Evidence pack

Canterbury region

June 2025

Version 1.0

NZ TRANSPORT AGENCY
WAKA KOTAHI

Te Kāwanatanga o Aotearoa
New Zealand Government

More information

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Introduction

This Canterbury region section is part of the *Evidence pack*, which is intended to help in the preparation of the strategic front end of regional land transport plans (RLTPs).

It does this by providing a consistent set of data and information setting out the current and future state of New Zealand's transport system at a national and regional level, and what interventions are likely to be effective to address identified deficiencies.

This iteration (version 1, June 2025) is the first step in the collaborative development with the sector of consistent and comprehensive evidence and information. For future iterations we will be drawing on your feedback to iteratively improve it and close any data and analysis gaps.

For more background information about the evidence pack, see the Introduction and national summary.

What's in the evidence pack?

The complete evidence pack is available on the Transport Insights portal.

There you will find:

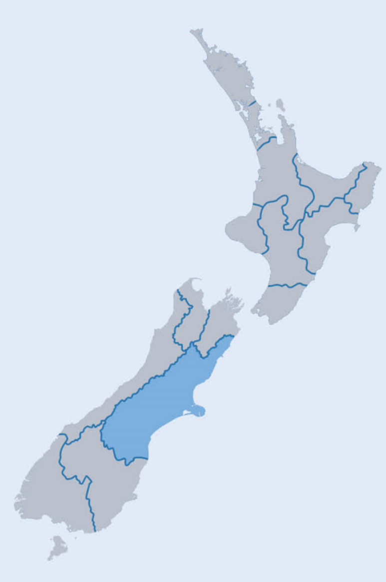
- evidence pack introduction and national summary, which gives you more background to the pack, its purpose and where the information and data are sourced from, and provides an overview for the whole country
- a section for each region, with data and information (calculated as strategic measures) specific to that region, and discussion of how it fits into the national network.

What's in this Canterbury region section?

Each regional section follows the same structure:

- **Canterbury overview** – a brief overview of the region.
- **Strategic measures** – which looks at how the region currently rates against the 14 strategic measures from the Land Transport Benefits Framework, and how it is expected to change over time.
- **Current and future challenges** – specific issues for the region to address.
- **Focusing effort** – identifies key areas to focus investment in the short and longer term, and includes targeted suggestions of potential interventions.
- **Appendices** – data sources for the strategic measures and more information on potential interventions.

Canterbury overview



Population in 2023
651,027

Projected Population in 2048 (2018 base)
780,500

Māori population and percentage of overall regional population in 2018
79,647 (12.2%)

Iwi and Hapū
- Ngāi Tahu

Key industries
- Construction
- Specialist manufacturing
- Primary production and food processing

GDP percentage of NZ total
12.5%
(year ending March 2024)

Tourism GDP of NZ total
4.3%
(Christchurch City)

Freight task 2017-2018
43.6 million tonnes
16% Of NZ total

Freight percentage by method 2017-2018
Road 96.3%
Coastal Shipping 1.1%
Rail 2.5%

Canterbury is New Zealand's largest region by area, covering 45,346 square kilometres, and is home to the country's second-largest regional population. The region stretches from Kēkerengū, north of the Clarence River, to the Waitaki River catchment in the south and from the coast to the Southern Alps in the west. The population of Canterbury is projected to grow from 651,000 to 781,000 by 2048, making up 13 percent of New Zealand's population.

Greater Christchurch, encompassing parts of Christchurch city, Selwyn District, and Waimakariri District, is the primary economic hub for Canterbury. It serves as the main logistics hub, tourism gateway to the South Island, and a key location for tertiary education and research. Strategic road and rail networks, including SH1, SH73, SH74, and SH76, are essential for moving goods and supporting the region's logistics.

Greater Christchurch has continued to grow since the 2011 earthquakes, with a higher proportion of that growth focused in the south, north and to the west. Parts of Selwyn and Waimakariri have experienced higher rates of growth compared to Christchurch city. This uneven population distribution creates transport challenges, with 82 percent of the population in Greater Christchurch but 80 percent of the state highway network outside it. Rural communities rely on these roads to access services in towns such as Timaru and Ashburton.

The Canterbury region's transport network includes approximately 16,000km of roads (37 percent unsealed), with 1350km designated as state highways and the remaining 14,800km as local roads. SH1 is a critical route, facilitating north–south travel along the east coast, connecting Christchurch with Timaru, Ashburton, and smaller towns, and supporting significant freight movement to and from the North Island via the Cook Strait ferries. Other important routes include SH73 to the West Coast and SH79 (inland Canterbury) and SH8 to Otago. Most freight in the region is transported by road; rail and coastal shipping account for less than 4%. There is 605km of rail in the region.[1]

Approximately 31 percent of the region's GDP, 28 percent of its employees, and 39 percent of its population are located outside Christchurch, making connections to Christchurch Airport, Lyttelton Port, inland freight hubs, and Timaru Port essential for export processing and import distribution. Agriculture remains a significant part of the economy, with dairy, meat, and horticulture being key sectors. The region's transport network supports these industries by facilitating the movement of

[1] ArcGIS (n.d.) KiwiRial network map. https://www.arcgis.com/apps/View/index.html?appid=556c4a9c73914fe1983529ddf9ae5099

goods to manufacturing and processing facilities. This results in high freight demand, particularly for dairy, meat, coal, logs, and timber products. Increased freight and commuter traffic are causing congestion, especially in areas such as Woolston and Brougham Street in Christchurch. The population is expected to grow significantly, increasing pressure on the transport network. Limited public transport options and high car usage contribute to congestion and emissions, with socio-economically deprived areas facing the most transport disadvantage.

Cycle usage has been increasing in Christchurch city because of the flat terrain and the partially completed major cycleway network. Over the past 2 decades, Canterbury region's transport network has undergone significant upgrades to enhance connectivity, resilience, and efficiency. Key projects include the completion of the Christchurch Southern Motorway and the Northern Corridor, which has improved traffic flow and reduced congestion in the region.[2] Additionally, the Main North Line railway was restored and upgraded following the 2016 Kaikōura earthquake, ensuring freight and passenger services.[3]

Investments in public transport infrastructure, such as the introduction of new bus routes, bus lanes, Park-and-Ride (from neighbouring districts) and the development of the Christchurch Bus Interchange, have also been pivotal in promoting sustainable transport options.[4]

The National Land Transport Programme 2024–27 includes projects such as the extension of the SH1 motorway north of Christchurch and the construction of a second Ashburton Bridge to improve safety, resilience, and journey reliability. The region also faces challenges such as limited transport choices, hazard risks including coastal flooding and seismic activity, which impact the movement of goods and visitors.

Additionally, separate Crown funded projects include the Rolleston access improvements and Brougham Street improvements.

[2] Environment Canterbury (n.d.). Canterbury transport plans. https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-transport-plans/

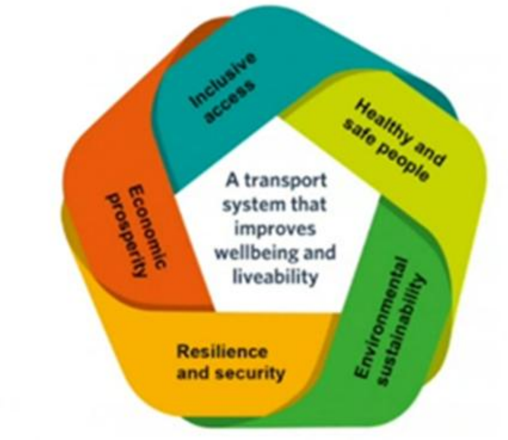
[3] Environment Canterbury (n.d.). Transport network resilience. https://www.ecan.govt.nz/your-region/living-here/transport/regional-transport-planning/transport-network-resilience/

[4] Environment Canterbury (n.d.). Transforming public transport. https://www.ecan.govt.nz/your-region/living-here/transport/public-transport-services/transforming-public-transport/

Strategic measures – current and future

This section provides tables summarising the 14 strategic measures in relation to this region. The data and evidence used to produce these results is included in Appendix A.

The 14 strategic measures are a subset of 60+ measures included in the Land Transport Benefits Framework. They have been selected to provide a coarse but practical overview of the 5 Transport Outcomes, as shown in the diagram.



The tables provide indicative current and future values for the 14 strategic measures (grouped by outcome), to understand how each measure (and therefore outcome) is likely to change if there is no significant investment (beyond that already committed).

More detail about the measures can be found in the Land Transport Benefits Framework measures manual.

Healthy and safe people

Benefit framework measure	Units	Current (2023/24)	Future (2048)	Change
1.1.1 Collective risk (crash density)	Average annual fatal and serious per kilometre of road section	0.021	0.030	0.009 (+43%)
1.1.3 Deaths and serious injuries (DSIs)	Number of DSIs (annual)	346	486	140 (+40%)
1.1.4 Personal risk (crash rate)	Average annual DSI per 100 million vehicle kilometres travelled	5.007	5.007	0 (0%)
1.2.1 Road assessment rating – roads	Infrastructure risk rating (applies to both current and future)	High: 10.87% Medium-high: 29.16% Medium: 42.29% Low-medium: 16.36% Low: 1.32%		N/A

Insights

- If there is no significant investment (beyond that already committed), crash density and the number of deaths and serious injuries (DSI) are projected to increase significantly by 2048. Projections are unavailable for other strategic measures for safety but indicate Canterbury currently performs poorly for this outcome on those strategic measures.

- Collective risk (crash density) shows where the biggest difference can be made in terms of absolute numbers of DSI, and is affected by population size and transport mode chosen. The average annual fatal and serious crashes per kilometre of road section in Canterbury are currently lower than the national average and in the middle of the range of all regions. If there is no significant investment (beyond that already committed), crash density is projected to increase by 43 percent by 2048.
- Canterbury has the third-highest number of DSI of all regions, with 13 percent of the national total and approximately double the average number of DSI of all regions. If there is no significant investment (beyond that already committed), the number of DSI is projected to increase by 40 percent by 2048.
- Personal risk (crash rate) highlights areas where a crash is more likely to occur based on use of the road network and is not affected by population size. The average annual DSI per 100 million vehicle kilometres travelled in Canterbury is currently less than the national average and the fifth-lowest average of all regions.
- Infrastructure risk rating (IRR) describes the underlying level of risk a road presents to an individual road user based on key physical and operational attributes. The proportion of Canterbury's roads rated as being at medium-high and high risk (that is, with DSI per 100 million VKT (vehicle kilometres travelled) equal to or greater than 8) is 10 percent less than the country as a whole and the fourth-lowest proportion of all regions.

Resilience and security

Benefit framework measure	Units	Current (2023/24)	Future (2048)	Change
4.1.1 Availability of a viable alternative to high-risk and high-impact route	Percentage of high-risk, high-impact route with a viable alternative	Not included in this release		
4.1.2 Level of service and risk (note that for this evidence pack this data is from the National Resilience Assessment Tool (NRAT) and includes only state highways)	Number of identified sites in region by combined risk rating (future, geological and hydrological)	Low: 195 Med: 57 High: 88 Critical: 32 Not yet rated: 46	N/A	N/A

Insights

- If there is no significant investment (beyond that already committed), Canterbury is projected to have the fifth-lowest number of future (emerging) risks. The proportion of high and critical risks indicate Canterbury currently performs moderately for this outcome.
- Hazard events at identified risk sites can lead to unplanned closures of the state highway network, impacting network resilience. Canterbury is mostly at risk from geological events (rockfall, overslips, underslips), which make up 326 of the 418 resilience risk sites in the region.

- High and critical risks make up 29 percent of all risks rated to date in the region. The proportion of high and critical risks is 2 percent lower than the national rate and in the middle of the range of all regions.
- The risks include 17 sites with future (emerging) risks, because of the impact of climate change for example. This number is in the middle of the range by region, if there is no significant investment (beyond that already committed).

Economic prosperity

Benefit framework measure	Units	Current (2024)	Future (2048)	Change
5.1.2 Travel time reliability – motor vehicles (note for this evidence pack, the data only relates to state highway traffic monitoring system (TMS) sites)	Calculated using coefficient of variation (CoV); standard deviation of travel time divided by average minutes travel time Rate: High <0.3, Medium 0.3–0.6, Low >0.6)	Low: AM 9% Day 2% Med: AM 17% Day 4% High: AM 74% Day 94%	Low: N/A% Med: N/A% High: N/A%	Low: N/A% Med: N/A% High: N/A%
5.1.3 Travel time delay (note, data is from Christchurch Transport Model (CTM) model (covering Greater Christchurch). Numbers in brackets are from NNP which uses state highway TMS sites (region wide)	Difference between average travel time during AM peak and average travel time during the inter-peak in minutes per kilometre (by mode) as a percentage	Car: 5% (4% for full region) PT: 11% Cycle: N/A	Car: 17% PT: 29% Cycle: N/A	Car: 11% PT: 18% Cycle: N/A
5.2.2 Freight – mode share value	Percentage of value for each mode	Not included in this release		
5.2.3 Freight – mode share weight	Percentage of weight for each mode	Road: 88% Rail: 12%	Road: 90% Rail: 10%	Road: 2% Rail: 2%

Insights

- If there is no significant investment (beyond that already committed), travel time delay in the morning peak is projected to increase for both cars and public transport by 2048. Also, the proportions of freight carried by road and rail in Canterbury are projected to change slightly by 2048. A projection is unavailable for travel time reliability, but the poor travel time reliability in Canterbury compared to the national rate and other regions indicate Canterbury currently performs poorly for this strategic measure.
- Travel time reliability can impact the efficient movement of people and goods. 9 percent of Canterbury's state highway network (limited to data based on where we have TMS sites) has poor travel time reliability (that is, a high CoV.), compared with 6 percent for the country as a whole, and the fifth-highest proportion of all regions. The volume of vehicle movements and congestion impacts travel time reliability in Canterbury. The capability to estimate travel time reliability for future years is still being developed and is intended to be included in later iterations of the evidence pack.

- Travel time delay can impact the efficient movement of people and goods. Travel time delays for cars in the morning peak can be reduced by spreading peak demand and facilitating mode shift to public transport or active modes through investment in infrastructure, services or road pricing mechanisms. Public transport in Canterbury currently has higher average travel times during the peak period than during inter-peak. However, if there is no significant investment (beyond that already committed), the difference is projected to increase significantly by 2048, resulting in longer travel times during the peak than the inter-peak. The difference between peak and inter-peak travel times for cars is projected to increase in the future.
- While road freight is more efficient over short distances, rail freight is safer, lower emissions and more efficient over longer distances. 88 percent of freight in Canterbury is carried by road, 1 percent higher than the national rate and in the middle of the range rate of all regions. 12 percent is carried by rail, 1 percent lower than the national rate and in the middle of the range for all regions. The share of freight carried by road is projected to increase by 2048, consistent with the trend for the country as a whole.

Environmental sustainability

Benefit framework measure	Units	Current (2023)	Future (2048)	Change
8.1.1 Greenhouse gas emissions (all vehicles)	Annual tonnes of CO_2 equivalents (CO_2-e) emitted	1.98 m	1.26 m	-0.71 m (-36%)
8.1.3 Light vehicle use impacts	Annual light vehicle kilometres travelled (light VKT)	6,182 m	8,583 m	+2,402 m (+39%)

Insights

- If there is no significant investment (beyond that already committed), Canterbury's greenhouse gas (GHG) emissions from all vehicles are projected to reduce significantly (primarily due to a highly uncertain assumed level of vehicle fleet electrification) and light vehicle VKT is projected to increase significantly.
- Land transport is a major contributor to GHG emissions. Canterbury accounts for 14 percent of transport GHG emissions in New Zealand. This proportion of the national total is the third-largest contribution of all regions. If there is no significant investment (beyond what is already committed), the Canterbury volume is projected to decrease by 2048 – primarily through electrification of the vehicle fleet (as forecast using the Ministry of Transport Vehicle Fleet Model (VFM)) – the proportion of national emissions is projected to remain stable. However, this assumed level of electrification has high uncertainty, and is a major factor affecting GHG emissions; therefore the calculated 32% decrease needs to be considered in this light.
- Light vehicle VKT is currently the largest source of transport GHG emissions. Electrification could be complemented by mode shift to public transport and/or active modes to maximise a reduction of GHG emissions. Canterbury accounts for 14 percent of light vehicle VKT in New Zealand. This proportion is the third-largest of all regions. Both the volume of Canterbury's vehicle VKT and proportion of the national total are projected to increase to decrease by 2048.

Inclusive access

Benefit framework measure	Units	Current (2023)	Future (2048)	% Change
10.2.1 People – mode share	Percentage by mode (Census (2023) journey to work and education for Christchurch). Regional values (current year only) in brackets. Future year values are based on Christchurch Transport Model (CTMv21).	Car: 77.7% (79.8% regional) PT: 5.8% (4.4% regional) Cycle: 7.2% (6.3% regional) Peds: 9.2% (9.5% regional)	Car: 71.6% PT: 7.9% Cycle: 8.9% Peds: 11.5%	Car: -6.1% PT: 2.1% Cycle: 1.8% Peds 2.3%

Benefit framework measure	Units	Mode	Current 0–5	Current 5–10	Current 10+km	Mode	Future 0–5	Future 5–10	Future 10+km	Mode	% Change 0–5	% Change 5–10	% Change 10+km
10.3.1 Access to key social destinations (all modes)	Number of jobs (x1000) accessible by mode in AM peak (car 40 min, PT 45 min, cycle 45 min) and distance from city centre (km)	Car:	247	237	351	Car:	298	286	441	Car:	21%	21%	26%
		PT:	136	84	25	PT:	164	100	33	PT:	21%	19%	31%
		Cycle:	197	164	46	Cycle:	238	197	60	Cycle:	21%	20%	28%

Insights

- If there is no significant investment (beyond that already committed), the proportion of journeys to work and education by car are projected to decrease by 6.1 percent by 2048. The proportion of jobs more than 5km from central Canterbury accessible by public transport and cycling is projected increase significantly by 2048.
- The availability of public transport services and active mode infrastructure can reduce car dependence, which can be a barrier to access for those who are on low incomes or unable to drive. Journeys to work and education in Canterbury by all modes are 13 percent of the national total, and this proportion is the second highest of all regions.
- Journeys by car in Canterbury are 1 percent lower than the national rate and the fourth-lowest in the country of all regions.
- Public transport use in Canterbury is 3 percent lower than the national rate and this proportion is the third-highest in the country of all regions.
- The proportion of people cycling in Canterbury is 3 percent higher than the national rate and the second-highest of all regions.
- The proportion of people walking in Canterbury is the same as the national rate and in the middle of the range of all regions.

- If there is no significant investment (beyond that already committed), journeys to work and education by car are projected to decrease in Canterbury by approximately 6 percent by 2048, with journeys by other modes increasing by roughly equal proportions. This projected level of mode shift is lower than Auckland and higher than Greater Wellington.
- The accessibility of jobs by modes other than car increases people's ability to work. There are more jobs accessible by car than other modes in Canterbury
- Within 5km of central Christchurch accessibility by car is more than double that for public transport and 20 percent higher than cycling. The farther out the location, the greater the difference. If there is no significant investment (beyond that already committed), the proportions of jobs more than 5km from central Christchurch accessible by public transport and cycling are projected to increase by 2048.
- A dispersed urban form in Christchurch and several urban areas around the region means Christchurch is the main centre of employment but not the only one, with people who live further away working more locally. There are few public transport options outside Christchurch. The lowest income households spend a greater proportion of their incomes on transport.[5] These factors combine to result in transport poverty (where people lack adequate access to affordable and reliable transport, hindering their ability to participate in essential activities such as work).

Interdependencies between outcomes

- Addressing the current and future challenges for one transport outcome can have negative impacts on others. On the other hand, it is possible to take an approach that makes a positive impact on the others.
- For example, encouraging a compact urban form and facilitating mode shift from light vehicles to public transport in the Canterbury region – including with priority for public transport in the morning peak – can reduce emissions (see environmental sustainability), improve access to work and education (see inclusive access), reduce safety risk (see healthy and safe people), improve the efficient movement of people and goods through urban areas and address congestion (see economic prosperity), and mitigate the long-term impacts of climate change (see resilience and security).

[5] Te Manatū Waka Ministry of Transport (2022). *The distributional impacts of transport-related carbon policy*. https://www.transport.govt.nz/assets/Uploads/The-Distributional-Impacts-of-Transport-final-report-005.pdf

Current and future challenges

To achieve a land transport network that is safe, efficient and effective for Canterbury, it is important to understand it in combination with the needs and lives of the region's people and the unique natural and built environment.

National context

New Zealand's transport networks are extensive and vital for the country's connectivity and economic prosperity. The state highway network spans about 11,750km,[6] while the local road network covers about 83,368km.[7] Additionally, the rail network consists of around 4128km of rail lines.[8]

Maintaining existing networks

Maintaining such a vast network requires significant effort. Annually, 5−10 percent of the road network (4750km to 9500km) needs resurfacing or rebuilding.[9] The network includes nearly 4200 bridges[10] on state highways and about 15,000 on local roads.[11] Urban growth and higher traffic volumes, especially of heavy vehicles, increase maintenance needs, which strains budgets. Neglecting maintenance can lead to safety risks, higher long-term costs, and disrupted connectivity.[12]

Looking ahead, future challenges are expected to intensify. Climate change is likely to increase the frequency and severity of extreme weather events, such as flooding and heatwaves, which can damage infrastructure and accelerate wear and tear. Technological advancements, such as the rise of electric and autonomous vehicles, may require new types of infrastructure and maintenance protocols. Additionally, population growth and urban sprawl will create pressure to further expand the network, which will lead to increasing the scale and complexity of maintenance operations.

Access to opportunities and enabling the efficient movement of freight around the country

The transport system underpins economic and social wellbeing, ensuring access to jobs, education, healthcare, and efficient freight movement. Remote and rural areas face significant access challenges, especially during adverse weather. These challenges include a lack of alternatives to private vehicle trips as public transport services are not a viable alternative because of coverage and frequency. In addition, there is a lack of redundancy in parts of the land transport system – some places rely on one or 2 critical lifelines to stay connected.

Looking ahead, existing access challenges in remote and rural areas will be exacerbated by the impacts of climate change and demographic change. The population is expected to remain static or decline in smaller, rural, and remote districts. In some areas, people aged over 65 are expected to make up more than 35 percent of the population. The affordability of local government rates increases will be an issue in these areas. Network resilience will be further challenged as damage caused by climate change becomes more frequent, outages last longer and repair costs increase. Rural and

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[6] NZTA (n.d.). State highway frequently asked questions. https://www.nzta.govt.nz/roads-and-rail/research-and-data/state-highway-frequently-asked-questions/

[7] Ministry of Transport (n.d.). Statistics and insights. https://www.transport.govt.nz/statistics-and-insights

[8] Stats NZ (n.d.). Transport. https://www.stats.govt.nz/topics/transport

[9] NZTA (n.d.). Road management and maintenance. https://nzta.govt.nz/roads-and-rail/management-and-maintenance/

[10] NZTA (n.d.). Bridges and structures. https://www.nzta.govt.nz/roads-and-rail/bridges-and-structures/

[11] Figure.NZ (n.d.). Number of bridges on local roads in New Zealand. https://figure.nz/chart/nHM7UwJuYIrWnLdT

[12] Government of New Zealand (n.d.). Government Policy Statement on land transport 2024–34. https://www.transport.govt.nz/assets/Uploads/Government-Policy-Statement-on-land-transport-2024-FINAL.pdf

coastal communities may become increasingly isolated and have difficulty accessing essential services – this may particularly impact Māori.

Freight is a key part of economic activity and is fundamental to making places great to live (liveability).[13] The efficient movement of freight is essential for economic productivity. Current freight inefficiencies such as delays, detours and highly variable travel times can increase costs by up to 20 percent.[14]

Looking ahead, total freight volume is expected to increase by 39 percent by 2053.[15] The location of freight origin and destination may change. A growing population in the largest urban areas means more goods will need to be moved to these locations, and industry and population concentration is occurring in the upper North Island. Climate change is expected to change the nature and location of primary production and increase the frequency of extreme weather events, disrupting transport networks, isolating communities, and affecting freight reliability.[16] Technological shifts, including the rapid growth of e-commerce and the transition to low-emission freight vehicles, will require significant infrastructure upgrades and new logistics strategies to ensure efficiency and sustainability.[17]

Resilience to natural hazards and climate change

New Zealand faces significant natural hazard risks, including earthquakes, floods, and cyclones, worsened by climate change. The land transport system has always been exposed to natural hazard risks, with minor closures or delays through small scale events like slips and localised flooding common. However, the network is increasingly exposed to national and regional scale events such as Cyclones Hale and Gabrielle and the Kaikoura earthquakes that caused widespread and significant damage.[18] For instance, Cyclone Gabrielle alone caused damage estimated at $13.5 billion.[19]

Recovery from small events is quick, but larger events, such as Cyclone Gabrielle, cause extensive damage and long recovery times. The state highway network performs critical lifeline functions for communities, and repeated disruption to these functions impacts communities' access to the services they need.

Looking ahead, the land transport system will have to adapt to escalating impacts from natural hazards and climate change now and into the future. These impacts include sea-level rise and ongoing changes in the physical environment, as well as increasingly severe and frequent climate-related events such as storms, flooding, droughts, and wildfires.[20] The probability of an Alpine Fault earthquake occurring in the next 50 years is 75 percent, and there is a 4 out of 5 chance that it will be

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13 Auckland Transport (2020). Auckland freight plan. https://at.govt.nz/media/1983982/auckland-freight-plan.pdf

14 Ministry of Transport (2023). Aotearoa New Zealand Freight and Supply Chain Strategy. https://www.transport.govt.nz/assets/Uploads/MOT4806_Aotearoa-Freight-and-Supply-Chain-Strategy-p09-v03.pdf

15 Ministry of Transport (2019). *New Zealand transport outlook – Freight model*. https://www.transport.govt.nz/assets/Uploads/Data/Transport-outlook-updated/Freight-Model-Version-2-Documentation-20190423.pdf

16 KPMG & The Aotearoa Circle (2024). *Transport sector climate change scenarios: Report on big climate risks to New Zealand's transport sector*. https://kpmg.com/nz/en/home/media/press-releases/2024/06/report-on-big-climate-risks-to-new-zealand-s-transport-sector.html

17 Ministry of Transport (n.d.). Climate change — emissions work programme. https://www.transport.govt.nz/area-of-interest/environment-and-climate-change/climate-change

18 Byett, A, et al (2019). *Climate change adaptation within New Zealand's transport system*. Motu Economic and Public Policy Research. https://www.motu.nz/our-research/environment-and-resources/climate-change-impacts/climate-change-adaptation-within-new-zealands-transport-system

19 NIWA (2024). Cyclone Gabrielle was intensified by human-induced global warming. https://niwa.co.nz/news/cyclone-gabrielle-was-intensified-human-induced-global-warming

20 NZTA (2022). *Tiro Rangi: our climate adaptation plan 2022–2024*. https://www.nzta.govt.nz/assets/resources/tiro-rangi-our-climate-adaptation-plan-2022-2024/tiro-rangi-our-climate-adaptation-plan-20222024.pdf

a magnitude 8+ event.[21] Such an event has the potential to cause severe damage and disruption across the entire South Island, with major consequences for the rest of the country.

These types of impacts will continue and will affect communities and the transport networks that connect them. As damage becomes more frequent, outages last longer and repair costs increase, rural and coastal communities may become increasingly isolated and have difficulty accessing essential services, and this may especially impact Māori. In urban areas, the impacts of climate change on multimodal networks can be complex, widespread and cascade across the land transport system. Interregional connections will also be disrupted.

Congestion and capacity constraints, especially in large and growing cities

New Zealand's road network is a vital part of the country's infrastructure, with significant portions now facing congestion and capacity constraints. This is particularly evident in Auckland, where congestion costs are estimated to range between $1.3 billion and $2.6 billion annually.[22]

The demand for transport in New Zealand has grown rapidly, meaning that in some places the demand exceeds the ability of the transport system to cater for it. This has resulted in frequent congestion across parts of the road and public transport networks, particularly on motorways in Auckland, Tauranga, Wellington, Queenstown and Christchurch. Previously confined to 'rush hour' periods, congestion has steadily lengthened and worsened over time.[23] Congestion on the local road network is a growing concern, especially in urban areas. Rail network capacity restraints currently affect both public transport services in Auckland and Wellington, and freight movements across the country. Population growth, dispersed land use patterns, and increasing vehicle ownership will continue to contribute to this issue into the future.

Looking ahead, a growing population in the largest urban areas means more people who need to get to work, education, business and entertainment. New Zealand's population is projected to reach over 6 million by the early 2030s, with much of this growth concentrated in urban areas.[24] This, combined with dispersed land use and rising vehicle ownership – currently at nearly 0.9 vehicles per person – will further strain transport corridors and worsen congestion.[25] Without significant investment, it is likely congestion will worsen, network productivity will fall, and emissions will rise. Future challenges include adapting for electric and autonomous vehicles, building resilience to climate impacts and reducing emissions through urban planning, mode shift and fleet carbonisation.

Reducing the level of harm to people and the environment

New Zealand's land transport system faces significant safety and environment challenges. In 2024, there were 292 road fatalities, placing New Zealand 7th highest in road deaths per capita among 35 OECD countries.[26] Contributing factors include adverse weather, unsafe driving behaviour, and poor road conditions. Rural road fatalities are disproportionately high, accounting for 60 percent of all road deaths, despite rural roads making up only 40 percent of the network.[27]

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[21] AF8 (2022). *AF8 Programme Strategy 2022–25*. https://af8.org.nz/media/fpxjy3uu/af8_programme-strategy-2022-25-jul22.pdf

[22] NZTA (2013). *The costs of congestion reappraised*. https://www.nzta.govt.nz/assets/resources/research/reports/489/docs/489.pdf

[23] NZTA (2024). *Significant land transport challenges facing New Zealand*. https://www.nzta.govt.nz/assets/planning-and-investment/nltp/2024/docs/significant-challenges-nltp-2024-27.pdf

[24] NZTA (n.d.). *Significant land transport challenges facing New Zealand*. https://www.nzta.govt.nz/assets/planning-and-investment/nltp/2024/docs/significant-challenges-nltp-2024-27.pdf

[25] NZTA (n.d.). *Significant land transport challenges facing New Zealand*. https://www.nzta.govt.nz/assets/planning-and-investment/nltp/2024/docs/significant-challenges-nltp-2024-27.pdf

[26] International Transport Forum (2024). Road safety country profile – New Zealand 2023. https://www.itf-oecd.org/sites/default/files/new-zealand-road-safety.pdf

[27] Stats NZ (n.d.). Transport. https://www.stats.govt.nz/topics/transport

Air pollution from fossil fuels and particulate matter continues to impact public health, contributing to an estimated 2247 deaths in 2016.[28] While low-emission vehicles are essential for reducing transport-related emissions, they are not a complete solution. A broader systems approach – encompassing clean energy, sustainable manufacturing, and urban planning – is needed to fully address environmental harm.[29]

The impact on the environment, including climate, on and from the transport network and its use is another pressing issue. The extensive road system crosses many sensitive ecosystems, habitats, and waterways, leading to habitat fragmentation, noise pollution, artificial light, and stormwater discharges.

Looking ahead, climate change is expected to intensify these impacts because of more frequent extreme weather events, increased infrastructure stress, and greater disruption to both human and natural systems. Future challenges will also include managing the environmental footprint of new transport technologies and ensuring that safety improvements keep pace with population growth and the needs of changing demographics (such as people with children), travel patterns (increased travel by older people) and vehicle types, while also taking advantage of new technologies (for example cooperative intelligent transport systems and alternatives to bitumen) to improve safety and environmental outcomes.

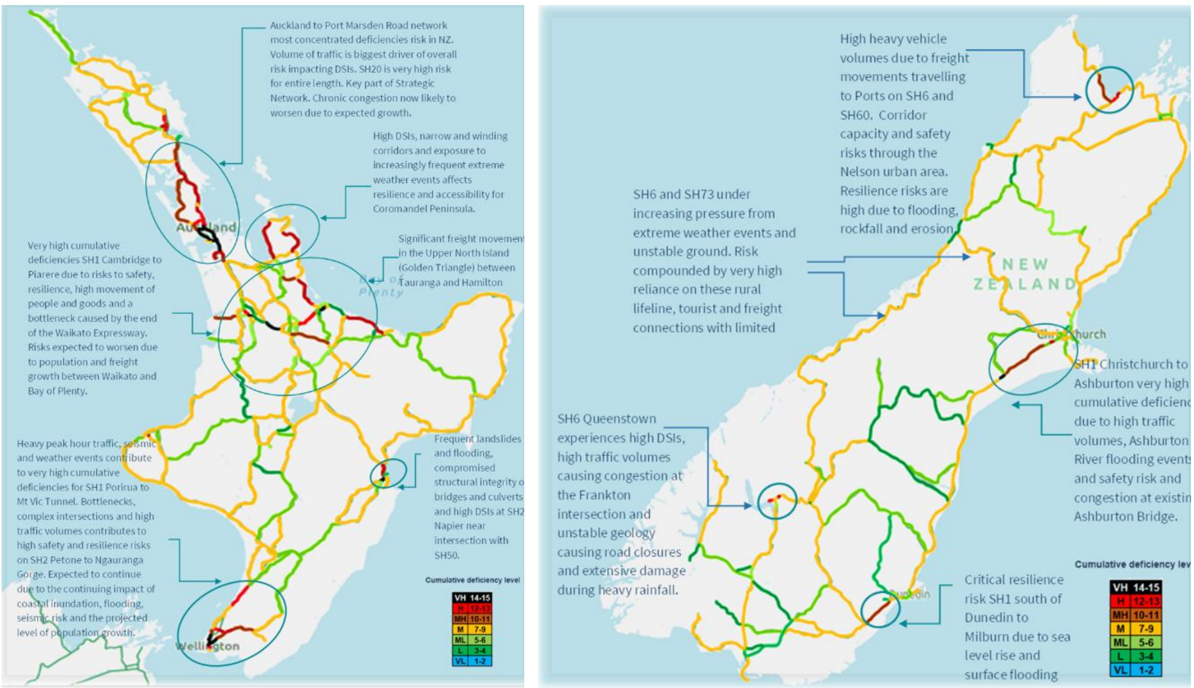

Figure 1: Cumulative (resilience, reliability and safety) deficiencies across the state highway network (source: NZTA data[30])

[28] Emission: Impossible Ltd and the HAPINZ 3.0 team (2022) Key findings from HAPINZ. https://ehinz.ac.nz/projects/hapinz3/key-findings-from-hapinz/

[29] Auckland Council (2022). *Transport emissions reduction pathway*. https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/Documents/transport-emissions-reduction-pathway.pdf

[30] Analysis of NZTA National Resilience Assessment Tool (NRAT), NZTA average annual daily traffic and NZTA cumulative risk using DSI data from 2019 to 2023.

Regional context

This section discusses the key current and future challenges of Canterbury's transport network, using evidence and insights from NZTA's *Arataki* and regional planning documents.

The Canterbury transport network plays a major role in the South Island, which is home to nearly a quarter New Zealand's population and generates more than 22 percent of the national GDP. About 22 percent of the country's population growth over the next 20 years is expected in the South Island.

Figure 2: Current strategic network in the South Island (source: Arataki)

The Canterbury transport network connects to:

- North: SH1 Marlborough
- South: SH1 to Otago, SH8 to the Southern Lakes
- West: SH7 and SH73 to the West Coast.

Growth patterns in Greater Christchurch put significant pressure on the transport system

Greater Christchurch is the second-most populous urban area nationally and is growing rapidly. Selwyn District is the second fastest growing district in the country. Much of the region's recent growth is through greenfield development in the outlying towns of Rolleston, Rangiora and Kaiapoi. These growth patterns present many challenges for the transport system that will grow over time, including longer trips, a greater reliance on private vehicles, and a less efficient and effective public transport system.

Canterbury has higher rates of private vehicle use than most other urban centres in New Zealand. Combined with longer journey lengths as people need to travel further to get to jobs, schools and other important destinations, this is putting pressure on the road network, resulting in congestion and poor journey reliability at peak travel times.

If these growth and travel patterns continue Christchurch will face decreasing productivity on routes from low density residential areas and new developments on the urban fringes to employment centres. Traffic could also spill over from arterials into quiet residential streets.

With minimal intervention, the safety risk could increase, and air pollution from vehicle emissions could worsen. Potential economic growth because of population increase will mean traffic on the region's road network increases from increased movement of goods. Changes to where people work and live may increase travel demand where it's already high, particularly by private vehicles.

Key transport infrastructure and critical routes for people are in areas particularly vulnerable to natural hazards

The freshwater and geological landscape of Canterbury is dynamic. It has the highest exposure of infrastructure assets to sea level rise in the country and has the most built land area in New Zealand exposed to coastal flooding.

A significant number of bridges on state highways, rural roads and rail are susceptible to flooding, pier erosion and scouring effects. This risk is made more severe by the dependence on a small number of bridges across major rivers and ageing infrastructure carrying more and heavier vehicles and enduring weather events not predicted or anticipated during their design and construction.

In particular, we need a plan to replace the critical SH1 bridges in Rakaia, Ashburton and Rangitata that is timely and affordably sequenced. These bridges are critical for the whole South Island on our most important route (SH1).

Parts of SH1 and the Main Trunk rail line for the South Island are located next to the current coastline to take advantage of the flat topography. Rising sea levels, coastal inundation and erosion will increasingly endanger these routes and disrupt vital freight flows between ports and distribution hubs.

The risk of seaside flooding in Christchurch is great, particularly in low-lying eastern suburbs along the lower areas of the Styx, Avon, and Heathcote rivers.

Seismic events in the last 20 years created significant and widespread damage to the region's transport system. The limited number of transport routes in Canterbury means that major disruption or lengthy closures can have significant and widespread economic and social impacts. This was clearly demonstrated when SH1 was closed after the Kaikōura earthquake in 2016. While there is a high probability of future events, uncertainty about the severity and location make it difficult to proactively manage this risk.

The risk to transport connections to coastal Ngāi Tahu marae and settlements that are already vulnerable will increase.

A variety of interventions are needed to ensure the key transport routes are maintained if impacted by a natural hazard.

The resilience of the region's freight system is compromised by the high dependence on road transport

Freight in Canterbury is mostly moved by road, 96.3 percent of tonnage. This is a higher figure than the country as a whole and creates competition for road space between goods and people in Greater Christchurch – particularly in high demand areas such as Hornby, Christchurch International Airport and state highway arterial routes such as SH1 and SH76. Traffic in these areas contributes to longer travel times for people or goods, hindering productivity and poses safety risks through greater exposure to heavy goods vehicles.

Rail, which has lower emissions than road freight, currently plays a small but important role in the movement of freight in Greater Christchurch and could play a bigger role in the future with the growth in importance of inland ports, such as at Rolleston and Ashburton.

The resilience of the region's freight system is compromised by such a high dependence on road transport and little scope for substitution if one network is unavailable. The ability of rail to play a larger role is constrained by factors such as:

- network condition, capacity constraints (including of rolling stock)
- market uncertainty, such as inter-strait shipping and West Coast coal production

- the small size of the network relative to roading
- inefficient transfers between modes.

Road and rail closures as a result of natural hazards (seismic or climate) will impact the growth of key industries and the projected increase in freight if it continues to be mostly transported by truck, as many alternative routes are not suitable for heavy vehicles. Intervention is therefore required to ensure the future growth of industries is not impacted by natural hazards.

Poor travel choices for people in Greater Christchurch reduces access to economic and social opportunities

While private vehicles remain key to providing access for many people in Canterbury, the lack of alternatives impacts their ability to access both economic and social opportunities. Urban Christchurch does not possess a public transport system that reflects New Zealand’s second most populous city.

Public transport use in Greater Christchurch occupies a 2.25 percent share of all trips, making it low in comparison to other urban centres in the country. The active travel-friendly (flat) topography of urban Christchurch has relatively well-developed cycling networks and some of the highest levels of cycling in New Zealand. Despite this, walking and cycling rates have declined substantially over recent decades.

As the residential edges of urban Christchurch and surrounding areas have grown, it’s harder for people to access quality public transport with the routes not being adapted to changes in travel demand patterns. This lag in service provision has led to, frustrations with service reliability increasing car usage, and consequently greater congestion in peak commuting hours into the city centre and to key employment hubs such as Hornby and Christchurch Airport.

Mana whenua have place-based interests in kāinga nohoanga development on Māori reserve land in Greater Christchurch, such as at Tuahiwi and Rāpaki, to create a sustainable and economic base for their people. The Greater Christchurch Spatial Plan articulates that ‘whilst policy and plan changes have occurred to enable kāinga nohoanga, this has not been supported with investment in infrastructure.’

Currently, young people, disabled people and those on low incomes are the least satisfied with their ease of access to suitable transport to daily activities in Greater Christchurch. These are population groupings that often experience transport disadvantage, and they risk entrenched, intergenerational disadvantage if their travel choices are not increased.

The future of travelling to work is likely to look very different with contracting and remote work becoming more prevalent as society shifts to valuing the flexibility for other commitments. If the lack of investment in travel choices continues, this lifestyle shift will reinforce the reliance on cars to travel across and through suburbs to schools, community hubs and small suburban shopping centres. This could especially happen if growth continues to attract young families around the city’s periphery.

Between 2009 and 2018, funding for state highway maintenance was static, while both heavy and light vehicle volumes increased 15 to 20 percent, respectively. There are many bridges on the network, some of which have already experienced a reduction in life expectancy as a result of the 2011 earthquakes.

Transport infrastructure requires both asset replacements and enhanced maintenance just to continue to provide the current levels of service. Frequent flooding of rivers, regular coastal inundation and seismic events will continue to increase the demand on infrastructure maintenance and emergency works budgets.

State highway hotspots

The following data sets have been overlaid to identify ‘hotspots’ on the state highway network:

- **Reliability:** Measured by the average annual daily traffic (AADT), which calculates the total number of vehicles, including heavy vehicles, passing through traffic count sites. High to medium reliability issues are identified when highways frequently operate at or near their capacity of 20,000 vehicles per day.
- **Resilience:** Assessed by examining the risk of disruptions across the state highway network over the past 12 years.
- **Safety:** Derived from the NZTA Collective Risk Map, which uses historical crash data from 2019 to 2023 to identify areas with higher accident risks.

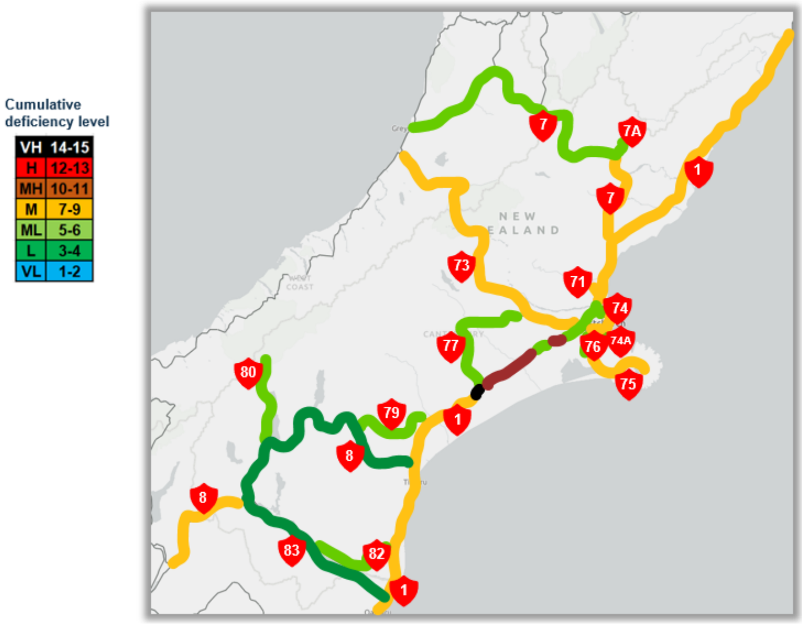

Figure 3: Cumulative deficiencies on the state highway network in Canterbury region (source: NZTA data[31])

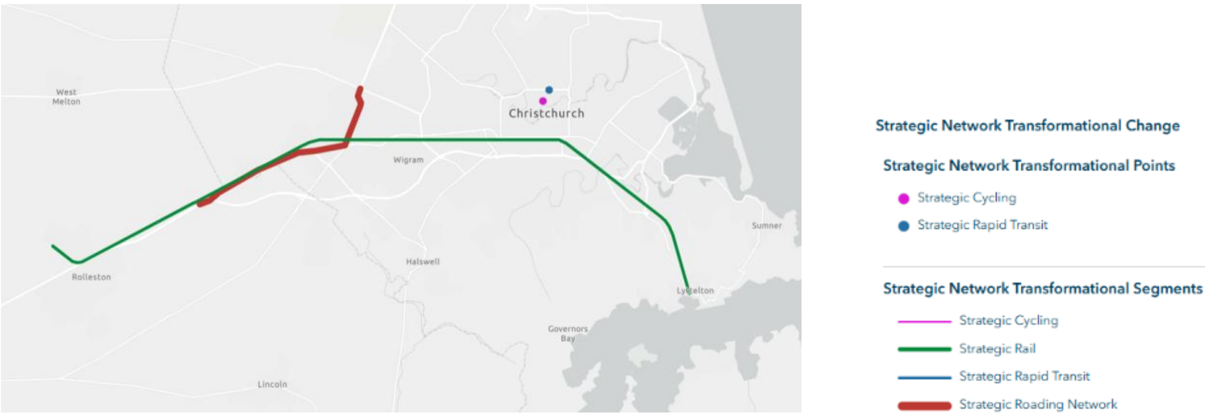

Figure 4: Arataki strategic network where transformational change is required (source: Arataki)

[31] Analysis of NZTA National Resilience Assessment Tool (NRAT), NZTA average annual daily traffic and NZTA cumulative risk using DSI data from 2019 to 2023.

Very-high deficiency: SH1 Ashburton to Tinwald

The SH1 corridor between Ashburton and Tinwald is a vital two-lane section of the nationally strategic network, crucial for the movement of people and freight in the South Island. This road also serves local journeys between Ashburton and Tinwald, contributing to an average annual daily traffic of 23,141 vehicles.

One of the primary issues facing this corridor is its resilience, rated as critical because of the hydrological challenges posed by the braided Ashburton River. The existing bridge is a significant limiting factor, often causing congestion and safety concerns. To address these issues, funding has been secured for a second river crossing, co-funded by the Ashburton District Council and NZTA. This new crossing, along with associated road construction, is expected to alleviate congestion, enhance safety, and improve the overall resilience of this important corridor.[32,33]

Medium-high deficiency: SH1 Rolleston to Ashburton

The SH1 corridor between Rolleston and Ashburton is a busy two-lane route, carrying an average daily traffic of 21,132 vehicles, including 2430 heavy vehicles. Safety is a major concern along this stretch, which has a high collective road safety risk. This risk is driven by the high volume of vehicles and the numerous local roads joining SH1 in the communities along the corridor.

Several activities are either committed or proposed to address these issues. These include the SH1 Selwyn River to Ashburton and Templeton to Selwyn River Safety Improvements, as well as the Rolleston Access Improvements. These projects aim to enhance safety, reduce congestion, and improve overall journey reliability for all road users.[34]

Medium deficiency: SH1, SH7, SH71, SH73, SH74A, SH75, SH76

These state highway sections are identified as having medium deficiencies along all or part of their length, predominantly driven by resilience and safety risks. Several activities are either committed or proposed for these corridors:

- **SH1**: This busy corridor carries significant traffic, including heavy vehicles. Safety is a major concern because of high traffic volumes and numerous local road intersections. Planned improvements include the Rolleston Access Improvements, SH1 Belfast to Pegasus Motorway and Woodend Bypass, SH1 Hornby Hub and corridor, SH1/SH73 Intersection Improvements, and the Burnham roundabout.
- **SH75**: This highway faces challenges such as accidents and natural events such as flooding, which can lead to road closures and significant disruptions. Planned improvements include SH75 Hallswell Road Improvements

The following corridors currently have no planned improvements identified. SH74 and SH76 are designated as nationally strategic sections of the strategic state highway network, while SH73 is considered regionally strategic. To maintain their current level of performance, these roads have planned regular maintenance, operations, and renewals (MOR) activities in place.

- **SH7**: This highway faces challenges such as accidents and natural events like flooding, rockfalls, weather events (including snowfall) bushfires, which can lead to road closures and significant disruptions
- **SH71**: Safety issues are prevalent, with high-risk intersections and frequent accidents.

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32 NZTA (2025). SH1 Tinwald Corridor improvements. https://www.nzta.govt.nz/projects/sh1-tinwald/

33 Ashburton District Council (2024). SH1 Tinwald: February project update. https://www.ashburtondc.govt.nz/news/2024-news/sh1-tinwald-february-project-update

34 Ashburton District Council (2025). SH1 night closures for asphalt resurfacing in Ashburton late March. https://www.ashburtondc.govt.nz/news/2025-news/nzta-sh1-night-closures-for-asphalt-resurfacing-in-ashburton-late-march

- **SH73**: This route is prone to natural events like scrub fires and accidents, causing frequent closures and disruptions.
- **SH74A**: The highway faces issues with level crossings and traffic signal faults, leading to occasional closures and delays.
- **SH76**: This corridor experiences frequent accidents and traffic disruptions, particularly at key intersections such as those along Brougham Street.

Focusing effort

Note: this section has a high-level strategic focus; we'll develop more specificity in future iterations of the evidence pack.

Based on the preceding sections and consideration of regional investment priorities identified in regional documents, the following list of areas of investment focus have been identified:

Longer-term investment focus

Resilience

- Investigate options for critical transport corridors away from high-risk areas in the face of natural hazards such as relocation and extension of routes – this includes working with communities to identify plans for when to defend, accommodate, or retreat.
- Investigate the diversification of transportation networks by developing alternative modes.
- Investigate coastal shipping for response and recovery phases in the event of an AF8 or Hikurangi subduction zone event.

Transport connectivity

- Developing a mass rapid transit network in Greater Christchurch, including progressing route protection ahead of time.
- Provide additional cycling and walking connections across Greater Christchurch and other urban areas.
- Continue to make changes to the allocation of space on existing roads and streets to enable and encourage mode shift to public transport, walking, and cycling.
- Explore opportunities with iwi/Papatipu Rūnanga for te ara tawhito (ancestral coastal and river routes) in improving the resilience of the regional land transport network.

Economic and urban development

- Continue to align transport investments with urban development plans – supporting, enabling, and encouraging growth and development in areas that have good travel choices and shorter trip lengths such as the approach outlined in the Greater Christchurch Spatial Plan.
- Explore opportunities to move to a more multi-modal freight system with greater use of rail and coastal shipping.
- Better understand the impact of future socio-economic transformation on travel patterns and freight volumes.
- Focus on improving travel in and around key destinations with complex transport interconnections, especially interregional connections, town centres and key freight and industrial hubs.
- Investigate Main South Line capacity and resilience required to support additional freight movements through Christchurch and support freight movement to and from the Lyttelton and Timaru ports and the inland port at Rolleston.

Safety and environment

- Continue to invest in safety infrastructure, education, enforcement, and incentives that significantly reduce harm caused by the region's transport system.
- Focus improvement on local corridors that have safety deficiencies across multiple modes.
- Deliver interventions, activities, and investments needed to achieve vehicle kilometres travelled (VKT) and emissions reduction across the region.
- Continue to reduce the environmental impact of the maintenance, operations and improvement across the transport network including waste minimisation and resource efficiency.

Community and accessibility

- Work with Papatipu Rūnanga to improve or maintain, as appropriate, physical access to marae, papakāinga, wāhi tapu, and wāhi taonga.
- Continue to improve the design and provision of transport infrastructure and services to meet the needs of people of all ages and abilities, focusing on communities with unmet needs.
- Continue to improve access to social and economic opportunities, especially by public transport, walking, and cycling, so these low-cost, sustainable, and healthy travel options are safely used for more journeys.
- Explore opportunities to support the mobile or digital delivery of essential services.
- Investigation of future Ashburton public transport needs.

Short-term investment focus

Projects in the shorter term typically will involve low-cost, low-risk, high-effectiveness improvements and projects that 'set the scene' to incrementally enable (or transition to) longer-term outcomes.

Steps to make progress towards transport outcomes in a more efficient and cost-effective way include:

- renewing the focus on small-scale projects
- getting more from existing infrastructure, by making the most of existing networks, services, and demand management
- reallocating existing road space, particularly for public transport and active modes
- seeking continuous improvement in network resilience through maintenance, renewals, and low-cost, low-risk investments
- influencing travel behaviour and growth patterns.

Resilience

- Investigation of the future resilience pressures on the SH1, SH7, SH73, SH74 and SH75 corridors and whether MOR will be sufficient to maintain the required level of performance over the next 30 years.
- Identify transport assets and infrastructure at risk of natural hazards and impacts of climate change, identifying priorities for network resilience and options for alternate routes less likely to be disrupted.
- Identify, plan and maintain for alternate routes with appropriate level of service to support community resilience and safe movement of freight.
- Develop a plan for maintaining, operating, and replacing end-of-life infrastructure, especially bridges on SH1.

Transport connectivity

- Delivery of network improvements in Hornby and airport surrounds.
- Expand and improve walking and cycling facilities and infrastructure.

- Maintain and improve the resilience and efficiency of road and rail connections to surrounding regions and Lyttelton Port.
- Effectively integrate the SH1 Belfast to Pegasus Motorway and Woodend Bypass into the wider network to maximise benefits.
- Scaling up of bus services and infrastructure improvement on key routes in Greater Christchurch identified in Public Transport Futures and the Greater Christchurch Spatial Plan.
- Complete the connection of cycling networks in urban Christchurch.

Economic and urban development

- Complete the South Island Freight Study, to provide a strong evidence base and methodologies for investment decisions impacting freight productivity.
- Investigate first- and last-mile freight solutions in key activity centres.
- Supporting multi-modal, resilient, reliable, and efficient freight and business travel around key parts of the network, especially interregional connections, and key freight and industrial hubs.
- Support safe and reliable movement of visitors across the region.
- Investigate how to efficiently and effectively improve public transport in growing urban communities in Ashburton and Timaru.
- Implement the transport components of the Greater Christchurch Spatial Plan – this includes protecting key strategic corridors and developing high-quality public transport, walking, and cycling infrastructure along key housing and employment growth corridors.

Safety and environment

- Continue safety improvements that target high-risk intersections, run-off road crashes, high-volume roads, and head-on crashes on high-risk rural roads, especially SH1 Christchurch to Timaru.
- Address safety challenges in non-protected areas of existing cycling and walking networks.
- Plan what interventions, activities, and investments are needed to achieve vehicle kilometres travelled (VKT) and emissions reduction, focusing on Christchurch.
- Reduce the environmental impact of the maintenance, operations and improvement across the transport network by supporting and enabling low-emission, low-carbon and low-impact policies, practices, and standards.

Community and accessibility

- Work with Papatipu Rūnanga to plan for and develop land transport network connectivity and services to kāinga nohoanga development.
- Deliver bus stop access upgrades and infrastructure improvements.
- Improve public transport service quality and reliability by increasing frequency and connection of key centres.
- Expand and improve walking and cycling facilities in smaller towns.
- Improve travel choice and access to social and economic opportunities, focusing on low income/low access areas in urban centres.
- Continue and develop community transport/on-demand services where appropriate and develop a community transport policy and funding framework.

Potential interventions for focused effort

As part of the PIE programme, NZTA is developing the Intervention Catalogue (IC) tool, which compiles a wide range of empirical data relating to the implementation of transport projects and how effective they were in achieving the intended outcomes. We'll continue to add to this over time, using data from benefit realisation associated with the investment logic mapping (ILM) process.

An AI interface for supporting queries and providing relevant evidence is currently being investigated.

An example of how exploratory use of this tool might be used to match potential interventions to deficiencies to understand and compare the likely relative effectiveness is included in Appendix B.

The process seeks to avoid potential pitfalls that might occur during option formulation:

- an over-reliance on preconceived ideas
- a focus on the more obvious supply-side measures, such as infrastructure and management rather than demand-side measures such as regulation and pricing
- a general lack of awareness of the wider range of policy measures available
- lack of evidence of the performance of those measures in other contexts
- lack of a formalised or consistent approach for option generation.

The example tables included in Appendix B take the focus areas and related transport issues from the previous section of this report and maps them to some relevant interventions from the KonSULT knowledgebase.

Insights

Using IC is only intended to inform the option formulation process. It does not replace the need for judgement, but rather provides a set of empirical evidence that supports decisions (along with additional information sources).

The table of IC interventions included in Appendix B indicates the following:

- Most interventions related to addressing the identified Canterbury deficiencies are likely to be cost effective.
- Most interventions have mostly a positive (or neutral) effect across all outcomes, much more so than negative.
- Some of the most effective interventions for Canterbury indicated by IC include:
    - walking and cycling network improvements
    - light rail or bus rapid transit (Greater Christchurch)
    - road space reallocation
    - traffic calming
    - spatial and place-based planning (Greater Christchurch)
    - rail freight services
    - road pricing (Greater Christchurch).

Short-list of most effective interventions

It is intended that the information and tools provided above will assist consideration and development of projects to be included in the next RLTP and NLTP.

It provides a starting point for us to understand regional issues and investment opportunities, which can then be expanded upon through further engagement between approved organisations and NZTA to increase the likelihood of suitable projects being submitted for funding via the NLTP.

Appendix A: Data sources for the strategic measures

This appendix references all relevant data sources and assumptions for the 14 strategic measures reported within each regional chapter.

Because this is the first attempt at providing the evidence pack, and the development of the associated tools and processes under the Planning and Investment Evidence base (PIE) programme is still ongoing, we do not yet have the full capability to report outputs for all measures, particularly for future years. In these instances, we have noted that the data is 'not available' by using the 'N/A' abbreviation as a placeholder until such time this can be addressed by a subsequent version of the evidence pack.

Similarly, the process has identified the need for better understanding and reporting of data quality ratings, version control and internal consistency (that is, a single source of truth). These are all things we intend to improve in subsequent releases.

Bearing the above in mind, we have adopted the following general convention for this version in how we report numbers:

- For large numbers, only report 3–4 significant figures (and using rounding units of thousands or millions).
- For small numbers (including percentages), report to one decimal place by default, but make exceptions where appropriate (for example where more or less detail is required to make meaningful comparisons).

The focus is on convenience and the useability of the data. As such, it doesn't necessarily imply a particular level of accuracy (especially for future year forecasts, which have a great deal of uncertainty associated with them).

Each section below (grouped by outcome) provides data for all regions to allow comparison in terms of how each region contributes to the national total. It also provides any important caveats and limitations associated with each of the measures for that outcome.

Healthy and safe people

To understand the current and future safety risk both at the regional and national level, we calculated deaths and series injuries, personal risk and collective risk as shown in the following table. More details can be found in the Land Transport Benefits Framework.

Benefit framework measure	Units
1.1.1 Collective risk (crash density)	Average annual fatal and serious per kilometre of road section
1.1.3 Deaths and serious injuries (DSIs)	Number of DSIs (annual)
1.1.4 Personal risk (crash rate)	Average annual DSI per 100 million vehicle kilometres

Notes, caveats and data limitations:

- Data for the number of deaths and series injuries (DSIs) is sourced from the Crash Analysis System (CAS) database managed by NZTA.
- Regional VKTs and network length in kilometres is sourced from the NZTA official data published for financial year 2023/24.[35]
- Generally, DSI measures are calculated as multi-year rolling average. However, because of time and resource constraints the following data is for the financial year 2023/24 only.
- Future year growth factor is based on regional VKT change. This method to calculate this change is discussed in more detail for the 'E.4 Environmental sustainability' section later in this appendix.

[35] https://www.nzta.govt.nz/planning-and-investment/learning-and-resources/transport-data/data-and-tools/

- It is assumed that crash rates remain constant over time. This is consistent with safety expert advice that application of crash trend adjustment factors for long term future predictions may no longer be supported by evidence.
- Future year DSIs were estimated based on the regional change on VKT (all vehicles) between 2023 and 2048 adopted for the GHG emissions measure (8.1.1). This assumes the crash rate (per VKT) remains constant (that is, no crash trend reduction factors applied).

Region	Current 2023/24			Future 2048		
	DSIs #	Per km	Per 100 million VKT	DSIs #	Per km	Per 100 million VKT
01 – Northland	181	0.027	7.783	176	0.026	7.554
02 – Auckland	593	0.073	4.267	924	0.114	6.651
03 – Waikato	416	0.035	6.372	501	0.042	7.678
04 – Bay of Plenty	184	0.038	5.321	210	0.044	6.059
05 – Gisborne	33	0.015	7.779	37	0.016	8.737
06 – Hawke's Bay	125	0.027	7.005	145	0.031	8.135
07 – Taranaki	82	0.021	6.293	97	0.024	7.429
08 – Manawatū-Whanganui	234	0.026	7.718	231	0.026	7.619
09 – Wellington	171	0.039	4.671	230	0.052	6.289
10 – Top of the South	117	0.027	6.868	151	0.035	8.848
11 – Canterbury	346	0.021	5.007	480	0.030	6.942
12 – West Coast	43	0.014	7.548	43	0.014	7.545
13 – Otago	137	0.013	4.799	142	0.013	4.968
14 – Southland	51	0.007	3.877	53	0.007	4.024
15 – Chatham Islands	0	0.000	0.000	0	0.000	0
National	**2713**	**0.025**	**5.451**	**3419**	**0.035**	**5.055**

Infrastructure risk rating (safety)

We calculate strategic measure 1.2.1 Road assessment rating to understand the current situation of infrastructure risk both at regional and national level. This measure can be used for any safety-related investment benefits, particularly those that target road infrastructure to improve safety. It is a comprehensive measure that considers land use, road type, alignment, average annual daily traffic (AADT), intersection density, land and shoulder width, roadside hazards and access density. More details can be found in the Land Transport Benefits Framework.

Benefit framework measure	Units
1.2.1 Road assessment rating – roads	Average infrastructure risk rating

Notes, caveats and data limitations:

- Data to calculate the regional infrastructure risk rating (IRR) measure in the following table is sourced from Megamaps, which is a geospatial platform managed by NZTA.[36]
- IRR data used to calculate regional and national measure values in the following table was calculated in Megamaps in 2024. The raw data used is for the period 2019–23.
- The data in Megamaps is for each road segment, intersection or corridor. We have aggregated it to calculate regional percentages under each risk band.

Region	High	Medium-high	Medium	Low-medium	Low
01 – Northland	45.77%	26.44%	18.74%	8.34%	0.71%
02 – Auckland	14.92%	17.54%	48.12%	13.18%	6.24%
03 – Waikato	21.40%	25.42%	34.39%	15.15%	3.64%
04 – Bay of Plenty	17.10%	20.74%	37.82%	19.35%	4.99%
05 – Gisborne	50.43%	19.93%	21.93%	7.50%	0.21%
06 – Hawke's Bay	33.47%	25.30%	29.79%	9.16%	2.28%
07 – Taranaki	28.83%	24.08%	33.13%	13.13%	0.83%
08 – Manawatū-Whanganui	41.81%	19.13%	25.67%	12.43%	0.96%
09 – Wellington	17.98%	19.51%	41.67%	13.62%	7.22%
10 – Top of the South	33.70%	23.83%	28.06%	12.94%	1.47%
11 – Canterbury	10.87%	29.16%	42.29%	16.36%	1.32%
12 – West Coast	17.75%	29.97%	38.04%	13.61%	0.63%
13 – Otago	21.83%	37.95%	26.55%	12.63%	1.04%
14 – Southland	6.99%	41.27%	37.99%	13.34%	0.42%
National%	**23.21%**	**2.29%**	**13.50%**	**34.25%**	**26.75%**

[36] https://spatial.nzta.govt.nz/apps/megamaps/

Resilience and security

This transport outcome is about minimising and managing the risks from natural and human-made hazards, anticipating and adapting to emerging threats, and recovering effectively from disruptive events. We intended to use strategic measure 4.1.1 and 4.1.2 from the Land Transport Benefits Framework to understand the resilience and security situation at national and regional level. However, we don't currently have data to calculate measure 4.1.1, so this time around we have only calculated measure 4.1.2. The intent of the measure 4.1.2 is to allow for description and measurement of the risk to level of service by unplanned disruption (including earthquakes, storms, volcanos and tsunamis). This measure is generally used for any investment that focuses on maintaining or increasing the resilience of the transport network.

Benefit framework measure	Units
4.1.1 Availability of a viable alternative to high-risk and high-impact route	Percentage of high-risk, high-impact route with a viable alternative
4.1.2 Level of service and risk	Number of identified sites in region by combined risk rating (future, geological and hydrological)

Notes, caveats and data limitations:

- The data for the following measure is sourced from the National Resilience Assessment Tool (NRAT) managed by NZTA.[37]
- The following table shows the regional number of resilience risks on state highways under each risk band. This includes hydrological, geological and future risks.
- 'No rating' is for considered risk sites that have not yet been rated.
- There is no easy way to currently calculate future projections for this measure, but we are working on the capability to do so.

Regions	Critical	High	Moderate	Low	No rating
01 – Northland	29	84	276	171	169
02 – Auckland	5	13	29	41	1
03 – Waikato	20	175	212	174	149
04 – Bay of Plenty	16	64	153	121	67
05 – Gisborne	1	7	35	49	74
06 – Hawke's Bay	18	123	72	30	143
07 – Taranaki	0	11	9	0	98
08 – Manawatū-Whanganui	1	11	9	8	8
09 – Wellington	39	37	25	118	1
10 – Top of the South	9	51	59	177	91
11 – Canterbury	32	88	57	195	46
12 – West Coast	34	49	21	34	37
13 – Otago	26	84	86	247	172
14 – Southland	27	23	18	28	14
National	**257**	**820**	**1061**	**1393**	**1070**

[37] https://national-resilience-assessment-tool-nzta.hub.arcgis.com/

Economic prosperity

This transport outcome is about supporting economic activity via local, regional, and international connections, with efficient movements of people and products. We calculated the following strategic measures from the Land Transport Benefits Framework to measure the economic prosperity outcomes at both regional and national level.

Benefit framework measure	Units
5.1.2 Travel time reliability – motor vehicles (note for this evidence pack, the data only relates to state highway traffic monitoring system (TMS) sites)	Calculated using coefficient of variation (CoV); standard deviation of travel time divided by average minutes travel time Rate: Low <0.3, Medium 0.3–0.6, High >0.6)
5.1.3 Travel time delay	Difference between average travel time during AM peak and average travel time during the Inter Peak in minutes per kilometre (by mode) as a percentage
5.2.2 Freight – mode share value	Percentage of value for each mode
5.2.3 Freight – mode share weight	Percentage of weight for each mode

Notes, caveats and limitations:

- Data for travel time reliability and delay measures is sourced from the National Network Performance (NNP) platform managed by NZTA.
- The sources used to calculate following measures is limited to the TMS sites only – that is, for state highways. In future, as more data is available in NNP for local roads, we intend to calculate using extensive local and state highway roads. Additionally, NNP will be able to assess both travel time delay and travel time reliability.
- The data for 5.1.2 Travel time reliability and 5.1.3 Travel time delay is for a typical day.
- Where we have gained access to regional model origin–destination data (for Auckland, Waikato, Wellington and Christchurch), we have used this to estimate current and future values of travel time for all available modes.
- Measure 5.2.2 Freight – mode share value has been selected as one of the 14 strategic measures but currently, there is insufficient data to reliably calculate this. Therefore, the data table for this measure remains unpopulated as a placeholder.
- Measure 5.2.3 Freight – mode share weight would ideally include coastal shipping but currently only includes road and rail modes.
- Future road freight is based on the same data used to forecast heavy commercial vehicle (HCV) VKT (also used for other measures) combined with average cargo weight from weigh-in-motion (WiM) sites (collected for the North Island only, but also applied to the South Island due to lack of data from the South Island). This data covers seven years and shows a trend of average load sizes decreasing over time. This trend line was used to estimate the 2048 average cargo weight (4615kg). Compared to the 2024 value (4822kg), this implies the average load size is projected to decrease by 7%. In contrast, national HCV VKT is projected to increase by 39% (2024 to 2048).
- The last seven years of rail freight net tonne-kilometres (NTK) by line segment has been provided by KiwiRail. This indicates that the amount of freight is reasonably steady over this period (with a small decline over the last few years). Based on the overall trend, we have assumed future year (2048) NTK will remain the same as current day (2024)
- A discrepancy in the rail data has been noted, where a 27km section of the network is missing from the calculations. This is possibly the section between Palmerston North and Woodville, which has been noted for further follow up.

5.1.2 Travel time reliability – motor vehicles

Region	Daily (CoV)			Peak time (CoV)		
	Low	Medium	High	Low	Medium	High
01 – Northland	96.43%	3.57%	0.00%	88.24%	0.00%	11.76%
02 – Auckland	96.67%	2.50%	0.83%	78.57%	9.18%	12.24%
03 – Waikato	94.59%	1.35%	4.05%	95.00%	0.00%	5.00%
04 – Bay of Plenty	100.00%	0.00%	0.00%	80.56%	19.44%	0.00%
05 – Gisborne	96.30%	3.70%	0.00%	100.00%	0.00%	0.00%
06 – Hawke's Bay	98.95%	1.05%	0.00%	65.38%	34.62%	0.00%
07 – Taranaki	94.74%	5.26%	0.00%	69.44%	16.67%	13.89%
08 – Manawatū-Whanganui	92.11%	7.89%	0.00%	82.56%	8.14%	9.30%
09 – Wellington	92.37%	6.78%	0.85%	67.90%	30.86%	1.23%
10 – Top of the South	100.00%	0.00%	0.00%	86.49%	10.81%	2.70%
11 – Canterbury	94.39%	3.96%	1.65%	73.98%	16.84%	9.18%
12 – West Coast	96.30%	1.23%	2.47%	98.08%	0.00%	1.92%
13 – Otago	92.59%	6.79%	0.62%	75.56%	17.78%	6.67%
14 – Southland	93.27%	5.77%	0.96%	71.43%	21.43%	7.14%
National	**95.30%**	**3.84%**	**0.86%**	**77.34%**	**15.54%**	**7.12%**

5.1.3 Travel time delay

Region	Peak (mins/km)	Inter-peak (mins/km)	Difference (mins/km)	%Change
01 – Northland	0.78	0.85	0.7	8.40%
02 – Auckland	0.77	0.86	0.8	10.23%
03 – Waikato	0.79	0.87	0.8	9.17%
04 – Bay of Plenty	0.69	0.76	0.6	8.18%
05 – Gisborne	0.75	0.77	0.2	3.30%
06 – Hawke's Bay	0.79	0.87	0.7	9.15%
07 – Taranaki	0.80	0.88	0.7	8.46%
08 – Manawatū-Whanganui	0.73	0.78	0.4	5.72%
09 – Wellington	0.83	1.00	0.2	16.94%
10 – Top of the South	0.82	0.84	0.1	1.98%
11 – Canterbury	0.75	0.77	0.2	3.46%
12 – West Coast	0.74	0.77	0.2	3.13%
13 – Otago	0.74	0.78	0.3	4.69%
14 – Southland	0.73	0.76	0.2	3.23%
National	**0.76**	**0.83**	**0.6**	**8.17%**

5.2.3 Freight – mode share weight – Base Year 2024

Region	Road (m NKT/yr)	Rail (m NKT/yr)	Total (m NKT/yr)	Road (%)	Rail (%)
01 – Northland	912	17	929	98%	2%
02 – Auckland	2904	132	3036	96%	4%
03 – Waikato	5016	751	5767	87%	13%
04 – Bay of Plenty	2208	534	2742	81%	19%
05 – Gisborne	301	0	301	100%	0%
06 – Hawke's Bay	1120	31	1152	97%	3%
07 – Taranaki	603	59	661	91%	9%
08 – Manawatū-Whanganui	1824	646	2470	74%	26%
09 – Wellington	1004	102	1106	91%	9%
10 – Top of the South	1193	60	1253	95%	5%
11 – Canterbury	4045	563	4608	88%	12%
12 – West Coast	409	313	722	57%	43%
13 – Otago	1396	220	1616	86%	14%
14 – Southland	776	73	849	91%	9%
15 – Chatham Islands	0	0	0	100%	0%
Grand total	**23,712**	**3,500**	**27,212**	**87%**	**13%**

5.2.3 Freight – mode share weight – future year 2048

Region	Road (m NKT/yr)	Rail (m NKT/yr)	Total (m NKT/yr)	Road (%)	Rail (%)
01 – Northland	912	17	929	98%	2%
02 – Auckland	2,904	132	3,036	96%	4%
03 – Waikato	5,016	751	5,767	87%	13%
04 – Bay of Plenty	2,208	534	2,742	81%	19%
05 – Gisborne	301	0	301	100%	0%
06 – Hawke's Bay	1,120	31	1,152	97%	3%
07 – Taranaki	603	59	661	91%	9%
08 – Manawatū-Whanganui	1,824	646	2,470	74%	26%
09 – Wellington	1,004	102	1,106	91%	9%
10 – Top of the South	1,193	60	1,253	95%	5%
11 – Canterbury	4,045	563	4,608	88%	12%
12 – West Coast	409	313	722	57%	43%
13 – Otago	1,396	220	1,616	86%	14%
14 – Southland	776	73	849	91%	9%
15 – Chatham Islands	0	0	0	100%	0%
Grand total	**23,712**	**3,500**	**27,212**	**87%**	**13%**

Environmental sustainability

This transport outcome is about transitioning to net zero carbon emissions, and maintaining or improving biodiversity, water quality and air quality. We calculated following strategic measures from the Land Transport Benefits Framework to the measure the economic prosperity outcomes at both regional and national level.

Benefit framework measure	Units
8.1.1 Greenhouse gas emissions (all vehicles)	Annual tonnes of CO_2 equivalents (CO_2-e) emitted
8.1.3 Light vehicle use impacts	Annual light vehicle kilometres travelled (light VKT)

Notes, caveats and limitations:

- Current year data for VKT is sourced from NZTA's open data portal.
- Future light national VKT projections have been sourced from the NZTA 2024 Light VKT projection models. These are based on Stats NZ population growth and forecasts for GDP and fuel prices (mid-range assumptions have been adopted for this evidence pack).
- Future regional light vehicle VKT distribution is based on research work done by Beca (VKT and GHG emissions baseline report – NZTA research note 008 September 2022). This assumes the base year light VKT per capita remains unchanged and uses population projection to estimate light VKT within each territorial local authority (TLA). The results are aggregated to spatial areas and adjusted to reconcile with the Ministry of Transport (MoT) observed and projected national totals. It uses base and projected light vehicle fleet GHG emissions factors from the Vehicle Fleet Emission Model (VFEM) to calculate GHG emissions for the baseline spatial areas. The report year 2035 (future) VKT values (by region) have been adjusted (scaled) to 2048 national light vehicle (LV) totals.
- Future year regional heavy vehicle VKT distribution has been calculated using growth factors comprising trend data, Stats NZ medium population forecast and Ministry of Business, Innovation and Employment (MBIE) GDP forecast data. This is a placeholder calculation pending further work on HCV demand forecasting currently being developed (using this general approach) as part of the PIE programme.
- GHG emissions have been estimated by applying light and heavy VKT to Vehicle Emissions Prediction Model (VEPM) (v7.0) emission rates (for current and future years) using the default MoT Vehicle Fleet Model (VFM) assumptions within VEPM (for each year) and average vehicle speeds from NNP or regional transport models (Auckland, Waikato, Wellington and Christchurch).
- Estimates of VKT are key inputs to multiple measures (such as vehicle emissions (affecting both health and environmental measures), DSIs, freight etc. Care has been taken to ensure consistency at the national, regional and local levels.

8.1.1 Greenhouse gas emissions (all vehicles)

Region	Current 2024	Future 2048	Change	% Change	Contribution
01 – Northland	0.61	0.27	-0.35	-57%	4%
02 – Auckland	3.58	2.19	-1.38	-39%	26%
03 – Waikato	2.00	1.36	-0.64	-32%	14%
04 – Bay of Plenty	1.01	0.63	-0.38	-38%	7%
05 – Gisborne	0.13	0.07	-0.06	-48%	1%
06 – Hawke’s Bay	0.52	0.30	-0.22	-42%	4%
07 – Taranaki	0.35	0.19	-0.16	-46%	3%
08 – Manawatū-Whanganui	0.87	0.49	-0.38	-44%	6%
09 – Wellington	0.93	0.45	-0.48	-52%	7%
10 – Top of the South	0.51	0.36	-0.15	-30%	4%
11 – Canterbury	1.98	1.26	-0.71	-36%	14%
12 – West Coast	0.17	0.10	-0.08	-44%	1%
13 – Otago	0.78	0.40	-0.38	-48%	6%
14 – Southland	0.38	0.21	-0.17	-46%	3%
15 – Chatham Islands	0.002	0.001	-0.001	-39%	0.02%
National	**13.83**	**8.29**	**-5.54**	**-40%**	**100%**

8.1.3 Light vehicle use impacts

Region	Current 2024	Future 2048	Change	% Change	Contribution
01 – Northland	2172	2075	-97	-4%	5%
02 – Auckland	13137	20504	7367	56%	29%
03 – Waikato	5597	6514	918	16%	12%
04 – Bay of Plenty	3056	3349	293	10%	7%
05 – Gisborne	369	420	52	14%	1%
06 – Hawke’s Bay	1581	1810	229	14%	3%
07 – Taranaki	1199	1397	198	17%	3%
08 – Manawatū-Whanganui	2702	2523	-179	-7%	6%
09 – Wellington	3488	4746	1258	36%	8%
10 – Top of the South	1484	1854	370	25%	3%
11 – Canterbury	6182	8583	2402	39%	14%
12 – West Coast	494	476	-18	-4%	1%
13 – Otago	2610	2624	14	1%	6%
14 – Southland	1175	1182	7	1%	3%
15 – Chatham Islands	5	4	-0.4	-7.9%	0%
National	**45250**	**58062**	**12812**	**28%**	**100%**

Inclusive access

This transport outcome is about enabling all people to participate in society through access to social and economic opportunities, such as work, education and health care. We calculated the 10.2.1 and 10.3.1 strategic measures from the Land Transport Benefits Framework to measure the inclusive access outcome both at the national and regional level.

Benefit framework measure	Units
10.2.1 People – mode share	Percentage by mode (Census (2023) journey to work and education)
10.3.1 Access to key social destinations (all modes)	Number of jobs (x1000) accessible by mode in AM peak (car 40 min, PT 45 min, cycle 45 min) and distance from city centre (km)

Notes, caveats and limitations:

- There is a limited information about measure 10.2.1 in the Land Transport Benefits Framework measures manual – that is, its intent, scope, forecasting methods etc are not defined yet.
- Mode share data, that is main means of travel to work and education, is sourced from census 2023 outputs produced by Stats NZ.[38]
- The data for all public transport (PT) modes (buses, trains and ferries) is aggregated together.
- Where we have gained access to regional model origin–destination data (for Auckland, Waikato, Wellington and Christchurch), we've used this to estimate current and future values of 10.2.1 People – mode share based on modelled relative changes applied to the base year census values.

10.2.1 People – mode share

Region	%Car	%PT	%Cycle	%Peds
01 – Northland	91.00%	1.33%	0.99%	6.67%
02 – Auckland	77.81%	11.29%	1.32%	9.58%
03 – Waikato	86.34%	2.69%	2.49%	8.48%
04 – Bay of Plenty	87.36%	2.06%	3.37%	7.22%
05 – Gisborne	89.78%	0.43%	2.54%	7.25%
06 – Hawke's Bay	88.12%	0.99%	2.96%	7.93%
07 – Taranaki	87.18%	1.25%	2.91%	8.66%
08 – Manawatū-Whanganui	86.33%	1.77%	2.60%	9.30%
09 – Wellington	63.97%	18.40%	2.98%	14.64%
10 – Top of the South	80.14%	1.09%	7.53%	11.24%
11 – Canterbury	85.26%	0.17%	3.27%	11.30%
12 – West Coast	79.75%	4.44%	6.27%	9.54%
13 – Otago	73.35%	4.38%	3.77%	18.50%
14 – Southland	87.70%	0.70%	3.40%	8.21%
Auckland city	77.78%	11.30%	1.32%	9.59%
Hamilton city	82.96%	4.96%	3.08%	9.01%

38 https://explore.data.stats.govt.nz/?fs[0]=2023%20Census%2C0%7CTransport%23CAT_TRANSPORT%23&pg=0&fc=2023%20Census&bp=true&snb=9

Region	%Car	%PT	%Cycle	%Peds
Tauranga city	85.33%	2.92%	4.65%	7.10%
Wellington city	48.62%	28.51%	3.59%	19.29%
Christchurch city	77.74%	5.84%	7.20%	9.22%
Queenstown-Lakes District	79.27%	4.13%	5.77%	10.83%
National total	**79.45%**	**7.46%**	**2.91%**	**10.19%**

Accessibility to employment

Notes, caveats and limitations:

- Data is sourced from the Accessibility Toolkit (ATK).
- It uses network-based travel times (by mode) between household locations and employment locations. This uses recorded travel times for general traffic, bus timetables for PT and road network distance with a constant average speed applied for cycles (the default used in OpenTripPlanner, which is 5m/s = 18km/h).
- Measure 10.3.1 currently estimates accessibility to employment rather than social destinations. Further work is progressing using ATK to also include access to social destinations, which will be included in subsequent versions of this evidence pack.
- ATK has been used to estimate future accessibility in a very limited way by only looking at changes associated with land-use growth based on population and employment sub-regional projections (while keeping base year travel times by mode). It may be possible to improve this in future releases, where other tools (currently being developed) can provide suitable inputs to ATK regarding future network performance (including travel times).

10.3.1 Access to key social destinations (all modes)

Region	Mode	Current year (2023)			Future year (2048)		
		0–5km	5–10km	10+km	0–5km	5–10km	10+km
01 – Northland	Car	31,292	30,536	35,034	36,807	35,913	40,486
	PT	16,850	5,845	869	19,200	7,465	1,311
	Cycle	29,138	19,854	2,377	34,068	24,541	3,369
02 – Auckland	Car	716,503	536,916	455,088	899,714	670,758	582,690
	PT	313,788	177,213	124,557	388,878	224,214	151,103
	Cycle	355,847	280,586	216,239	451,914	355,494	265,792
03 – Waikato	Car	133,357	133,999	213,804	176,632	177,837	276,406
	PT	69,881	25,929	9,321	95,049	33,744	12,351
	Cycle	104,923	82,607	16,567	140,886	112,340	21,034
04 – Bay of Plenty	Car	79,040	77,841	93,611	103,455	101,584	107,430
	PT	35,631	23,794	18,017	47,915	32,656	20,225
	Cycle	58,707	40,240	26,289	77,374	54,337	29,099
05 – Gisborne	Car	17,327	17,265	25,979	18,308	18,254	27,378
	PT	9,241	144	147	9,421	137	150
	Cycle	15,211	10,255	517	15,898	9,799	849
06 – Hawke's Bay	Car	72,436	71,160	165,625	82,291	81,101	186,660
	PT	18,570	12,495	21,930	20,305	13,607	26,451
	Cycle	27,802	26,148	59,881	30,745	29,448	70,751
07 – Taranaki	Car	36,869	36,779	81,917	41,180	40,985	91,527
	PT	17,946	6,379	3,989	19,839	7,537	4,939
	Cycle	27,594	21,814	5,315	30,784	26,806	6,171

08 – Manawatū-Whanganui	Car	63,400	60,858	116,324	70,215	68,118	129,915
	PT	42,455	8,809	12,769	47,710	12,863	14,373
	Cycle	49,725	27,467	15,275	55,486	31,480	16,815
09 – Wellington	Car	226,937	203,306	257,735	254,242	227,977	286,594
	PT	149,015	87,351	100,318	169,490	97,902	112,643
	Cycle	160,012	138,296	82,987	178,699	153,837	93,008
10 – Top of the South	Car	59,509	39,238	43,526	65,205	43,653	48,604
	PT	33,554	20,850	2,236	36,531	23,406	2,550
	Cycle	48,104	34,767	5,135	52,973	39,147	5,744
11 – Canterbury	Car	246,820	237,377	350,704	298,103	286,139	440,946
	PT	135,521	83,670	25,420	164,523	99,853	33,350
	Cycle	197,173	163,672	46,480	238,400	196,568	59,540
12 – West Coast	Car	6,225	6,455	14,589	5,843	6,196	13,893
	PT	3,757	183	1,862	3,445	210	2,326
	Cycle	5,537	4,664	3,015	5,099	4,604	3,432
13 – Otago	Car	59,213	58,364	112,598	62,075	61,521	128,941
	PT	45,898	27,674	13,916	48,301	33,897	16,699
	Cycle	53,343	41,614	12,458	55,959	47,303	15,473
14 – Southland	Car	32,733	33,106	69,145	34,463	34,638	71,342
	PT	20,598	10,281	2,169	21,320	13,138	2,138
	Cycle	27,027	22,387	4,685	28,399	26,232	4,374
National	Car	1,781,661	1,543,200	2,035,679	2,148,533	1,854,674	2,432,812
	PT	912,705	490,617	337,520	1,091,927	600,629	400,609
	Cycle	1,160,143	914,371	497,220	1,396,684	1,111,936	595,451

Appendix B: Intervention Catalogue

As part of the PIE programme, NZTA is developing the Intervention Catalogue (IC) tool, which compiles a wide range of empirical data relating to the implementation of transport projects and how effective they have been in achieving the intended outcomes. We'll continue to add to this over time, using data from benefit realisation associated with the investment logic mapping (ILM) process.

An AI interface for supporting queries and providing relevant evidence is currently being investigated.

For this evidence pack, a limited subset of data (related to 80 interventions) based on the KonSULT knowledgebase maintained by the University of Leeds in the UK, on sustainable urban land use and transport has been made available to demonstrate how IC might be applied to explore and identify the effectiveness of various interventions as part of the option formulation process.

Effectiveness is reported using a simple qualitative 1–5 scale that is indicative rather than absolute, and results may vary based on context.

The screenshot in Figure 5 shows the interventions we extracted from the KonSULT knowledgebase. This data is available in the summary spreadsheet: Extract-of-IC-KonSULT-data-(interventions-typology).xlsx.

Figure 5: Extract of IC KonSULT data

We've used the data shown in Figure 5 to create a draft interactive tool ([Spreadsheet-deficiency-to-intervention-example.xlsx]) that allows users to explore the effectiveness and trade-offs associated with a range of interventions that are associated with a user-specified list of issues or deficiencies.

The tables shown in the screenshots below are examples of how the tool can be used (and is not necessarily recommending any of the interventions currently selected).

User Inputs	Intervention Catalogue	Intervention Catalogue		4) Select Area Type	5) Review likely effectiveness of se		
Issue/Deficiency	Intervention Group	IC Interventions	IC Lever		Effectiveness	Cost	
1) User to provide list of issues/deficencies below	2) User drop down menus to explore avalible Groups	3) User drop down menus to explore Interventions in Group		Area	(1-5)	Min.	Max.
Consolidate growth, shorten trip lengths, co locating transport hubs with community services	Regulation (pricing and incentives)	Public transport fare reductions	Pricing	Tier 1	3	0	0
Design and Planning - adaptable 'scenarios-based' (defend, accommodate, retreat), identify critical routes, improve operational responses to events	Spatial and place-based planning	Design and Planning	Resiliance	Tier 1	0	0	0
perceived safety (incl. crime)	Deliver new or upgraded infrastructure and services	Safe system approach	Safe System	Tier 1	4	0	0
prioritise low risk low cost maintenance projects	Maintain and optimise existing networks and services	Maintaining the existing road network level of service	Infrastructure	Tier 1	3	0	1
Implement high quality improvements that bring about mode change	Maintain and optimise existing networks and services	Conversion of road capacity to shared and active modes	Optimisation	Tier 1	2	0	2
perceived safety (incl. crime)	Deliver new or upgraded infrastructure and services	Safe system approach	Safe System	Tier 1	4	0	0
rapid transport network	Spatial and place-based planning	Spatially integrated land use and transport networks	Multi-modal planning	Tier 1	4	0	1
Improved services	Deliver new or upgraded infrastructure and services	Fixed line mass public transport	Public transport	Tier 1	3	0	5
Road pricing	Regulation (pricing and incentives)	Time and distance based charges	Pricing	Tier 1	2	-4	0
PT Fares	Regulation (pricing and incentives)	Public transport fare reductions	Pricing	Tier 1	3	0	0
Road safety plans, safe speed limits, reduce dangerous behavior	Deliver new or upgraded infrastructure and services	Safe system approach	Safe System	Tier 1	4	0	0
Encourage Evs (low emission zones)	Maintain and optimise existing networks and services	Banning polluting vehicles from a defined area	Management	Tier 1	2	0	1
Encourage active modes	Deliver new or upgraded infrastructure and services	Networks for small, low powered, low speed transport devices	MAAS	Tier 1	4	0	1
Encourage active modes	Education and awareness	School based travel behaviour change	Travel reduction	Tier 1	4	0	1
Accessible infrastructure	Deliver new or upgraded infrastructure and services	On call shared transport	Public transport	Tier 1	2	0	1
Adaptable approach to road space management (e-scooters)	Deliver new or upgraded infrastructure and services	Networks for small, low powered, low speed transport devices	MAAS	Tier 1	4	0	1
More Freq Rail &PT Services	Deliver new or upgraded infrastructure and services	New rail services on existing lines	Public transport	Tier 1	1	0	3
Bus Priority	Maintain and optimise existing networks and services	Reduce journey times and improve reliability of bus services	Public transport	Tier 1	3	0	1

Figure 6: Example of using tool to explore overall effectiveness and cost of potential interventions based on a list of user specified deficiencies or issues (entered in the first column)

User Inputs	Intervention Catalogue	MoT Outcome(s)											
Issue/Deficiency	IC Interventions	Economic prosperity		Environment		Health		Inclusive access		Safety		Resilience	
1) User to provide list of issues/deficencies below	3) User drop down menus to explore Interventions in Group	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Consolidate growth, shorten trip lengths, co locating transport hubs with community services	Public transport fare reductions	0	0	0	2	0	2	0	4	0	1	0	0
Design and Planning - adaptable 'scenarios-based' (defend, accommodate, retreat), identify critical routes, improve operational responses to events	Design and Planning	0	0	0	0	0	0	0	0	0	0	0	0
perceived safety (incl. crime)	Safe system approach	-2	2	-1	3	0	0	0	3	0	5	0	0
prioritise low risk low cost maintenance projects	Maintaining the existing road network level of service	0	1	0	2	0	1	0	3	0	3	0	2
Implement high quality improvements that bring about mode change	Conversion of road capacity to shared and active modes	-1	2	-1	3	-1	4	0	3	0	3	0	0
perceived safety (incl. crime)	Safe system approach	-2	2	-1	3	0	0	0	3	0	5	0	0
rapid transport network	Spatially integrated land use and transport networks	0	3	0	2	0	3	0	4	0	3	0	0
Improved services	Fixed line mass public transport	-1	3	0	2	0	0	0	2	0	3	0	0
Road pricing	Time and distance based charges	0	3	0	4	0	3	-3	3	0	3	0	0
PT Fares	Public transport fare reductions	0	0	0	2	0	2	0	4	0	1	0	0
Road safety plans, safe speed limits, reduce dangerous behavior	Safe system approach	-2	2	-1	3	0	0	0	3	0	5	0	0
Encourage Evs (low emission zones)	Banning polluting vehicles from a defined area	-2	0	0	1	0	4	-2	0	0	1	0	0
Encourage active modes	Networks for small, low powered, low speed transport devices	0	0	-1	1	0	0	0	2	-1	0	0	0
Encourage active modes	School based travel behaviour change	0	1	0	3	0	3	0	1	0	4	0	0
Accessible infrastructure	On call shared transport	0	0	0	1	0	1	0	3	0	1	0	0
Adaptable approach to road space management (e-scooters)	Networks for small, low powered, low speed transport devices	0	0	-1	1	0	0	0	2	-1	0	0	0
More Freq Rail &PT Services	New rail services on existing lines	0	0	0	2	0	2	0	3	0	2	0	0
Bus Priority	Reduce journey times and improve reliability of bus services	0	2	0	2	-1	2	0	3	0	2	0	0

Figure 7: Example of using tool to explore overall trade-offs between outcomes associated with potential interventions