

# Arataki

## Introduction to geospatial maps and layers

September 2023 v1.1

*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.

The interactive maps, Our Current Networks and Our Future Focus, complement the *Arataki* context setting and direction. Each map pulls data from multiple sources to provide insights to help manage, develop, and evolve the land transport system in Aotearoa. These data sources are shown as layers and sub-layers. Information about each of layer is outlined in the table below.

This is an ongoing and evolving process towards building a full-system plan. Through the Baseline Network Version we developed an initial baseline prototype using state highway information. For this version, we have added more detail and started our journey towards building a fuller picture of what is needed to achieve the Transport Outcomes Framework set by Te Manatū Waka Ministry of Transport.

Your input and feedback is always welcome – you can email us at [Arataki@nzta.govt.nz](mailto:Arataki@nzta.govt.nz).

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 is outlined in this section.

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
<b>State Highway Network</b>	<b>Aggregated Harmful/(GHG) Emissions</b> <ul style="list-style-type: none"> <li>Aggregated Harmful/GHG Emissions at SA1 Levels</li> <li>Aggregated Harmful/GHG Emissions at SA2 Levels</li> </ul>
<b>Strategic Network</b> <ul style="list-style-type: none"> <li>Nationally Strategic</li> <li>Regionally Strategic</li> <li>Strategic Intermodal Freight Hubs</li> </ul>	<b>Coastal Sensitivity Index</b> <ul style="list-style-type: none"> <li>Coastal Sensitivity Index CSI - Erosion</li> <li>Coastal Sensitivity Index CSI - Inundation</li> </ul>
	<b>Coastal Shipping Routes</b>
	<b>Commercial Vehicle Safety Centres</b>
	<b>Crash Analysis System (CAS) Data</b>
	<b>Department of Conservation (DOC) Walking Experiences</b> <ul style="list-style-type: none"> <li>Great Walks</li> <li>Normal Walks</li> </ul>
	<b>Department of Conservation (DOC) Public Conservation Land</b> <ul style="list-style-type: none"> <li>National Parks</li> <li>Department of Conservation (DOC) Other Public Conservation Land Types</li> <li>Conservation Covenant Areas</li> </ul>
	<b>Electric Vehicle (EV) Charging Points</b>
	<b>Ferry Service</b>
	<b>Flood Prone Areas</b> <ul style="list-style-type: none"> <li>Auckland Flood Prone Areas</li> </ul>
	<b>Freight Flows</b>
	<b>Heavy Vehicle Routes</b> <b>(High Productivity Motor Vehicle/50Max)</b>
	<b>Index of Multiple Deprivation</b>
	<b>InterCity Bus Network</b>

Insight layers and sublayers	Information layers and sublayers
	<b>Interregional Passenger Rail</b> <ul style="list-style-type: none"> <li>• Commuter</li> <li>• Tourist</li> </ul>
	<b>Iwi by Local Authority</b>
	<b>Key Alternate Routes</b>
	<b>Māori Demographics</b> <ul style="list-style-type: none"> <li>• Current Māori Demographics</li> <li>• Projected Māori Demographics</li> </ul>
	<b>Marae Locations</b>
	<b>Maritime Ports</b>
	<b>National Rail Network</b> <ul style="list-style-type: none"> <li>• National Rail Network</li> <li>• National Rail Network – Infrastructure</li> <li>• National Rail Network – Line Priorities</li> </ul>
	<b>New Zealand Cycle Trail</b>
	<b>One Network Framework</b> <ul style="list-style-type: none"> <li>• One Network Framework: State Highway</li> </ul>
	<b>Projected Aging Population</b>
	<b>Projected Population Growth</b>
	<b>Rapid Transit</b> <ul style="list-style-type: none"> <li>• Auckland Bus</li> <li>• Auckland Rail</li> <li>• Wellington Rail</li> <li>• Wellington Bus</li> </ul>
	<b>Tourism Flows</b>
	<b>Traffic Cameras</b>

Insight layers and sublayers	Information layers and sublayers
	<p><b>What's planned</b></p> <ul style="list-style-type: none"> <li>▪ Primary Outcomes <ul style="list-style-type: none"> <li>▪ Inclusive Access <ul style="list-style-type: none"> <li>▪ Inclusive Access - Points</li> <li>▪ Inclusive Access - Corridors</li> </ul> </li> <li>▪ Economic Prosperity <ul style="list-style-type: none"> <li>▪ Economic Prosperity - Points</li> <li>▪ Economic Prosperity - Corridors</li> </ul> </li> <li>▪ Resilience and Security <ul style="list-style-type: none"> <li>▪ Resilience and Security - Points</li> <li>▪ Resilience and Security - Corridors</li> </ul> </li> <li>▪ Healthy and Safe People <ul style="list-style-type: none"> <li>▪ Healthy and Safe People - Points</li> <li>▪ Healthy and Safe People - Corridors</li> </ul> </li> <li>▪ Environmental Sustainability <ul style="list-style-type: none"> <li>▪ Environmental Sustainability - Points</li> <li>▪ Environmental Sustainability - Corridors</li> </ul> </li> <li>▪ KiwiRail Interventions <ul style="list-style-type: none"> <li>▪ KiwiRail Intervention - Points</li> <li>▪ KiwiRail Intervention - Corridors</li> </ul> </li> <li>▪ Mode <ul style="list-style-type: none"> <li>▪ Cycling/Walking</li> <li>▪ Road Freight</li> <li>▪ Car</li> <li>▪ Public Transport</li> </ul> </li> </ul> </li> </ul>

## Our future focus map

Insight layers and sublayers	Information layers and sublayers
<b>Change required</b>	<b>Aggregated Harmful/(GHG) Emissions</b> <ul style="list-style-type: none"> <li>Aggregated Harmful/GHG Emissions at SA1 Levels</li> <li>Aggregated Harmful/GHG Emissions at SA2 Levels</li> </ul>
<b>Maintain with Current Programmes</b>	<b>Crash Analysis System (CAS) Data</b>
<b>Our Network Deficiencies</b> <ul style="list-style-type: none"> <li>Safety Risk (2020)</li> <li>Extreme Resilience Risk (2020)</li> <li>Extreme Resilience Risk (Future)</li> <li>Journey Reliability Deficiency (2020)</li> <li>Journey Reliability Deficiency (Future)</li> <li>National Rail Network Deficiencies</li> </ul>	<b>National Rail Network</b> <ul style="list-style-type: none"> <li>National Rail Network</li> <li>National Rail Network – Infrastructure</li> <li>National Rail Network – Line Priorities</li> </ul>
<b>Potential Change Required</b>	<b>One Network Framework: State Highway</b>
<b>Strategic Network Transformational Change</b> <ul style="list-style-type: none"> <li>Strategic Network Transformational Points</li> <li>Strategic Network Transformational Segments</li> </ul>	<b>Projected Aging Population</b>
	<b>Projected Population Growth</b>
	<b>Iwi by Local Authority</b>
	<b>Marae Locations</b>
	<b>Māori Demographics</b> <ul style="list-style-type: none"> <li>Current Māori Demographics</li> <li>Projected Māori Demographics</li> </ul>

## Layers in detail

### Aggregated harmful/Green House Gas (GHG) emissions

The carbon dioxide equivalent, CO<sub>2</sub>-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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Waka Kotahi (Vehicle Emission Mapping Tool) <sup>1</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Future Focus
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Taihoro Nukurangi National Institute of Water and Atmospheric Research (NIWA) <sup>2</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Te Manatū Waka Ministry of Transport (National Freight Demand Study (NFDS)) <sup>3</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi <sup>4</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Waka Kotahi <sup>5</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Te Papa Atawhai <sup>6</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Te Papa Atawhai <sup>7</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	External stakeholders including EV charge station owners and operators, Waka Kotahi <sup>8</sup>
<b>Layer type</b>	Information

## Ferry service

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

<b>Map</b>	Our Current Network
<b>Data source</b>	Auckland Transport, <sup>9</sup> Metro Christchurch, <sup>10</sup> Bluebridge, <sup>11</sup> Interislander, <sup>12</sup> Wellington Harbour Ferries <sup>13</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Auckland Council <sup>14</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Tauranga Aotearoa Stats NZ, <sup>15</sup> Te Manatū Waka Ministry of Transport, <sup>16</sup> Te Manatū Waka Ministry of Transport, <sup>17</sup> Governance Group <sup>18</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi 50Max interactive map <sup>19</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waipapa Taumata Rau University of Auckland <sup>20</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	InterCity Buses <sup>21</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Great Journeys New Zealand, <sup>22</sup> Te Huia, <sup>23</sup> Metlink, <sup>24</sup> Capital Connection <sup>25</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Te Puni Kōkiri <sup>26</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi <sup>27</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Future Focus
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Tatauranga Aotearoa Stats NZ (Medium forecast for subnational ethnic population projections and Māori age profiles) <sup>28</sup>
<b>Layer type</b>	Information

## Marae locations

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

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Local and central government departments, Te Kāhui Māngai (TKM), Te Puni Kōkiri <sup>29</sup>
<b>Layer type</b>	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).

<b>Map</b>	Our Current Network
<b>Data source</b>	Te Manatū Waka Ministry of Transport, <sup>30</sup> Manatū Ahu Matua Ministry for Primary Industries <sup>31</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	KiwiRail (Rail Network Investment Programme), <sup>32</sup> KiwiRail <sup>33</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Toitū Te Whenua Land Information New Zealand <sup>34</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi <sup>35</sup>
<b>Layer type</b>	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.

<b>Map:</b>	Our Current Network, Our Future Focus
<b>Data source:</b>	Waka Kotahi <sup>36</sup>
<b>Layer type:</b>	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 25<sup>th</sup> and 75<sup>th</sup> 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 Tirau 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*.

<b>Map</b>	Our Future Focus
<b>Data source</b>	Waka Kotahi, <sup>37</sup> Te Manatū Waka Ministry of Transport, <sup>38</sup> KiwiRail (Rail Network Investment Programme) <sup>39</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Tatauranga Aotearoa Stats NZ <sup>40</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Future Focus
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	Insight

## Projected population growth

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

<b>Map</b>	Our Current Network, Our Future Focus
<b>Data source</b>	Tatauranga Aotearoa Stats NZ <sup>41</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Auckland Transport, <sup>42</sup> Metlink <sup>43</sup>
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	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.

<b>Map</b>	Our Future Focus
<b>Data source</b>	Waka Kotahi
<b>Layer type</b>	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.

<b>Map</b>	Our Current Network
<b>Data source</b>	Hikina Whakatutuki Ministry of Business, Innovation and Employment <sup>44</sup>
<b>Layer type</b>	Information

## Traffic cameras

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

<b>Map</b>	Our Current Network
<b>Data source</b>	Waka Kotahi <sup>45</sup>
<b>Layer type</b>	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).

<b>Map</b>	Our Current Network
<b>Data source</b>	KiwiRail, <sup>46</sup> Waka Kotahi
<b>Layer type</b>	Information

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