Arataki

Methodology

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. This also includes new layers added to the two geospatial maps: Our Current Network and Our Future Focus. More detail about these layers has been added to the updated sub-section Geospatial Maps in the Methodology.

Overview

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

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

Arataki Version 2 was published in 2020. This release reflected the initial impact of COVID-19 on the land transport system. This work supported the Waka Kotahi response to the global pandemic.

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

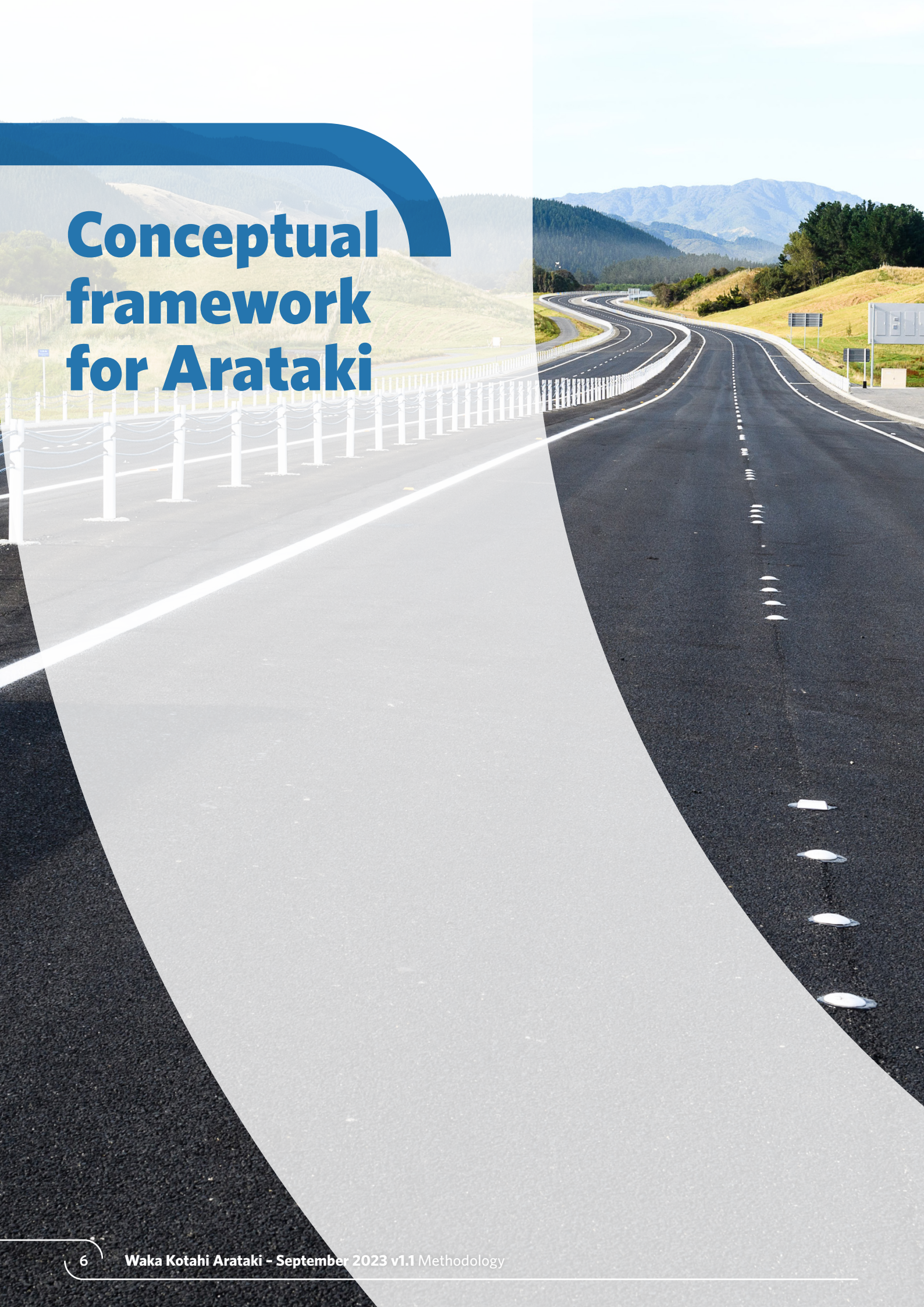
Arataki: 30-Year Plan replaces all previous versions of *Arataki.* All relevant information has been included in this latest version of *Arataki*. References to information from *Arataki: 10-Year Plan* and the BNV are still available within the *Arataki: 30-Year Plan.* Information that is outdated, archived, or not available, such as the pan-regional summaries, can be requested.

This methodology statement explains the conceptual framework of *Arataki: 30-Year Plan.* It also outlines how the evidence, insights, and directions that inform the current version were found and applied.

What is the land transport system?

We have defined the land transport system as anything that affects transport outcomes for individuals and households, businesses, and communities through the movement of people and goods. It consists of all institutions, networks, purposes, and modes. It excludes pipelines and separate but related components of the wider transport system such as aviation, maritime and outer space (as these are not covered by the definition in the Land Transport Management Act 2003).

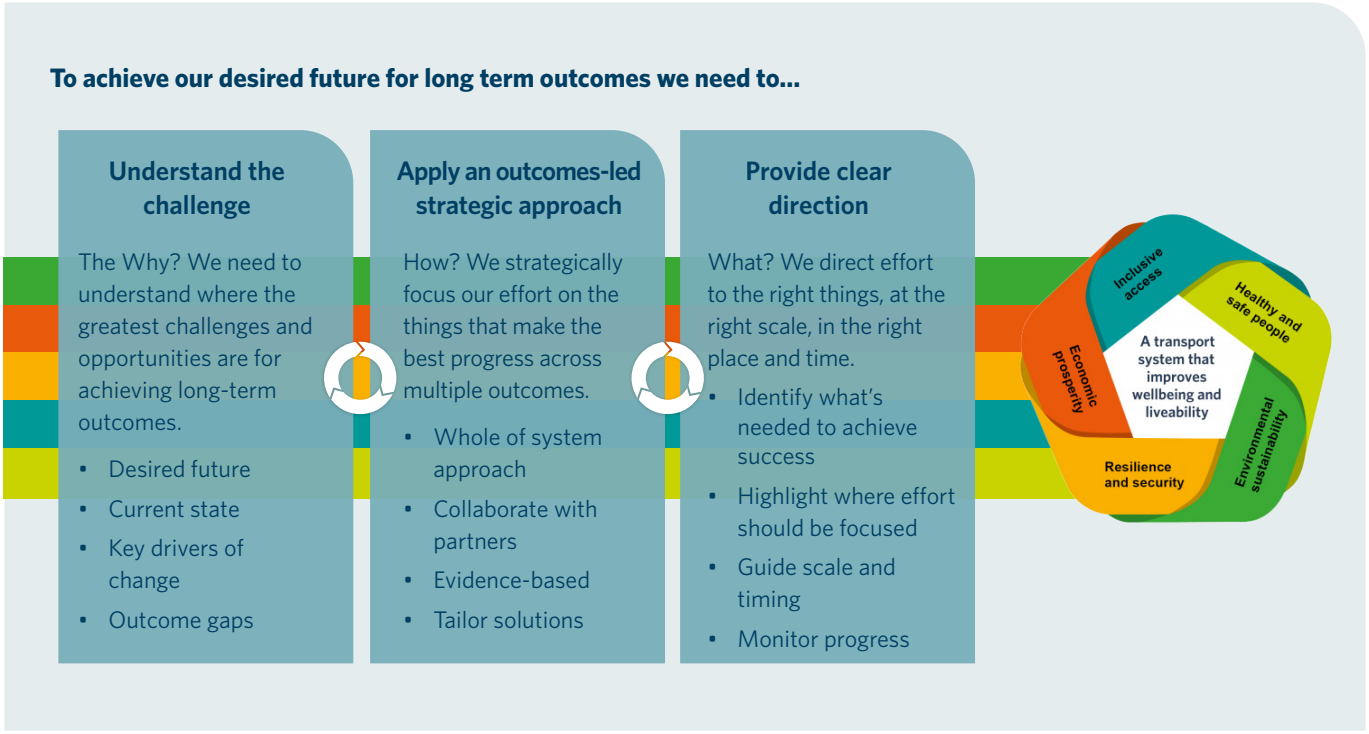
Conceptual framework for Arataki



Arataki aims to understand the challenges we face from a system perspective through the application of a strategic approach to provide clear direction.

Conceptual framework for Arataki

Figure 1



Understanding the challenge

The Why: We need to understand where the greatest challenges and opportunities are to achieve the long-term outcomes.

The current challenges, as we have understood while developing this version, can be summarised in Figure 2. Detailed analysis and insights can be found in the following sections of Arataki: *Strategic Context, National Directions, Regional Directions, and Transport Modes and Strategic Networks.*

Understanding the challenge
Figure 2

Desired future	Current and future state	Outcome gaps
• Affordable, convenient, safe and sustainable access for everyone to social and economic opportunities. • Efficient, resilient and reliable connections that support economic activity and move goods to market. • Safe, decarbonised travel that avoids harm to people ad the environment. • Plan, design, build, maintain and operate in a way that minimises waste and uses resources efficiently. • Responsive and adaptive to disruption and the impacts of climate change. • Contribution to the creation of great places. • Respect and uphold Te Tiriti and Te Ao Māori.	• Uneven population growth, focused in and near major urban areas and the Upper North Island. • An aging and increasingly diverse population, with changing travel needs. • An economy with equity and productivity challenges, increasingly focused on the service sector, that will need to decarbonise. • A pressing need to both dramatically reduce greenhouse gas emissions and also adapt to the impacts of climate change. • Rapid development of transport technologies with complex and unpredictable impacts. • Growing cost pressures and an increasingly outdated funding system.	• A lack of genuine travel choice, undermining access and reinforcing a dependence on private vehicles. • An unacceptable level of harm to people form unsafe and unforgiving transport networks, and from harmful pollutants. • A need for fundamental change to decarbonise transport in an equitable way. • Long and unreliable journey times, adding cost and reducing quality of life. • Declining use of active travel modes, with significant health impacts. • Growing challenges in looking after existing networks appropriately. • Poor integration between transport and growth, undermining the creation of great places and achieving transport outcomes. • Insufficient recognition of Te Tiriti and Te Ao Māori.

Applying an outcomes-led strategic approach

The Why: We need to strategically focus our effort on the things that make the best progress across multiple outcomes.

Apply an outcomes-led strategic approach
Figure 3

Collaborate with partners	Whole-of-system approach	Evidence based	Tailor solutions
• Partner across the sector and with the public, to build broad agreement on plans, strategies and programmes. • Make a step-change improvement to meeting Te Tiriti partner obligations.	• Use the right tool for the job, in the right place, at the right time. • Prioritise actions that achieve multiple outcomes and deliver value in a variety of possible futures. • Use maintenance and operational activities to achieve multiple outcomes.	• Use data and real-time information to better understand system deficiencies and target effort. • use the most effective solutions to achieve change. • Create clear and transparent plans and programmes to inform robust decision-making.	• Apply different approaches in urban and rural areas, reflecting their fundamentally different transport challenges. • use different transport tools for tasks they are well suited to and perform strongly. • Apply a mix of interventions in an integrated way.

Providing clear direction

The What: We aim to direct effort to the right things, at the right scale, in the right place and time.

Details about providing direction is captured in the *National Directions* and *Regional Directions* sections of *Arataki*.

Providing clear direction at a national level

Figure 4

Achieving shared outcomes with our partners	Maximise the benefits of technology, data, and innovation
• Build broad agreement on plans, strategies, and programmes. • Make step-change improvement to meeting Treaty partner obligations. • Develop shared evidence bases and collaborative responses to system-wide challenges. • Ensure the right tool is used at the right place at the right time, and prioritise those that achieve multiple outcomes. • Further refine procurement practices to help achieve multiple outcomes. • Develop joint frameworks, release open data for use, and enable community-led delivery. • Use targeted regulatory change to achieve a range of outcomes, particularly for vehicle safety and emissions.	• Ramp up collection, use, and distribution of transport data (including real-time) to improve the speed and quality of choices that transport system users, operators, and regulators can make. • Extend the use of evidence and insights to inform approaches and direction. • Provide clear direction on the role for new technology, services, and business models to support the future transport system.

Maximise value from transport infrastructure and services	Support highly liveable urban areas	Support prosperous rural communities
• Focus on maintaining and optimising existing infrastructure and services, to protect and maximise value from current assets. • Identify, anticipate, and progress opportunities to deliver multiple outcomes as part of looking after existing networks and building new ones. • Manage and operate transport networks more deliberately and actively, to support their movement and place functions, reduce conflicts between different users, and prioritise critical services. • Identify and progress opportunities to reallocate road space for a range of users and modes. • Improve service levels across public transport and rapid transit, and make the experience for customers better through real-time data to increase patronage. • Boost network resilience by maintaining critical parts of the network and addressing immediate challenges in areas with heightened risk from climate change and extreme weather. • Better manage existing assets by improving management and funding practices to reflect long-term drivers and reduce whole of life-cycle costs.	• Enable, support, and shape quality, mixed-use, compact towns and cities where most growth happens in locations with better travel options and shorter trip lengths. • Reshape the use of urban road networks to free up space for public and active transport modes, and more efficient freight movements. • Provide improved travel choices, especially where this helps improve equity outcomes. • Enable and support the use of public, shared, and active modes, especially for those with limited transport choices. • Implement rapid transit solutions in major metropolitan areas where transformational change to transport and urban development outcomes is required.	• Ensure rural communities are provided with safe and resilient transport connections. • Explore new ways rural communities can access safe, convenient, and reliable shared transport services. • Build more resilient rural and coastal communities by making adaptation a core and urgent element of transport planning, especially for high-risk areas and connections.

Strategic framing

The strategic framing of the 2023 version of *Arataki* includes:

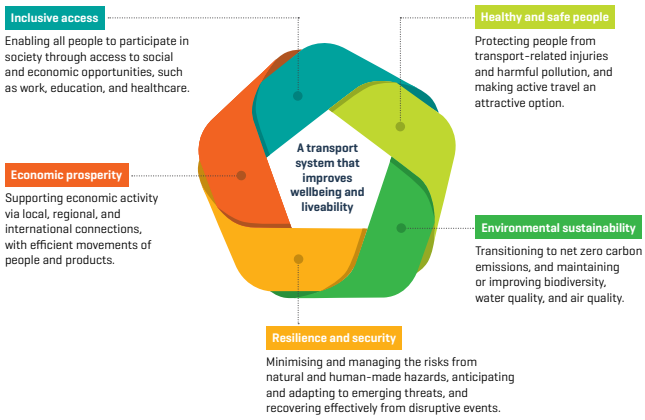
- outcomes
- key drivers for future change
- levers
- step changes (for future versions of *Arataki*).

Outcomes

To help government and the transport sector take a strategic approach, Te Manatū Waka Ministry of Transport developed the *Transport Outcomes Framework*. This framework sets a purpose for the transport system centred around the wellbeing of New Zealanders and making places great to live.[1] It outlines five outcome areas to contribute to this purpose:

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

Transport Outcomes Framework
Figure 5



The *Transport Outcomes Framework* clarifies:

- what we are aiming to achieve
- why this is important
- how we will work together to achieve our goals.

Why does Arataki use the Transport Outcomes Framework from Te Manatū Waka?

The *Arataki* 2023 release is framed towards delivering against the *Transport Outcomes Framework*. Previous versions of *Arataki* and the *Baseline Network Version* were framed around delivering against the six key drivers for future change. The refocus to the outcomes framework was to provide an enduring and apolitical structure from a transport system perspective. Targets for the transport outcomes will be adopted and incorporated into *Arataki* when made available by Te Manatū Waka.

The scale of change required to address outcome gaps is outlined in the *Regional Directions* section of *Arataki*. The methodology of this section is outlined in Appendix 1: Regional ratings methodology.

Key drivers for future change

How were the key drivers identified?

The Waka Kotahi Performance Improvement Framework (PIF) review identified six external factors that will shape our operating environment over the next 10 to 15 years. The key drivers for future change identified in *Arataki* draw on these factors and remain largely consistent in the current version of *Arataki*. Where possible, the key drivers have been extended across 30 years in *Arataki* and draw from the same evidence sets.

The six key drivers for change are:

- demographic change
- climate change
- technology and data
- changing travel patterns and preferences
- changing economic structure
- funding and financing challenges.

Drivers for future change
Figure 6

These key drivers draw on the base case set out in the *Transport Outlook: Future State* from Te Manatū Waka Ministry of Transport.[2] The key drivers will be monitored and emerging trends identified to influence the choices and trade-offs that need to be made to achieve the long-term view.

Levers

In *Arataki*, we use 'lever' to describe a group of related directions that can be used to bring about change.

Levers, and the related directions, provide us with the ways we can bring about change to the transport system. Levers can be used to:

- respond to and prepare for key challenges, such as those presented in the key drivers
- unlock opportunities to improve the way the system runs.

Achieving the outcomes of *Arataki* will likely require a mix of different levers and directions across the whole land transport system, not just from Waka Kotahi.

Over time, we want to offer high-level guidance to our system partners. This will identify what we see as the most effective changes to the system to make the best progress towards achieving transport outcomes. As a step towards this, we have started to group core directions for the transport sector under six main levers. This builds on the levers we used for the *Arataki: 10-Year Plan*. Using these groupings as a starting point allows us to test the effectiveness and impact of different directions, including which may work best in different places.

The levers described in Figure 7 are those that we think can have the greatest impact on the outcomes as described by the outcome framework.

Levers
Figure 7

Lever type	Definition	Strengths of this lever	Weaknesses of this lever
Regulate network use	Positively influence the movement of people and goods across the network to ensure users, and those who affect the system, can use and comply with the system by: • setting and communicating standards • overseeing licensed regimes • enforcing responses to non-compliance • ensuring the network can absorb new technologies and approaches.	• able to be directed at classes and/or groups to bring about larger scale change • provides a direct way to change behaviour • can work well when paired with complementary levers that incentivise compliance and certain travel behaviours.	• less opportunity for regional and/or user nuances than other levers provide • less able to be easily changed and/or amended as opportunities and challenges evolve • comparatively expensive to operate to ensure high compliance and accountability.
Pricing tools	Influencing access to and use of the land transport system by changing the price of transport.	• price signals are a strong tool to incentivise behaviour • can support a range of outcomes • allows people to make their own decisions about the value of the activity • can provide a revenue stream to support use of other levers.	• can have equity impacts because of increasing costs • requires a legislative basis and so can be slower to bring in and adapt if needed • usually requires some form of system to support operation which increases costs.

Lever type	Definition	Strengths of this lever	Weaknesses of this lever
Spatial and place-based planning	Long-term integrated growth and infrastructure plans and land-use decision-making that covers both urban and non-urban areas.	• supports better travel options, improved social, health and community outcomes, and efficient use of land • delivers value for money by providing more detail about how funds are invested • provides assurance by giving long-term, strategic direction and supporting the optimal integration of other levers • helps maximise the value of assets and space and deferral and/or delay of investment in new assets • supports communities to respond to key drivers, such as climate change.	• urban form is critical to determining transport networks and services but the ability to direct private development is limited • resource intensive to participate • delivery occurs over many decades and can have long lead times for change • requires significant cross-agency alignment.
Maintain and get the most out of existing networks and services	Ensuring land transport system users have continued access to current land transport services and networks by: • providing public transport • managing access to the network • operating and maintaining existing networks • managing disruptive events.	• able to 'design in' features at an early stage to reduce the likelihood of long-term negative impacts to the network and promote positive shifts • responses can be flexible, and tailored to specific conditions, users, or parts of the network • further investment can be avoided or deferred.	• scope of impact is limited by the original design of the infrastructure being maintained or operated • scope of impact is limited by revenue available, and prioritisation is needed • some changes have long lead times to deliver and may require legislative change.
Deliver new or upgraded infrastructure and services	Performance improvements to the land transport system, including multi-modal capacity, networks, connections, and facilities, through new or enhanced infrastructure, technologies, and services.	• can be prioritised and targeted to specific projects or issues • adds to network capacity and provides for multi-modal options • flexible, can be used to provide new connections or services, to maintain and to improve • well established process for determining how to deliver • enables partnership approach, such as with local government	• may require significant investment • lag time in delivery because of the work required in investment processes and planning, consenting, and construction • risk of cost increases or unforeseen issues.
Education and awareness	Providing information and education to: • raise sector capability • support better decision-making • improve the authorising and influencing environment.	• always 'on' and can be changed according to the audience • ability to identify customer insights that influence outcomes • can be used to influence change in behaviours • can reach a large audience • can be introduced, targeted, modified or finished quickly • cost effective.	• low degree of confidence in terms of directly changing behaviour • achieved changes in behaviour may not be sustainable • behavioural change and social norms can be slow to achieve.

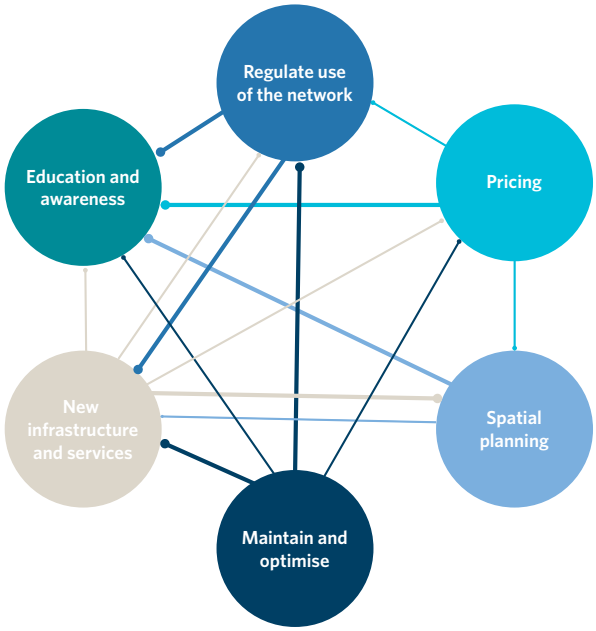
These levers will be supported by a set of cross-cutting enablers that underpin the delivery of all levers.

Policy and planning	Planning and policy involves: • establishing goals and guidance • identifying barriers • comparing options and developing solutions for planning, managing, funding, and using the land transport system • creating, initiating, and monitoring programmes of activities to deliver solutions.
Collaboration and partnership	Transport system partners work together to: • provide sector leadership • deliver programmes of work • positively drive delivery against long-term outcomes by advising, guiding, enabling, and learning from others.
Evidence and research	Evidence and research includes: • collecting data, evidence, and insights • analysing, researching, and evaluating • providing an informed basis for the selection, design, delivery, and improvement of interventions.

How do the levers interact with each other?

There are many dependencies between the levers. In Figure 8, thick lines show strong dependencies and thin lines shows medium dependencies.

Interaction of levers
Figure 8



We need to do more work to better understand:

- how the levers interact with each other
- the core levers needed to deliver on each transport outcome
- the circumstances in which they are most usefully applied
- whether improvements could be made to how they are currently being delivered.

This version of *Arataki* doesn't feature levers. As we gain more understanding and agreement on the right levers, future versions will reflect the application of this work.

Step changes

A step change is a transformational shift that the sector needs to make to close the gap between:

- our outcome targets
- what will be achieved if we continue on our current pathway.

It is a potential element in our strategic response to address the challenge of operating in a complex system with multiple outcomes, levers, and partners. It is about how we use system thinking to look at our problems in a new way to achieve step change in performance. Currently, our step changes are:

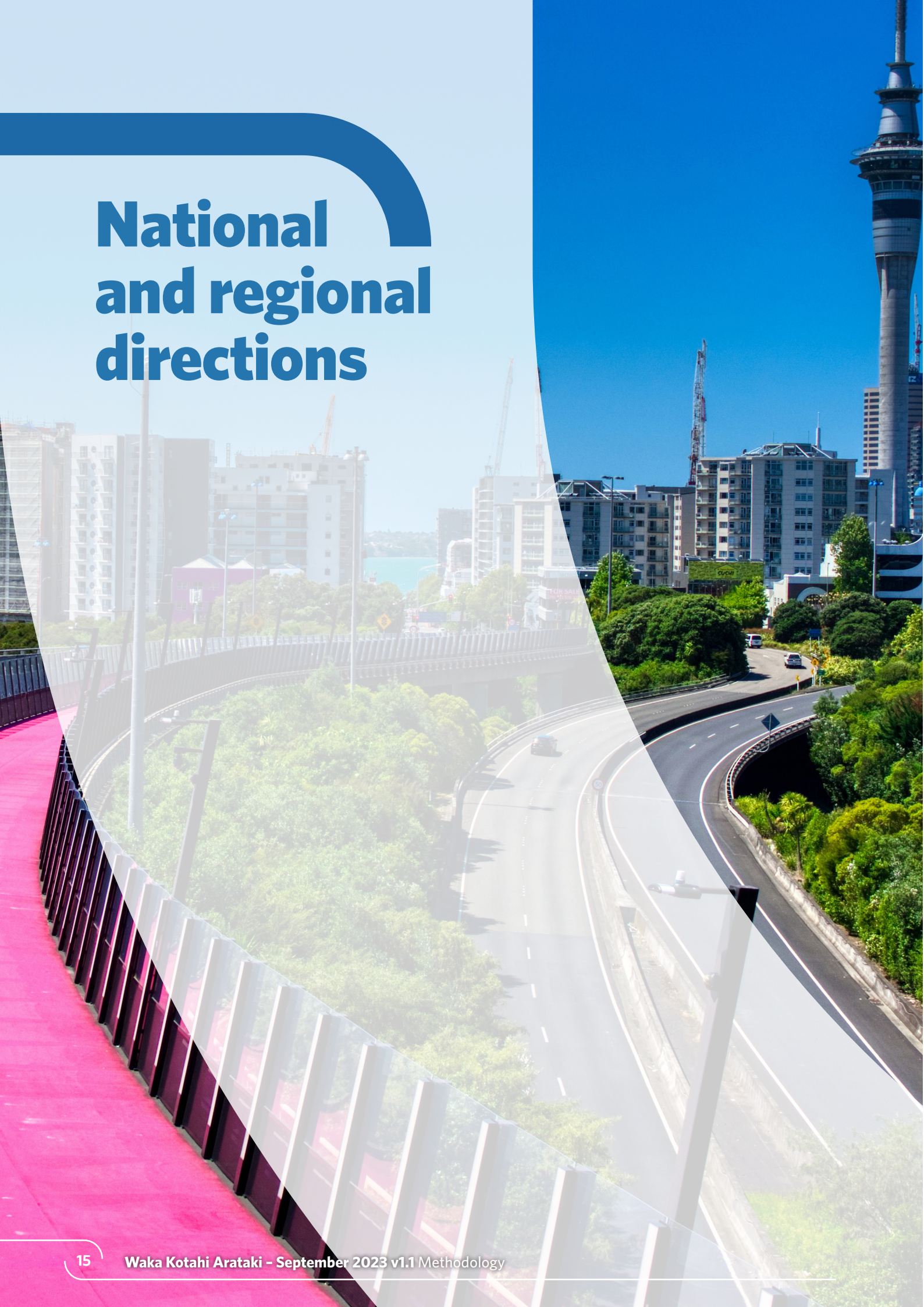
- support regional development
- transform urban mobility
- improve urban form
- tackle climate change
- significantly reduce harms.

It is recognised that a major review of these step changes is required to:

- determine if they provide enough direction for the next 30 years
- identify where new or re-focused transformations are needed in the system.

Therefore the 2023 version of *Arataki* hasn't focused on the impact of step changes. The next future release will feature a review of our step changes, including how we use them and their degree of impact.

National and regional directions



In 2023, we developed directions at national and regional scales. Our key objective was to better understand which directions would help us deliver on multiple outcomes from Te Manatū Waka Ministry of Transport's *Transport Outcomes Framework*. Developing the directions followed a two-step process.

Firstly, we used a bottom-up approach to identify directions across all outcomes from subject matter experts within Waka Kotahi. This process yielded a long list of potential directions including those that were:

- already underway
- planned and about to start
- identified to deliver on a range of Waka Kotahi strategies, such as Road to Zero, vehicle kilometres travelled (VKT) reduction, and mode shift plans
- planned as part of Waka Kotahi involvement in partnerships, such as spatial plans and the Urban Growth Agenda
- identified as future or potential directions.

For each direction, existing peer-reviewed studies were used to populate the qualitative impact across multiple outcomes, costs, and key contextual factors, such as the spatial scale and time horizon at which evidence suggests the direction best operates.[3] International studies were used where there was a lack of robust local evaluation. Key contextual factors have been translated to a New Zealand context. Each direction was scored across all five outcomes. The scores were then used to build a composite score to assess and identify directions that were most likely to deliver across multiple outcomes. The directions were then tested with:

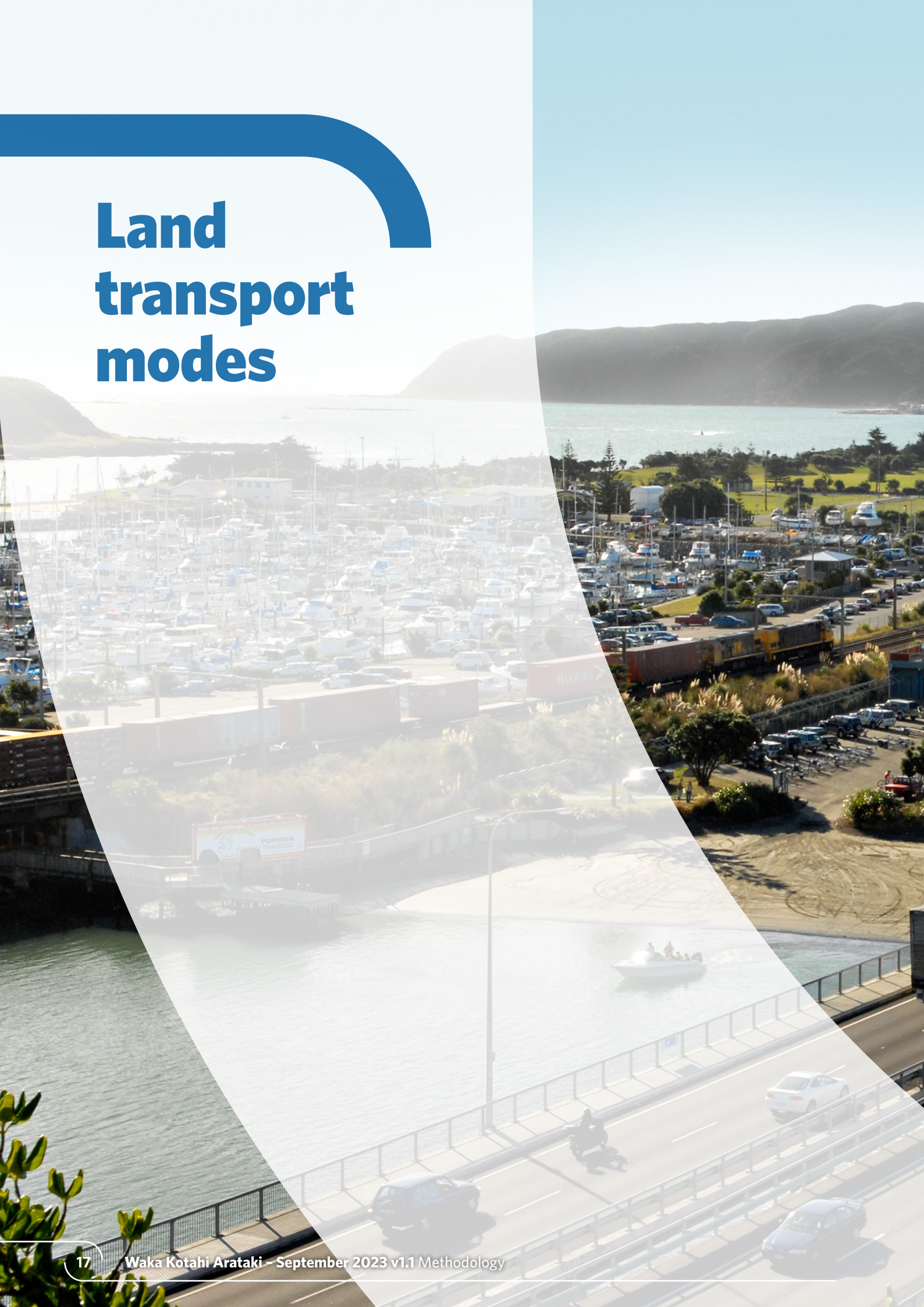
- subject matter experts across Waka Kotahi
- internal key stakeholders including regional teams, transport planners, local government partnerships, and others.

As a second set, the set of directions were tested by the advisory group who applied a top-down approach using a long-term system lens. As a result, the altitude of the directions was amended to reflect the long-term system view. The directions were then assessed through a national lens and then a regional lens. These were again tested with subject matter experts and key stakeholders. This focused on making sure:

- the directions were positioned at the appropriate spatial scale
- the national directions supported and enabled the regional directions.

We don't expect the directions to change with each version of *Arataki*. The triggers for change will depend on the significance of the evidence and insights. In the next version of *Arataki*, we are looking to further test these directions with our partners, including local government.

Land transport modes



The land transport system refers to anything that affects transport outcomes for individuals, households, businesses, and communities through the movement of people and goods.

It consists of all:

- institutions and organisations such as Te Manatū Waka Ministry of Transport, Waka Kotahi, KiwiRail, and councils
- regulations, policies, funding/investment tools, and agreements
- networks of infrastructure, services, and technology, including all transport corridors
- purposes and modes of travelling by land (walking, cycling and micromobility), public transport, rapid transit, private motor vehicles, heavy motor vehicles, heavy rail, and coastal shipping.

It excludes pipelines and separate but related components of the wider transport system including aviation, maritime, and outer space.

Rapid transit

Rapid transit is defined as public transport:

- running to a 15 minute or less frequency
- in either road- or rail-based modes.

For the purposes of *Arataki*, we have included the entire Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington metro-rail services, recognising that not all lines experience a 15 minute or less service frequency even during the peak periods. However, we believe their inclusion in the overall rapid transport picture is valid both from public perception and a holistic transport system perspective.

Heavy rail

The national rail network in *Arataki* is the KiwiRail owned and maintained rail network. Privately-owned tourist lines are excluded.

Public transport

Bus services and ferry services that run to public schedules, on established routes and charged an advertised fare.

Coastal shipping

Shipping flows that carry cargo within Aotearoa New Zealand waters and between Aotearoa maritime ports only.

Lenses

The land transport system can be viewed from multiple perspectives or lenses. Those using *Arataki* resources may wish to focus on content that is relevant to their perspective, or view all content through their own specific lens.

For this reason, the 2023 releases of *Arataki* begin to include content related to four lenses: climate change adaptation, Māori, freight, and equity.

For each of these lenses we have outlined:

- their specific characteristics and current state
- the impact of key drivers
- the evidence we have in relation to the transport outcomes
- key messages to take away from the 2023 releases.

We are at the beginning of the journey of creating and presenting *Arataki* lenses, with each at a different stage of development.

Climate change adaptation lens	Māori lens
For the climate change adaptation lens, we have presented current: • national and regional outlooks • challenges and opportunities. We have limited evidence and content in relation to the transport outcomes of: • healthy and safe people • environmental sustainability • inclusive access • economic prosperity. In the future, we intend to develop this lens further by: • expanding to include mitigation • gathering more evidence of climate change impacts and how these relate to transport outcomes.	We have included the Māori lens to embed the principles of Te Tiriti ō Waitangi. For 2023, we have presented available evidence about Māori in relation to the land transport system and the aspirations of Māori, as they have expressed them in their own documents. These include reports and strategic documents of iwi and post-Treaty settlement organisations, as well as secondary information from the transport and public sectors. We hope to use this as a base for engagement with Māori in future years to: • confirm these aspirations • gather more evidence • develop a plan to respond to these in partnership with Māori.

Freight lens	Equity lens
For the freight lens, we have relied on forecasts of the freight task included in the *National Freight Demand Study 2017–18*, which was conducted before COVID-19 impacted the economy and supply chains. We have limited live evidence on freight movements and relatively little content on coastal shipping or urban freight. The *National Freight and Supply Chain Strategy* is being developed by Te Manatū Waka Ministry of Transport. We intend to develop this user lens further in the future by: • reflecting the strategy • obtaining more live data • expanding on coastal shipping and urban freight.	Transport equity is an area of increasing focus for the land transport system. For 2023, we have included an equity lens. This is an initial way of thinking about transport equity, focused on: • accessibility • availability • affordability. This framework is new, evolving and is led by Te Manatū Waka Ministry of Transport. We expect this will be updated as the framework evolves. We know equitable access is an issue in the land transport system, and including this lens allows us to consider equity issues across the system and evolve our approach as needed.

New lenses

In addition to further developing the current lenses with our partners, there are other lenses that weren't included in this release. We will scope these out and confirm these in due course, including who we will work with.

Geospatial maps

The geospatial (GIS) maps developed for *Arataki* focus on showing the modal networks operated by Waka Kotahi and KiwiRail. The current maps included are outlined below. Future versions of *Arataki* will expand on this.

There are currently two maps available:

1. Our current network map
2. Our future focus map

The digital platform of *Arataki* enables multiple insights from shared evidence bases, data, and information. As a step towards progressing these, we have hosted two types of layers:

1. Insight layers – these layers incorporate insights derived by *Arataki* from shared evidence bases.
2. Information layers – these layers provide users with information from external and internal sources.

Both insight and information layers are nested within either Our current network map or Our future focus map, or both.

Users can interact with the maps by selecting, showing, and hiding layers to manage visibility and shape the map to their requirements.

As the maps are updated, more information and insights will become available.

The maps hosted on the *Arataki* digital platform source data from:

- internal and external shared evidence sources
- internal and external GIS data links.

Icons and colours

Icons

Icons are attributed and aligned with the primary impact of the intervention.

Icon	Description	Focus of intervention benefit
	Truck	Road freight
	Train	Public transport – rail
	Bicycle	Walking / cycling
	Car	State highway improvements
	Boat	Public transport – ferry
	Bus	Public transport – bus

Colours

Icon colours show the primary outcome that the intervention is focused on.

Colour	Description	Outcome
	Orange	Economic prosperity
	Green	Environmental sustainability
	Light green	Healthy and safe people
	Teal	Inclusive access
	Yellow	Resilience and security

Our current network map

Our current network map shows our view of the existing land transport network of Aotearoa New Zealand. It includes currently planned projects and activities for the state highway and national rail networks.

Our future focus map

Our future focus map details the expected long-term approach to managing different sections of the state highway network managed by Waka Kotahi and national rail network.

Layers overview

Our current network map

Insight layers and sublayers	Information layers and sublayers
State Highway Network	**Aggregated Harmful/(GHG) Emissions** • Aggregated Harmful/GHG Emissions at SA1 Levels • Aggregated Harmful/GHG Emissions at SA2 Levels
Strategic Network • Nationally Strategic • Regionally Strategic • Strategic Intermodal Freight Hubs	**Coastal Sensitivity Index** • Coastal Sensitivity Index CSI – Erosion • Coastal Sensitivity Index CSI – Inundation
	Coastal Shipping Routes
	Commercial Vehicle Safety Centres
	Crash Analysis System (CAS) Data
	Department of Conservation (DOC) Walking Experiences • Great Walks • Normal Walks
	Department of Conservation (DOC) Public Conservation Land • National Parks • Department of Conservation (DOC) Other Public Conservation Land Types • Conservation Covenant Areas
	Electric Vehicle (EV) Charging Points
	Ferry Service
	Flood Prone Areas • Auckland Flood Prone Areas
	Freight Flows
	Heavy Vehicle Routes **(High Productivity Motor Vehicle/50Max)**
	Index of Multiple Deprivation
	InterCity Bus Network

Insight layers and sublayers	Information layers and sublayers
	Interregional Passenger Rail • Commuter • Tourist
	Iwi by Local Authority
	Key Alternate Routes
	Māori Demographics • Current Māori Demographics • Projected Māori Demographics
	Marae Locations
	Maritime Ports
	National Rail Network • National Rail Network • National Rail Network – Infrastructure • National Rail Network – Line Priorities
	New Zealand Cycle Trail
	One Network Framework • One Network Framework: State Highway
	Projected Aging Population
	Projected Population Growth
	Rapid Transit • Auckland Bus • Auckland Rail • Wellington Rail • Wellington Bus
	Tourism Flows
	Traffic Cameras

Insight layers and sublayers	Information layers and sublayers

	What's planned
	• Primary Outcomes
	  • Inclusive Access
	  • Inclusive Access – Points
	  • Inclusive Access – Corridors
	  • Economic Prosperity
	  • Economic Prosperity – Points
	  • Economic Prosperity – Corridors
	  • Resilience and Security
	  • Resilience and Security – Points
	  • Resilience and Security – Corridors
	  • Healthy and Safe People
	  • Healthy and Safe People – Points
	  • Healthy and Safe People – Corridors
	  • Environmental Sustainability
	  • Environmental Sustainability – Points
	  • Environmental Sustainability – Corridors
	  • KiwiRail Interventions
	  • KiwiRail Intervention – Points
	  • KiwiRail Intervention – Corridors
	  • Mode
	  • Cycling/Walking
	  • Road Freight
	  • Car
	  • Public Transport

Our future focus map

Insight layers and sublayers	Information layers and sublayers
Change required	**Aggregated Harmful/(GHG) Emissions** • Aggregated Harmful/GHG Emissions at SA1 Levels • Aggregated Harmful/GHG Emissions at SA2 Levels
Maintain with Current Programmes	**Crash Analysis System (CAS) Data**
Our Network Deficiencies • Safety Risk (2020) • Extreme Resilience Risk (2020) • Extreme Resilience Risk (Future) • Journey Reliability Deficiency (2020) • Journey Reliability Deficiency (Future) • National Rail Network Deficiencies	**National Rail Network** • National Rail Network • National Rail Network – Infrastructure • National Rail Network – Line Priorities
Potential Change Required	**One Network Framework: State Highway**
Strategic Network Transformational Change • Strategic Network Transformational Points • Strategic Network Transformational Segments	**Projected Aging Population**
	Projected Population Growth
	Iwi by Local Authority
	Marae Locations
	Māori Demographics • Current Māori Demographics • Projected Māori Demographics

Layers in detail

Aggregated harmful/Green House Gas (GHG) emissions

The carbon dioxide equivalent, CO2-e, was selected as the key visualised measure for greenhouse gases using 2022 levels.

Emissions for each calendar year are estimated based on the:

- length of the road transport network travelled together with traffic data
- expected emissions as predicted by the New Zealand Vehicle Emission Prediction Model (VEPM).

VEPM predicts emissions from the New Zealand vehicle fleet under typical road, traffic, and operating conditions.

Data is displayed at both Statistical Area 1 (SA1) and Statistical Area 2 (SA2) levels.

Map	Our Current Network, Our Future Focus
Data source	Waka Kotahi (Vehicle Emission Mapping Tool)[4]
Layer type	Information

Change required

Our understanding of future demand and pressure on the network indicates change is likely to be required over the next 30 years to address a system deficiency relating to travel time reliability, resilience (including climate impacts), and/or safety.

The need for change was identified using:

- evidence regarding existing or emerging system deficiencies for travel time reliability, safety, and resilience
- insight from existing business cases and corridor management plans – this includes any significant constraints with resolving system deficiencies on their current alignment, for example topography, landownership, and operational constraints with undertaking work in the existing corridor.

It is important to note that capacity is not the only factor used to determine where change may be required on the state highway network. Many corridors identified for change through significant interventions are subject to a mix of safety, resilience, and physical constraints that cannot be readily addressed on their current alignment, for example State Highway 1 Lake Taupo and Desert Road, and State Highway 6 Cromwell to Queenstown.

Arataki includes direction about the triggers and preconditions that apply to each corridor. Triggers indicate the level of service deficiency or impact expected to trigger the need to do a significant intervention. Preconditions apply the intervention hierarchy and signal where we expect other levers or activities to be maximised prior to committing to a significant intervention. The triggers and preconditions for each corridor were determined based on insights about the potential future impacts of key drivers, and our understanding of local context. Assessments from Waka Kotahi subject matter experts, existing investigations, and business cases were also considered. Where the scale of change required is likely to significantly alter the form and scale of the current corridor, and may include a new corridor alignment, interim works on the corridor should be limited to maintenance and renewals or works that will provide long-term value for money regardless of future significant interventions.

Map	Our Future Focus
Data source	Waka Kotahi
Layer type	Insight

Coastal sensitivity index

Visualisation for the index values for erosion and inundation risks around the coast of Aotearoa New Zealand. These are derived from the Coastal Sensitivity Index (CSI) which provides a snapshot of the potential sensitivity of New Zealand's soft shore coastline to coastal inundation (coastal flooding) and coastal erosion due to future climate change.

Map	Our Current Network
Data source	Taihoro Nukurangi National Institute of Water and Atmospheric Research (NIWA)[5]
Layer type	Information

Coastal shipping routes

Illustrates the significant regional coastal shipping flows that carry freight within the waters of Aotearoa New Zealand. The indicative flows were derived from the National Freight Demand Study (NFDS) 2017/18, which was published in September 2019.

The petroleum shipping element following the closure of the Marsden Point refinery was removed from the data and required further detailed examination of flows from NorthPort.

Map	Our Current Network
Data source	Te Manatū Waka Ministry of Transport (National Freight Demand Study (NFDS)[6]
Layer type	Information

Commercial vehicle safety centres

The locations of commercial vehicle safety centres (CVSCs) – previously called weigh stations. These centres are where officers can safely carry out inspections of:

- vehicle weight
- Road User Charges (RUC)
- logbook accuracy
- driver impairment.

Map	Our Current Network
Data source	Waka Kotahi[7]
Layer type	Information

Crash analysis system (CAS) data

The locations of when, where, and how road crashes occurred on the New Zealand road network since the 2017/18 financial year.

Map	Our Current Network, Our Future Focus
Data source	Waka Kotahi[8]
Layer type	Information

Department of Conservation (DOC) – Walking experiences

Shows the tracks that are managed and maintained by Te Papa Atawhai Department of Conservation and classified as either Great Walks or Normal Walks.

Map	Our Current Network
Data source	Te Papa Atawahi[9]
Layer type	Information

Department of Conservation (DOC) – Public conservation land

Shows how parcels of land are geographically defined, recognised, dedicated, and managed through legal or other means to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Conservation land includes land administered by Te Papa Atawhai Department of Conservation and Public Conservation Land (PCL). This layer also maps out national parks, other public conservation land type, and conservation covenant areas.

Map	Our Current Network
Data source	Te Papa Atawhai[10]
Layer type	Information

EV charging points

The location and technical details of publicly accessible electric vehicle (EV) charging points in Aotearoa New Zealand as of March 2023.

Map	Our Current Network
Data source	External stakeholders including EV charge station owners and operators, Waka Kotahi[11]
Layer type	Information

Ferry service

This layer shows ferry services in Aotearoa New Zealand that provide a service for commuters or freight transport.

Map	Our Current Network
Data source	Auckland Transport,[12] Metro Christchurch,[13] Bluebridge,[14] Interislander,[15] Wellington Harbour Ferries[16]
Layer type	Information

Flood prone areas – Auckland flood prone areas

Flood prone areas are low points in the ground that may flood. They are often associated with roads or railway embankments, or places where water can become trapped and pool if the outlet is blocked. These areas are also associated with one-in-100-year rainfall events. This flood map shows the extent of flooding expected around the Tāmaki Makaurau Auckland region during severe rainfall events. However, areas that are not highlighted may also experience flooding in some circumstances.

Map	Our Current Network
Data source	Auckland Council[17]
Layer type	Information

Freight flows

This layer was developed as part of the pan-regional summaries for *Arataki 10-Year Plan V2* and shows the key freight flows in Aotearoa New Zealand.

Map	Our Current Network
Data source	Tatauranga Aotearoa Stats NZ,[18] Te Manatū Waka Ministry of Transport,[19] Te Manatū Waka Ministry of Transport,[20] Governance Group[21]
Layer type	Information

Heavy vehicle routes (High productivity motor vehicle/50Max)

Where Road Controlling Authority (RCA) and state highway restrictions are in place on the road network. Only restrictions on the state highway network are shown.

Map	Our Current Network
Data source	Waka Kotahi 50Max interactive map[22]
Layer type	Information

Index of multiple deprivation

The 2018 New Zealand Index of Multiple Deprivation (IMD18) is a set of tools for identifying concentrations of deprivation in Aotearoa New Zealand. The IMD18 includes 29 indicators grouped into seven domains of deprivation:

1. employment
2. income
3. crime
4. housing
5. health
6. education
7. access to services.

IMD18 is the combination of these seven domains, which may be used individually or combined.

The overall index rating is displayed on the layer and the ranking is indicated by colour as per the map layer legend. Sub-domains and their rankings/deciles are identified in the pop-out boxes for each data zone.

Map	Our Current Network
Data source	Waipapa Taumata Rau University of Auckland[23]
Layer type	Information

InterCity bus network

The geolocations of bus stops served by the InterCity bus network. The locations were provided as general transit feed specification (GTFS) files by InterCity buses, part of the Entrada Travel Group.

Map	Our Current Network
Data source	InterCity Buses[24]
Layer type	Information

Interregional passenger rail

Commuter

This layer shows the routes of the current interregional passenger rail services that are primarily focused on commuters.

Note: This includes the Wairarapa line service between Te Whanganui-a-Tara Wellington City to Whakaoriori Masterton although this is intraregional.

Tourist

This layer shows the routes of the current interregional passenger rail services that are primarily focused on tourists.

Map	Our Current Network
Data source	Great Journeys New Zealand,[25] Te Huia,[26] Metlink,[27] Capital Connection[28]
Layer type	Information

Iwi by local authority

The iwi authorities/rohe primarily located in, or associated with, a local council area. They are listed in a pop-up box for each local council.

Map	Our Current Network, Our Future Focus
Data source	Te Puni Kōkiri[29]
Layer type	Information

Key alternative routes

For state highway corridors, the layer indicates the:

- key tourism and freight flows on each corridor
- designated alternate state highway routes used in the event of disruption on the main corridor.

The alternate routes were identified using the Waka Kotahi Detour Routes tool. Future versions of *Arataki* will expand this layer to include alternative routes using local roads.

Map	Our Current Network
Data source	Waka Kotahi[30]
Layer type	Information

Maintain with current programmes

The current corridor is generally fit for purpose given our best understanding of the impacts of key drivers, future demand, and pressure on the network. The current alignment and form of the corridor is likely to remain largely unchanged over the next 30 years.

Some sections of the corridor may be subject to safety and resilience challenges, but capacity is not expected to be an issue over the coming decades.

Our focus will be on maintenance, renewals, and targeted improvements as required (including for safety and resilience) to ensure the corridor delivers an appropriate level of service for customers.

Additional investment may be required on designated alternate routes to ensure that they can function at an appropriate level of service in the event of disruption on the main corridor.

Map	Our Future Focus
Data source	Waka Kotahi
Layer type	Information

Māori demographics

This layer shows Māori demographics by the current population and the population projection to 2043.

Current Māori population

- Māori population as a percentage of total population for each local authority area.
- Māori population male and female totals compared to total population figures.
- Māori median age compared to total population median age.

Projected Māori demographics

- Projected percentage of total population that is Māori as at 2043.
- Māori population projections in five-year snapshots from 2023 to 2043. The comparative total population data was included for context and comparison.

Map	Our Current Network, Our Future Focus
Data source	Tatauranga Aotearoa Stats NZ (Medium forecast for subnational ethnic population projections and Māori age profiles)[31]
Layer type	Information

Marae locations

Tribal, urban, institutional, and historic marae of Aotearoa New Zealand.

Map	Our Current Network, Our Future Focus
Data source	Local and central government departments, Te Kāhui Māngai (TKM), Te Puni Kōkiri[32]
Layer type	Information

Maritime ports

Strategic ports were identified from freight and logistics data available from Te Manatū Waka Ministry of Transport. These were further cross-checked with Manatū Ahu Matua Ministry for Primary Industries ports of first arrival list to determine which non-strategic ports should be included, for example commercial freight handling and excluding passenger or fishing (commercial or pleasure).

Map	Our Current Network
Data source	Te Manatū Waka Ministry of Transport,[33] Manatū Ahu Matua Ministry for Primary Industries[34]
Layer type	Information

National rail network

Information for this layer is presented across three sub-layers:

- National rail network: Shows active lines and some unused or inactive (mothballed) lines currently managed by KiwiRail. Some lines shown as unused by KiwiRail may be used for tourist purposes by private sector operators using very light rail vehicles, for example the Whakaahurangi Stratford to Okahukura line.
- Infrastructure: The level crossings, tunnels, bridges, key operational centres, stations, electrification, and track layout.
- Line priorities: Shows how national rail network lines have been classified by KiwiRail, for example:
  - priority
  - secondary
  - tertiary
  - mothballed/unused.

Map	Our Current Network, Our Future Focus
Data source	KiwiRail (Rail Network Investment Programme),[35] KiwiRail[36]
Layer type	Information

New Zealand community facilities

Locations relating to health centres and schools are currently presented in this layer.

NZ community facilities – health centres
- Health centres: State and private sector health facilities.
- Type: Public Hospital (state run facilities) or NGO Hospital (privately run facilities).

NZ community facilities – schools
- Schools: Educational establishments catering for students from years 0-15.
- Type: Full Primary, Contributing, Intermediate, Composite, and Secondary.

Map	Our Current Network
Data source	Toitū Te Whenua Land Information New Zealand[37]
Layer type	Information

New Zealand cycle trail

The current national cycling network under five cycling trail headings. Geospatial data is drawn from the Waka Kotahi Cycling Network – Cycle Trail Category map.

Map	Our Current Network
Data source	Waka Kotahi[38]
Layer type	Information

One Network Framework: State Highway

The One Network Framework (ONF) is a tool to help establish transport network function, performance measure, operating gaps, and potential interventions for each road and street type.

The ONF data set used in this layer was extracted as shapefiles from the Road Assessment and Maintenance Management system (RAMM) and entered in the geospatial system. The layer displays the current state highway network and the ONF road segment terminology.

	Map: Our Current Network, Our Future Focus
	Data source: Waka Kotahi[39]
	Layer type: Information

Our network deficiencies

Our network deficiencies identifies parts of the state highway and rail network that experience a significant service deficiency in relation to safety, resilience, or travel time reliability. Layers indicate current deficiencies and areas where a deficiency may emerge over the next 30 years. This is based on our best understanding of the impacts of key drivers including population growth, technology, and climate change.

Arataki acknowledges the uncertainties associated with trying to understand future impacts on the land transport system. The deficiency layers are not intended to be a definitive statement on where action is required over the next three decades; rather they are intended to indicate where significant challenges and opportunities may play out around the country. They are intended to support further conversations and more detailed analysis regarding the scale of issues and delivery of priority outcomes.

The layers were developed using a combination of:
- evidence of existing deficiencies
- modelling of future network capacity pressure
- input from Waka Kotahi and KiwiRail subject matter experts
- analysis of safety and resilience risks
- the potential impacts of climate change.

Resilience

Resilience indicates parts of the network that are at particular risk of closure and disruption because of unplanned events, either natural or human. The ratings reflect the risk and impact of disruption and emphasise connections with high-potential impacts on customers and/or corridors with no viable alternate routes.

Extreme resilience risk (2020)

The sections of the state highway network with an existing resilience risk rating of extreme, sourced from the National Resilience Programme Business Case.

Extreme resilience risk (Future)

The sections of the state highway network that are expected to have an extreme resilience risk rating by 2050, as sourced from the National Resilience Programme Business Case. The 2050 ratings help us understand the sections of the network expected to experience increased risks because of climate change, including the impacts of more extreme weather events and sea level rise.

Journey reliability

Journey reliability indicates how well the transport system delivers reliable travel times to customers. Delivering reliable travel times doesn't mean a trip won't have delays, but ideally users of the transport system should experience consistent travel times when making the same journey at different times of day and from day-to-day.

On interregional corridors, travel time reliability tends to vary most:

- in and around major urban centres where urban peak traffic periods impact the reliability of trips
- on corridors with extended sections that offer limited opportunities for vehicles to safely overtake slower traffic, for example the stretch from Waitohi Picton to Waiharakeke Blenheim, along the Kaikōura Coast, or on Desert Road.

In some parts of the country, travel time reliability can also be affected by increased demand caused by holidays, large events, and severe weather events.

The travel time reliability layers indicate sections of the state highway network:

- that currently experience poor travel time reliability
- where travel time reliability is expected to get worse over the coming decades.

Forecasted growth in traffic volumes is expected to cause some parts of the network to reach or exceed maximum capacity, leading to reduced time travel reliability.

Journey reliability (2020)

The parts of the rural and interregional state highway networks that experience poor travel time reliability on a regular basis, in other words not during holiday peaks. This layer is based on:

- evidence of existing traffic volumes
- analysis contained within corridor management plans and business cases
- input from network managers.

Most of the corridors identified:

- have average daily traffic volumes nearing the carrying capacity of the corridor
- are in areas experiencing strong population growth.

An exception is the corridor between Waitohi Picton to Waiharakeke Blenheim. This corridor experiences variable travel times because of the periodic flows of vehicles disembarking from the Cook Strait ferries, combined with hilly terrain and limited passing opportunities along the corridor. This issue is made worse by increasing road and rail interactions at the rail crossing of State Highway 1 and South Island Main Trunkline in Waitohi.

Journey reliability (Future)

The sections of the rural and interregional networks where growth in demand, driven primarily by population growth, is expected to place capacity pressure on a corridor. The assessment of future travel time reliability combines:

- basic forecasts of potential growth in traffic demand, driven primarily by population growth
- analysis of the capacity of the existing road network.

This identifies the corridors where travel time reliability is expected to drop below an acceptable level if nothing is done to:

- manage demand
- get the most out of networks
- enable mode shift
- increase network capacity.

Waka Kotahi doesn't currently have a national travel demand model that can provide future state highway demand estimates. In the absence of this model, *Arataki* made use of two sets of data to understand future demand on each interregional corridor.

Te Manatū Waka Ministry of Transport data

This data set uses region-level projections from the Staying Close to the Action transport outlook scenario. The regional growth projections were then assigned to the state highway corridor segments based on current level demands.

Waka Kotahi data

These projections are based on a very simplistic methodology that looked at recent annual growth rates on state highway corridor segments. To provide a range of potential future demand, the 25th and 75th percentiles were calculated for each corridor and these numbers were used in the analysis of possible future demand.

Neither of these approaches considers detailed demographic, economic, mode-shift effects, or changes in the network. They need to be used with caution and are only considered a starting point for analysis. They aren't considered sufficiently robust to be considered as forecasts, rather they are extrapolations, or estimates, of the current state. The Disclaimer at the end of this sub-section has more about this.

The Waka Kotahi extrapolations, or estimates, were done for corridors classified as high volume, national, regional, and arterial, as detailed by the One Network Road Classification. Lower classification corridors were not modelled as they tend to carry relatively low volumes of traffic and were considered unlikely to come under demand pressure over the next 30 years.

The following corridor capacity levels were applied to the state highway network:

- Four-lane highway – approximately 40,000 vehicles per day maximum capacity.
- Two-lane highway – approximately 20,000 vehicles per day maximum capacity.
- Two-lane highway (constrained) – less than 20,000 vehicles depending on the nature of the constraint.

When all three future-demand numbers exceeded the current capacity of a corridor, that corridor was noted as expected to reach capacity and result in travel time reliability issues. When two of the future-demand numbers exceeded the current capacity, the corridor was noted as possible to reach capacity. If one or none of the numbers exceeded the current capacity, the corridor was noted as unlikely to reach capacity.

Arataki combines the future-demand numbers with specialist network and regional expertise to identify which corridors are likely to experience a travel time reliability deficiency over the next 30 years. All corridors noted as expected to reach capacity have been mapped as a future travel time reliability deficiency. For the corridors noted as possible to reach capacity, discretion was applied in interpreting the future-demand numbers. In situations where there was a significant gap between current volumes and forecast volumes, with no clear driver of future demand, a softer position was taken. This focuses on monitoring demand to understand whether demand is growing as detailed by the forecasts and whether any interventions may be required in the future. An example of where this occurred was State Highway 8 between Tīrau Cromwell and Areketanara Alexandra. No corridors assessed as unlikely to reach capacity have been mapped.

Disclaimer

The future-demand extrapolations, or estimates, done by Waka Kotahi reflect recent trends in demand, forecast growth in population, and the future transport patterns described in the Staying Close to the Action transport outlook scenario from Te Manatū Waka Ministry of Transport. They don't account for:

- events such as pandemics
- major changes in land-use patterns
- changes in demand following mode shift
- further investment in the transport system.

While the future-demand extrapolations are useful in providing an initial indication of the parts of the network that may come under demand pressure in the future, they aren't a replacement for proper travel demand modelling.

We will continue testing the layers with the resilience and safety teams at Waka Kotahi to ensure they are aligned with the latest analysis and prioritisation from development of the Resilience Platform and Road to Zero road safety strategy delivery programme. Ongoing analysis of real-time traffic data will enhance our understanding of travel time reliability.

Safety risk

The safety deficiency ratings indicate the risk profiles for different sections of the state highway network.

Safety risk

State highway corridors with elevated risk profiles, as sourced from the New Zealand Road Assessment Programme's ratings of collective risk. It records the sections of the network that are rated as high or medium-high.

There is currently no assessment of safety risk beyond the current Road to Zero period from 2020 to 2030. Work is underway to understand the longer-term safety challenges for the land transport system beyond 2030. Once completed, this work will be included in the safety deficiency layers.

National rail network deficiencies

Key national rail infrastructure and service pinch points identifies the:

- level of service gap
- potential solution
- timescale of likely activity.

The expected trigger point for activity is also identified. The national rail network deficiencies information is aligned with the Rail Network Investment Programme and was provided by the KiwiRail investment team in comma-separated values (CSV) format and geolocated within *Arataki*.

Map	Our Future Focus
Data source	Waka Kotahi,[40] Te Manatū Waka Ministry of Transport,[41] KiwiRail (Rail Network Investment Programme)[42]
Layer type	Information

Projected aging population

Data in 10-year snapshots starting in 2018 for:

- total estimated population aged over 65
- percentage make-up of the total population.

Map	Our Current Network, Our Future Focus
Data source	Tatauranga Aotearoa Stats NZ[43]
Layer type	Information

Potential change required

Our understanding of future demand and pressure on the network indicates the corridor will come under increasing pressure in terms of travel time reliability, resilience including climate impacts, and/or safety. Triggers indicate the level of service deficiency or impact expected to trigger the need to do a significant intervention. Preconditions apply the intervention hierarchy and signal where we expect other levers or activities to be maximised before committing to a significant intervention.

The triggers and preconditions for each corridor were determined based on insights about the potential future impacts of key drivers and our understanding of local context. Assessments from Waka Kotahi subject matter experts, existing investigations, and business cases were also considered. It is uncertain whether the speed of change will require a significant intervention within the next 30 years. We will continue to monitor these change pressures but at this stage, any significant intervention would most likely happen near the end of the 30-year timeframe.

Investigations into potential future interventions should consider thresholds and triggers for both short- and long-term interventions. Before doing any new work on the corridor, consider the likelihood and potential impacts of long-term pressures to ensure any interventions can be adapted and will provide value for money over the longer term.

Map	Our Future Focus
Data source	Waka Kotahi
Layer type	Insight

Projected population growth

The projected population growth at local authority level shown in five-year increments from 2018 to 2048.

Map	Our Current Network, Our Future Focus
Data source	Tatauranga Aotearoa Stats NZ[44]
Layer type	Information

Rapid transit

Auckland bus

The bus rapid transit network in Tāmaki Makaurau Auckland includes high frequency bus services. The routes were identified from the Auckland Transport Journey Planner schematic and then geolocated for mapping purposes on this geospatial layer.

Please see the *Land Transport Modes and Strategic Networks* section of *Arataki* for more about what makes up the rapid transit networks.

Land Transport Modes and Strategic Networks →

Auckland rail

The rail rapid transit network in Tāmaki Makaurau Auckland includes all metro-rail lines. The routes were identified from the Auckland Transport Journey Planner schematic and then geolocated for mapping purposes on this geospatial layer.

Please see the *Land Transport Modes and Strategic Networks* section of *Arataki* for more about what makes up the rapid transit networks.

Land Transport Modes and Strategic Networks →

Wellington bus

The bus routes were identified by analysis of Metlink's timetables to determine which services operate at a minimum of a 15-minute frequency for much of the day. They were then geolocated for mapping purposes on this geospatial layer.

Wellington rail

The metro rail lines in Te Upoko o te Ika a Māui Greater Wellington including Johnsonville, Kapiti, Melling, and Hutt Valley lines. The routes were identified from Metlink's Regional Rail Network schematic and then geolocated for mapping purposes on this geospatial layer.

Note: The Wairarapa Line service from Te Whanganui-a-Tara Wellington City to Whakaoriori Masterton is not included in this layer as there are currently only five trains per day in each direction.

Map	Our Current Network
Data source	Auckland Transport,[45] Metlink[46]
Layer type	Information

State highway network

The state highway network has been broken into segments to enable data, attributes, insights, and guidance to different parts of the system.

The state highway network segments are based on the corridors between state highways and state highway intersections. These segments were reviewed and refined to reflect situations where the:

- volume or type of traffic using the corridor changes significantly
- physical form of the corridor changes significantly – for example, steep terrain, narrow lane widths, and windy alignment.

Within the larger urban centres, the state highway networks have been grouped given highway corridors form part of a more complex urban transport system involving multiple mode and route choices. In this situation, it's more appropriate to consider the highway corridors as part of the whole system, rather than focusing on individual corridors.

Where a state highway corridor passes through a city, defined as an urban centre with a population over 50,000, a segment has been created extending from one side of the city to the other. This allows for targeted attributes and insights that reflect the urban setting and the wider range of routes options, modes, and trips occurring along these corridors.

Map	Our Current Network
Data source	Waka Kotahi
Layer type	Insight

Strategic network

The strategic network identifies the critical parts of the land transport system.

Nationally strategic

These roads cover the most critical parts of the network, acting as the spine of the strategic road and rail networks.

Nationally strategic roads:

- provide important primary connections between population centres and ports, and through urban areas
- perform national level functions
- link major freight hubs to cities
- support both in-region and interregional trips in cities
- have the highest volumes and significant value of trips.

Regionally strategic

These roads perform strategic functions at a regional or subnational scale.

Regionally strategic roads:

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

Strategic intermodal freight hubs

These are the critical hubs where freight is transhipped between transport modes and are served by nationally and regionally strategic networks.

Please see Appendix 2 for more details.

Map	Our Current Network
Data source	Waka Kotahi
Layer type	Insight

Strategic network transformational change

Transformational change may be required if the:

- current networks are underdeveloped and require the introduction or expansion of new solutions
- scale of change required is beyond what can be achieved through ongoing programmes.

Strategic network transformational points

Indicates where transformational change may be required at various points in a city.

Strategic network transformational segments

Indicates where transformational change may be required along a particular section of road, rail, or cycling network.

Please see Appendix 2 for more details.

Map	Our Future Focus
Data source	Waka Kotahi
Layer type	Insight

Tourism flows

This layer was developed as part of the pan-regional summaries for *Arataki 10-year plan V2* and shows the key tourism flows around Aotearoa New Zealand.

Map	Our Current Network
Data source	Hīkina Whakatutuki Ministry of Business, Innovation and Employment[47]
Layer type	Information

Traffic cameras

Information about Waka Kotahi traffic cameras on the state highway network including the location and direction of view.

Map	Our Current Network
Data source	Waka Kotahi[48]
Layer type	Information

What's planned

Committed and planned interventions on the state highway network and other interventions that Waka Kotahi and KiwiRail are responsible for delivering. Interventions for this purpose are projects or programmes that either:

- change the use and/or form of the existing network
- improve the level of service.

For version 1.1 of *Arataki*, interventions for walking, cycling, and public transport have been added and all funding thresholds have been removed.

The starting point for developing the list of interventions was an extract in March 2023 from Transport Investment Online (TIO) for the period from 2021 to 2051.

The initial extract was split into the 16 regions and then refined by applying a range of filters to:

- retain only interventions that had the funding status identified as 'Funding Approved' or 'Included in RLTP 2021–24' or 'Included in NLTP 2021–24'
- remove all interventions that had an end year of 2022 or earlier and retain only those interventions with an end year of 2023 or later
- remove local road improvements and maintenance, leaving interventions focused on Waka Kotahi infrastructure
- remove state highway maintenance activities as they are effectively maintaining the current level of service and they are not able to be geolocated from a geospatial (GIS) perspective.

The remaining interventions were reviewed and non-geographically specific activities were removed, like funding investment planning activities or advertising spend.

Interventions were geolocated as either a:

- point, either when the intervention was at a specific location or where it was dispersed across a geographic area
- line segment, where the intervention was clearly identified as occurring between two points.

Locations were derived from road centre-line data and other data to give an approximate location of the activity.

Primary Outcomes Mode

Interventions were then allocated a primary outcome and a related transport mode or theme, as identified in Transport Investment Online.

Users can choose to display the interventions in sub-layer by outcome.

Mode

Users can choose to display the interventions in sub-layers by mode such as cycling/walking, road freight, car, and public transport.

KiwiRail Interventions

Rail interventions show the current and planned projects and interventions on the national rail network. Interventions were geolocated to either a:

- a specific point, either where the intervention was focused on a particular asset or impacted across a wider geographical area
- to an identifiable rail line section.

This information was provided by the KiwiRail investment planning team and is aligned to the Rail Network Investment Programme (RNIP).

Map	Our Current Network
Data source	KiwiRail,[49] Waka Kotahi
Layer type	Information

Appendix 1: Regional ratings methodology

The regional ratings show how Waka Kotahi has assessed the potential scale of effort required in each region to achieve the future desired state for each Te Manatū Waka Ministry of Transport outcome over the next 10 years. The ratings in each region indicate where effort can be best focused and inform conversations with partners about priority outcomes in each region.

Healthy and safe people

The healthy and safe people ratings are focused on road safety.

While the healthy and safe people outcome encompasses both safety and health elements, the current regional ratings for this outcome are restricted to analysis of the road safety issues in each region. At this stage health harms are addressed primarily through efforts to reduce emissions and vehicle kilometres travelled (VKT) under the environmental sustainability outcome.

Metrics and methodology

The regional ratings have been developed using death and serious injury (DSI) data for the 2018/19, 2019/20, 2020/21 period. The assessment considers both total DSI (collective risk) and DSI per 100,000 population (personal risk).

Collective risk is a measure of the total number of fatal and serious injury crashes within each region. It highlights regions with higher traffic volumes, as this is where the majority of crashes occur.

Personal risk is a measure of the danger to each individual using the road network in each region. Unlike collective risk, personal risk considers the resident population in each region. Personal risk shows the average likelihood of a road user being involved in a fatal or serious crash in a particular region. Personal risk tends to be highest in regions with more difficult terrain and where traffic volumes and road standards are often lower.

For both collective and personal risk, the regions were rated on a five-point scale depending on how their collective and personal risk figures compared to other regions, as shown in Table 1. The ratings were allocated to reflect groupings or breakpoints within the data.

Legend

Collective and personal risk per region

Table 1

Region	Collective risk (average total death and serious injury 2018/19 to 2020/21)	Personal risk (average death and serious injury per 100,000 population 2018/19 to 2020/21)
Te Tai Tokerau Northland	182	93.9
Tāmaki Makaurau Auckland	581	34.1
Waikato	428	86.2
Te Moana a Toi-te-Huatahi Bay of Plenty	208	62
Tairāwhiti Gisborne	53	103.4
Te Matau-a-Māui Hawke's Bay	124	69.5
Taranaki	89	71.3
Manawatū-Wanganui	198	78
Te Upoko o te Ika a Māui Greater Wellington	195	36.2
Te Tauihu Top of the South	84	156
Te Tai o Poutini West Coast	33	101
Waitaha Canterbury	313	48.9
Ōtākou Otago	139	57.1
Murihiku Southland	81	79.5

It was considered that *Arataki* should focus on those regions where the majority of DSIs occur, as this is where there is the greatest scope to reduce harm. However, it is also important to recognise those regions that have high personal risk ratings, as travel in these regions carries the greatest risk.

Legend

More effort — Less effort

Table 2 matrix was used to combine the collective and personal risk ratings into a single rating for each region for the healthy and safe people outcome.

Collective and personal risk rating matrix

Table 2

Regional rating total DSI	Regional rating DSI per 100,000				
	1	2	3	4	5
5	5	5	5	6	6
4	4	4	4	5	5
3	3	3	3	4	4
2	2	2	2	3	3
1	1	1	1	2	2

The matrix enabled *Arataki* to focus on those regions with the highest collective risk (total DSI), while also giving increased weighting to regions with higher personal risk (DSI per 100,000 population) to recognise the increased risk for customers travelling in those regions. Table 3 shows the final regional ratings for the reduce harm step change.

Final ratings for healthy and safe people

Table 3

Region	Regional rating
Te Tai Tokerau Northland	4
Tāmaki Makaurau Auckland	5
Waikato	5
Te Moana a Toi-te-Huatahi Bay of Plenty	3
Tairāwhiti Gisborne	2
Te Matau-a-Māui Hawke's Bay	3
Taranaki	2
Manawatū-Wanganui	3
Te Upoko o te Ika a Māui Greater Wellington	3
Te Tauihu Top of the South	3
Te Tai o Poutini West Coast	2
Waitaha Canterbury	4
Ōtākou Otago	3
Murihiku Southland	2

Legend

Environmental sustainability

The environmental sustainability ratings are focused on current and potential future greenhouse gas (GHG) emissions.

Metrics and methodology

The regional ratings have been developed using road transport emission (CO_2 equivalents) data from 2015 to 2019. Existing emission rates have been combined with forecast regional population growth from 2018 to 2048 (Tatauranga Aotearoa Statistics New Zealand medium projections) as a proxy for where emissions can be expected to increase in.

For both existing emissions and forecast population growth, each region was rated using a five-point scale depending on how their figures compared to other regions, as shown in Table 4. The ratings were allocated to reflect groupings or breakpoints within the data.

Current greenhouse gas emissions and future population growth ratings
Table 4

Region	Average emissions 2015–2019	Population growth 2018–2048
Te Tai Tokerau Northland	582	45,400
Tāmaki Makaurau Auckland	4,455	648,000
Waikato	1,532	139,500
Te Moana a Toi-te-Huatahi Bay of Plenty	966	83,500
Tairāwhiti Gisborne	158	5,600
Te Matau-a-Māui Hawke's Bay	471	29,600
Taranaki	372	17,100
Manawatū-Wanganui	733	29,200
Te Upoko o te Ika a Māui Greater Wellington	1,226	86,300
Te Tauihu Top of the South	560	20,918
Te Tai o Poutini West Coast	201	-1,800
Waitaha Canterbury	1,824	157,700
Ōtākou Otago	730	47,600
Murihiku Southland	348	7,800

Legend

More effort — Less effort

6	5	4	3	2	1

It was considered that *Arataki* should focus on those regions where the largest emissions occur, as this is where there is the greatest scope to reduce emissions. However, it is also important to recognise those regions that are forecast to experience the highest levels of growth, as these regions have the greatest potential to deliver growth in a way that can support emissions reductions.

Table 5 matrix was used to combine the emissions and population growth ratings into a single rating for each region for the healthy and safe people outcome. Table 5 matrix enabled *Arataki* to focus on those regions with the highest existing emissions, while also giving increased weight to regions with the highest levels of projected population growth.

Emission and population growth rating matrix
Table 5

Average emissions rating	Projected population growth rating 1	2	3	4	5
5	6	6	6	5	5
4	5	5	5	4	4
3	4	4	4	3	3
2	3	3	3	2	2
1	2	2	2	1	1

Table 6 sets out the final regional ratings for the reduce harm step change.

Final ratings environmental sustainability
Table 6

Region	Regional rating	Region	Regional rating
Te Tai Tokerau Northland	2	**Manawatū-Wanganui**	3
Tāmaki Makaurau Auckland	6	**Te Upoko o te Ika a Māui** Greater Wellington	5
Waikato	5	**Te Tauihu** Top of the South	2
Te Moana a Toi-te-Huatahi Bay of Plenty	4	**Te Tai o Poutini** West Coast	1
Tairāwhiti Gisborne	1	**Waitaha** Canterbury	5
Te Matau-a-Māui Hawke's Bay	2	**Ōtākou** Otago	3
Taranaki	2	**Murihiku** Southland	2

Legend

Resilience and security

The resilience and security ratings are focused on the impact of unplanned disruptions caused by weather events or natural hazards on the state highway network, measured as vehicle hours lost to disruption.

Metrics and methodology

The resilience and security regional ratings combine evidence about the:

- number and duration of unplanned closures
- number of vehicles impacted by the closure averaged over a 10-year period (to provide the annual average vehicle disruption hours within each region from 2012 to 2021).

The data used for these disruptions was recorded in TREIS, a database managed by the Waka Kotahi Transport Operations Centres (TOCs). When an unplanned closure occurs, Waka Kotahi contractors notify the TOC who then records the:

- location
- time and date information
- duration of the event until reopening
- cause of the disruption.

Within TREIS there are four categories of corridor disruptions to reflect the scale of impact. The four categories ranked from least to greatest impact are:

- caution
- delay
- vehicle restriction
- closure.

Arataki regional ratings included all unplanned events that involved a vehicle restriction or full closure.

To understand the number of vehicles impacted by the unplanned disruptions, traffic volumes have been taken from state highway traffic monitoring sites. Because there are large variances depending on locality, an average has been taken for each state highway defined by the Network Operating Contract (NOC) regional boundaries. This has been normalised over a 24-hour period and therefore doesn't measure disruption during peak travel times.

The average annual vehicle hours disrupted on state highway corridors was calculated for each NOC region to provide a resilience summary. Where necessary, the NOC region totals were aggregated up to align with local government regions as shown in Table 7.

Vehicle hours lost to unplanned disruption per region
Table 7

Region	Vehicle hours lost to unplanned disruption	Regional rating
Te Tai Tokerau Northland	43,823	3
Tāmaki Makaurau Auckland	3,301	1
Waikato	29,411	3
Te Moana a Toi-te-Huatahi Bay of Plenty	24,553	3
Tairāwhiti Gisborne	10,003	2
Te Matau-a-Māui Hawke's Bay	25,917	3
Taranaki	16,607	2
Manawatū-Wanganui	78,936	4
Te Upoko o te Ika a Māui Greater Wellington	34,850	3
Te Tauihu Top of the South	141,509	5
Te Tai o Poutini West Coast	24,582	3
Waitaha Canterbury	31,429	3
Ōtākou Otago	34,933	3
Murihiku Southland	12,651	2

Caveats:

- Historically, the quality of data in the TREIS database has been patchy, as the recording of closures has relied on individuals logging network closure. Since the TOCs have taken over responsibility for logging state highway closures and disruptions, the consistency and completeness of entries has improved. The accuracy of the entries in TREIS will continue to improve, but over the past decade there have been gaps in the recording of network disruption which may result in some regions being underrepresented in the ratings.
- The network closure data contained in the TREIS database is categorised by NOC region, not local government region. While the NOC and local government region boundaries generally align, there are some discrepancies. Therefore, the regional ratings are not an exact match of network disruptions based on local government region boundaries. Notable areas of misalignment in regional boundaries include:
  - Northland NOC region contains parts of the Tāmaki Makaurau Auckland local government region north of Kumeū in the west and Puhoi in the east
  - Te Moana a Toi-te-Huatahi Bay of Plenty East NOC region contains a section of the Waikato local government region east of SH1 between Rotorua and Taupō
  - Central Waikato NOC region contains parts of northern Manawatū-Whanganui local government region, including Waiouru, Ohakune, and Tongariro National Park and extending north to Pureora Forest Park
  - Taranaki NOC region extends north into the Waikato local government region to just south of Te Kūiti, and west into Manawatū-Whanganui as far as Taumarunui; this means the resilience hotspots of Mount Messenger and Awakino Gorge are included in the Taranaki rating, even though they are located within the Waikato region.

This analysis is based on historical data reflecting where disruption has occurred in the past. While it is useful in understanding the scale of disruption experienced in different regions over the past decade, it does not indicate which regions will be most impacted by unplanned disruption in the future. Future versions of the analysis should consider including research and analysis of the geographic impacts of climate change, to provide a sense of where resilience impacts are likely to grow over time.

This analysis doesn't include analysis or weighting to reflect where certain routes serve a lifeline function, if there are adequate alternate routes available, or if alternate routes are able to accommodate the likely volume and types of traffic.

All of this influences the impact of unplanned disruptions of network users and local communities. Future versions of this analysis should consider options for including these elements in the regional ratings.

The ratings don't reflect recent improvements to the state highway network that will improve system resilience, such as the opening of Te Aranui o Te Rangihaeata Transmission Gully north of Te Whanganui-a-Tara Wellington city and the Waikato Expressway.

The Kaikōura earthquake and Manawatū Gorge closures were excluded from this analysis, as the scale and duration of those events is much larger than other disruptions and can skew the regional ratings. In addition, the Manawatū Gorge corridor is being replaced by a new, more resilient alignment, so the resilience challenges posed by the old corridor won't be a factor in the future.

Economic prosperity

The economic prosperity ratings are focused on travel time predictability on key freight routes.

Metrics and methodology

The economic prosperity ratings are based on analysis of travel time predictability along key state highway freight routes, combined with details regarding trip length and number of heavy vehicles using each route. The analysis brought these elements together to evaluate the cost impact of poor travel time predictability on heavy vehicle freight movements.

The main source for this measure was TomTom travel time data to provide wide coverage of traffic mobility. This data comes from iPhones, as well as other in-vehicle navigation devices.

Predictability is recorded on a continuous basis for key interregional routes considered important for freight. The method involves examining a series of 15-minute travel time slots across TomTom road-segments during the interpeak period (between 10am and 2pm). The travel times for the financial year 2020–2021 were tested against the previous financial year and were found to be unpredictable if the travel time is 10% or more than the previous year, for the same time slot and the same road-segment. The proportion of those tests that are predictable, in other words are not slower by over 10%, across the full financial year is calculated for a series of sub-journeys within each key freight route. Sub-journeys are aggregations of TomTom road segments but are smaller than an overall freight route.

Legend

Each sub-journey is examined for predictability and the regional score is an average of the scores for all sub-journeys within the region. When a sub-journey straddles two or more regions, its influence on each region's score is weighted according to the distance contained within the regional boundary. For example, if a sub-journey is 100km, and 50km falls inside Region A and 50km falls inside Region B, then its overall influence on each of the region's predictability score is halved.

In some regions, such as Tāmaki Makaurau Auckland, there are overlapping sub-journeys where several routes enter the isthmus along the same state highway. In these circumstances, the influence of each sub-journey on the region's overall score is proportionally reduced by the distance of the overlap so as not to double count the overlap, otherwise the Southern Motorway in Tāmaki Makaurau, which has three overlapping sub-journeys but is often congested, would have a negative influence on the regional score. This data is shown in Table 8.

Travel time predictability per region
Table 8

Region	Travel time predictability on key freight routes (weighted average 2020/21)
Te Tai Tokerau Northland	55.20%
Tāmaki Makaurau Auckland	65.80%
Waikato	81.30%
Te Moana a Toi-te-Huatahi Bay of Plenty	75.70%
Tairāwhiti Gisborne	94%
Te Matau-a-Māui Hawke's Bay	96.30%
Taranaki	96.50%
Manawatū-Wanganui	94.90%
Te Upoko o te Ika a Māui Greater Wellington	90.60%
Te Tauihu Top of the South	92.20%
Te Tai o Poutini West Coast	95.20%
Waitaha Canterbury	99.10%
Ōtākou Otago	96.40%
Murihiku Southland	94.20%

Heavy vehicle kilometres travelled (VKT) per region
Table 9

Region	Heavy vehicle VKT annual average 2018–2021 (000,000 km/Year)
Te Tai Tokerau Northland	159.5
Tāmaki Makaurau Auckland	891.2
Waikato	581.2
Te Moana a Toi-te-Huatahi Bay of Plenty	252.0
Tairāwhiti Gisborne	37.0
Te Matau-a-Māui Hawke's Bay	140.4
Taranaki	89.6
Manawatū-Wanganui	237.0
Te Upoko o te Ika a Māui Greater Wellington	244.9
Te Tauihu Top of the South	134.1
Te Tai o Poutini West Coast	48.7
Waitaha Canterbury	534.2
Ōtākou Otago	199.6
Murihiku Southland	126.2

Legend

Finally, rather than taking a simple average of all sub-journeys contained within a region, each sub-journey's influence on the regional score is weighted based on its estimated heavy vehicle kilometres travelled (VKT) from 2020, sourced from the Vehicle Emissions Prediction Model from Waka Kotahi that draws on traffic counting data to determine road link based heavy VKT as shown in Table 9.

This means sub-journeys within a region that carry significant volumes of heavy vehicles over a significant distance have more influence than sub-journeys in the same region that don't carry as much, and vice-versa. The aim of this weighting within each region is to help build a score which reflects a typical freight user experience, rather than a simple route-based average. This is shown in Table 10. The final ratings for economic prosperity are shown in Table 11.

Travel time predictability per region
Table 10

Region	Travel time predictability on key freight routes (weighted with heavy VKT and distance 2020/21)
Te Tai Tokerau Northland	53.0%
Tāmaki Makaurau Auckland	64.5%
Waikato	77.8%
Te Moana a Toi-te-Huatahi Bay of Plenty	74.3%
Tairāwhiti Gisborne	94%
Te Matau-a-Māui Hawke's Bay	95.7%
Taranaki	96.9%
Manawatū-Wanganui	93.9%
Te Upoko o te Ika a Māui Greater Wellington	90.5%
Te Tauihu Top of the South	94.0%
Te Tai o Poutini West Coast	95.9%
Waitaha Canterbury	98.8%
Ōtākou Otago	96.3%
Murihiku Southland	93.9%

Regional economic prosperity ratings
Table 11

Region	Regional rating
Te Tai Tokerau Northland	5
Tāmaki Makaurau Auckland	5
Waikato	4
Te Moana a Toi-te-Huatahi Bay of Plenty	4
Tairāwhiti Gisborne	2
Te Matau-a-Māui Hawke's Bay	2
Taranaki	2
Manawatū-Wanganui	2
Te Upoko o te Ika a Māui Greater Wellington	3
Te Tauihu Top of the South	2
Te Tai o Poutini West Coast	2
Waitaha Canterbury	1
Ōtākou Otago	2
Murihiku Southland	2

Caveats:

- The travel time predictability datasets are relatively new, and were developed during the COVID-19 pandemic, an exceptional period in terms of traffic volumes and trips undertaken. We anticipate the quality of data will improve over time as we build a longer timescale of data and as Aotearoa New Zealand emerges from the pandemic, enabling more detailed assessments of travel time predictability across the land transport system.
- The travel time predictability data is recorded according to key routes, and sub-journeys within them, taken on the state highway network; for example, Wiri to Port of Tauranga via SH1 and SH29, or Māwhera Greymouth to Christchurch Airport via SH73 & SH1. Within a sub-journey it's not possible to identify the specific location or cause of reduced travel time predictability.
- The data is based upon TomTom general traffic flows which may not accurately reflect the experiences of road freight users. Over time we hope to improve this by using EROAD data which should be more representative of road freight.

Inclusive access

The inclusive access ratings are focused on:

- access to employment
- what modes people have available
- how far people need to travel
- if deprived neighbourhoods need to travel further.

Metrics and methodology

The regional ratings have been developed using three datasets:

- percentage of people that can reach their jobs in different time thresholds by different modes
- median commuting distance by region
- average commuting distance by deprived area.

Percentage of people that can reach their jobs in different time thresholds by different modes was sourced from the 2020 Integrated Data Infrastructure (IDI). This measure was used to calculate the percentage of people who can reach their jobs by a 30-minute public transport trip, walk, and cycle. Driving was excluded from this measure as in all regions over 90% of people can get to work within a 30-minute drive, excluding Tāmaki Makaurau Auckland where it's 82%, and 99.5% within a 45-minute drive. This is shown in Table 12.

Median commuting distance by region was calculated using the IDI measure of average one-way road networked distance between place of work and place of residence for employees in 2019. This was then divided by the number of full-time equivalent employees in the region. This gives an assessment of the median one-way distance travelled by people to get to work.

Average commuting distance by deprived area was calculated using the average IDI measure of one-way road networked distance between place of work and place of residence for employees in 2019, totalled for deprived area (deciles eight, nine, and 10).

The average commuting distance minus the average commuting distance by deprived area gives a measure of how much further or shorter average commuting trips are for those from deprived areas, as shown in Table 12.

Legend

More effort — Less effort

6	5	4	3	2	1

Modal journey distance to workplace and excess distance for deprived neighbourhoods per region

Table 12

Region	Percentage of people that can reach their jobs by a 30-minute trip				Length of trip (kilometers)	
	Public transport	Walking	Cycling	Overall (excludes driving)	Median distance travelled per employee	How much more do deprived neighbourhoods have to travel
Te Tai Tokerau Northland	10.17%	20.19%	52.53%	**27.63%**	8.004579671	-1.393057386
Tāmaki Makaurau Auckland	12.12%	11.10%	34.86%	**19.36%**	10.64639248	-0.106763841
Waikato	17.27%	21.99%	60.12%	**33.13%**	6.789433563	-1.986295131
Te Moana a Toi-te-Huatahi Bay of Plenty	14.44%	16.41%	49.75%	**26.87%**	8.417711962	-2.474581173
Tairāwhiti Gisborne	0.00%	25.58%	72.43%	**32.67%**	5.20898293	0.158513005
Te Matau-a-Māui Hawke's Bay	11.39%	20.21%	53.61%	**28.40%**	6.90366455	-1.375233366
Taranaki	4.99%	23.84%	56.85%	**28.56%**	6.569239402	-1.783426136
Manawatū-Wanganui	16.90%	25.17%	65.97%	**36.01%**	6.126856036	-1.812333087
Te Upoko o te Ika a Māui Greater Wellington	25.60%	19.48%	52.09%	**32.39%**	8.059651726	0.185150273
Te Tauihu Top of the South	17.08%	26.33%	61.18%	**34.86%**	6.402653965	-2.475718477
Te Tai o Poutini West Coast	0.00%	37.84%	67.24%	**35.03%**	5.819878349	-0.210828612
Waitaha Canterbury	13.93%	14.90%	49.98%	**26.27%**	8.202561313	-2.241874886
Ōtākou Otago	24.81%	25.90%	63.29%	**38.00%**	6.645722552	-2.319623736
Murihiku Southland	10.54%	25.17%	68.82%	**34.84%**	5.263222288	-1.250407677

Legend

To develop the final ratings, we first ranked each indicator in each region, using a five-point scale. This gave ratings for each indicator in each region. Next a matrix approach was used to develop the overall rating. For example, if two indicators were rated five, and the third was three, then the overall rating was a four. Alternatively, if two indicators were rated one, and the third was three, then the overall rating was two. The highest rating was used as the key driver of the overall rating, meaning this would move the overall rating up a category. If all indicators were the same, then the overall rating was the same, too. Inclusive access ratings are shown in Table 13.

Caveats:

- This approach only considers access to jobs, rather than other opportunities like school, university, social engagements.
- It only considers access for people who are currently employed.
- Some travel to work trips may be multi-purpose such as dropping kids at school or popping into the shops.
- The percentage of trips to work on modes and times is relatively new data and may have some limitations.

Inclusive access ratings per region
Table 13

Region	Regional rating
Te Tai Tokerau Northland	4
Tāmaki Makaurau Auckland	5
Waikato	2
Te Moana a Toi-te-Huatahi Bay of Plenty	2
Tairāwhiti Gisborne	3
Te Matau-a-Māui Hawke's Bay	3
Taranaki	2
Manawatū-Wanganui	1
Te Upoko o te Ika a Māui Greater Wellington	4
Te Tauihu Top of the South	1
Te Tai o Poutini West Coast	3
Waitaha Canterbury	3
Ōtākou Otago	2
Murihiku Southland	2

Appendix 2: Strategic network

The strategic network section is a new addition to the 2023 release of *Arataki*.

The strategic network identifies the critical parts of the land transport system and what should happen on each of these to maintain appropriate levels of service. It covers all modes and is mode neutral. It has two components:

- current strategic network
- areas of transformational change.

The defining characteristics of strategic networks, that set these apart from the rest of the transport network, is a combination of the:

- criticality of the corridor to the overall network of that mode
- volume of use of the corridor
- significance of locations served by the corridor
- scale of contribution the corridor makes to transport outcomes.

For this release, the strategic network is limited to state highways, rail, rapid transit, walking, and cycling in Tier 1 cities. Future releases of *Arataki* will build on this to include public transport and strategic networks on local roads.

Identifying the current strategic network

The current networks were identified using existing work and classifications where possible including:

- pan-regional summaries developed for *Arataki Version 2*
- Our Current Network map
- Our Future Focus map
- One Network Framework (ONF)
- KiwiRail's network classification from the *Rail Network Investment Programme*
- spatial plans and rapid transit plans for Tier 1 urban areas.

A working group from across Waka Kotahi used these inputs to determine the current strategic network.

Strategic road network

To identify the strategic road network, Our Current Network map and the two highest classes of roads from the One Network Framework (transit corridors and interregional connectors) were grouped together to form a long list of the strategic roads network. Where these overlapped, then a road was considered part of the strategic network. To be considered strategic at this point, the road had to be:

- classified as nationally or regionally significant in *Arataki Version 2* for the purposes of the pan-regional summaries
- either a transit corridor or interregional connector (ONF).

This list was then categorised into nationally strategic and regionally strategic.

The nationally strategic network covers the most critical parts of the network, acting as the spine of the strategic road network to:

- provide important primary connections between population centres, ports, and through urban areas
- perform national level functions
- link major freight hubs to cities
- support both in-region and interregional trips
- have the highest volume and significant value of trips.

Regionally strategic roads perform strategic functions at a regional or sub-national scale to:

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

Some roads on this long list didn't meet either of these classifications and they were removed from the network. Some important connections on the local road network have also been included because they support freight and connect to the strategic network.

Strategic rail network

The strategic rail network was defined as the parts of the network that:

- provide for the efficient and sustainable movement of large volumes of freight across longer distances between cities, ports, and major distribution centres
- have an emerging role for larger volumes of sustainable interregional passenger movement.

The strategic rail network is the same as the priority lines in the *Rail Network Investment Programme* and includes the Rolleston to Lyttelton rail spur.

Strategic rapid transit network

The strategic rapid transit network was defined by the *National Policy Statement on Urban Development 2020* from Manatū Mō Te Taiao Ministry for the Environment.[50] It covers services moving large numbers of people across key transport bottlenecks and into highly constrained areas to support and shape growth and urban development. Currently only the following meet this definition:

- Tāmaki Makaurau Auckland metro rail
- Te Upoko o te Ika a Māui Greater Wellington metro rail
- Tāmaki Makaurau northern and eastern busways.

Strategic cycling network

The strategic cycling network was defined as the backbone of urban cycling networks to:

- enable healthy, reliable, and sustainable travel for short-to-medium length journeys
- support neighbourhood trips to shops, schools, services, and work.

The following One Network Framework classes were used to develop the strategic cycling network:

- Class C1 – Primary strategic cycling network, intended to support high volumes of cyclist movement.
- Class C2 – Secondary strategic cycling network, providing key connections to schools, community facilities, or employment.

Strategic walking network

Key pedestrian attractors that are strategically important parts of walking networks include:

- city and suburb centres
- shopping precincts
- business districts
- schools and universities.

Walking catchments are also critical to support public transport networks. Strategic walking networks also correlate closely with public transport stops and interchanges.

The following One Network Framework classes were used to develop the strategic walking network:

- Class W1 - Key routes within primary walking catchments connecting pedestrians with key destinations and places of significance.
- Class W2 - Key routes within secondary walking catchments, providing key connections to local destinations and providing access to W1 networks.

Identifying areas of transformational change

Areas of transformational change were identified using three steps:

1. Assess against criteria.
2. Compare against information from the system deficiencies layers and Our Future Focus map, for state highway and rail.
3. Assess against existing work, including programme business cases, corridor management plans, and spatial plans.

Criteria

The table below was used to assess whether a part of the network needed transformational change. These criteria were used as a first assessment of whether a part of the network requires transformational change.

Key drivers of transformational change
Table 14

Mode	Key drivers
Road	• Very significant safety, resilience, or reliability deficiencies with national-scale implications that can't be effectively addressed through incremental programmes of improvement. • A level of demand over time, after considering necessary traffic reductions to reduce emissions, that mean improvements deliver enduring value. • Resolution of fundamental place/movement conflicts that will continue to undermine achieving nationally significant transport outcomes if not addressed over time.
Rail and rapid transit	Rapid transit • Significant existing access and travel choice deficiencies for large numbers of people. • A level of demand over time that will deliver enduring value and cannot be adequately served through 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/freight conflicts on the rail network, to ensure both can continue to grow over time. • Delivers a nationally significant improvement to the country's freight and supply chain system.
Active modes	• Creates a key element for wider active mode networks in major urban areas. • Addresses the most critical network gaps.

Comparison against network deficiencies layers and our future focus map

To create the list of potential transformational changes, Our Future Focus map was used as a first step. This map assesses whether there is a need for an intervention on a part of the network. Where part of the network was classified by the map as significant intervention expected or possible, it was assessed against the criteria in Table 14. Previous GIS maps layers were also considered, including system deficiencies that shape the need for change.

This list of potential transformational changes was checked to see if changes were planned and underway through existing programmes and safe system corridor improvements. Where this was not the case, these were considered as transformational change. Table 15 outlines how this assessment was done.

Projects that are part of The New Zealand Upgrade Programme were also included in this analysis, with an assessment of whether they were transformational. Some additional deficiencies identified since the Baseline Network Version was completed were also added at this point, such as SH1 Mangamuka Gorge and SH1 Hornby.

Assessment was done against existing work including programme business cases, corridor management plans, and spatial plans.

Each of the strategic roading network areas of transformational change were then analysed to determine what the strategic direction for each of these parts of the network should be. This analysis considered:

- the key drivers of transformational change, including what the critical deficiencies and opportunities are over time, and why these can't be achieved through incremental change
- what previous work has confirmed, including corridor management plans, programme business cases, Te Tupu Ngātahi Supporting Growth alliance work, and others.

For rail and rapid transit, areas of transformational change were analysed to determine what the strategic direction for each of these parts of the network should be. This analysis considered:

- the key drivers of transformational change, including what the critical deficiencies and opportunities are over time, and why these can't be achieved through incremental change
- what previous work on rapid transit has been done, including the Auckland Transport Alignment Project, Auckland Rapid Transit Plan, Auckland Light Rail, Hamilton Metro Spatial Plan, Urban Form + Transport Initiative project (Tauranga), Let's Get Wellington Moving, and Christchurch Public Transport Futures
- what previous work on rail has been done, including Tāmaki Makaurau Auckland and Te Upoko o te Ika a Māui Greater Wellington network improvements, New Zealand Upgrade Programme, and the Rail Network Investment Programme.

For walking and cycling areas of transformational change were analysed to determine what the strategic direction for each of these parts of the network should be. This analysis considered:

- the key drivers of transformational change including what the critical deficiencies and opportunities are over time and why they can't be achieved through incremental change
- walking and cycling programmes in Tāmaki Makaurau, Kirikiriroa Hamilton, Tauranga, Te Whanganui-a-Tara Wellington city, and Ōtautahi Christchurch
- specific network completion projects including Tāmaki Makaurau city centre to Albany and Te Ara Tupua in Te Upoko o te Ika a Māui Greater Wellington.

The potential transformational change required reflects the triggers and preconditions identified in Our Future Focus map. Where triggers and preconditions for a change have been reached, they have been included in the potential areas of transformational change. As the key drivers continue to change, and preconditions and triggers are met, then new areas of transformational change will be added.

Strategic network – 30-year plan – Our future focus map: Need for intervention and deficiencies
Table 15

Name	Need for significant corridor intervention	Deficiency shaping potential need for significant intervention	30-year plan - Our future focus map	2023 Arataki strategic networks update
SH1: Whangārei to Ruakākā	Expected	Resilience (adaptation) and capacity	A New Zealand Upgrade Programme project is underway to address current safety issues. We anticipate resilience (climate adaptation) deficiencies and growing demand will trigger the need for a significant intervention within the next 30 years. This should only be progressed once demand management and getting the most out of the network have been maximised.	Transformational change
SH1: I/S Waipu Gorge Road to Brynderwyn	Expected	Resilience	Growing resilience challenges on the Brynderwyns, combined with forecast growth in demand, are likely to trigger the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and resilience where these will provide long-term value for money.	Transformational change
SH1: Brynderwyn to Wellsford	Expected	Capacity	Forecast growth in demand, combined with resilience challenges and a lack of viable alternate routes, may trigger the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and resilience where these will provide long-term value for money.	Transformational change
SH1: Wellsford to Warkworth	Possible	Resilience and capacity	Growing resilience challenges and forecast growth in demand are likely to trigger the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and resilience where these will provide long-term value for money.	Transformational change

Name	Need for significant corridor intervention	Deficiency shaping potential need for significant intervention	30-year plan - Our future focus map	2023 Arataki strategic networks update
SH1: Cambridge to Piarere (I/S with SH29)	Expected	Safety and capacity	Existing resilience and safety challenges, combined with forecast growth in demand, are likely to trigger the need for a significant intervention over the 30-year period. In the interim, maintain existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety, resilience, and access where these will provide long-term value for money.	Transformational change identified between Cambridge and Taupō which captures these segments.
SH1: Piarere (I/S with SH29) to Tīrau (I/S with SH27)	Expected	Safety and capacity	Safety challenges and forecast growth in demand are expected to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and access where these will provide long-term value for money.	
SH1: Tīrau (I/S with SH27) to I/S with SH5	Expected	Safety, access, and capacity	Safety challenges, forecast growth in demand, and associated impacts on community severance are expected to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and access where these will provide long-term value for money.	
SH1: I/S with SH5 to Putāruru (I/S with SH28)	Possible	Safety and capacity	Safety challenges and forecast growth in demand are expected to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and access where these will provide long-term value for money.	
SH1: Putāruru (I/S with SH28) to Tokoroa	Possible	Safety, access, and capacity	Safety challenges, forecast growth in demand, and associated impacts on community severance are expected to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and access where these will provide long-term value for money.	
SH1: Tokoroa to Wairakei	Possible	Safety and capacity	Safety challenges and forecast growth in demand are expected to drive the need for a significant intervention over the 30-year period. In the interim. Maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety and access where these will provide long-term value for money.	

Name	Need for significant corridor intervention	Deficiency shaping potential need for significant intervention	30-year plan - Our future focus map	2023 Arataki strategic networks update
SH1: Taupō to Tūrangi	Expected	Resilience and capacity	We anticipate a significant intervention will be required on parts of the corridor (eastern edge of Lake Taupō, Three Sisters) because of severe physical constraints on the current alignment, existing safety and resilience challenges, and forecast growth in demand, particularly freight. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to improve resilience, safety, and travel time reliability.	Transformational change
SH1: Bulls to Sanson	Possible	Safety, access, and capacity	A significant intervention may be required between Bulls and Sanson, triggered by increasing demand particularly for freight, safety issues, and place-making/severance issues. A safe system corridor transformation is proposed as part of the Speed and Infrastructure Programme. In the interim, maintain the corridor at appropriate levels of service and get the most out of travel along the network to ensure interregional journeys and freight movements are safe and reliable.	Likely covered as part of SH1 Ōtaki to Palmerston North above. The current state highway safety risks layer in the system deficiencies layers also points out that a safety intervention is already planned as part of existing programmes so not considered transformational.
SH1: Sanson to Levin	Possible	Safety and capacity	A significant intervention may be required between Sanson and Levin, triggered by increasing demand. In the interim, maintain the corridor at appropriate levels of service and get the most out of travel along the network to ensure interregional journeys and freight movements are safe and reliable.	

Name	Need for significant corridor intervention	Deficiency shaping potential need for significant intervention	30-year plan - Our future focus map	2023 Arataki strategic networks update
SH1: Christchurch to Ashburton	Expected	Safety and capacity	Existing safety challenges, combined with forecast growth in demand particularly for freight, are likely to drive the need for a significant intervention over the 30-year period. NZUP projects along this corridor will improve safety and access. In the interim, maintain the existing corridor and deliver small-medium scale improvements to ensure road and rail journeys between Christchurch and Ashburton are safe, resilient, and reliable. Monitor the impacts of climate change, particularly more intense rainfall events on strategic infrastructure, including bridges.	Unlikely transformational change is needed along whole corridor. Issues can be largely addressed through ongoing programmes. Potential isolated areas of transformational change (such as Hornby).
SH1: Ashburton to Timaru	Expected	Safety and capacity	Existing safety challenges, combined with forecast growth in demand particularly for freight, are likely to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and deliver small-medium scale improvements to safety to ensure journeys between Ashburton and Timaru are safe, resilient, and reliable. Future interventions should take growth in travel demand into account. Monitor the impacts of climate change, particularly more intense rainfall events on strategic infrastructure, including bridges.	
SH1: Timaru urban	Expected	Capacity	Forecast growth in demand, driven by continued population growth, is expected to trigger the need for significant interventions over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety, access, and resilience where these will provide long-term value for money.	
SH2: Hastings urban	Possible	Safety and capacity	A significant intervention may be required between Napier and Hastings, triggered by increasing demand. A safe system corridor transformation is proposed as part of the Speed and Infrastructure Programme. Maintain the existing corridor to ensure interregional journeys are reliable and safe, and work with partners to integrate land-use planning and transport improvements to enable mode shift.	The Current State Highway Safety Risks layer also points out that a safety intervention is already planned as part of existing programmes so not considered transformational.
SH2: Masterton to Featherston	Possible	Safety, access, and capacity	A significant intervention may be required between Masterton and Featherston, triggered by increasing transport demand and associated place-making/severance issues. A safe system corridor transformation is proposed as part of the Speed and Infrastructure Programme. Maintain the network to an appropriate level of service and integrate land-use planning for the townships along SH2 with transport planning to ensure interregional journeys are safe and reliable.	Likely covered as part of SH1 Ōtaki to Palmerston North above. The Current State Highway Safety Risks layer also points out that a safety intervention is already planned as part of existing programmes so not considered transformational.

Name	Need for significant corridor intervention	Deficiency shaping potential need for significant intervention	30-year plan - Our future focus map	2023 Arataki strategic networks update
SH29: Piarere (I/S with SH1) to I/S with SH28 (base of Kaimai Range)	Possible	Safety and capacity	The SH1/SH29 intersection at Piarere will be upgraded through NZUP to improve safety outcomes. The need for a significant intervention over the next 30 years is expected to be triggered by increased demand particularly for freight. Maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety, resilience, and access.	Intervention layers of the geospatial maps indicate that an NZUP project is planned as part of existing programmes so not considered transformational.
SH29: I/S with SH28 (base of Kaimai Range) to Tauranga	Possible	Safety, resilience, and capacity	Existing safety challenges, combined with forecast growth in demand particularly for freight, are likely to drive the need for a significant intervention over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety, resilience, and access where these will provide long-term value for money. Land-use changes in the Tauranga urban area should integrate with other transport interventions.	Transformational change
SH3: New Plymouth to Inglewood	Possible	Safety and capacity	A significant intervention may be required between New Plymouth and Waitara, triggered by increasing demand and place-making/severance issues. Corridor safety improvements are proposed as part of the Speed and Infrastructure programme. Maintain the existing corridor to appropriate levels of service and enable mode shift along urban parts of the corridor to ensure interregional journeys between New Plymouth and Whanganui are safe, resilient, and reliable.	
SH6: Nelson urban	Possible	Capacity	Forecast growth in demand, driven by continued population growth, may trigger the need for significant interventions over the 30-year period. In the interim, maintain the existing corridor and make ongoing small-medium scale improvements to respond to deficiencies in safety, access, and resilience where these will provide long-term value for money.	
SH6/6A: Cromwell to Queenstown	Possible	Resilience and capacity	Growing resilience challenges and forecast growth in demand may trigger the need for a significant intervention between Cromwell and Queenstown over the next 30 years. In the interim, maintain the existing corridor and deliver improvements through spatial partnerships while ensuring journeys between Wanaka and Queenstown are safe, resilient, and reliable. NZUP projects on SH6 near Queenstown will enable mode shift through improving walking, cycling, and public transit networks and services.	The What's Planned layer on the Our Current Network map also points out that an NZUP project is planned as part of existing programmes so not considered transformational.

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