight movement by volume, by value it represents 22% of imports and 16% of exports (to June 2016).[38]

Auckland Airport receives 87% of New Zealand's air freight, followed by Ōtautahi Christchurch, and a small amount through Te Upoko o te Ika a Māui Greater Wellington.[39]

Providing reliable land transport connections to airports is important for the movement of people and goods to support New Zealand's economy. Aviation also acts as a backup for land transport in emergency situations.

Most international visitors arrive in Aotearoa New Zealand through airports in Tāmaki Makaurau Auckland, Ōtautahi Christchurch, Te Upoko o te Ika a Māui Greater Wellington, Tāhuna Queenstown, and Ōtepoti Dunedin.

International visitors have increased dramatically in recent years, jumping from 2.6 million in 2011 to 3.89 million in 2019.[40]

COVID-19 dramatically affected international arrivals, with 528,000 arrivals in the year to April 2022.[41] Over time, we expect a gradual return to pre-pandemic levels.

Growing international visitor numbers impact how airports connect to the transport system. Airport facilities have undergone, or will undergo, infrastructure upgrades to cope with growth.

Domestic air travel also plays an important role in supporting business and personal trips within Aotearoa. Air travel is increasingly replacing land-based trips for longer trips between cities and between the North and South Islands. It's difficult to predict whether this trend will change as climate change measures are taken.

Advances in drone technology will mean greater integration of the aviation and land transport systems. For example, drones will likely use existing land transport corridors within towns and cities. Drones may also be useful as tools for managing and surveying parts of the network. Appropriate regulatory settings and infrastructure are required to ensure the safety of people, vehicles, and property.
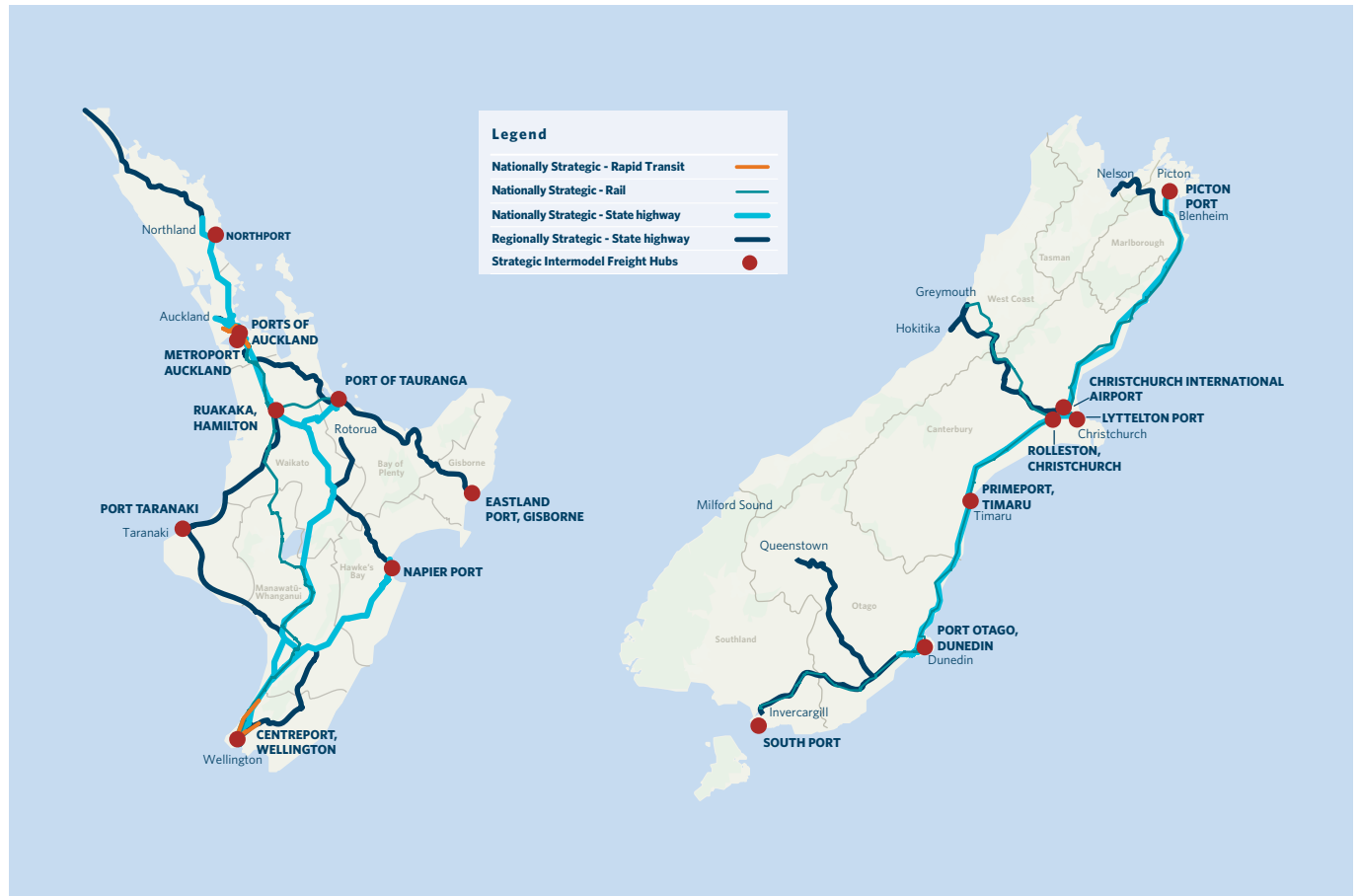
Strategic networks

Strategic networks are the most critical parts of the country's land transport network. They form the backbone of the entire transport system, supporting the most essential movements of people and freight across all modes.

Many of these networks across Aotearoa have been in place for a long time. They've shaped the way the country has grown and developed. Many towns and cities exist where they do because of past or current strategic transport routes.

North Island strategic networks

South Island strategic networks

Legend

Nationally Strategic - Rapid Transit
Nationally Strategic - Rail
Nationally Strategic - State highway
Regionally Strategic - State highway
Strategic Intermodal Freight Hubs

Our Current Network map →

Strategic networks play a major role in our daily lives. We use them to shop, access recreation, catch public transport, or cycle to school and work. The goods and services we purchase have been transported – often on multiple occasions – along these routes.

Because we are so reliant on strategic networks, the consequences are significant when there are performance issues.

Strategic networks will play an important role as we work towards our transport outcomes and address current and future challenges.

Our strategic networks across road, rail, rapid transit, and active modes will need to be high performing. They'll need to work together as a system to move large volumes of people and freight safely, reliably, and sustainably.

Some existing networks will need refinement and extension, like rapid transit in Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington. Others will be adapted progressively, starting with targeted improvements.

In Kirikiriroa Hamilton, Ōtautahi Christchurch, and Tauranga, rapid transit networks are likely to start with more frequent services that are improved and extended to meet future demand.

This section of *Arataki* outlines the necessary steps over the next three decades, so our strategic networks make the best contribution to the Te Manatū Waka Ministry of Transport's *Transport Outcomes Framework*.

At a national level, this section:

- describes the role of strategic networks and how they work within the wider transport system
- explains the challenges and opportunities for strategic networks over the next 30 years
- outlines how strategic networks should be maintained and improved over time.

At a pan-regional level for the Upper North Island, Lower North Island, and South Island, this section:

- identifies the current strategic networks and key drivers of change
- identifies where transformational change may be required and provides direction about work in those locations.

Role and function

Role of strategic networks

Strategic networks are high-performing parts of the land transport network. They make a significant contribution to achieving transport outcomes at a national level.

Strategic networks make up a relatively small proportion of the overall transport network – yet carry a significant amount of the country's people and freight.

There are a few things that make strategic networks different from the rest of the transport network. Strategic networks have corridors that:

- are critical to the overall network
- handle large volumes of use
- are in significant locations
- are large-scale contributors to transport outcomes.

While all strategic networks have the characteristics above, each play a specific role depending on their mode and location.

For example, the role of strategic rail networks varies by location. In major urban areas, they form a large part of rapid transit networks that carry lots of passengers. In rural areas, rail networks are focused on moving large freight volumes over long distances between major cities and ports.

Some modes, like walking and cycling, are better for shorter journeys. Strategic networks for these modes tend to be located within towns and cities. They can look quite different from road- and rail-strategic networks.

The following table outlines the role of strategic networks in different areas.

	Urban	Interregional and rural
Road	- provides safe and reliable freight access to ports and airports - provides the most critical road connection to, or through, a major urban area.	- provides primary connections between major population centres - provides safe and reliable freight access to markets.
Rail and rapid transit	- moves large numbers of people across key transport bottlenecks and into highly-constrained areas - supports and shapes growth and urban development - provides efficient, sustainable, and reliable freight access to ports and major distribution centres.	- provides efficient and sustainable movement of large freight volumes across long distances, between cities, and to/from ports and major distribution centres - plays a growing role for larger volumes of sustainable, interregional passenger movement.
Active modes	- are the backbone of urban walking and cycling networks - enable healthy, reliable, and sustainable travel for short-to-medium length journeys.	need further work to determine if strategic active mode networks are appropriate for these locations.

Strategic road networks

There are two parts to the roads network:

- nationally-strategic
- regionally-strategic.

Some roads play an important national function by connecting cities, towns, and regions. These are nationally-strategic road networks.

Some roads serve important regional functions, like connecting areas, acting as lifelines, and offering alternate routes. These are regionally-strategic networks.

Nationally-strategic roads network

The nationally-strategic roads network acts as the spine of the network. It serves critical functions by:

- providing important primary connections between population centres, ports, and urban areas
- performing national-level functions
- linking major freight hubs to cities
- supporting in-region and interregional travel
- having trips of high volumes and value.

Regionally-strategic roads network

These roads perform strategic functions at a regional or sub-national scale by:

- providing interregional connections
- connecting areas to the spine of the network
- providing a lifeline for areas with a single connection
- providing alternate routes in the event of disruption or closures.

Strategic rail network

The strategic rail network provides the efficient and sustainable movement of large freight volumes across long distances between cities, ports, and major distribution centres. It has a growing role in sustainable interregional passenger movement.

Priority Lines, as classified by KiwiRail in the Rail Network Investment Programme (RNIP), make up the current strategic rail network.[42]

In Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington, the strategic rail network and rapid transit networks overlap.

Rapid transit network

The rapid transit network moves large numbers of people across key transport bottlenecks and into highly-constrained areas. It supports and shapes growth and urban development, especially quality, compact design.

Only Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington have a rapid transit network. These are largely made up of passenger rail systems. The rapid transit network in Tāmaki Makaurau includes the Northern and Eastern busways.

Strategic walking and cycling networks

Strategic walking and cycle networks form the backbone of urban active modes. They allow healthy, reliable, and sustainable travel for short-to-medium length journeys. They support neighbourhood trips to shops, schools, services, and work.

Strategic walking and cycle networks are different to other networks. There is less hierarchy across different walking and cycling routes. This makes them more extensive.

Strategic walking and cycling networks include:

- **One Network Framework (ONF) class C1** – A primary strategic cycling network, intended to support high volumes of cyclist movement.
- **ONF class C2** – A secondary strategic cycling network, providing key connections to schools, community facilities, or employment.
- **ONF class W1** – Key routes within primary walking areas connecting pedestrians with key destinations and places of significance.
- **ONF class W2** – Key routes within secondary walking areas, providing key connections to local destinations and access to W1 networks.

Intermodal freight terminals

Intermodal freight terminals support freight movement and cruise ships. They include:

- national and regional ports
- interisland connections at Te Upoko o te Ika a Māui Greater Wellington and Waitohi Picton
- inland hubs
- major international airports.

Challenges and opportunities

Our strategic networks contribute greatly to Te Manatū Waka Ministry of Transport's *Transport Outcomes Framework*.

This section outlines the key challenges and opportunities in achieving transport outcomes.

Inclusive access

Strategic networks play a major role in helping people of all ages, abilities, and income levels access social and economic opportunities.

High-performing strategic networks allow large volumes of people to travel safely, reliably, and sustainably. This is especially critical in urban areas where jobs, healthcare, and educational activities are often clustered in high-density centres.

Providing a selection of high-performing travel options allows people to travel in ways that work for them.

In rural areas, strategic networks are often the only way people can access social and economic opportunities. These networks perform key lifeline functions – they allow people to access employment, education, healthcare, and other essential activities.

Current challenges and opportunities

In larger towns and cities, high reliance on private vehicles creates access challenges.

Strategic networks become overwhelmed at peak times. This leads to congestion, delays, and poor travel-time reliability for thousands of people.

Delays reduce the number of social and economic opportunities people can access within a set travel time. This also reduces overall quality of life.

Urban areas with underdeveloped rapid transit and strategic active mode networks offer few opportunities for people to avoid congestion or use these travel options.

Poor access and travel choice can limit opportunities to thrive and participate in society. This is especially true for people who live in high-deprivation areas, or who have specific mobility needs.

In provincial and rural areas, people often have few travel choices. They sometimes experience long travel times to access social and economic opportunities.

There is high reliance on private vehicles for all but the shortest journeys. This is because of reduced inter-city passenger rail services and very limited public transport services.

Being dependent on a car can be very expensive. Transport makes up an increasing proportion of household budgets, up to 28% in 2019.[43] This means money may go towards transport instead of other critical necessities.

Future challenges and opportunities

Future demand on strategic networks is likely to be highly variable over the next 30 years.

Most population and economic growth is expected to occur in a few parts of the country, particularly in urban areas of the Upper North Island.

Climate change will require less light vehicle travel over time.

Ageing and declining populations in some parts of Aotearoa mean inclusive access challenges of the future may be quite different than today.

Key issues will be about using strategic networks in new and different ways to provide access to everyone.

Technology developments will offer new and fair ways to provide access.

For areas of high growth, climate change and urban development will be important considerations to ensure inclusive access to strategic networks.

Strategic road networks in urban areas will play a multi-modal role in the transport system. Some locations need to provide access to rapid transit and strategic active mode infrastructure. That way, people will use fewer vehicles and reduce CO_2 emissions.

Rail infrastructure may be more heavily used in the future. This could create conflicts between freight and passenger services that will need to be worked through.

There is a major opportunity to use strategic networks to shape growth and urban development. For example, strategic networks could create more compact, mixed-use communities where people make shorter trips and rely less on private vehicles.

Strategic networks play a major role in helping people of all ages, abilities, and income levels access social and economic opportunities.

Key areas of focus

Some key areas to focus efforts:

- understand future travel demand across different strategic networks, in light of changing population, economic trends, and climate change
- understand how strategic networks can take a fair approach and improve access for everyone
- explore opportunities, like technological developments, to improve travel choice for all areas and parts of society
- expand and upgrade under-developed strategic networks (rapid transit, rail, and active modes), especially in large, fast-growing urban areas.

Economic prosperity

Strategic networks play a fundamental role in supporting New Zealand's economic prosperity.

These critical networks support economic activity by connecting businesses with their workers, customers, suppliers, and other businesses.

They allow products to connect to domestic and international markets, starting from producers through to ports and airports. They help imports reach customers, efficiency and effectively.

They are often the routes used most by tourists and contribute to economic activity across many parts of Aotearoa.

We can boost economic productivity and business competitiveness by offering a range of travel:

- options
- journey times
- reliability
- capacity
- improved economic productivity and cost.

Because strategic networks play a major role in the movement of people and freight, well-targeted improvements can have transformational impacts on economic prosperity.

There can also be wider indirect benefits, especially in urban areas where transport:

- supports the key functions of cities (agglomeration)
- enables housing supply and urban development
- increases labour pools and job opportunities.

Current challenges and opportunities

Some strategic networks in major cities are overburdened, underdeveloped, and inefficient. These networks struggle to provide access to economic opportunities. They experience delays and poor reliability that drive up costs.

Past efforts to improve network performance have been less effective than hoped.

For example, adding extra traffic capacity to roads improves travel times and reliability. But these efforts are short-lived and encourage more people to drive.

Improvements to rapid transit and strategic active modes have generally increased use of these travel options. Yet gaps in these networks mean they still play a small role in meeting travel demand (apart from a few key journeys like access to city centres at peak times).

Outside major urban areas, strategic networks support economic prosperity by providing reliable and efficient travel for people, goods, and services. However, there remain key challenges, including:

- past under-investment in the rail network means substantial effort is required to provide a resilient and reliable freight option
- some regions face significant social deprivation – this appears linked to areas of lower transport accessibility and connectivity
- network resilience risks are becoming more frequent because of extreme weather events – closures to strategic networks often have severe and widespread economic impacts.

> Strategic road networks in urban areas will play a multi-modal role in the transport system. Some locations need to provide access to rapid transit and strategic active mode infrastructure.

Future challenges and opportunities

Strategic networks will need to be managed and progressively upgraded to connect people to jobs, education, and training.

In urban areas, demand varies greatly. This means it can be hard to predict where new services will be required. As a result, there can be delays to required upgrades.

In rural areas, strategic networks that support freight traffic and tourism would benefit from targeted efforts to increase efficiency. These areas are likely to see a shift away from fewer, large-scale projects. Instead, projects may focus on small improvements to key parts of the network to deliver return on investment.

There's an opportunity to shift more long-distance freight to rail and coastal shipping. This will:

- free up the strategic road network for vehicle traffic
- reduce the number of heavy vehicles through small communities
- reduce emissions
- improve freight reliability.

Key areas of focus

Some key areas to focus efforts:

- better understand likely future travel demand across different strategic networks by considering population changes, economic trends, and private vehicle travel reduction to tackle climate change
- maximise use of existing infrastructure, through maintenance and demand-management tools, like pricing
- target efforts to maximise efficiency for tourism and freight
- expand and upgrade under-developed strategic networks, especially in large and fast-growing urban areas.

Healthy and safe people

Given the large volumes of people and freight that travel strategic networks, any safety risk on these networks creates a high level of collective risk.

It also means safety improvements on these networks will benefit a lot of people, and greatly reduce:

- deaths and serious injuries from road crashes
- air pollution
- noise.

Strategic networks may affect:

- how safety improvements are made
- what the key risks are.

This could be driven by things like a higher-than-normal volume of heavy vehicles, or existing issues because of geography.

Infrastructure investment in these routes mean safety improvements can be made in a way that retains efficiency. But investment often comes with a substantial upfront and on-going cost.

Strategic networks carry large volumes of cars and trucks, including diesel vehicles. As a result, these networks have a high concentration of harmful pollutants and noise. This impacts physical and mental health.

Reducing emissions could have significant health benefits. It could be particularly beneficial in areas with high-population densities, and where housing is centred around transport nodes.

Active mode networks also have physical health and wellbeing benefits. They encourage physical activity, like walking and cycling, to meet everyday travel needs.

Current challenges and opportunities

An unacceptable number of people are killed or seriously injured on our roads each year.

The Road to Zero programme aims for a future where no one is killed or seriously injured in road crashes. Meeting this vision requires us to make improvements on the strategic network.

Strategic networks have health and safety implications because they:

- make up a large number of trips
- have the highest vehicle speed limits
- pose risks for people walking and cycling.

> **Strategic networks carry large volumes of cars and trucks, including diesel vehicles. As a result, these networks have a high concentration of harmful pollutants and noise.**

Safety on much of the strategic road network is below standard, with little margin for error. Small mistakes on these high-speed, high-volume roads can easily cause major tragedies. This is heightened by factors like weather, congestion, and fatigue.

Addressing this means we need to target safety improvements on many parts of the network.

In towns and cities, strategic networks can become dangerous routes, especially as increased volumes are made up of heavy vehicles. This can cut off communities and create conflicts with active modes.

The rail network has similar issues, with the added problem of level-crossing safety.

Emissions and noise have a serious impact on health.[44] More than 3,300 adult New Zealanders die prematurely each year from air pollution, mostly from diesel motor vehicles; another 38,000 people are exposed to high levels of noise from state highways and major local roads.[45]

Some strategic active mode networks are underdeveloped. If safety infrastructure was improved, these networks could encourage more mode share, especially cycling, to deliver better health outcomes.

Future challenges and opportunities

With increasing growth and demands on the network, health and safety challenges will likely continue over time. That is, unless there is substantial mode shift for freight and people.

In urban areas, continued growth will likely mean ongoing conflicts between different modes. Better integration of land use and transport will reduce exposure to air pollution and noise.

Safer networks will help reduce deaths and serious injuries. Our safety responses must keep pace with changes.

Key areas of focus

Some key areas to focus efforts:

- make strategic networks more forgiving of driver errors
- reduce deaths and serious injuries from road crashes
- expand active modes and make them safer
- expand public transport networks as safer modes
- reduce conflicts and negative impacts in highly-populated areas.

Environmental sustainability

Vehicles are a major source of transport emissions along strategic networks. They also present an opportunity for major emission reductions through:

- developing rapid transit and active mode networks in urban areas
- encouraging rail and coastal freight to play a greater role in the movement of goods.

Strategic networks are often major pieces of infrastructure. They can affect an environment's biodiversity and water quality. The impact to the environment needs great consideration when building and operating these networks.

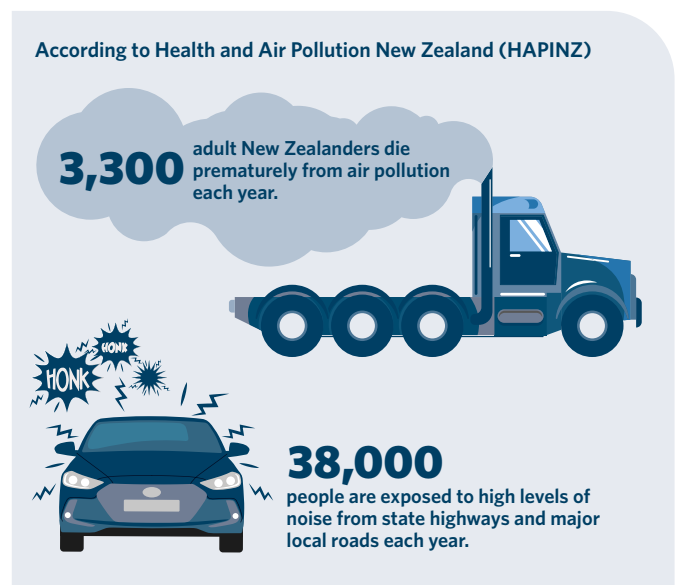## Current challenges and opportunities

Strategic networks can create transformational improvements to encourage sustainable travel options, like public transport, walking, and cycling.

Given the scale of mode shift and reduction of vehicle kilometres travelled (VKT) needed to meet emissions goals, strategic networks will be critical to the step-change required. This should be a key focus in urban areas.

Many strategic networks, even in urban areas, aren't multi-modal or contribute positively to environmental outcomes.

Some pass through constrained environments but are often the only available strategic network in an urban area.

Enabling transport connections to public transport, walking, and cycling will help avoid or minimise costly activities, like tunnelling, elevation, demolition, and land purchase.

According to Health and Air Pollution New Zealand (HAPINZ)

3,300 adult New Zealanders die prematurely from air pollution each year.

38,000 people are exposed to high levels of noise from state highways and major local roads each year.

Future challenges and opportunities

Emissions reduction challenges will grow over time as we work towards a net-zero emissions transport system by 2050.

While the vehicle fleet will decarbonise, there will be an ongoing need to reduce VKT beyond the 2035 target. This means encouraging mode shift for emissions-reduction purposes and improving access.

We also need to reduce the impact of strategic networks on biodiversity and other localised environmental issues, like water quality.

Key areas of focus

Some key areas to focus efforts:

- encourage sustainable-travel options, especially in urban areas
- improve how we handle the impacts of strategic networks, like management of stormwater through nature-based solutions
- maximise opportunities to use strategic corridors as biodiversity areas
- make the most of existing networks

- find ways to integrate multi-modal connections within constrained corridors
- support mode shift to reduce emissions and improve access.

Resilience and security

Strategic networks provide lifeline connections between populated areas, ports, and other infrastructure. They need to be resilient to perform their functions effectively.

A well-functioning strategic network is vital for:

- responding to emergencies quickly
- restoring communities and business activity after an emergency.

As climate-related impacts increase, planning for adaptation is critical to manage future vulnerabilities in the transport system and the communities served.

Many parts of the strategic network have considerable resilience issues. Reduced or interrupted services must be addressed, as this greatly impacts communities and businesses.

Current challenges and opportunities

As the second riskiest country in the world for natural disasters, Aotearoa is particularly prone to significant seismic and geological activity.[46]

Critical parts of the strategic network have been impacted by these in the past. For example, State Highway 1 and Main South Railway Line north of Kaikōura following the earthquake in 2016.
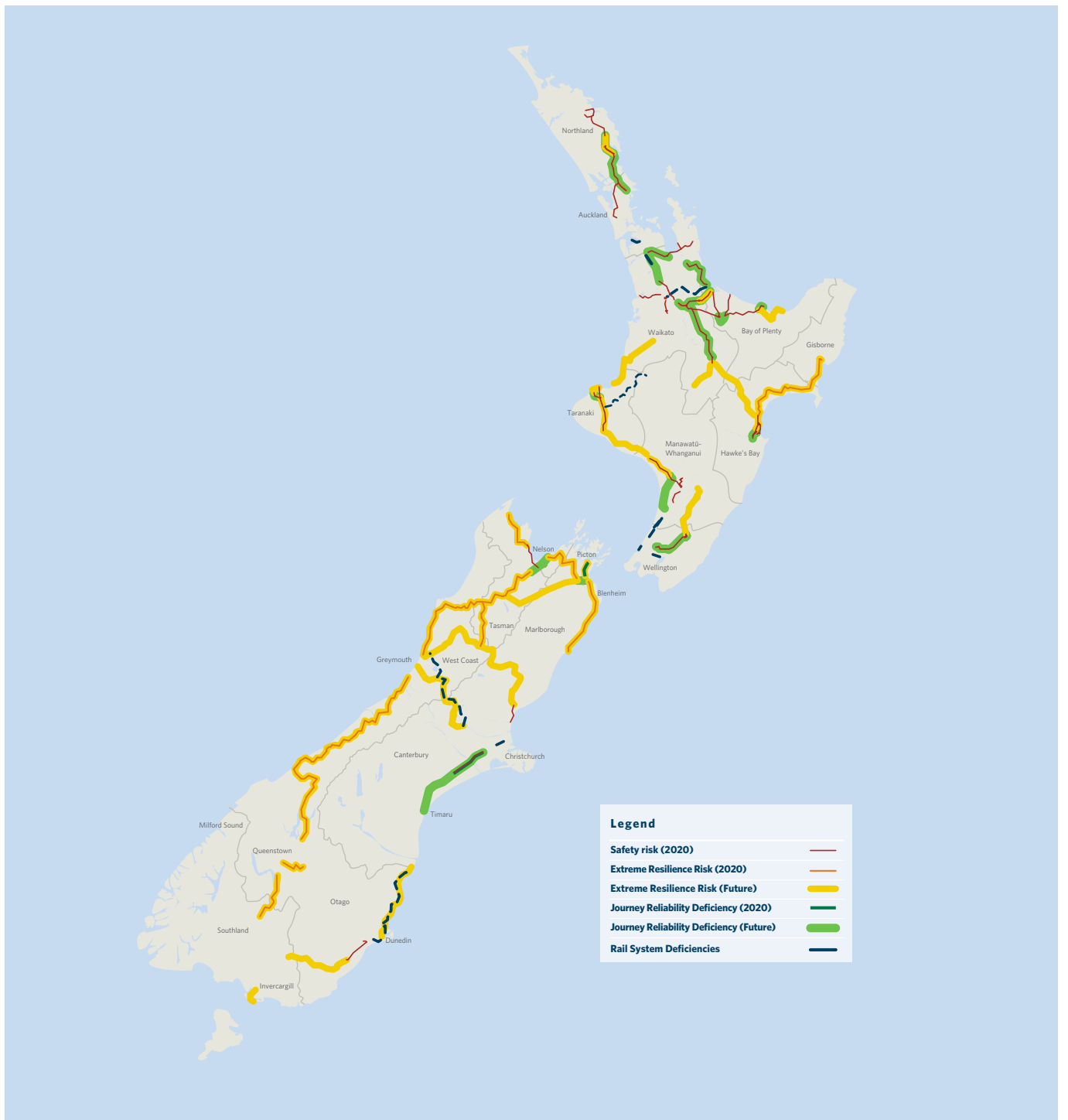
Others have high levels of risk, like fault lines near State Highway 1 in Te Whanganui-a-Tara Wellington and the interisland ferry terminal.

Some alternative routes also have risks, like the closure of State Highway 7 Lewis Pass because of heavy snow.

These risks are mostly unpredictable, but how they are dealt with can be planned.

Our Future Focus map ➡

Map of network deficiencies

Legend

- Safety risk (2020)
- Extreme Resilience Risk (2020)
- Extreme Resilience Risk (Future)
- Journey Reliability Deficiency (2020)
- Journey Reliability Deficiency (Future)
- Rail System Deficiencies

There is a lack of redundancy, or ways to minimise downtime, in parts of the strategic network. Some regions depend on one or two critical lifelines to stay connected to neighbouring regions.

Emergency and maintenance costs on strategic networks are rising. This is mostly because of climate change. Areas are experiencing more frequent and severe unplanned disruptive events like:

- storms
- flooding
- sea-level rise
- higher temperatures.

This is expected to continue and only get worse.

Future challenges and opportunities

Challenges are likely to remain the same, but increase in:

- magnitude
- frequency
- duration.

To continue as lifeline connections, the strategic network will need to balance resilience, service levels, and maintenance costs.

As we expand or change strategic networks in the future, we'll need to make sure we don't create new resilience challenges.

Key areas of focus

Some key areas to focus efforts:

- consider how to maintain lifeline connections and service levels during disruption
- develop a greater understanding of the changing risks of climate-related hazards
- improve monitoring of real-time system hazards and data collection
- use an adaptive-management approach to climate change when maintaining and operating the transport network
- develop a better understanding of managing security risks.

Our strategic networks plan

Approach

How we manage, operate, and develop strategic networks now and over the next 30 years will significantly affect:

- achieving the government's transport outcomes
- resolving key issues
- realising major opportunities.

Decisions we make around strategic networks are complex with significant implications:

- Major upgrades or new corridors can cost billions of dollars. They may take years, or even decades, to complete. They create major complex new assets that require significant investment in operations and maintenance.
- Strategic networks have the potential to create transformational benefits but can have adverse impacts if not carefully planned and designed.
- The scale and impact of these networks means there's high public and political interest in decision-making, including competing interests across stakeholders and the public.
- Future strategic networks can impact decision-making in advance of construction – this sets community expectations and encourages different patterns of development, as well as economic and population growth.

Our approach to strategic networks over the next 30 years has two parts:

- look after and get more out of existing networks through ongoing programmes
- target transformational change across multiple outcomes for the greatest impact.

This approach recognises the best way to progress towards transport outcomes is through ongoing programmes to:

- maintain
- renew
- make incremental improvements.

This applies to most strategic networks, especially those already well developed.

It also highlights that in some areas and networks, an incremental approach won't be enough. Here, more transformational change is required.

To give confidence that transformational change is necessary and will deliver value in the long run, these situations must be:

- extremely well targeted
- based on robust evidence
- of a national perspective.

Ongoing programmes

Our standard approach across most strategic networks, especially well-developed networks, is a series of programmes that maintain, renew, and make the most of existing infrastructure.

This requires significant effort and investment to ensure these networks continue to deliver and function well in the transport network.

Alongside this, small-scale improvements help networks respond to changing circumstances, with the aim to contribute to transport outcomes over time.

Key programmes are:

- maintenance, operations, and renewal
- safety
- optimisation and resilience.

Maintenance, operations, and renewal programmes

Current strategic transport networks are among New Zealand's most important and valuable assets. They require constant care.

Historically, under-investing in the maintenance and renewal of assets leads to deterioration that can be difficult, costly, and disruptive to fix.

Well-resourced programmes for maintenance and renewal are needed. They also need sufficient operational investment to manage and run critical networks daily.

To ensure critical parts of the strategic networks continue to function, decisions must be made about programme investment standards and timings.

Programmes should avoid rebuilding infrastructure that's not fit for purpose. Instead, the focus should be on improvements to all modes and safety.

Programmes will need to adapt to change over time. For example, an ageing population may require footpath standards to change to support mobility scooters.
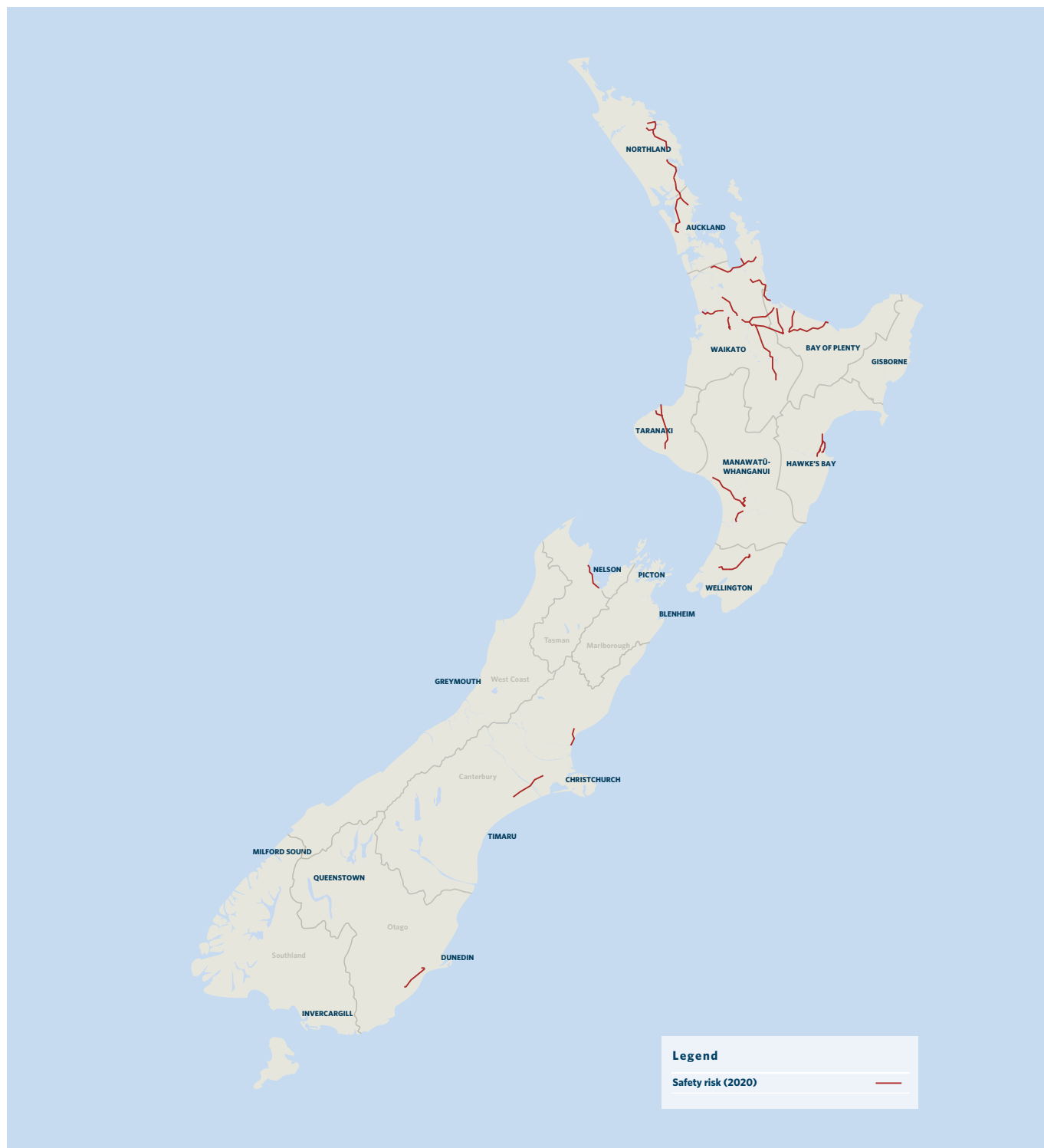
Automated vehicles may require new road markings and increased cell phone coverage to support a connected fleet.

Safety programmes

Stretches of New Zealand's strategic networks – especially the road network – have a high-safety risk rating.

Our Future Focus map →

Map of high safety risks on state highways

Legend

Safety risk (2020) —————

Small-scale, safety-focused programmes will be implemented across existing networks over time. They will focus on improving things like:

- side and centre barriers
- road curves and curve easing
- pavement
- rumble strips
- level crossing upgrades and removals.

These programmes should build on and extend the Road to Zero goal of zero deaths and serious injuries.

For speed limits that have been lowered because of safety reasons, investment will enable these limits to be safely raised again.

Optimisation programmes

Small-scale improvements to strategic networks can deliver significant benefits and help get more value out of existing infrastructure. This applies to all modes.

Reallocating space is one way we can make existing networks more efficient. There is an opportunity to better provide for different modes on existing parts of the strategic network.

Small, flexible changes can be used in a targeted way, particularly for walking and cycling. Consider the right level of service for a range of new modes like e-scooters, e-bikes, and mobility scooters.

Public transport can be improved by dedicating space for permanent- and dynamic-bus priority.

Demand-management approaches can help:

- reduce transport demand
- redistribute demand across different modes of transport.

Technological change will affect how this shift occurs through:

- increased flexible work

- real-time information for journey planning.

Transformational change

While ongoing programmes are the best way to make progress for most of the strategic network, transformational change will be required when:

- current networks are under-developed and require the introduction or expansion of new solutions – for example, rapid transit and strategic active mode networks in major cities
- scale of change required is beyond what can be achieved through ongoing programmes – for example, the scale of existing or forecasted deficiency, how challenging the desired outcome is, where circumstances change, or where new approaches are required.

Transformational change doesn't always mean large-scale investment is required. These programmes still need robust planning and design to deliver the best solution and value for money.

The key test for transformational change relates to:

- the scale of required change
- if addressing the issues through ongoing programmes would be successful.

Arataki maps areas of transformational change on the state highway and rail network. Other areas of transformational change on the strategic network will be updated as part of future releases of *Arataki*. This includes identifying transformational change on public transport routes, local

Our Future Focus map →

Map of transformational change on the strategic network

Legend

Strategic cycling	━━━
Strategic rail	▬▬▬
Strategic rapid transit	━━━
Strategic roading network	━━━
Strategic cycling citywide networks	🚲
Strategic rapid transit networks	🔴

NORTHLAND

AUCKLAND

Ports of Auckland

Metroport Auckland

TAURANGA

Port of Tauranga

Ruakura, Hamilton

ROTORUA

Bay of Plenty

Gisborne

Waikato

TAUPŌ

NEW PLYMOUTH

Hawke's Bay

Manawatū-Whanganui

NELSON

WELLINGTON

BLENHEIM

Tasman

Marlborough

GREYMOUTH

West Coast

Christchurch International Airport

CHRISTCHURCH

Canterbury

Primeport, Timaru

Timaru

Milford Sound

Queenstown

Otago

Southland

DUNEDIN

INVERCARGILL

roads, and active mode networks in smaller urban areas. We'll partner with local government to develop this.

Mode	Key drivers
Road	• significant safety, resilience, or reliability issues with national-scale implications that can't be addressed through incremental improvement programmes • a level of demand where improvements will deliver lasting value, after considering decreased traffic to reduce emissions • fundamental place and movement conflicts that undermine nationally-significant transport outcomes.
Rail and rapid transit	**Rapid transit** • significant issues with access and travel choice for large numbers of people • a level of demand where improvements will deliver lasting value that can't be achieved by lower-capacity interventions • opportunities to shape nationally-significant urban development to enable, support, and shape compact, mixed-use, land-use patterns. **Rail** • nationally-significant passenger or freight conflicts on the rail network, to ensure both modes continue growing • a nationally-significant improvement to the country's freight and supply-chain system.
Active modes	• creating a core to wider active mode networks in major urban areas • addressing the most critical network gaps.

Current and future strategic networks

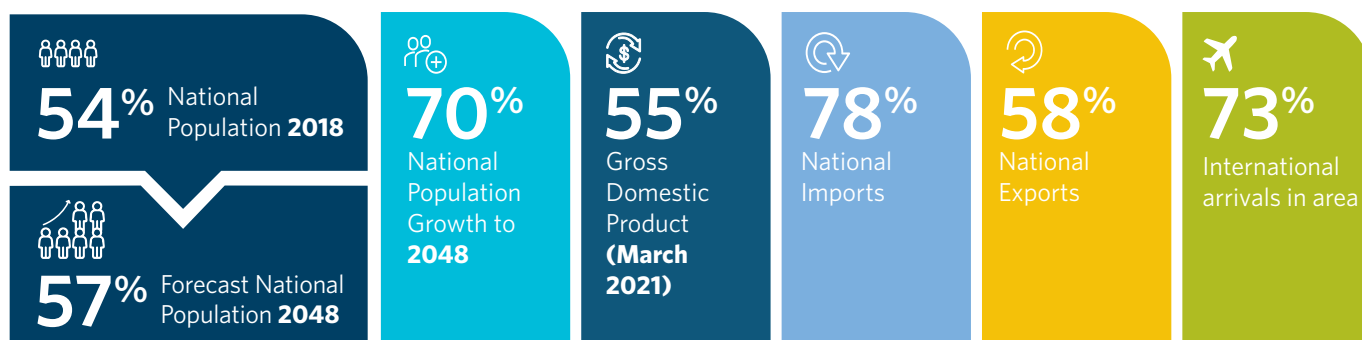# Mai te Puku o te Ika a Māui ki te Hiku o te Ika a Māui – Upper North Island

Four regions make up the Upper North Island area:

- Te Tai Tokerau Northland
- Tāmaki Makaurau Auckland
- Waikato
- Te Moana a Toi-te-Huatahi Bay of Plenty.

This area is vital to New Zealand's social and economic success. It's home to over half of New Zealand's population and generates more than 50% of the national GDP. [47]

Nearly 75% of the country's population growth over the next 20 years is expected in the Upper North Island.[48]

Upper North Island

54% National Population **2018**

57% Forecast National Population **2048**

70% National Population Growth to **2048**

55% Gross Domestic Product **(March 2021)**

78% National Imports

58% National Exports

73% International arrivals in area

Current strategic networks

The nationally-strategic road network in the Upper North Island consists of:

- SH1 Whangārei to Lower North Island
- SH15 Ruakākā to Marsden Point
- SH20 Manukau to Waterview
- SH20 to SH20A and SH20B to Auckland Airport
- SH16 Ports of Auckland to Westgate
- SH18 Westgate to Albany
- SH29 Tauranga to Piarere, including port access SH2/SH29
- SH2 Pōkeno to Tauranga
- SH2 Tauranga to Gisborne (Lower North Island)
- SH3 Hamilton to Whanganui (Lower North Island)
- SH5 Taupō to Napier (Lower North Island).

The regionally-strategic road network in the Upper North Island consists of:

- SH1 Kaitaia to Whangārei
- SH5 Taupō to Rotorua
- SH16 Westgate to Kumeū/Huapai
- SH22 Drury to Pukekohe
- Neilson Street, Tāmaki Makaurau
- Port of Tauranga access.

Map of current strategic network in the Upper North Island

Legend

Nationally Strategic - Rapid Transit

Nationally Strategic - Rail

Nationally Strategic - State highway

Regionally Strategic - State highway

Strategic Intermodel Freight Hubs

Northland

NORTHPORT

Auckland

PORTS OF AUCKLAND

METROPORT AUCKLAND

PORT OF TAURANGA

RUAKAKA, HAMILTON

Rotorua

Waikato

Bay of Plenty

The strategic-rail network in the Upper North Island consists of:

- North Island Main Trunk Line (NIMT)
- East Coast Main Line (ECML).

The strategic rapid transit network in the Upper North Island consists of:

- Auckland Metro Rail Network
- Northern Busway
- Eastern Busway.

The strategic walking and cycling network is defined as all walking and cycling connections in classes C1, C2, W1, and W2.

Several intermodal freight terminals are in the Upper North Island:

- Northport
- Ports of Auckland
- Port of Tauranga
- Westfield (Auckland)
- Metroport (Auckland)
- Ruakura (Hamilton)
- Auckland Airport.

Key drivers of change

The most significant drivers of change for strategic networks in the Upper North Island over the next 30 years are:

- increasing travel demand from population and economic growth
- urgently and dramatically reducing transport emissions
- improving resilience to the impacts of climate change
- addressing unacceptable safety, health, and resilience deficiencies
- addressing unacceptable impacts of network conflicts, including those between movement and place outcomes
- potentially changing national supply chains, particularly the long-term location of the Ports of Auckland.

Areas of potential transformational change

Areas of transformational change in the Upper North Island are identified in this section. For parts of the strategic network not identified below, transformational change is not required unless there's a significant shift in key drivers.

Our Future Focus map →

Required transformational changes reflect the identified triggers and preconditions in Our Future Focus map. Where triggers and preconditions for a change have been reached, they've been incorporated into the potential areas of transformational change. New areas of transformational change will be added as key drivers change, and preconditions and triggers are met.

Map of potential transformational change for the Upper North Island

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Kawakawa to Kaitaia	Road	• Sections of current route (especially through Mangamuka Gorge) are extremely vulnerable to ongoing closures from slips – this results in extended, repeated, ongoing closures that are expected to become more frequent because of climate change. • Route is a strategic connection for many isolated communities. • Existing route is unsafe.	• The entire route is vulnerable to flooding, rockfalls, and slips – some parts have limited redundancy (ability to minimise downtime when disruption occurs). • Challenging topography and geology. • Alternate routes limited and substandard.	• Fast-track planning work to respond to current closure. • Investigate what's required to achieve a long-term solution to current slip vulnerabilities. • Investigate potential alternative routes to existing connection.
Whangārei to Port Marsden	Road	• A combination of severe safety issues, the need to improve access to Northport, and ongoing growth in Whangārei. • Incremental programmes may delay the need for transformational change, but continued growth and access demand to the port area will likely trigger needed changes.	• Safety upgrades are required on SH1 because of high numbers of deaths and serious injuries.	• Confirm funding for the safety component on SH1. • Confirm detailed design.
North Auckland Line – Tāmaki Makaurau Auckland to Port Marsden	Rail	• Northport will play a larger role in New Zealand's future supply chain because of constraints at other ports – the rail network north of Tāmaki Makaurau needs to support this growing function, to limit growth of heavy trucks on SH1. • The rail network doesn't currently serve Northport. • There are growing conflicts between passenger and freight services within Tāmaki Makaurau on the North Auckland Line (Westfield-Newmarket-Swanson) – these will limit the ability to increase passenger and freight services.	• Rail upgrades connecting the North Auckland Line at Oakley to the port area have been proposed through the New Zealand Upgrade Programme. • KiwiRail Northland Rail Rejuvenation Programme. • KiwiRail has a designation for a future rail spur line to Port Marsden. • Auckland rail network planning highlighted growing conflicts between freight and passenger services – these may need major investment to address.	• Confirm future investment programme and implementation plan.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Brynderwyns to Warkworth	Road	• Very high safety risk, especially through Dome Valley and around the Brynderwyns. • Hilly and low-standard corridor for such a critical link. • Little resilience as the only main road connection between Tāmaki Makaurau and Northland. • Incremental programmes are in progress and should continue, but need to be developed with a long-term plan in mind.	• Warkworth to Wellsford route protection work has confirmed this as the preferred long-term route for this section. • A combination of online and offline improvements to progress over 30 years. • Current focus on addressing critical safety issues and resilience.	• Confirm plan from current programmes of improvement through to preferred long-term corridor form. • Complete route protection process for Warkworth to Wellsford project.
Orewa to Auckland City Centre	Road, rapid transit, walking, and cycling	• Resilience issues on the Auckland Harbour Bridge and its approaches. • Forecast growth and capacity constraints on Northern Busway and Northern Motorway that can't be fully addressed through small-scale improvements. • All-day congestion is forecasted, despite significant improvements to public transport and active modes. • Gaps in the active mode and rapid transit networks. • Extremely high forecast demand for public transport which, if not provided for, will undermine mode shift and urban form outcomes.	• Business case work for additional Waitematā Harbour connections confirmed need for a programme of work that includes busway enhancements, an additional rapid transit connection, and improvements to road connectivity. • Growth-planning work confirmed the need for strategic roading corridor upgrades between Orewa and Albany. • New and upgraded interchanges with enhanced capacity and public transport priority. • No walking and cycling structure can be attached to the existing Harbour Bridge – a connection alongside SH1 is preferred (Harbour Bridge to Albany).	• Confirm the preferred additional Waitematā Harbour connections option with partners. • Complete route-protection work between Albany and Orewa. • Confirm programme of improvements over time.
Tāmaki Makaurau: Upper Harbour	Rapid transit	• Significant forecast growth in corridors and limited capacity on SH18 corridor mean there's a need to increase capacity by introducing rapid transit. • A connection between critical-growth nodes of Westgate and Albany is necessary to realise the potential of these locations. • Provides network-level benefits by connecting Northwest and North Shore rapid transit.	• Some work on corridor protection as part of SH18 development. • High-level work confirmed bus rapid transit as most likely mode, and potential station locations.	• Need to confirm design and plan to implementation, potentially through a series of interventions over time.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Tāmaki Makaurau: Westgate to Kumeū/ Huapai	Road and rapid transit	• Very significant future growth planned in Northwest Auckland – this will create fundamental place and movement conflicts, especially through Whenuapai and Kumeū/Huapai. • Northwest Auckland has relatively poor access to employment and travel choice – this results in high car dependency and significant congestion.	• Supporting Growth Alliance work and SH16/18 work identified preferred future solutions – the focus on removing traffic from key value locations by motorway-to-motorway links, enhancing interchanges, and a bypass of Kumeū/Huapai. • Rapid transit between Westgate and Kumeū/Huapai confirmed necessary, as part of wider Northwest Rapid Transit corridor.	• Focus on timing, when different investments are needed, and how investments should integrate with development and the wider transport network to achieve key outcomes.
Tāmaki Makaurau: City Centre to Westgate	Rapid transit	• Significant forecast growth and major reliance on the single-lane SH16 corridor – need to dramatically increase the corridor's capacity by introducing rapid transit. • Northwest part of Auckland has relatively poor access to employment and travel choice. • High levels of car dependency and relatively high deprivation in many areas.	• Planning and business-case work confirmed the need for rapid transit, alignment, and the preferred mode as either bus rapid transit or light-rail. • Regional-planning work confirmed corridor as a high priority. • Interim bus improvements are in progress.	• Confirm mode and design. • Confirm timeframe for implementation, including progression from short-term bus improvements to a more permanent solution.
Tāmaki Makaurau: City Centre to Māngere	Rapid transit	• Growing public transport demand can't be met through incremental improvements to bus system because of capacity constraints in city centre and on key approaches. • Encourage more of Auckland's future growth into this corridor for regional-level benefits. • Access and travel choice deficiencies in parts of the corridor contribute to deprivation.	• Several previous business cases, most recently culminating in an indicative business case, confirmed light-rail with tunnelled sections.	• Confirm project design and implementation pathway. • Integrate with wider rapid transit network, especially Northwest and North Shore corridors.
Tāmaki Makaurau: Cross-Isthmus	Rapid transit	• Links up several rapid transit corridors, providing faster journeys across Tāmaki Makaurau. • Enables, supports, and shapes significant potential growth across a part of Tāmaki Makaurau well suited to transformational change.	• Little planning work to date. • Rail planning work has suggested the potential need for a freight-focused rail corridor using the long-designated Avondale-Southdown route – this could also be used by passenger services.	• Need to confirm extent of corridor, alignment, and mode. • Develop a pathway to implementation.
Neilson Street, Tāmaki Makaurau	Road	• Nationally-significant freight corridor and location faces highly complex challenges and conflicting movements. • Indirect strategic connections result in heavy freight movements on local roads and reduced efficiency.	• Designation for full East West Link acquired. • Some incremental improvements done, particularly at the eastern end and near Great South Road.	• Confirm a progressive programme of improvements that align with policy direction and priorities. • Identify smaller-scale improvements to be made in the short term.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Tāmaki Makaurau: Eastern Busway	Rapid transit	• Improve travel choice for a large part of Tāmaki Makaurau that's very car dependent. • Increase people capacity along a corridor that's constrained and under pressure.	• Extensive work confirmed project design.	• Construction to start shortly.
Tāmaki Makaurau: Airport to Botany	Rapid transit	• Transformational access improvements to South Auckland's two major future employment nodes – Manukau and Auckland Airport. • Improve travel options for southeast Auckland, which is highly dependent on cars. • Support major growth opportunities, especially at Botany, Flat Bush, Manukau, Puhinui, and Auckland Airport.	• Business case confirmed route and mode (bus rapid transit). • Previous business case identified a progressive implementation pathway, starting with service improvements and minor infrastructure upgrades.	• Secure the route through a designation process. • Begin progressive implementation of corridor.
Auckland Rail Network	Rail and rapid transit	• Enable the heavy rail network to play a larger role in moving people and freight, and an emerging role in inter-city passenger movement – this will help reduce private-vehicle reliance and improve access to opportunities. • Realise the full benefits of City Rail Link. • Reduce resilience, safety, and capacity constraints on the rail network.	• Rail network not likely to grow substantially over time in Tāmaki Makaurau – other modes are more suitable for new rapid transit corridors. • Additional tracks required to reduce conflicts between different services (metro rail, freight, intercity rail), especially between Westfield and Pukekohe – tracks will enable express- and limited-stop services to growing South Auckland areas. • Level crossings to be removed from the network over time. • Further tranches of trains, and supporting infrastructure, required to increase capacity over time.	• Rail programme business case will provide a view of how the rail network needs to evolve over time to meet future requirements, including maximising full benefit of the City Rail Link. • Complete current tranche of rail network improvements.
Tāmaki Makaurau Auckland Cycling Network	Walking and cycling	• Need to rapidly provide additional connections across the city. • Safety challenges for non-protected parts of the network. • Significant shift to cycling (7%) required to support emissions and mode shift goals.	• Active modes and micromobility business case identified priority routes and locations.	• Identify additional funding sources to support progress towards full implementation. • Support policy changes to enable progress.
Drury to Pukekohe	Road	• Very significant growth in the Drury, Paerata, and Pukekohe areas will create fundamental place and movement conflicts – will require urbanisation of the existing road. • Significant safety risks along the corridor.	• Supporting Growth Alliance work to confirm the form and function of the current corridor, and will consider if alternative corridors are needed.	• Confirm long-term transport network. • Integrate short-term upgrades to align across programmes and outcomes.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
North Island Main Trunk: Tāmaki Makaurau to Kikiriroa Hamilton	Rail	• Most of the country's future growth is within the Golden Triangle between Tāmaki Makaurau, Hamilton, and Tauranga – greater connectivity between these cities has potential to generate nationally-significant economic and productivity benefits. • A transformational improvement to the Tāmaki Makaurau to Hamilton rail corridor could achieve an optimal development pattern in the Upper North Island and open up significant new labour and job markets. • Growing conflicts between passenger and freight services need to be addressed, especially to enable faster passenger services.	• Tāmaki Makaurau to Hamilton Rapid Rail business case, led by Te Manatū Waka Ministry of Transport, has explored options about how faster passenger services can be provided. • Important incremental upgrades to the line should be made. • Required double tracking of some sections to support additional services.	• Complete rapid rail business case to confirm preferred long-term form and function of rail corridor. • Confirm implementation pathway and incremental upgrades.
Kikiriroa Mass Rapid Transit (MRT)	Rapid transit	• Support transformational improvement to the quality of public transport to achieve goals of mode shift and less car dependency. • Support and shape a more efficient and sustainable urban form for Hamilton.	• *Metro Spatial Plan* and integrated programme business case confirmed strategic direction and approach of a staged delivery to rapid transit. • Core is a dedicated bus rapid transit corridor serving the north-south and east rapid-transit corridors that connects Te Awa Lakes, Hamilton Airport, and Ruakura.	• Confirm route, detailed form, staging, and refine integrated urban-development outcomes.
Kikiriroa to Port of Tauranga	Road and rail	• Safety and resilience challenges on road connection. • Need rail to play a greater role in serving freight demand to Port of Tauranga. • Fundamental place and movement conflicts in Tauranga section.	• Tauriko long-term business case • Piarere to Tauriko business case and corridor-management plan work. • Double tracking of rail connection (other than tunnels) identified as key priority.	• Confirmation of preferred road design in Tauranga section. • Long-term planning exercise needed to identify preferred long-term rail and road solutions along whole corridor.
Waihi to Tauranga	Road	• Safety risk. • Population growth and increased pressure on network. • Increased place and movement conflicts that can't be resolved through incremental improvements.	• Takatimu North Link stage one required for safety improvements and accessibility. • Takatimu North Link stage one required later (post 2030).	• Stage one in construction. • Stage two progressing to route protection, but unfunded past this point. • Focus on timing and triggers for stage two.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Tauranga Mass Rapid Transit (MRT)	Rapid transit	• Support transformational improvement to public transport quality to achieve goals of mode shift and less car dependency. • Support and shape a more efficient and sustainable urban form for Tauranga.	• Planning and high-level business case identified the highest priority to consider for a high-quality MRT solution is the corridor linking Tauranga CBD, down the Te Papa corridor, and then connecting to Tauriko. • Next priority is an east to central-western corridor connection over the harbour.	• Confirm route, detailed form, staging, and refine integrated urban-development outcomes.
Kemureti Cambridge to Taupō	Road	• Significant safety risk. • Fundamental place and movement conflicts, especially through the towns of Tīrau, Putāruru, and Tokoroa. • Current SH1 corridor is an indirect route for longer journeys, meaning people are encouraged onto local, unsuitable roads that are highly unsuitable for this task.	• Safety issues south of Piarere. • Low quality surface south of Tīrau. • Need to resolve access issues in South Waikato towns. • Cambridge to Piarere project to deal with safety issues where the Waikato Expressway ends, including upgrade to SH1/SH29 intersection.	• Planning needed for the corridor to identify a preferred long-term solution and progressive programme of implementation.
Taupō to Tūrangi	Road	• Safety risk. • Resilience challenges. • Poor physical condition that creates key constraints.	• Eastern edge of Lake Taupō (Three Sisters): severe physical constraints on the current alignment, existing safety and resilience challenges, and forecast growth in demand, particularly freight.	• Planning needed for the corridor to identify a preferred long-term solution and progressive programme of implementation.

Network-level decarbonisation	Rail	• Freight carried by rail currently saves at least 70% of the carbon emitted by heavy-road transport.
		• Need to switch to low-emissions modes.
			• Electrification justified on high-volume routes:
			  - North Island Main Trunk rail line between Pukekohe and Hamilton
			  - East Coast Main Trunk rail line between Hamilton and Tauranga.
				• Planning needed to identify preferred long-term solutions.

Mai te Puku o te Ika a Māui ki te Upoko o te Ika a Māui – Lower North Island

The Lower North Island is made up of Tairāwhiti Gisborne, Te Matau-a-Māui Hawke's Bay, Taranaki, Manawatū-Whanganui, and Te Upoko o te Ika a Māui Greater Wellington. In 2018, it was home to more than 1,077,000 residents, or 23% of New Zealand's population. [49]

The Lower North Island has a diverse transport network that provides access to a wide range of economic and social opportunities.

The transport corridors that pass through the area are a key part of the transport system of Aotearoa New Zealand. They enable movement of people and goods between key centres of production, consumer markets, and freight distribution hubs.

Lower North Island

23% National Population **2018**	**13%** National Population Growth to **2048**	**23%** Gross Domestic Product **(March 2021)**	**8%** National Imports	**15%** National Exports	**5%** International arrivals in area
21% Forecast National Population **2048**					

Current strategic networks

The nationally-strategic road network in the Lower North Island consists of:

- SH1 Wellington Airport to Upper North Island
- SH3 Sanson to Ashhurst (this is mapped following the new Te Ahu a Turanga alignment)
- SH57 Ashhurst to Levin.

The regionally-strategic road network in the Lower North Island consists of:

- SH3 Whanganui to Bulls
- SH58 Paremata to Haywards
- SH2 Ngauranga to Woodville
- SH3 Hamilton to Whanganui
- SH5 Taupō to Napier.

The strategic rail network in the Lower North Island consists of:

- North Island Main Trunk line (NIMT).

The strategic rapid transit network in the Lower North Island consists of:

- Wellington Metro Rail.

The strategic walking and cycling network is defined as all walking and cycling connections in classes C1, C2, W1 and W2.

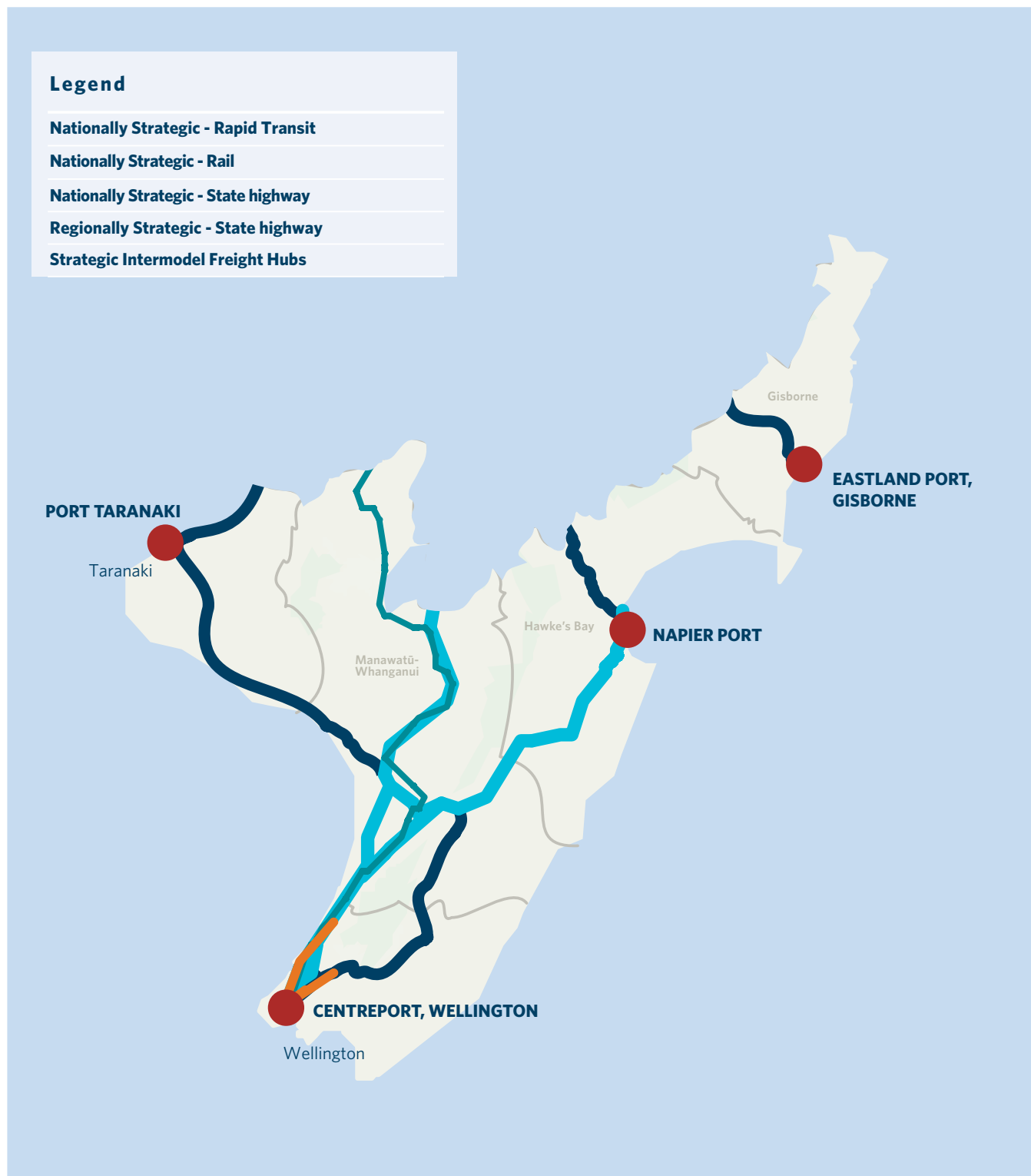Several intermodal freight terminals are in the Lower North Island:

- CentrePort, including Interislander
- Port Taranaki
- Napier Port
- Eastland Port (Gisborne).

Key drivers of change

The most significant drivers of change for strategic networks in the Lower North Island over the next 30 years are:

- unacceptable safety, health, and resilience deficiencies
- the need to urgently and dramatically reduce transport emissions
- the need to improve resilience because of the impacts of climate change
- unacceptable impacts of network conflicts, including conflicts between movement and place outcomes
- the need to preserve effective and efficient connectivity across Cook Strait.

Map of current strategic network in the Lower North Island

Legend

Nationally Strategic - Rapid Transit

Nationally Strategic - Rail

Nationally Strategic - State highway

Regionally Strategic - State highway

Strategic Intermodel Freight Hubs

PORT TARANAKI

Taranaki

Gisborne

EASTLAND PORT, GISBORNE

Hawke's Bay

NAPIER PORT

Manawatū-Whanganui
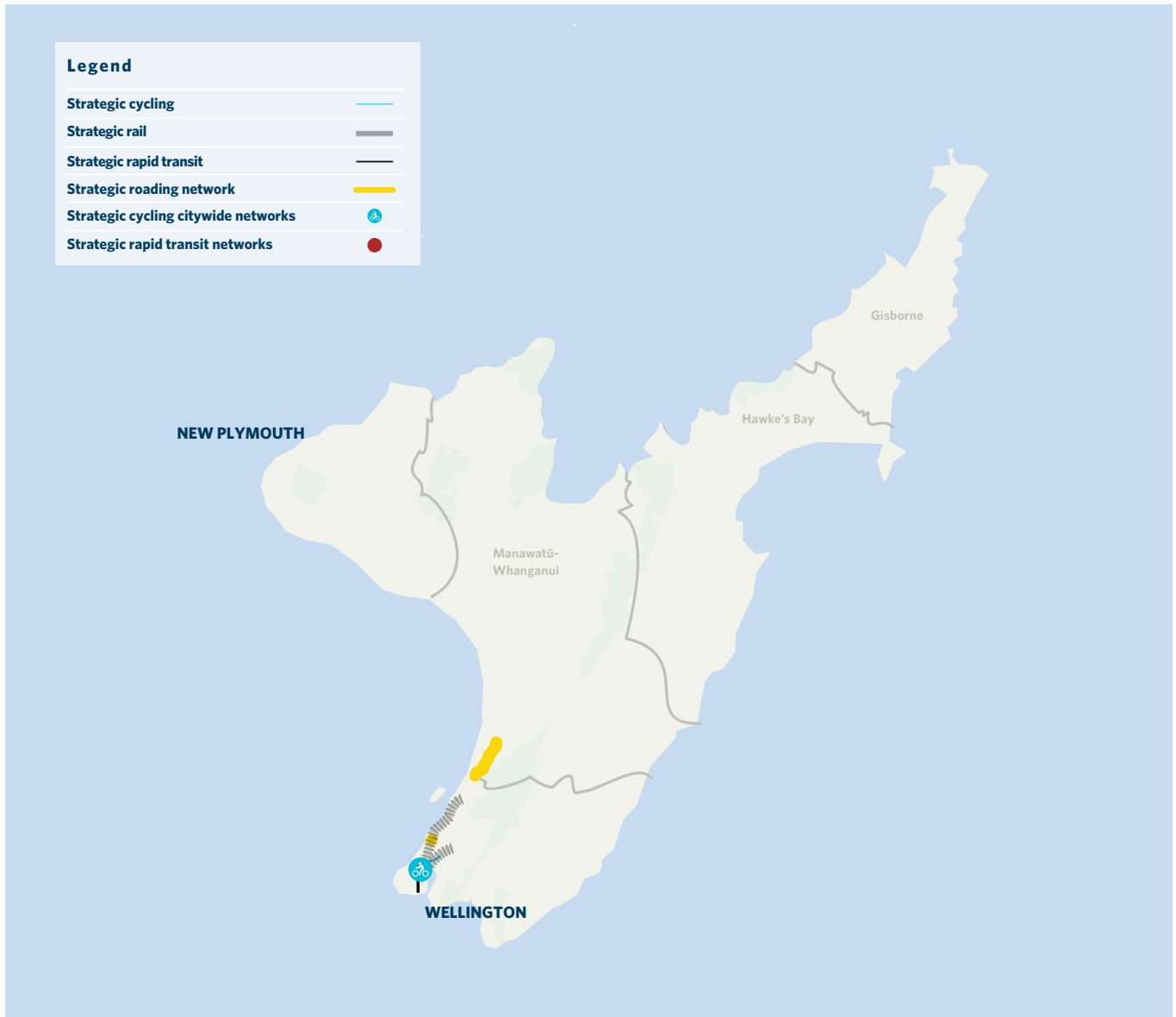
CENTREPORT, WELLINGTON

Wellington

Areas of potential transformational change

Areas of transformational change in the Lower North Island are identified in this section. For parts of the strategic network not identified below, transformational change is not required unless there is a significant shift in the key drivers.

Required transformational changes reflect the identified triggers and preconditions in Our Future Focus map. Where triggers and preconditions for a change have been reached, they've been incorporated into the potential areas of transformational change. New areas of transformational change will be added as key drivers change, and preconditions and triggers are met.

[Our Future Focus map →]

Map of potential transformational change for the Lower North Island

Legend

Strategic cycling	
Strategic rail	
Strategic rapid transit	
Strategic roading network	
Strategic cycling citywide networks	🚲
Strategic rapid transit networks	🔴

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Ōtaki to north of Levin	Road	• High safety risk, requiring a range of targeted interventions. • Place and movement conflicts through settlements. • Lack of transport choice for residents.	• Proposed highway and shared path from Ōtaki to SH57 intersection. • Safer speeds and safety improvements on existing SH1.	• Planning needed for the corridor north of Levin to identify a preferred long-term solution and progressive programme of implementation.
Te Whanganui-a-Tara Wellington: City Centre to Island Bay	Rapid transit	• Resolve capacity constraints on the public transport system for people travelling to the city centre from the south and east. • Encourage a greater proportion of Wellington's growth to occur in more central parts of the urban area, resulting in significant access improvements and emissions reduction. • Significantly improve public transport service quality in south and east Wellington, to support mode shift and reduce private vehicle reliance.	• Let's Get Wellington Moving business case has confirmed high-level route and that light-rail is the likely mode choice.	• Detailed business case to confirm alignment and mode. • Route protection work to secure corridor. • Timing and sequencing of implementation to be confirmed – particularly to ensure region-level integration across major investments and growth plans.

Te Upoko o te Ika a Māui Greater Wellington Rail Network Upgrades	Rail and rapid transit	• Increase capacity and resilience of the rail system, so it can play a growing role in meeting the region's travel needs (especially from the north into the city centre).
		• Enable, support, and shape the region's urban growth, – especially to encourage intensification around existing train stations.
			• A programme of upgrades has been identified. This includes:
			  - removing key bottlenecks of single-track
			  - station upgrades and access improvements
			  - fleet expansion, including supporting infrastructure
			  - ongoing service frequency improvements
			  - ongoing track and infrastructure upgrades.
				• Further work to confirm how the programme is implemented over time, especially in a way that's integrated with other regional investments and affordable to funders.
				• More detailed planning of high priority and urgent investments.

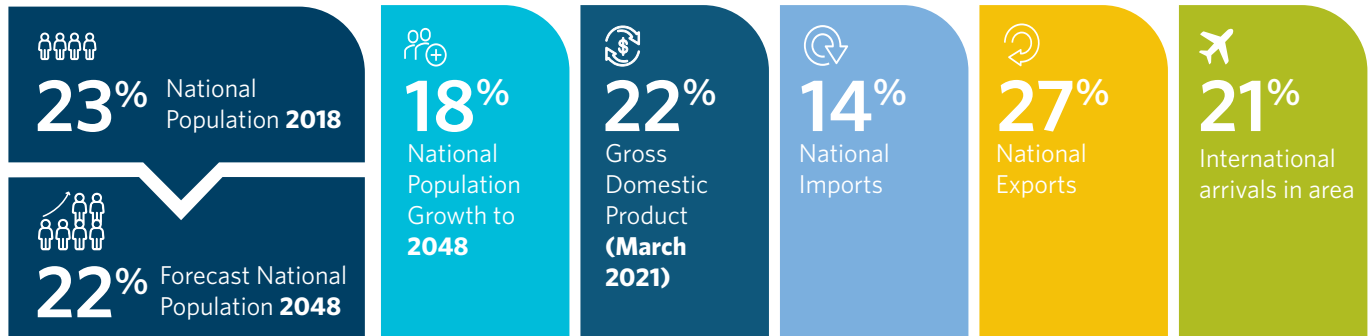| Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Te Whanganui-a-Tara Wellington Cycling Network – Paneke Pōneke	Cycling	• Connect suburbs to the city and destinations. • Help people of all ages and abilities get where they need to. • Safety challenges for unprotected parts of the network. • Significant shift to cycling required to support goals around emissions, vehicle kilometres travelled (VKT), and mode shift.	• *Paneke Pōneke* outlined the need for a significant upgrade to the cycling network and includes a network plan. • Barriers to cycling in Te Upoko o te Ika a Māui Greater Wellington include safety and access.	• Identify additional funding sources to support progress towards full implementation. • Some key routes to be completed early.
Te Ara Tupua	Walking and cycling	• Need for a safe, separated connection between Lower Hutt and Wellington. • Currently, cyclists ride with the traffic on SH2. • Improve resilience and placemaking.	• Existing connection isn't safe or fit for purpose. • Can integrate resilience (sea level rise) within the project.	• Construction began in 2022.
Network-level decarbonisation	Rail	• Freight carried by rail currently saves at least 70% of the carbon emitted by heavy-road transport. • Need to switch to low-emissions modes.	• Electrification justified on high-volume route – NIMT between Palmerston North and Waikanae.	• Planning needed to identify preferred long-term solutions.

Te Waipounamu – South Island

Te Waipounamu, the South Island, includes Te Tauihu Top of the South (Te Tauihu-o-te-waka Marlborough, Whakatū Nelson, and Te Moana-nui-a-Kiwa Tasman), Waitaha Canterbury,

Te Tai Poutini West Coast, Ōtākou Otago, and Murihiku Southland.

The South Island is 32% larger than the North Island and contains 23% of the total population.[50]

South Island

23% National Population **2018**

22% Forecast National Population **2048**

18% National Population Growth to **2048**

22% Gross Domestic Product **(March 2021)**

14% National Imports

27% National Exports

21% International arrivals in area

Current strategic networks

The nationally-strategic road network in the South Island consists of:

- SH1 Picton to Dunedin
- SH76 Weedons to Ferrymead
- SH74 Ferrymead to Lyttelton.

The regionally-strategic road network in the South Island consists of:

- SH6 Blenheim to Nelson
- SH6 Greymouth to Hokitika
- SH73 Ōtautahi Christchurch to Kumara Junction
- SH8 Clarksville to Cromwell
- SH8B Cromwell link
- SH6/6A Cromwell to Queenstown
- SH78 Timaru Port access
- SH88 Dunedin to Port Chalmers
- SH1 Dunedin to Invercargill.

The strategic rail network in the South Island consists of:

- Main North Line
- Midland Line
- Main South Line.

The strategic walking and cycling network is defined as all walking and cycling connections in classes C1, C2, W1 and W2.

Several intermodal freight terminals are in the South Island:

- Lyttelton Port
- Picton Port, including Interislander
- Port Otago
- Rolleston, serves Lyttelton and Timaru
- South Port
- PrimePort (Timaru)
- Christchurch Airport.

Key drivers of change

The most significant drivers of change for strategic networks in the South Island over the next 30 years are:

- increasing travel demand from population, economic growth, and tourism
- urgently and dramatically reducing transport emissions
- improving resilience to the impacts of climate change
- addressing unacceptable safety, health, and resilience deficiencies
- addressing unacceptable impacts of network conflicts, including conflicts between movement and place outcomes.

Map of current strategic network in the South Island

Legend

Nationally Strategic - Rapid Transit

Nationally Strategic - Rail

Nationally Strategic - State highway

Regionally Strategic - State highway

Strategic Intermodel Freight Hubs

Nelson

Picton

PICTON PORT

Blenheim

Tasman

Marlborough

Greymouth

West Coast

Hokitika

CHRISTCHURCH INTERNATIONAL AIRPORT

LYTTELTON PORT

Christchurch

ROLLESTON, CHRISTCHURCH

Canterbury

PRIMEPORT, TIMARU

Timaru

Milford Sound

Queenstown

Otago

PORT OTAGO, DUNEDIN

Dunedin

Southland

Invercargill

SOUTH PORT

Areas of potential transformational change

Areas of transformational change in the South Island are identified in this section. For parts of the strategic network not identified below, transformational change is not required unless there is a significant shift in the key drivers.

Required transformational changes reflect the identified triggers and preconditions in Our Future Focus map. Where triggers and preconditions for a change have been reached, they've been incorporated into the potential areas of transformational change. New areas of transformational change will be added as key drivers change, and preconditions and triggers are met.

Our Future Focus map →

Map of potential transformational change for the South Island

Legend

Strategic cycling	
Strategic rail	
Strategic rapid transit	
Strategic roading network	
Strategic cycling citywide networks	
Strategic rapid transit networks	

Areas of potential transformational change – South Island

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
SH1 Ōtautahi Christchurch (Hornby)	Road and rapid transit	• Major growth location. • Fundamental movement and place conflicts between existing infrastructure and desired centre role. • Road and rail level crossing on SH1 near critical intersection makes achieving incremental improvement extremely difficult.	• Additional motorway capacity has already been added to the Christchurch network, including SH76. • Mass rapid transit business case identified an emerging conflict between current SH1 alignment through Hornby and potential use of Main South Road as part of a rapid transit route. This is caused by the station/terminus function, coupled with the potential role of Hornby as a centre for development.	• Long-term planning needed to identify preferred long-term solution, to be done with mass rapid transit and spatial planning.
SH6/6A Tāhuna Queenstown	Road and public transport	• Rate of population growth. • Rate of tourism growth. • High dependency on private vehicle travel and visitor population. • Safety issues, particularly for walking and cycling.	• Corridor width constraints along SH6/6A restrict ability to provide more capacity for private vehicles. • Constraints at SH6/6A intersection – all vehicles must use this intersection to access central Queenstown, airport, and connecting routes. • Significant improvement to public transport required to support transport outcomes in the Wakatipu Basin – public transport spine along SH6/6A and into town centre.	• Planning approach for interventions identified as part of the Queenstown Lakes spatial plan. • Deliver active mode network and demand management approach. • Investigate offline public transport approach. • Identify further requirements on SH6/6A after New Zealand Upgrade Programme project is complete.
Ōtautahi Mass Rapid Transit (MRT) Network	Rapid transit	• There needs to be step-change improvements in the attractiveness of public transport to drive mode shift and improve travel choice. • There are significant urban development opportunities in parts of Ōtautahi that will be enabled and supported by rapid transit. • Christchurch's strategic road networks are essentially complete, yet significant growth is forecast in the future – without additional people movement capacity, congestion will increase over time.	• Christchurch Public Transport Futures Programme confirmed north and southwest as the key corridors where rapid transit is likely required in the future. • To support urban form, the mass rapid business case has proposed a turn-up-and-go service along a dedicated corridor from Hornby through to the city centre ending in Belfast.	• A detailed business case to investigate the design of the corridor and stations along the route.

Location	Type	Key drivers of need for transformational change	What has previous work confirmed?	Strategic direction/Next steps
Ōtautahi Cycling Network	Cycling	• Need to rapidly provide additional connections across the city for all kinds of trips. • Safety challenges for unprotected parts of the network. • Significant shift to cycling required to support goals around emissions, vehicle kilometres travelled (VKT), and mode shift.	• *Christchurch Transport Plan* identifies cycling infrastructure as a key contributor to the city's transport goals. • Focus on city centre, redesigning intersections, and completing major and local cycleways.	• Rapidly expand the cycling network. • Improve streets as places for people. • Reduce speeds to support cycling.
Lyttelton to Rolleston Rail spur	Rail	• Intermodal freight terminals at Rolleston serving Lyttelton and Timaru ports. • Capacity and resilience required to support additional freight movements to and from the port.	• Need for additional capacity and resilience. • Safety and congestion challenges at existing level crossings. • Opportunity to shift freight onto lower emissions modes for this connection.	• Planning needed to identify preferred long-term solutions.
Network-level decarbonisation	Rail	• Freight carried by rail currently saves at least 70% of the carbon emitted by heavy road transport. • Need to switch to low emissions modes.	• Electrification justified on high-volume routes – low-emission diesels only current solution for South Island.	• Planning needed to identify preferred long-term solutions.

References

1. Waka Kotahi NZ Transport Agency (2022). Benchmarking sustainable urban mobility. **https://nzta.govt.nz/assets/resources/sustainable-urban-mobility-benchmarking/sustainable-urban-mobility-benchmarking-report.pdf**

2. Ministry of Transport (2022). Te karore ā-whānau, Household travel. **https://www.transport.govt.nz/area-of-interest/public-transport/new-zealand-household-travel-survey/**

3. Ministry of Transport (2022). Te karore ā-whānau, Household travel. **https://www.transport.govt.nz/area-of-interest/public-transport/new-zealand-household-travel-survey/**

4. NZ Centre for Sustainable cities (2015). Benchmarking cycling and walking in six New Zealand cities. **https://rcaforum.org.nz/sites/public_files/images/Benchmarking-cycling-and-walking-in-six-NZ-cities.pdf**

5. NZ Centre for Sustainable cities (2015). Benchmarking cycling and walking in six New Zealand cities. **https://rcaforum.org.nz/sites/public_files/images/Benchmarking-cycling-and-walking-in-six-NZ-cities.pdf**

6. Waka Kotahi NZ Transport Agency (2022). Benchmarking sustainable urban mobility. **https://nzta.govt.nz/assets/resources/sustainable-urban-mobility-benchmarking/sustainable-urban-mobility-benchmarking-report.pdf**

7. Waikato Regional Council (2013). The costs of physical inactivity. **https://www.waikatoregion.govt.nz/assets/PageFiles/25488/The_Costs_of_Physical_Inactivity.PDF**

8. Waikato Regional Council (2013). The costs of physical inactivity. **https://www.waikatoregion.govt.nz/assets/PageFiles/25488/The_Costs_of_Physical_Inactivity.PDF**

9. Waka Kotahi NZ Transport Agency (2022). Benchmarking sustainable urban mobility. **https://nzta.govt.nz/assets/resources/sustainable-urban-mobility-benchmarking/sustainable-urban-mobility-benchmarking-report.pdf**

10. Waka Kotahi NZ Transport Agency (2022). Reshaping streets regulatory changes consultation document. **https://www.nzta.govt.nz/assets/consultation/reshaping-streets/reshaping-streets-regulatory-changes-consultation-document.pdf**

11. Waka Kotahi NZ Transport Agency (2017). Regulations and safety for electric bicycles and other low-powered vehicles. **https://www.nzta.govt.nz/assets/resources/research/reports/621/621-regulations-and-safety-for-electric-bicycles-and-other-low-powered-vehicles.pdf**

12. Let's Get Wellington Moving (2021). **https://lgwm.nz/**

13. Environment Canterbury Regional Council (2018). Draft Canterbury regional public transport plan. **https://www.ecan.govt.nz/document/download?uri=3456298**

14. KiwiRail (2017). Statement of corporate intent 2017–2019. Retrieved from **www.kiwirail.co.nz**

15. Sustainable Business Council (2016). Sustainable procurement guidelines for freight: September 2016. Retrieved from **www.sbc.org.nz**

16. Ministry of Transport (2019). National freight demand study 2017/18. **https://www.transport.govt.nz/assets/Uploads/Report/NFDS3-Final-Report-Oct2019-Rev1.pdf**

17. Maersk (2022). Maersk to launch dedicated coastal service in New Zealand. **https://www.maersk.com/news/articles/2022/06/15/maersk-to-launch-dedicated-coastal-service-in-new-zealand**

18. Ministry of Transport (2019). National freight demand study 2017/18. **https://www.transport.govt.nz/assets/Uploads/Report/NFDS3-Final-Report-Oct2019-Rev1.pdf**

19. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

20. Sustainable Business Council (2016). Sustainable procurement guidelines for freight: September 2016. Retrieved from **www.sbc.org.nz**

21. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

22. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

23. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

24. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

25. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

26. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

27. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

28. Stats NZ (2022). Electric vehicle imports accelerate as New Zealanders look to the future. **https://www.stats.govt.nz/news/electric-vehicle-imports-accelerate-as-new-zealanders-look-to-the-future/**

29. Stats NZ (2022). Electric vehicle imports accelerate as New Zealanders look to the future. **https://www.stats.govt.nz/news/electric-vehicle-imports-accelerate-as-new-zealanders-look-to-the-future/**

30. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

31. Ministry of Transport (2022). Te karore ā-whānau, Household travel. **https://www.transport.govt.nz/statistics-and-insights/household-travel/**

32. Ministry of Transport (2022). Te karore ā-whānau, Household travel. **https://www.transport.govt.nz/statistics-and-insights/household-travel/**

33. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

34. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

35. Ministry of Transport (2022). Te tatauranga rāngi waka a tau 2021 | Annual fleet statistics 2021. **https://www.transport.govt.nz/assets/Uploads/Report/AnnualFleetStatistics.pdf**

36. Stats NZ (2020). National population projections: 2020(base)–2073. **https://www.stats.govt.nz/information-releases/national-population-projections-2020base2073**

37. Ministry for the Environment (2022). Emissions reduction plan. **https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/emissions-reduction-plan/**

38. Ministry of Transport (2016). New Zealand international air freight. **https://www.transport.govt.nz/assets/Uploads/Report/Airfreight-Research-Final-Report-23-March.pdf**

39. Ministry of Transport (2018). Ngā waka rangi me ngā waka moana, Air and sea transport. **https://www.transport.govt.nz/statistics-and-insights/air-and-sea-transport/sheet/air-freight**

40. Stats NZ (2020). Key facts. **https://www.stats.govt.nz/information-releases/international-travel-december-2019#:~:text=Key%20facts,United%20States%20(up%203%2C300)**

41. Stats NZ (2022). International travel: April 2022. **https://www.stats.govt.nz/information-releases/international-travel-april-2022/**

42. KiwiRail (2021). Rail network investment programme. **https://www.kiwirail.co.nz/assets/Uploads/documents/Rail-Network-Investment-Programme-July-2021.pdf**

43. Ministry of Transport (2022). Transport indicators, Inclusive access. **https://www.transport.govt.nz/statistics-and-insights/transport-indicators/sheet/inclusive-access**

44. Emission: Impossible Ltd and the HAPINZ 3.0 team (2022). Health and air pollution in New Zealand 2016 (HAPINZ 3.0): Volume 1 – Finding and implications. **https://environment.govt.nz/assets/publications/HAPINZ/HAPINZ-3.0-Findings-and-implications.pdf**

45. Emission: Impossible Ltd and the HAPINZ 3.0 team (2022). Health and air pollution in New Zealand 2016 (HAPINZ 3.0): Volume 1 – Finding and implications. **https://environment.govt.nz/assets/publications/HAPINZ/HAPINZ-3.0-Findings-and-implications.pdf**

46. Crombie Lockwood (2018). New Zealand – Second in the world for natural disaster costs. **https://www.crombielockwood.co.nz/news/new-zealand-second-in-the-world-for-natural-disaster-costs/**

47. Stats NZ (2020). National population projections: 2020(base)–2073. **https://www.stats.govt.nz/information-releases/national-population-projections-2020base2073**

48. Stats NZ (2020). National population projections: 2020(base)–2073. **https://www.stats.govt.nz/information-releases/national-population-projections-2020base2073**

49. Stats NZ (2020). National population projections: 2020(base)–2073. **https://www.stats.govt.nz/information-releases/national-population-projections-2020base2073**

50. Stats NZ (2020). National population projections: 2020(base)–2073. **https://www.stats.govt.nz/information-releases/national-population-projections-2020base2073**