NEW ZEALAND INFRASTRUCTURE COMMISSION
Te Waihanga

Sector State of Play: Transport

Discussion Document

Foreword

Our wellbeing depends on our infrastructure

Our way of life depends on infrastructure. Whether it's moving freight to keep the supermarket shelves stocked, warming our homes, driving to work or calling our friends, there are few parts of our lives that don't rely on the services provided by infrastructure.

Infrastructure decisions have intergenerational impacts, so it is essential that we take a strategic view of the planning, development and operation of infrastructure in Aotearoa. New Zealand Infrastructure Commission was formed to give infrastructure this strategic voice, and the significance of this task is reflected in our Māori name, Te Waihanga, which means cornerstone.

Our first task is to develop a 30-year strategy for infrastructure - this paper is a part of this work. It takes a closer look at the current state of play in New Zealand's transport sector. By understanding where we are now we can set a course for where we want to go and the steps we'll need to take to get there over the next 30 years.

New Zealand faces a range of challenges and opportunities over the next 30 years which will have significant implications for infrastructure. Our changing climate, rapidly growing cities, aging population and evolving global technologies will change what we need from infrastructure to maximise the wellbeing of New Zealanders. Each of us has our own experiences of infrastructure, so we look forward to receiving your feedback to ensure this State of Play report accurately reflects the current state.

Ross Copland

Chief Executive

Table of Contents

Figures

Tables

1. Executive Summary

"A safe, well connected and accessible transport system is critical for the health and wellbeing of New Zealanders and underpins our economy."[1] A well-performing transport system provides people with access to social and cultural activities, jobs and other opportunities, and firms with access to markets and the inputs used in production.

Transport operates through a network of interconnected pieces of infrastructure, which together enable journeys of people and goods. For example, ports are gateways to international trade, but cannot function well without land transport connections to production and consumption centres. Effective integration between different system components and infrastructure providers is a key part of a successful transport system.

Transport infrastructure plays a key role in development. Investment in the railways in the 1870s allowed the country to significantly expand its agricultural potential and provided greater social connectivity. Nearly a century later, the Auckland Harbour Bridge catalysed the urban development of the North Shore.[2] Current and future investments in transport infrastructure, including Wellington's Transmission Gully, Christchurch's urban motorway projects, and Auckland's City Rail Link, will expand opportunities and shape future development patterns.

Transport is currently experiencing a period of significant change. Public sector transport agencies and investments are now expected to deliver on a broader range of objectives. This reflects the gradual movement towards a more wellbeing-based approach to investment and greater appreciation of the broader impacts of transport on economic opportunities, housing development, health, and environmental performance.

Better appreciation of the relationship between transport and land use may lead to more sustainable cities in the future, while the movement towards alternative fuels offers the opportunity to make progress towards carbon neutrality. Technology is opening up new ways of travelling (or avoiding travel) in urban areas, as shown by the recent growth in micro-mobility options and rapid uptake of electric bicycles.

The possibility of using pricing to manage demand on congested roads, which will help break the cycle of new road capacity simply leading to more peak demand and the need for further increases in road capacity, is again under serious consideration, with a recent proposal developed jointly between Auckland Council and central government now the subject of a Select Committee process.

Within this context, the State of Play summary of transport infrastructure is intended to provide an overview of the structure and performance of New Zealand's transport sector and identify emerging issues facing the sector. It will inform the development of the New Zealand Infrastructure Strategy.

[1] Waka Kotahi: New Zealand Transport Agency, *Whakarāpopoto a Aotearoa: Arataki Version 1 National Summary* (Wellington: Waka Kotahi: New Zealand Transport Agency, 2020), 2.
[2] Castalia Strategic Advisors, *Mobilising The Regions: The Role Of Transport Infrastructure In Achieving Economic Success Across All Of New Zealand* (Wellington: Local Government New Zealand, 2015), 12 -13.

2. Context

2.1. Who We Are and What We Do

The New Zealand Infrastructure Commission, Te Waihanga is working to improve New Zealanders' lives through better infrastructure. It aims to lift the level at which infrastructure is planned and delivered, taking a strategic approach so that we maximise the social return on our collective dollar and stand well prepared in the face of an uncertain future.

Our Māori name, Te Waihanga, means a cornerstone, or to make, create, develop, build, construct, generate. Te Waihanga therefore reflects the significance of long-term planning in shaping New Zealand's future.

A major part of this work is the development of a 30-year strategy for infrastructure. The strategy will look ahead to 2050, and consider how infrastructure might support environmental, social, cultural and economic wellbeing for all New Zealanders. This will be delivered to the government in September 2021 and will set out how we can make sure our investment in infrastructure delivers what we need, where we need it and at the right time.

2.2. About Our Sector State of Plays

We understand that our infrastructure works together - it is a system of systems. Our roads carry pipes and powerlines, and they connect to homes, workplaces and schools. For this reason, our strategy will focus on cross-cutting themes rather than infrastructure sectors in isolation. However, we believe that it's important we understand the infrastructure we have today, why we have what we have, and how it's already contributing to New Zealanders' wellbeing.

The sector State of Plays are structured around the components of Te Waihanga's working definition of infrastructure, set out in our discussion document, "Infrastructure Under One Roof".[3] Our definition places wellbeing outcomes at the core, while recognising commonalities, including the use of capital such as financial and environmental resources, the interconnectedness of physical structures; and the delivery of shared services, as well as the wellbeing benefits we get from those shared services. In short, Te Waihanga defines infrastructure as follows:

"A system of inter-connected physical structures that employ capital to provide shared services to enhance wellbeing."

Figure 1 illustrates the components of our working definition, showing how they are related to one another in delivering wellbeing services.

[3] New Zealand Infrastructure Commission, *Infrastructure Under One Roof: Standardising How We Think About the Shared Services Around Us* (Wellington: New Zealand Infrastructure Commission, December 2020), https://infracom.govt.nz/assets/Uploads/Te-Waihanga-Infrastructure-Under-One-Roof-2020.pdf.

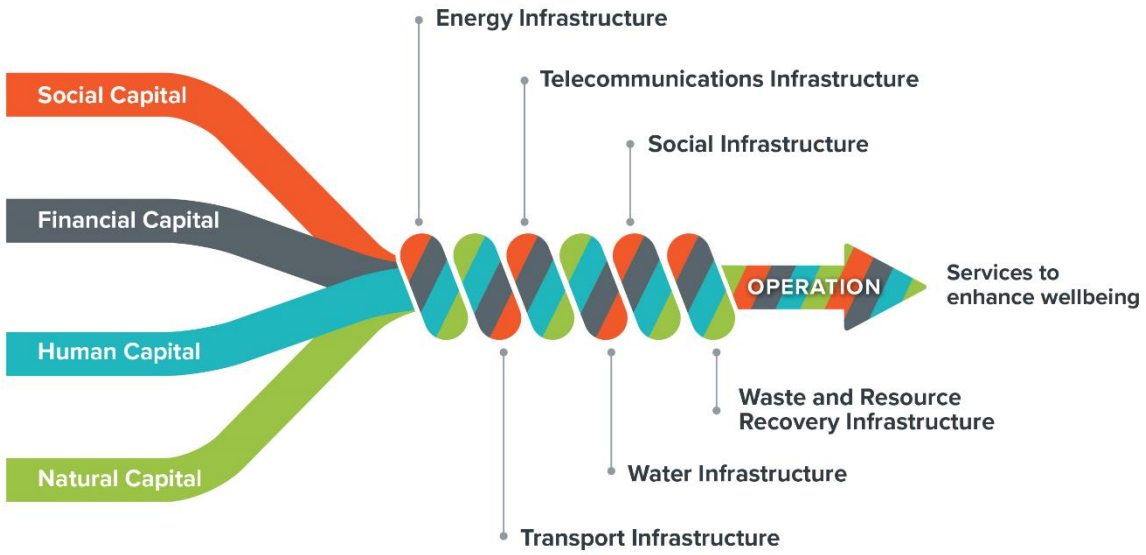


Figure 1: Te Waihanga's Definition of Infrastructure

By defining infrastructure in this way, we have then been able to develop a common framework to think about the integrated management of infrastructure. This considers the relationship between the enabling environment for our infrastructure, the sustainable use of the capitals employed in its development, the investment management process and the wellbeing benefits created by infrastructure services.

Our sector State of Plays are the result of desktop research, augmented by insights from our survey of infrastructure asset owners, and engagement with sector experts. These reports will be updated over time. We want to improve the picture as our understanding grows and different elements come in to focus.

2.3. Our Next Steps

As well as continuing to build on our picture of the State of Play, next steps include building our understanding of future trends and likely challenges, including climate change, incorporation of Mātauranga Māori, demographic change, and the role of technology. We will look at what our way of life might be 30 years from now. Based on all of this, we will begin to make recommendations as to how infrastructure might support New Zealand's future wellbeing.

We'll share our thinking on what will be included in the strategy, focusing on the cross-cutting themes that affect all sectors, the opportunities and challenges we can expect in the future, as well as our initial recommendations and options for consideration.

This will then be followed by a draft strategy that firms up our thinking on recommendations and provides greater detail as well as the evidence base behind them. From there, we'll develop the document that goes to Ministers.

2.4. Have Your Say

We'll share our work as we go and are keen to hear what you think, starting now. Tell us what you think about our State of Play reports – have we got it right or are there issues, information or problems that we've missed?

You'll also have the opportunity to comment on the draft strategy. We'll be continually refining and assessing our work based on the feedback we get from you and others.

3. Transport Infrastructure

3.1. Defining Transport Infrastructure

Transport infrastructure includes a broad range of fixed installations: roads, busways, cycle paths, walking paths, railways, stations/interchanges/bus stops, airports, ports and waterways.[4] There are also electronic systems and digital networks in place which support transport services, such as ticketing, road information systems and navigation aids.[5]

Transport infrastructure enables the movement of people and goods. These movements take place using a variety of means including, but not limited to, private vehicles (cars, trucks, motorcycles, bicycles, and other micro-mobility devices), public transport (buses, trains, ferries, commercial airplanes), and walking. This includes international movements which support trade and tourism.

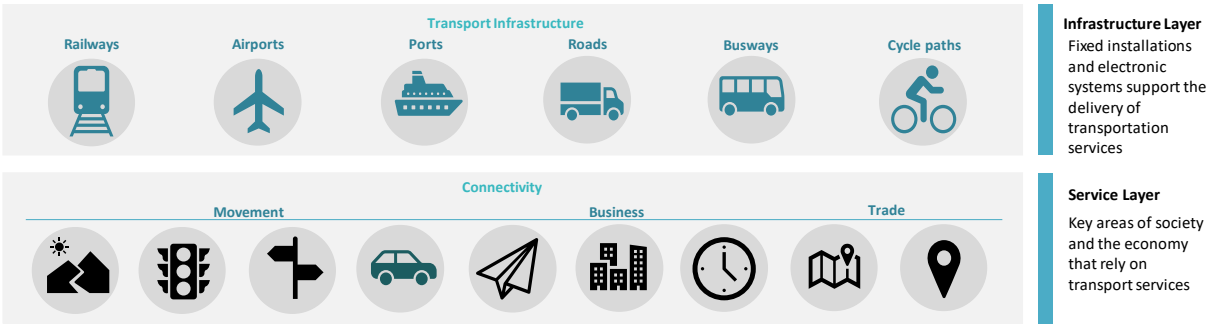


Figure 2: Transport Infrastructure and Services

3.2. The Role of Transport in New Zealand

Transport is a critical ingredient in the social and economic wellbeing of New Zealanders by enabling the movement of people and goods. From a social perspective, transport infrastructure:

- responds to society's needs by providing people with access to jobs, education, health care, resources, shops, cultural activities, and other social and leisure activities
- helps to shape society by enabling people to take advantage of these opportunities
- also contributes to social harms, such as noise, carbon emissions, local air pollution, and crashes.

From an economic perspective, transport infrastructure improves market access and productivity, and in so doing:

- enables economic activity (as an intermediate service) by allowing people to get to where they want to go and goods where they need to be
- creates economic activity by opening access to resources (including labour), connecting

[4] Pipelines for bulk liquids and gases (e.g. the fuel pipeline between Marsden Point and Wiri and First Gas's North Island high pressure gas piplines) are also sometimes classed as transport infrastructure.
[5] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Ministry of Transport, December, 2020), 5. https://www.transport.govt.nz//assets/Uploads/About-us/Corporate/BriefingIncomingMinister2020.PDF

businesses to new markets, reducing the cost of production, and increasing the efficiency of firms and workers

- supports regional development by connecting more distant communities
- is itself an economic activity, as provision of transport services comprises around 4% of GDP and employment.[6]

3.3. Transport Operates as a System

The transport system operates through a network of interconnected pieces of infrastructure, which together enable journeys of people and goods. Effective integration between transport modes, such as integration of walking and cycling access to public transport stations and integration of road and rail infrastructure for freight services, are critical parts of a successful transport system.[7] For example:

- Ports are gateways to international trade, but a well-equipped port cannot function well without efficient land transport connections to production and consumption centres.
- Inter-regional roads may promote economic links between cities and regions, but congestion in urban areas can erode these benefits.
- To be attractive to users, passenger rail requires stations which are well connected to origins and destinations of journeys.

The transport system needs to enable the movement (mobility) of people and goods as well as provide people with opportunities to access a wide range of social or economic activities.[8]

3.4. The Services Provided by Transport Infrastructure

Transport infrastructure enables two principal services: the movement of people and the movement of goods.

3.4.1. Movement of people - Household and Business Travel

New Zealanders spend on average about one hour travelling every day.[9] Most travel time is for personal business, such as shopping and medical visits (31%), followed by travel to and from work or travel on an employer's business (26%), social visits (22%), accompanying others (10%), recreation (5%), and education (5%).[10] Across the various modes, the great majority of trips made by New Zealanders (83%) are undertaken by car drivers and car passengers. Pedestrians

[6] Statistics New Zealand data shows that the "Transport, postal, and warehousing" services industry contributed 4.3% to New Zealand's GDP and 4.3% to total employment in the 2020 calendar year. Similar figures were recorded prior to the Covid-19 pandemic.
"Gross Domestic Product: December 2020 Quarter," Statistics New Zealand, accessed 11 May 2021, https://www.stats.govt.nz/information-releases/gross-domestic-product-december-2020-quarter
"Geographic Units by Industry and Statistical Area 2000-20," Statistics New Zealand, accessed 11 May 2021, http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7602

[7] Organisation for Economic Co-operation and Development, *Gaps and Governance Standards of Public Infrastructure in Chile Infrastructure Governance Review: Infrastructure Governance Review* (France: OECD Publishing, 2017), 169.

[8] Glenn Lyons and Cody Davidson, "Guidance for Transport Planning and Policymaking in the Face of an Uncertain Future," *Transportation Research Part A: Policy and Practice* 88 (June 1, 2016): 104–16. https://www.sciencedirect.com/science/article/pii/S0965856416302555#f0010

[9] "Te Karore ā-Whānau - Household Travel: How, Where and Why New Zealanders Travel," Ministry of Transport, accessed February 4, 2021, https://www.transport.govt.nz/statistics-and-insights/household-travel/key-facts/.

[10] Ibid.

account for the next largest proportion of trips, whilst public transport accounted for only around 4% of all trips.

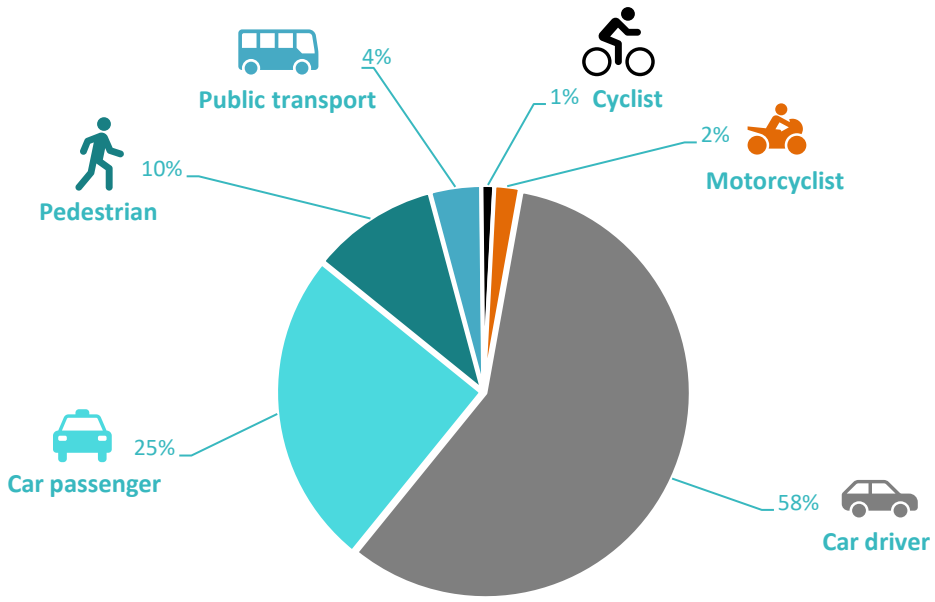


Figure 3: Use of Transport Modes for Trips (2010-2014)[11]

Looking at trends for different modes of travel, car travel (vehicle kilometres travelled or VKT) increased by 21% between 2011 and 2019, after a period of relative stagnation between 2004 and 2012.[12] For active modes, the total number of cycling trips declined sharply between the late 1980 and early 2000s and remain at less than 50% of the level seen in 1989/1990[13], whilst walking trips have also declined from a high point in 1997/1998 but recently showed signs of increasing.

[11] Ministry of Transport, *Transport Outlook Overview 2016: A Summary of New Zealand's Transport System* (Wellington: Ministry of Transport, 2017), 4.
[12] "RD086 - Vehicle Kilometres Travelled by Region (billion Km)," Ministry of Transport, Tableaupublic, accessed April 23, 2021, https://public.tableau.com/profile/mot.analytics#!/vizhome/RoadTransport_0/RD086-Vehiclekilometrestravelledbyregionbillionkm.
[13] The decline in cycling trips is partly attributable to fewer children cycling to school.

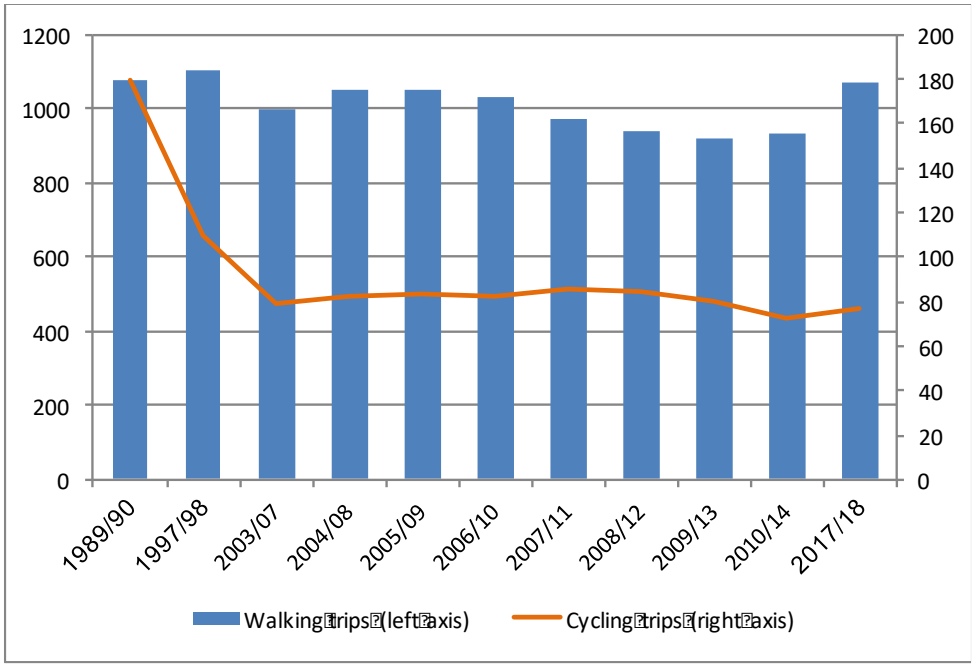


Figure 4: Walking and Cycling Trips (age over 5) (million trip legs)[14]

Even within the main urban areas, private vehicles remain the dominant mode of travel, catering for more than 80% of journeys, except in Wellington where this falls to 68% of journeys.

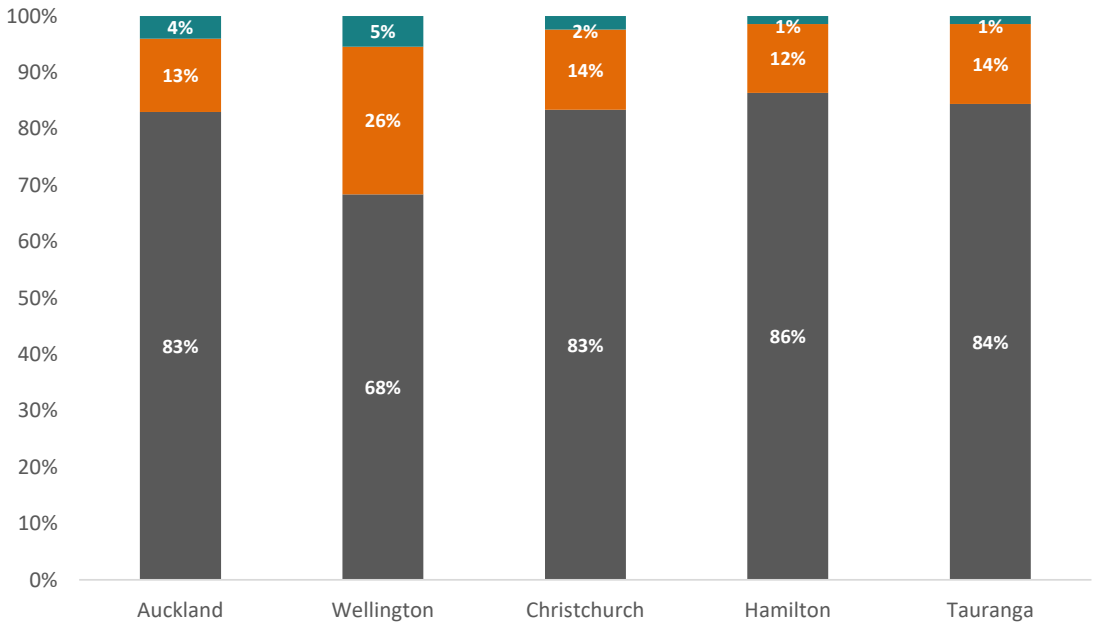


Figure 5: Urban Transport Mode Shares for Household Trip Legs (2014-2018)[15]

[14] "Data for Transport Outlook Current State: Walking and Cycling Trips," Transport Outlook Current State 2016, Ministry of Transport, accessed April 21, 2021, https://www.transport.govt.nz/assets/Uploads/Data/Graphs-for-Transport-Outlook-current-state-2.xlsx.

[15] Waka Kotahi: New Zealand Transport Agency, *Keeping Cities Moving: Increasing the Wellbeing of New Zealand's Cities by Growing* (Wellington: Waka Kotahi: New Zealand Transport Agency, 2019), 11.

Urban passenger transport (buses, trains, and ferries) and active modes are now playing a growing role in providing access to the areas of our cities where employment is most highly concentrated, particularly during peak hours. For example, in 2020 43% of trips to the Auckland city centre were made by private vehicle compared with 47% by passenger transport and 10% by active mode. In contrast, in 2001 60% of these trips were made by private vehicle with only 32% by passenger transport and 8% by active mode. Auckland Council consider that all projected growth in travel to the city centre will be catered for by public transport, walking or cycling. Nevertheless, shared and active modes continue to constitute a minority of total journeys and New Zealand remains a very car dependent country.[16] The continuing growth of private vehicle trips in urban areas is leading to steadily worsening congestion as road capacity cannot keep pace with demand.[17]

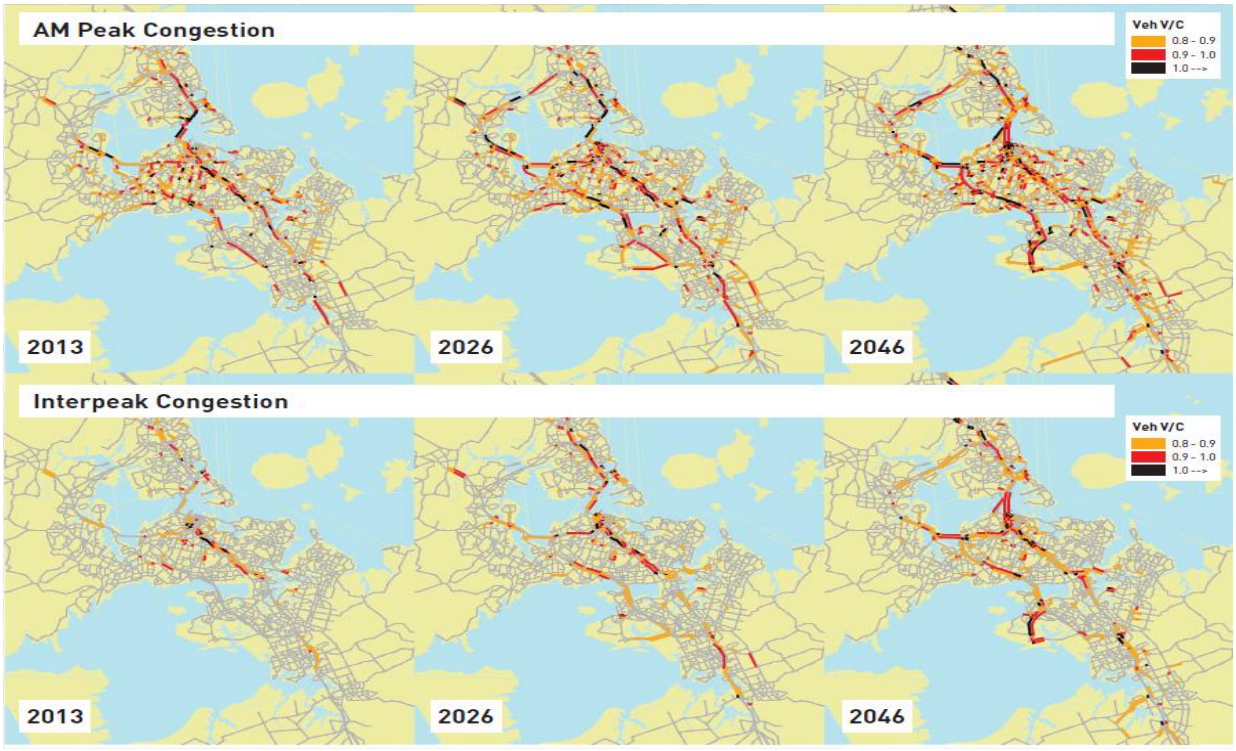


Figure 6: Congestion in Auckland[18]

Looking at trends in the movement of people by air, international air travel for New Zealand residents and overseas visitors increased up to around 2007, then remained steady until 2009 for New Zealand residents and 2012 for overseas visitors, when growth began again following the global financial crisis (GFC), with this growth being particularly strong for international visitors.

[16] Ibid.
[17] Auckland Transport Alignment Project, *The Congestion Question: Main Findings* (Wellington: Ministry of Transport, 2020), 3.
[18] Stephen Selwood, "From Taxes to Tolls," (presentation to the Road Infrastructure Management Forum, 2021), slide 11.

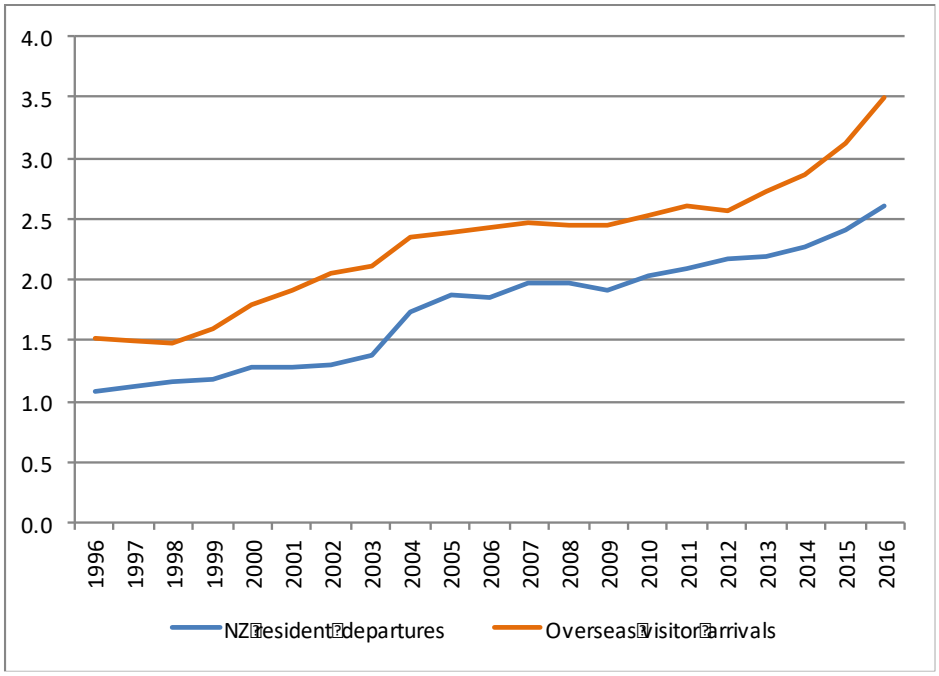


Figure 7: International Air Passenger Movements (Millions) 2006-2016[19]

The growth in passenger movements (domestic and international) at New Zealand's five main airports reflects a similar pattern with two periods of consistent growth separated by a period of stagnation which coincided with the GFC.

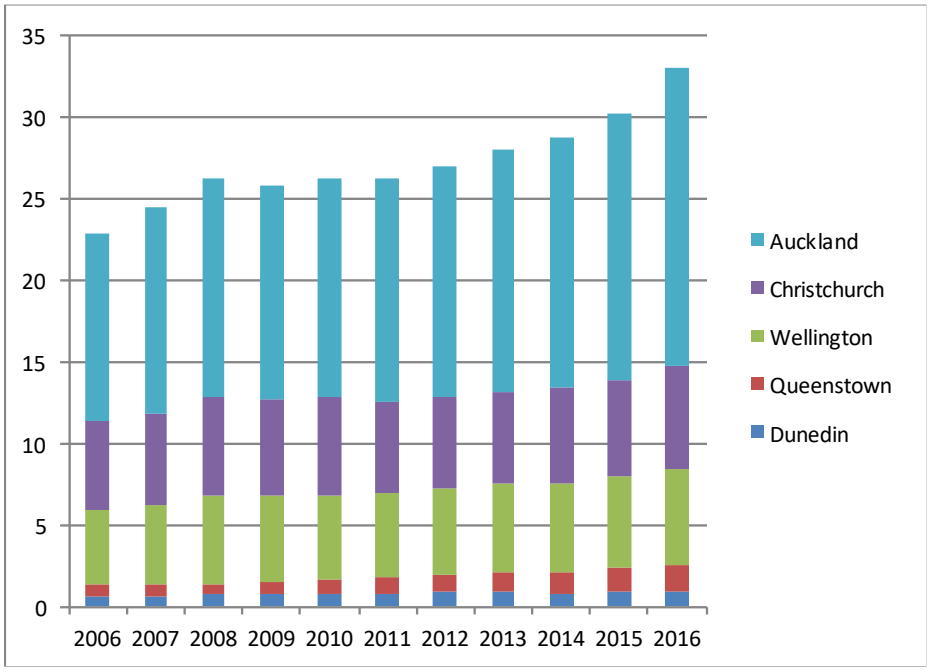


Figure 8: International and Domestic Air Passenger Movements by Airport (Millions) 2006-2016[20]

[19] "Data for Transport Outlook Current State: Air Arrivals Departures," Transport Outlook Current State 2016, Ministry of Transport, accessed April 12, 2021, https://www.transport.govt.nz/assets/Uploads/Data/Graphs-for-Transport-Outlook-current-state-2.xlsx.
[20] "Data for Transport Outlook Current State: Main Airports," Transport Outlook Current State 2016, Ministry of Transport, accessed April 12, 2021, https://www.transport.govt.nz/assets/Uploads/Data/Graphs-for-Transport-Outlook-current-state-2.xlsx.

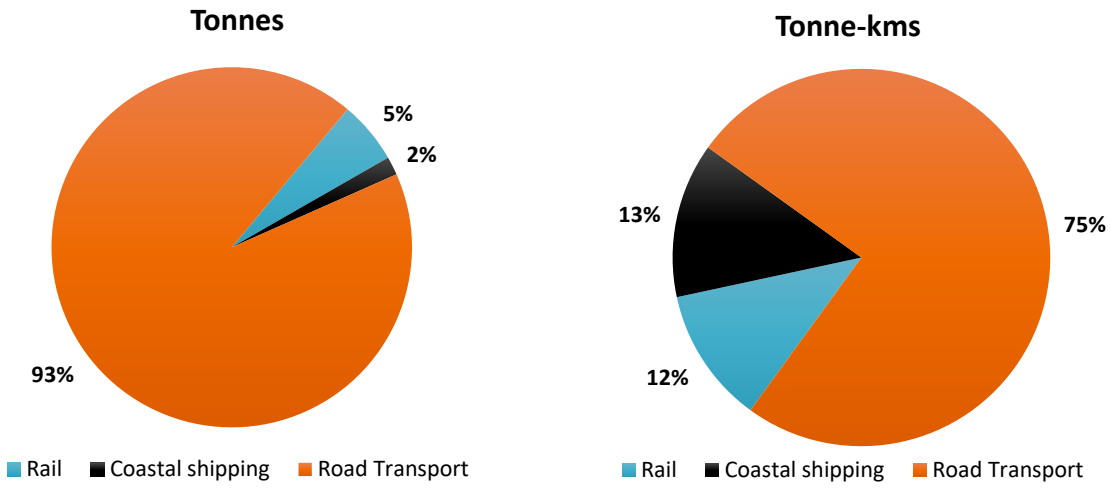
Auckland Airport has experienced the most growth, with total passenger movements increasing by 59% from 11.5 million in 2006 to 18.3 million in 2016. Queenstown has experienced the highest rate of growth, but with significantly lower volumes than Auckland, increasing from 0.6 million to 1.7 million passenger movements. This growth has been severely impacted by the effects of the Covid-19 pandemic.

3.4.2. Movement of Freight (Goods)

A key economic function of transport infrastructure is to move goods and freight, both within New Zealand and to and from international markets.[21]

The New Zealand Freight Task

Road is the dominant mode of freight transport within New Zealand. It accounts for 93% of the total tonnes of freight moved. Its share of total freight tonne-kilometres (quantity of freight multiplied by distance carried) is lower at 75%, reflecting the greater average distance for goods transported by rail or coastal shipping.[22] There are about 4,500 private operators in the road freight industry and about 23,000 licensed freight vehicles.[23]



	Tonnes		Tonne-kms	
Mode	Million Tonnes	Per cent of total	Billion tonne-kms	Per cent of total
Rail	15.6	0.056	3.5	0.115
Coastal shipping	4.6	0.016	4	0.134
Road Transport	258.5	0.928	22.6	0.751
Total	278.7	1	30.1	1

Figure 9: Freight Task 2017/18[24]

Breaking the freight task down by commodity, in tonnage terms one third of freight is made

[21] Ministry of Transport, Richard Paling Consulting, and Murray King & Francis Small Consultancy, *National Freight Demand Study 2017/18* (Wellington: Ministry of Transport, 2019), i.
[22] Ibid, ii.
[23] Ministry of Transport, *Transport Outlook: Current State 2016* (Wellington: Ministry of Transport, 2017), 7.
[24] Ministry of Transport, Richard Paling Consulting, and Murray King & Francis Small Consultancy, *National Freight Demand Study 2017/18* (Wellington: Ministry of Transport, 2019), ii.

up of manufactured, retail, and other goods, whilst aggregates and logs account for 35% and agricultural produce 12%.[25]

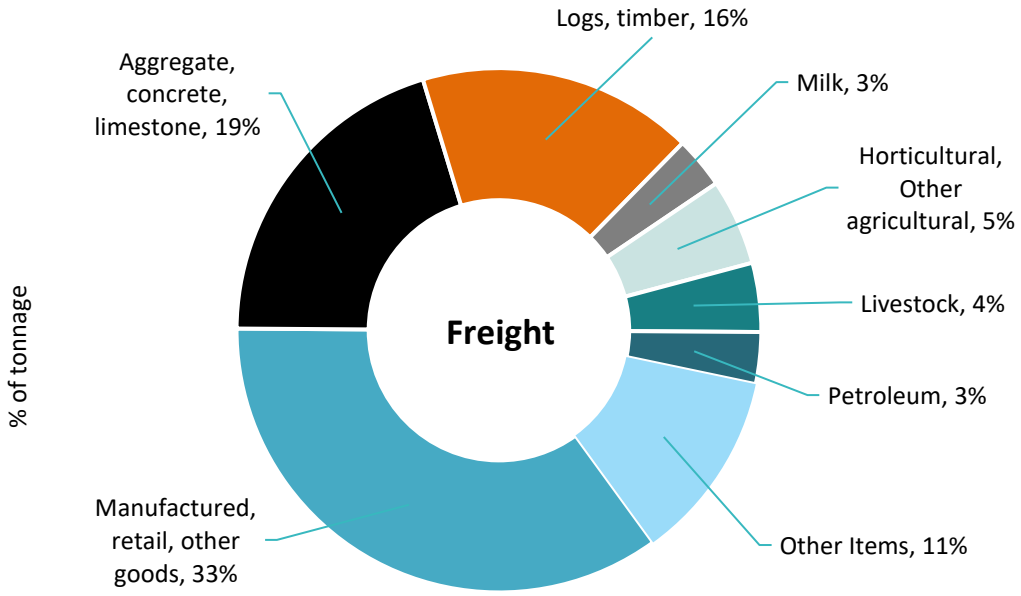


Figure 10: Freight Task by Commodity 2017/18[26]

Domestic freight movements are very localised, with 77% of freight tonnage being moved within the region where it is sourced.[27] Only 2.2% of freight tonnage is moved between the North and South Islands, and this movement is mostly southwards.[28]

Road and rail offer different advantages for freight customers. Road transport generally provides a faster solution as it operates a single handling service from door to door. It is generally more cost effective where distances are short, cargo volumes lower and where geographic constraints prohibit cost effective rail infrastructure. Rail freight is usually the more cost-effective option over long distances, as per-kilometre operating costs are lower. The movement of one tonne of freight by diesel-powered rail produces less than a third of the emissions produced on the same journey by road.

As a trading nation, dependent on both exports and imports, ports and airports play a critical economic role. In 2019, $64.8 billion of merchandise exports left New Zealand via sea or air, with sea exports accounting for $54 billion, or 83% of the total value. The Port of Tauranga was

[25] Ministry for Transport, *Transport Outlook Overview 2016: A Summary of New Zealand's Transport System* (Wellington: Ministry of Transport, 2017), 15.
[26] Ministry of Transport, Richard Paling Consulting, and Murray King & Francis Small Consultancy, *National Freight Demand Study 2017/18* (Wellington: Ministry of Transport, 2019), iv.
[27] Ibid, v.
[28] Ibid.

responsible for handling the highest value of exports at $25.9 billion, ahead of Auckland Airport in second place which handled $7.6 billion of exports.

In the same year, our ports and airports handled imports worth a total of $66.2 billion, with $50.1 billion or 76% by value arriving by sea and the remainder by air freight. Ports of Auckland was responsible for the highest value of imports at $24.3 billion, followed by Auckland Airport ($14.5 billion) and the Port of Tauranga ($11 billion).

Air freight is predominantly used for lightweight but high value products. It accounted for only 0.3% of New Zealand's exports and 0.4% of imports by volume in 2019 but 17% and 24%, respectively, by value.

Table 1: Exports and Imports by Value and Mode (2019)[29]

	Mode	Value	%age	Volume (tonnes)	%age
Exports	Sea	$54,059,350,521	83%	43,817,178	99.7%
	Air	$10,785,605,690	17%	114,824	0.3%
	Total	$64,844,956,211		43,932,002	
Imports	Sea	$50,098,925,031	76%	25,016,082	99.6%
	Air	$16,092,945,240	24%	110,262	0.4%
	Total	$66,191,870,271		25,126,344	
Combined	Sea	$104,158,275,552	79%	68,833,260	99.7%
	Air	$26,878,550,930	21%	225,086	0.3%
	Total	$131,036,826,482		69,058,346	

The Port of Tauranga was responsible for the highest volume of exports at 15.6 million tonnes, followed by Napier (3.9 million tonnes), New Plymouth (3.9 million tonnes) and Lyttelton (3.4 million tonnes). The Port of Tauranga was also responsible for the highest volume of imports (6 million tonnes), followed by Northport (5.9 million tonnes) and the Ports of Auckland (5.4 million tonnes).

[29] "Imports and Exports: New Zealand Port by Country of Origin, Commodity (HS2) and Period," Statistics New Zealand, accessed April 12, 2021, http://nzdotstat.stats.govt.nz/WBOS/Index.aspx?DataSetCode=TABLECODE7302.

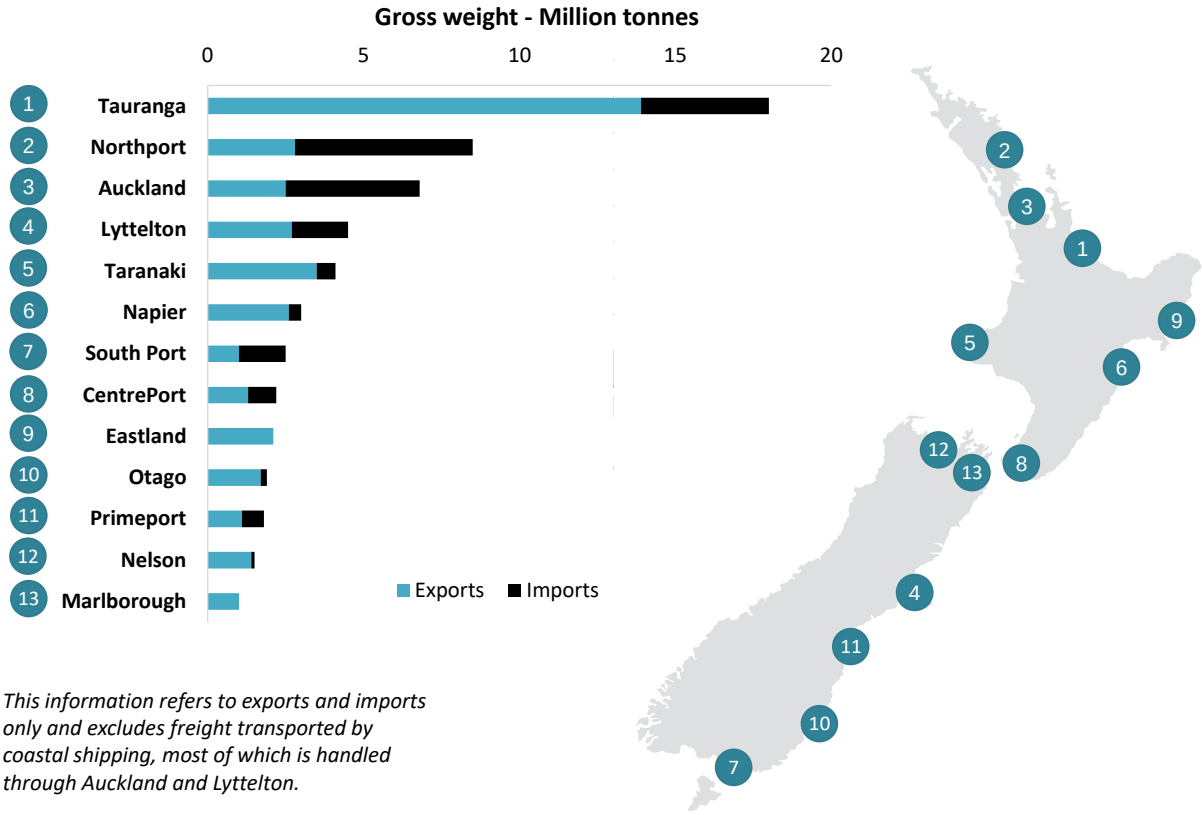


Figure 11: Exports and Imports by Port[30]

[30] Ministry of Transport, *Transport Outlook: Current State 2016* (Wellington: Ministry of Transport, 2017), 38.

4. Physical Assets (Capital Stock)

The long lifespan of transport infrastructure has seen these assets accumulate over decades and even centuries. Although transport assets form a single transport system, they are generally considered from a mode specific perspective when auditing the current state, with roading related assets the most prevalent. Although much attention is often given to investment in new assets, maintaining existing assets also represents a significant financial responsibility.

4.1. Roading Assets

New Zealand currently has around 10,855 km of State Highways and 84,150 km of local roads. The broad composition and geographical spread of these assets are shown in the table below.

Table 2: Composition and Spread of Roading Assets[31]

State Highways	10,855 km road length	55% North Island	99.7% Sealed
		45% South Island	0.3% Unsealed
	23,455 lane kms	57% North Island	99.7% Sealed
		43% South Island	0.3% Unsealed
Local Roads	84,150 km road length	57% North Island	63% Unsealed
		43% South Island	37% Unsealed
	155,700 km lane kms	58% North Island	67% Sealed
		42% South Island	33% Unsealed

4.2. Busways, Bus Lanes, Cycleways and Shared Paths

In urban areas, bus and active mode infrastructure often share the roading network. Separated busways include Auckland's Northern Busway between Akoranga and Constellation Drive (currently being extended north to Albany) and the under construction Eastern Busway in Auckland. However, the significant majority of bus priority measures within the main urban areas are bus lanes, accommodated within the road carriageway. There are now around 110km of separated cycleways,[32] 550km of on-road cycleways and 1,311km of shared pathways nationally, which reflects the increasing level of investment in both urban and rural cycleways which has been made over the last decade.[33]

[31] Ministry of Transport, *Transport Outlook: Current State 2016* (Wellington: Ministry of Transport, 2017), 17.
[32] "Separated cycleway' includes facilities known as: 'protected cycle lanes' (Auckland Transport) and 'separated cycle lanes' (Christchurch City Council).
[33] "FYI Request #11898 Email," Waka Kotahi: Robyn Elston, FYI, accessed February 2020, https://fyi.org.nz/request/11898/response/45560/attach/html/7/OIA%206229%20response%20Rod%20Badcock.pdf.html. This only includes infrastructure subsidised by Waka Kotahi.

Figure 12: Protected Cycleway, Colombo St, Christchurch[34]

4.3. Rail Assets

The rail network measures 3,700 km from Northland to Southland, and is connected across Cook Strait by the rail ferry Aratere operated by KiwiRail. There are active spurs to Northland, Bay of Plenty, Taranaki, Hawke's Bay, and the West Coast. The rail network has 1,344 bridges and 1,500 public road level crossings, and includes overhead power supply, signals, and platforms. KiwiRail owns 247 locomotives, 4,605 wagons and the three Interislander ferries (Aratere accommodates rail wagons, providing a rail link between the North Island and South Island). Around 12% of New Zealand's total freight task (tonne-kilometres) is carried on rail with 43,000 freight train departures every year. The total value of rail to New Zealand's economy has been estimated at approximately $1.5 billion every year.[35]

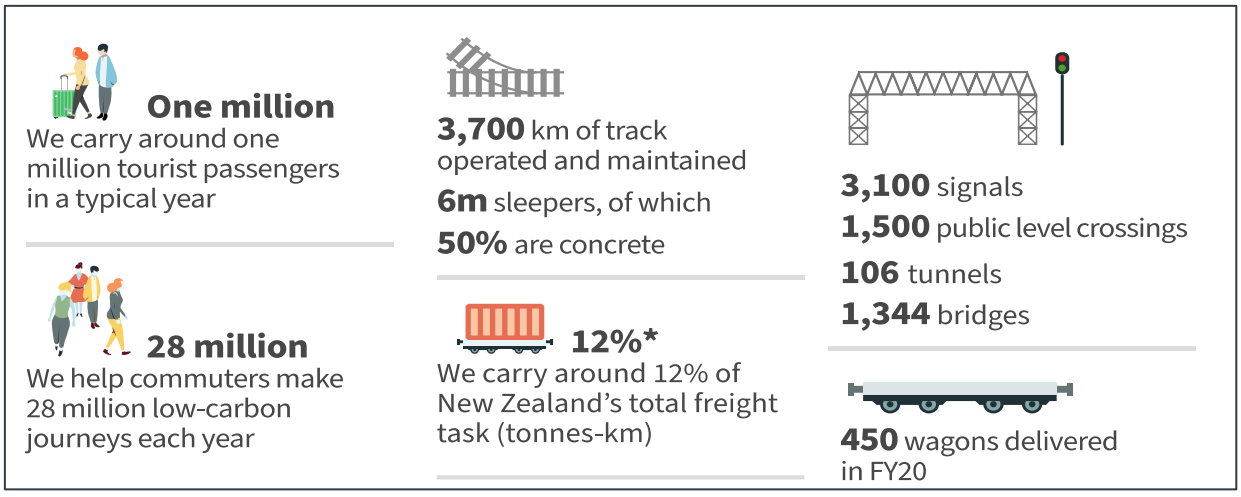


Figure 13: Selected KiwiRail Assets and Performance, 2020[36]

[34] "Separated Cycleways," Waka Kotahi: New Zealand Transport Agency, accessed April 13, 2021, https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/designing-a-cycle-facility/between-intersections/separated-cycleways.
[35] Ernst and Young, *The Value of Rail in New Zealand* (Wellington: Ernst and Young, 2016).
[36] KiwiRail, *Building on Recovery, Looking Ahead: KiwiRail Annual Integrated Report 2020* (Wellington: KiwiRail, 2020), 9. https://www.kiwirail.co.nz/assets/Uploads/documents/Annual-reports/2020/KiwiRail-2020-Integrated-Report.pdf

KiwiRail is responsible for the operation of the rail network, as well as rail freight fleet and passenger services including the Capital Connection between Wellington and Palmerston North, the recently launched Hamilton to Auckland service (Te Huia), and three KiwiRail Scenic Journeys experiences. Local government contracts for metro-passenger services in Auckland and Wellington.

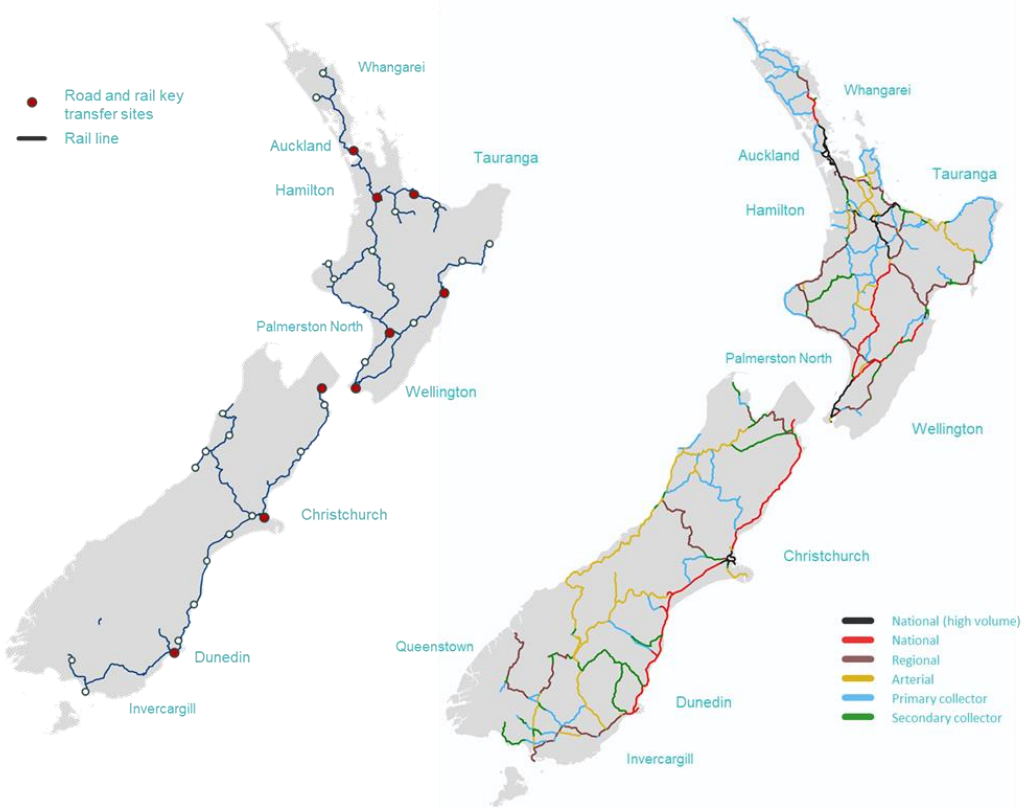


Figure 14: New Zealand's National Rail and Road Network[37]

4.4. Airports and Air Transport Infrastructure

Air transport infrastructure comprises airports, the air navigation system and functions that support the movement of people and freight. New Zealand's airports vary considerably in scale, utilisation, and ownership. Under normal (pre-Covid) circumstances scheduled domestic services operate from 35 airports, with eight civil airports designated by the Customs Service to receive overseas flights, five of which were operating scheduled international services prior to March 2020.[38]

4.5. Ports and Sea Transport

New Zealand has 13 cargo ports servicing both international and domestic movements. Like New Zealand's airports, they vary considerably in scale, utilisation, and ownership. Of these, ten are container and bulk ports whilst three handle bulk cargo only.[39] As over 99% of New Zealand's imports and exports by volume move through our sea ports, these provide a critical

[37] Waka Kotahi: New Zealand Transport Agency, *Whakarāpopoto a Aotearoa: Arataki Version 1 National Summary* (Wellington: Waka Kotahi: New Zealand Transport Agency, 2020), 3.
[38] Ministry of Transport, *Transport Outlook, Current State 2016* (Wellington: Ministry of Transport, 2017), 11.
[39] Ibid, 37.

connection to and from world markets.[40] Our ports have also been servicing a growing number of cruise ship passengers, until the Covid-19 outbreak.

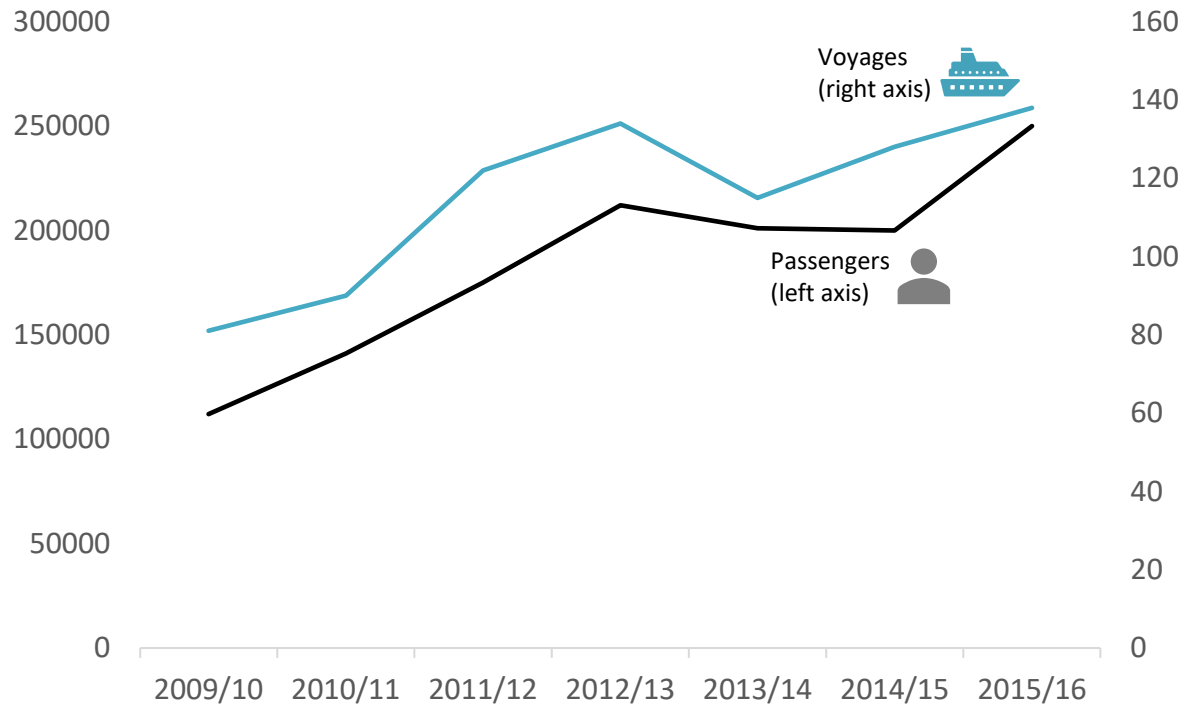


Figure 15: Passenger Utilisation of New Zealand's Ports[41]

Additionally, the ports at Westport, Greymouth, Whanganui, Stewart Island and the Chatham Islands handle domestic freight only, and there are fishing and recreational ports in places such as Akaroa, Milford Sound, and Whakatāne. A facility at Taharoa, south of Raglan, is owned by New Zealand Steel and used solely for the export of iron sands.

[40] Ibid.
[41] Ibid, 42.

5. Capital Inflows and Outflows

The purpose of the transport system is to improve people's wellbeing and the liveability of places. The Ministry of Transport's Transport Outcomes Framework (TOF) identifies five mechanisms through which transport contributes to wellbeing. The TOF is used by public sector transport agencies as a way of enabling a specifically mode neutral, connected approach across the system.

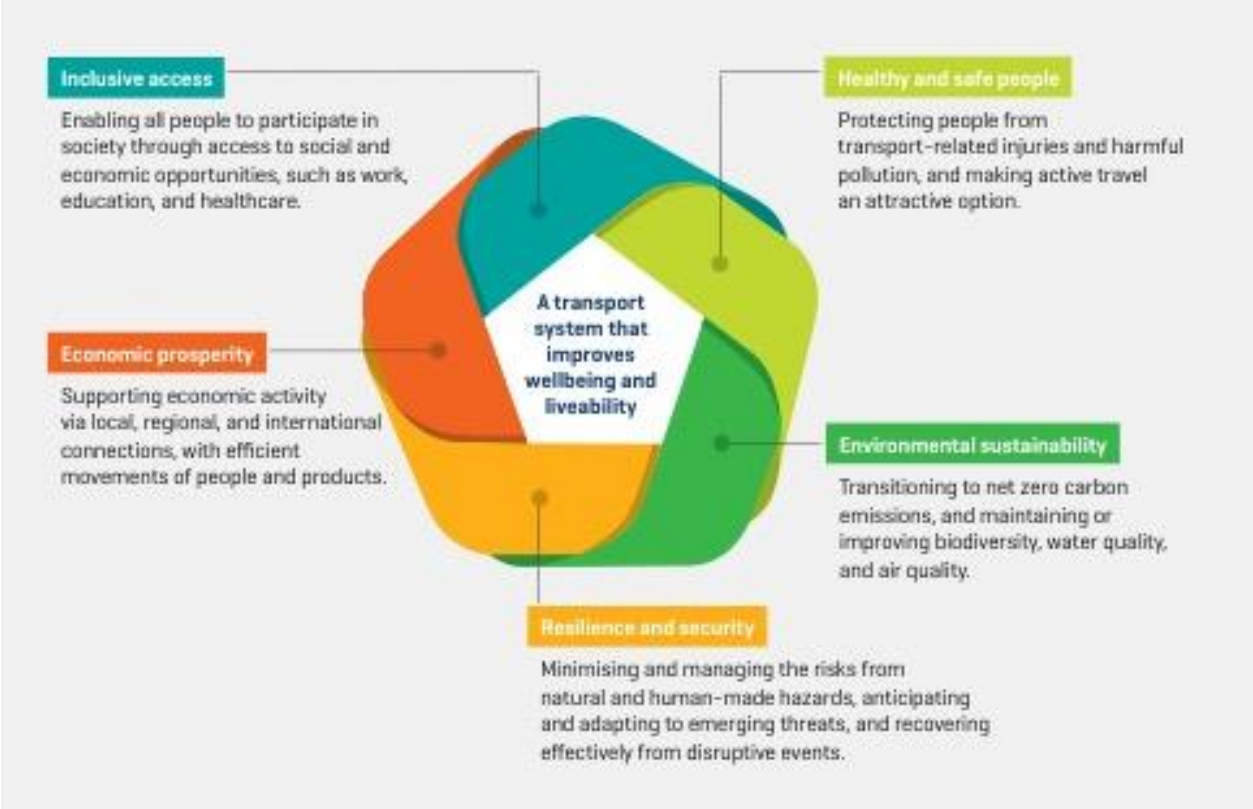


Figure 16: Transport Outcomes Framework[42]

The TOF is closely aligned with the Treasury's Living Standards Framework and through this connection, the four capitals (financial, physical, social and natural) can be used as a framework to consider the broad impacts of transport on wellbeing.[43] The section below summarises some of the main inflows and outflows of capital associated with transport infrastructure.

5.1. Financial and Physical Capital

Land transport infrastructure is highly capital intensive and requires a significant level of public funding to construct, operate, and maintain. The construction and maintenance of the physical assets which make up road, rail, passenger transport, cycling, and walking infrastructure is predominantly publicly funded. Waka Kotahi, the Crown transport agency, and councils

[42] "Our Context, Strategic Framework, Vision and Overview of the Ministry's Response to COVID-19," Ministry of Transport, accessed April 23, 2021, https://www.transport.govt.nz/about-us/what-we-do/our-corporate-publications/annual-report-2019-20/our-context/.
[43] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Wellington: Ministry of Transport, 16 December, 2020), 6.

provided a combined $5.3 billion of funding for transport infrastructure in the 2019/20 financial year.[44] A significant level of additional Crown funding for transport infrastructure is also being provided, including funding for KiwiRail to replace aged rolling stock and ferries, and to supplement existing investment in the land transport network via the $6.7 billion NZ Upgrade Programme, to be delivered by Waka Kotahi and KiwiRail over the next 10 years.

Although debt funding (and equity in public-private partnership financing, including PPPs) is used for capital projects, this is generally repaid from public sources too. For example, Auckland Council uses debt to fund capital works undertaken by Auckland Transport and repays interest from rates.

Port assets have a very high level of public ownership but operate largely as though they were private companies, via arms-length corporate entities. Financial capital inflows are a mixture of private investment (debt and some equity) and public funding. Like ports, many of the larger airports are operated by companies, with a mix of private and public ownership. These also rely on private capital inflows and retained earnings from revenue (which is partly regulated) for investment. Some airports, though, are operated as partnerships between the Crown and local government and can be the recipient of public funding.

From an outflow perspective, as noted by the Organisation for Economic Co-Operation and Development (OECD), productive investment in transport supports economic prosperity.[45] For physical capital, the contribution of transport infrastructure to economic development arises through a wide variety of channels, including enabling activities (e.g. supply chains), encouraging productive private investment and the reshaping of economic geography.[46] Economic (and financial) wellbeing is enhanced though the ability of firms to access inputs (including labour) and markets, creating and supporting higher levels of economic activity. This extends to the ability to export local output and import consumables and raw materials. In cities, transport is particularly important in providing connectivity between people and jobs, as access by firms to deep labour markets and opportunities for workers to become more specialised drives productivity growth and from this higher wages and profits. Given its central economic role, transport infrastructure is often referred to as the backbone of a modern economy.[47]

5.2. Human Capital

As an inflow, human capital contributes at all levels of transport infrastructure planning, delivery, and maintenance, with professional services and construction the most significant areas of activity. Transport activity also creates significant employment opportunities for operators of both private and public transport services.

In terms of capital outflows, transport infrastructure is a fundamental contributor to human capital formation and development by providing people with access to jobs. This is particularly

[44] "Waka Kotahi New Zealand Transport Agency Annual Report (end 30 June 2020)," Waka Kotahi: New Zealand Transport Agency, accessed October 2020, https://www.nzta.govt.nz/assets/resources/annual-report-nzta/2019-20/Waka-Kotahi-Annual-report-2020.pdf. Waka Kotahi provided $4.1 billion and Councils provided $1.2 billion.
[45] Organisation for Economic Co-operation and Development, *Gaps and Governance Standards of Public Infrastructure in Chile Infrastructure Governance Review: Infrastructure Governance Review* (France: OECD Publishing, 2017), 167.
[46] International Transport Forum, *Understanding the Value of Transport Infrastructure: Guidelines for Macro-Level Measurement of Spending and Assets* (France: Organisation for Economic Co-operation and Development, 2013), 6.
[47] Ibid, 6.

important in urban labour markets, where high value employment is concentrated in large employment centres which are dependent on extremely high levels of accessibility for people in order to reap the productivity benefits which come with increased scale and density. This is the basis of agglomeration.

Meanwhile, at the project level, there is an increasing focus on leveraging off transport infrastructure delivery to create opportunities to build human capital in sections of the community who are facing disadvantages. This is embodied within the concept of social procurement, which is now part of business as usual for Waka Kotahi and can be evidenced in many other organisations connected with transport infrastructure, such as Auckland International Airport's initiative with Fulton Hogan – 'Ara Auckland Airport' and the City Rail Link's Progressive Employment Programme.

Social Procurement - City Rail Link's Progressive Employment Programme[48]

The City Rail Link's Progressive Employment Programme is an example of social procurement in action. It provides Māori and Pasifika people aged 16-25 with on the job training over a 16-week period and ideally a full-time role on the project at the end of the programme.

The introduction to employment is progressive. Participants start at 10 hours a week and build to 28 hours a week for the last 4 weeks of the programme, which lets the young people adapt to the working environment. As well as undertaking real jobs within the project, the young people also learn about employment contracts, KiwiSaver and budgeting. The intention is to be work ready at the end of the 16 weeks.

Berenize Peita, City Rail Link's Social Outcomes Manager, has been involved in the Programme from its inception. "I have had the pleasure of seeing two lots of Progressive Employment Programme interns graduate and the third Progressive Employment Programme has just started. The growth and transformation of these young people is amazing." Of the 12 young people who have completed the programme so far, 10 are now in stable employment, 6 with the City Rail Link and there are 5 more young people currently engaged in the programme.

There is both an opportunity and responsibility for project delivery to become more than just delivering the project itself, but to lead and leave a legacy of change and improvement – to improve wellbeing on many levels.

5.3. Social Capital

Transport is vital in supporting and enhancing social capital by enabling people to participate in society, for example through providing access to social and economic opportunities, cultural activities, education, and healthcare. However, transport can also reduce social capital due to transport-related injuries and harmful pollution. Construction and operation of new transport infrastructure can also negatively impact sites of cultural significance.

Therefore, the objective of increasing social capital must underpin the regulation, funding, planning, delivery, and operation of transport infrastructure in New Zealand. Examples of this approach in practice include the Road to Zero programme and zero harm during construction.

[48] Berenize Peita, Social Outcomes Manager, City Rail Link Ltd, Email to John Williamson, March 2021.

5.4. Natural Capital

Natural capital refers to all aspects of the natural environment needed to support life and human activity. Natural capital inflows into transport infrastructure are predominantly comprised of the raw materials needed for the construction and maintenance of fixed infrastructure and buildings. This includes aggregates, steel, oil-based materials (e.g. bitumen) and concrete. The stock of natural capital is further eroded through the process by which the inputs are made (for example, the embedded carbon contained within concrete). Natural capital is further depleted by the transformation of land to accommodate transport infrastructure and ultimately through use of transport infrastructure, with vehicle emissions reducing air and water quality and contributing to climate change.

On the positive side, transport infrastructure can be used to enhance natural capital, for example through the inclusion of features such as better stormwater treatment. In net terms, however, the provision and use of transport infrastructure currently depletes natural capital.

5.5. The Overall Impact of Transport on Wellbeing

Although there are significant inflows and outflows of capital, transport infrastructure is likely to make a significant net positive contribution to the wellbeing of society in the aggregate. This is primarily due to its role in enabling the movement of people and goods for social and economic gains.

The primary negative impact of transport is that it diminishes environmental capital through consumption of raw material, impacts on air and water quality, and impacts on carbon emissions. There are significant opportunities to reduce negative environmental impacts through changes in infrastructure design and construction processes, increased availability and use of low-emission passenger transport and freight modes, and electrification of the vehicle fleet to reduce emissions. Reducing the environmental impacts of transport would further improve transport infrastructure's contribution to our overall wellbeing.

6. What Shapes the Sector Today?

The transport system is made up of a network of interconnected pieces of mode specific infrastructure. Together these parts enable connected journeys of people and goods. Ensuring that different transport modes are complementary and well-integrated is the key to a truly effective and efficient transport system.[49] The governance, ownership, funding, and regulation of transport will play a key role in determining the extent to which this outcome can be achieved in practice.

6.1. Governance

Central and local government are heavily involved in the governance of the transport system. The Ministry of Transport is responsible for overall policy direction and advising ministers on the performance of the transport system.

As described in the previous section, the Ministry of Transport's Transport Outcomes Framework outlines how the transport system contributes to wellbeing. To assist in implementing this framework, the Ministry is leading the movement towards a system-wide short-, medium-, and long-term planning framework through the General Investment Approach (GIA), which will integrate investment with other levers on the system.

The GIA sets out the choices that are available to governments over different time horizons. The approach considers the broader value of initiatives and investments over time, such as bigger changes in investment levels and particular investments in rapid transit, major transport corridors, and across air, land and maritime.[50]

In addition to its advisory role, the Ministry of Transport monitors the performance of the four transport Crown entities:

- Waka Kotahi – the New Zealand Transport Agency
- the Civil Aviation Authority
- Maritime New Zealand (a Crown Agent which gives effect to government policy when directed by ministers)
- the Transport Accident Investigation Commission (which is a Crown entity that operates independently from government policy).

There are three further transport related State-Owned Enterprises that work at arm's length to shareholding Ministers according to a commercial mandate; however, the activities of these organisations still fulfil important public policy goals:

- KiwiRail
- Airways
- MetService.

[49] Organisation for Economic Co-operation and Development, *Gaps and Governance Standards of Public Infrastructure in Chile Infrastructure Governance Review: Infrastructure Governance Review* (France: Organisation for Economic Co-operation and Development Publishing, 2017), 169.
[50] Ministry of Transport, *Briefing to the Incoming Minister – Your Guide to Opportunities and Challenges in the Transport System 2020* (Wellington: Ministry of Transport, 2020), 20.

Each of these agencies operates with varying levels of statutory independence and differing policy directions.[51] For example, Waka Kotahi and KiwiRail are both responsible for core elements of the national land transport network. However, Waka Kotahi is a Crown Agent mainly governed by the Land Transport Management Act 2003 (LTMA) whilst KiwiRail is a State-Owned Enterprise (SOE) responsible for the national rail network and operating within the policy and regulatory frameworks of the State-Owned Enterprises Act 1986.

Changes proposed through the Future of Rail Review, draft New Zealand Rail Plan, and the Land Transport (Rail) Legislation Act 2020 represent the beginning of a broader programme to integrate rail into an inter-modal transport system.[52] This includes enabling KiwiRail's network costs to be funded through the National Land Transport Fund (NLTF), moving the funding of rail to the same basis as other land transport modes.[53] The new draft New Zealand Rail Plan also sets out investment expectations for rail infrastructure. This is intended to support a longer-term planning and funding framework for the rail network that is closer to the rest of the land transport system. Under the new approach to rail planning and funding, the Minister of Transport is required to approve the Rail Network Investment Programme (RNIP) in consultation with KiwiRail's shareholders, and Waka Kotahi must advise on how it fits within the overall National Land Transport Programme (NLTP).

Councils are responsible for funding, planning, regulating, and delivering transport infrastructure at the local level.[54] They contribute to Regional Land Transport Plans, which are approved by regional councils and which Waka Kotahi considers when preparing the NLTP. City and district councils are Road Controlling Authorities whilst regional councils are responsible for public transport operations and some infrastructure.[55] In addition, City Rail Link Limited, jointly owned by the Crown and Auckland Council, is a company set up under Schedule 4A of the Public Finance Act 1989 to deliver Auckland's City Rail Link.

Many other aspects of the wider transport system are outside of government's direct control. For example, in the freight, aviation and maritime sectors, most operational decisions around planning and delivery of freight and passenger transport services are made by the private sector.[56]

Consistent with Government responsibilities under Te Tiriti o Waitangi, a meaningful partnership with Māori is key to improving transport and broader social outcomes for Māori, and to ensure the transport system serves all New Zealanders equitably.[57] These partnerships can provide greater opportunity for involvement in decision making, such as the City Rail Link's Mana Whenua Forum.

[51] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Wellington: Ministry of Transport, 16 December, 2020), 36.
[52] KiwiRail, *Statement of Corporate Intent 2021 -2023: Playing Our Part in New Zealand's Recovery* (Wellington: KiwiRail, 2020), 13.
[53] Ibid, 13.
[54] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Wellington: Ministry of Transport, 16 December, 2020), 5.
[55] Unitary councils, like Auckland Council and Marlborough District Council, combine the functions of city/district councils and regional councils.
[56] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System* 2020 (Wellington: Ministry of Transport, 16 December, 2020), 37.
[57] Ibid, 40.

The City Rail Link Mana Whenua Forum[58]

This forum was established in 2013 and formalised through the project's consent conditions. Its members include Te Ākitai Waiohua, Te Kawerau a Maki, Ngāti Maru, Ngāti Paoa, Ngāi Tai ki Tamaki, Ngāti Tamaoho, Ngāti Whātua o Orākei and Ngāti Te Ata.

The Mana Whenua Forum plays an important partnership role with City Rail Link Limited, providing input into design of the stations and preparation of the many environmental management plans. The forum works collaboratively around built heritage and archaeological matters and undertakes kaitiakitanga (guardianship) responsibilities. Mana Whenua have brought their cultural history, values, and practices to the City Rail Link's table and cultural elements are treated as a major part of the design resulting in the incorporation of many cultural references expressed in the architectural narratives of all its stations.

Mana Whenua are seeking to be involved more in the decision-making regarding planning and governance and City Rail Link are actively seeking to make this happen, with Mana Whenua now being recognised as Project Partners. Mana Whenua expect other projects to match the level of engagement they are receiving from City Rail Link.

6.2. Ownership

New Zealand's transport infrastructure is predominantly publicly owned by the Crown and councils. State Highways are owned by the Crown and managed by Waka Kotahi, whilst city and district councils own and manage local roads (as Road Controlling Authorities). KiwiRail owns the rail network infrastructure and New Zealand Railways Corporation owns 18,000 hectares of land that it provides to KiwiRail on long-term lease. KiwiRail owns most of the rail freight fleet and councils own the metro train fleets.

Although the legislative reforms undertaken in the 1980s made private ownership of ports possible, most remain in some form of council ownership reflecting historical arrangements. Port of Tauranga, which is publicly listed and 46% privately owned, is an exception, as shown in the figure below.

The same is true for airports, which are mostly in council or Crown/council ownership. Regional airports are often seen as providing both private and public benefits, including acting as a critical lifeline for access to public services not available in smaller regions (e.g. specialist health care). For instance, Auckland International Airport Ltd is a majority privately owned and listed company with Auckland Council holding around 22% of shares, while Wellington International Airport Ltd is 66% owned by Infratil, an investment company, and 34% by Wellington City Council. Meanwhile, Airways Corporation, which provides air traffic control services to all airports, is a state-owned enterprise, owned 100% by the Crown and charged with acting as a successful business, including delivering a return to shareholders.

[58] "Mana Whenua Partnership — City Rail Link," City Rail Link, accessed April 15, 2021, https://www.cityraillink.co.nz/mana-whenua.

Port	Location	Ownership
Northport	Marsden Point (near Whangarei)	50% Port of Tauranga. Other shareholders include Northland Regional Council and Ports of Auckland
Ports of Auckland	Auckland	100% Auckland Council
Port of Tauranga	Tauranga	Publicly listed. Bay of Plenty Regional Council majority owner
Eastland Port	Gisborne	100% Eastland Community Trust (of which Gisborne District Council is the main beneficiary)
Port of Napier	Napier	100% Hawke's Bay Regional Council
Port Taranaki	New Plymouth	100% Taranaki Regional Council
CentrePort	Wellington	76.9% Greater Wellington Regional Council, 23.1% Manawatu-Wanganui Regional Council
Port Marlborough	Picton	100% Marlborough District Council
Port Nelson	Nelson	50% Nelson City Council, 50% Tasman District Council
Lyttelton	Lyttelton	100% Christchurch City Council
PrimePort	Timaru	50% Timaru District Council, 50% Port of Tauranga
Port Otago	Port Chalmers	100% Otago Regional Council
South Port	Bluff	66.5% Southland Regional Council + other private owners

Figure 17: Port Ownership in New Zealand

6.3. Funding

6.3.1. Land Transport

Land transport infrastructure in New Zealand is funded by users, taxpayers, and ratepayers through a mixture of general taxation, fuel excise duty, road user charges, fees, levies and property rates. Recent changes mean that in future, rail network users will also contribute to the NLTF.

Funding Priorities

The Government Policy Statement on Land Transport (GPS) identifies the Government's broad funding priorities and how investment from the National Land Transport Fund (NLTF) will contribute to achieving overall government outcomes.[59] The GPS, which is grounded in the

[59] Ministry of Transport, *Government Policy Statement on Land Transport* (Wellington: Ministry of Transport, 2020), 9.

Ministry of Transport's Transport Outcomes Framework, identifies the following broad funding priorities for funds from the NLTF: safety, travel options, improving freight connections and climate change.[60]

Over $4 billion of New Zealanders' money is spent through the NLTF each year, supplemented by co-investment from local government and significant additional Crown funding and financing.[61] The NLTP then identifies and prioritises the specific activities to be funded from the NLTF.

Waka Kotahi is the funding approval agency for all projects within the NLTF, including both local road and passenger transport initiatives that are co-funded by local government and State Highway projects that are wholly funded by the NLTF. Because it operates the State Highway network, Waka Kotahi is also the delivery agency for State Highway projects. This structure is a consequence of the merger of Transfund (the former funding approval agency) and Transit (the former State Highway operator) in the late 2000s. Waka Kotahi reports to a board and hence makes funding and operational decisions at arms-length from the Minister of Transport.[62]

Funding Channels

Funding for transport infrastructure is provided through a range of channels. Although land transport infrastructure has never been fully funded from user revenues, there is a trend away from funding transport infrastructure out of current user revenues.

The NLTF has historically been the largest single source of funds, with additional Crown contributions and council spending making up the balance. The NLTF is funded from charges levied on road users, primarily including fuel excise duty, road user charges, vehicle and driver registration and licensing fees, and revenues from road tolling.[63] Crown contributions are funded out of general taxation. Council spending on transport infrastructure and services is primarily funded out of general rates, with some revenues from development contributions and targeted rates.

The balance between the major funding sources is changing. In recent years, direct Crown funding has increased significantly, and the amount of funding provided through the NLTF is projected to fall slightly over the next decade in real terms. At present, only around half of Vote Transport (the transport appropriation approved by Parliament) is funded via the NLTF. This position reflects a significant increase in transport investment requirements in recent years, and the fact that the NLTF does not have sufficient capacity to support a step change in transport investment while continuing to operate, maintain, and renew the existing network.

[60] Ibid, 9.
[61] Ibid.
[62] Ministry of Transport, *Briefing to the Incoming Minister – Your Guide to the Transport System 2020* (Ministry of Transport, 16 December, 2020), 18.
[63] "Funding sources", Waka Kotahi: New Zealand Transport Agency, accessed May 10, 2021, https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/201821-nltp/planning-and-investment-principles-and-policies/investment-and-funding-assistance-policy/funding-sources/.

Table 3: National Land Transport Programme Funding Ranges 2021/22 to 2026/27[64]

	2021/22 $million	2022/23 $million	2023/24 $million	2024/25 $million	2025/26 $million	2026/27 $million
Expenditure target	4,500	4,550	4,650	4,700	4,800	4,850
Maximum expenditure	4,700	4,750	4,850	4,900	5,000	5,050
Minimum expenditure	4,300	4,350	4,450	4,500	4,600	4,650

The diagram below illustrates the funding flows in and out of the NLTF. The types of projects that are eligible for NLTF funding have also changed, as the Land Transport (Rail) Legislation Act 2020 enables the NLTF to fund rail infrastructure through KiwiRail. KiwiRail's commercial business is funded by earnings and the Crown as shareholder.

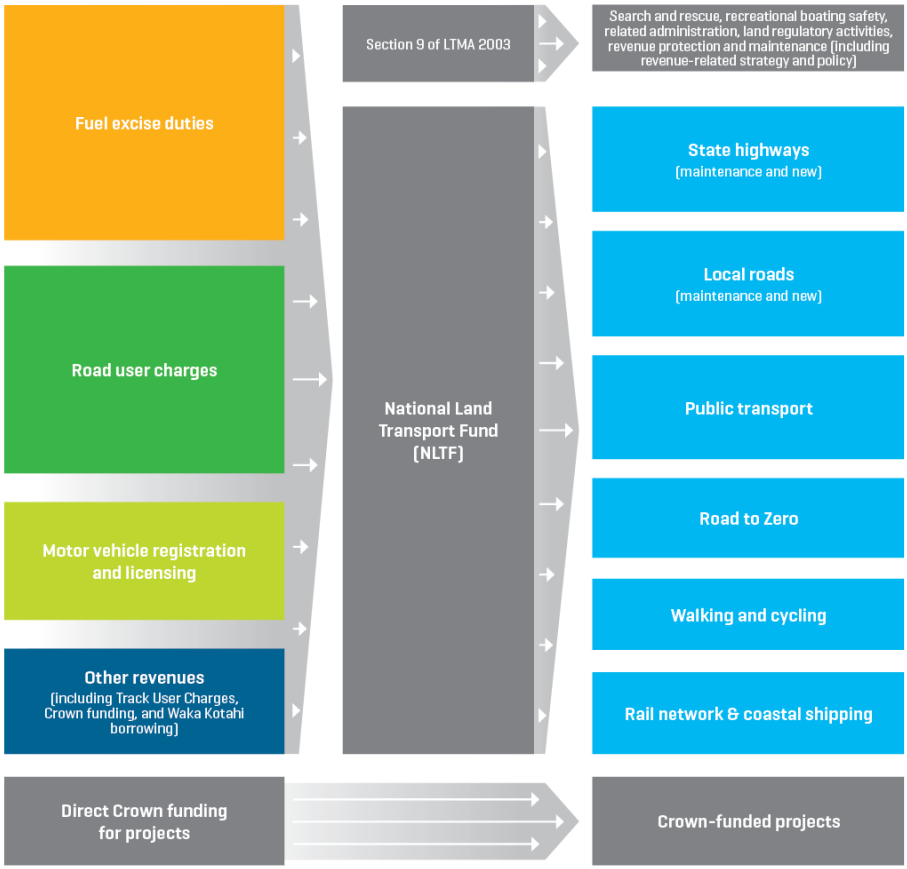


Figure 18: National Land Transport Fund Funding Flows[65]

[64] Ministry of Transport, *Government Policy Statement on Land Transport* (Wellington: Ministry of Transport, 2020), 31.
[65] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Wellington: Ministry of Transport, 16 December, 2020), 16.

The GPS sets funding allocation bands for a range of specific activity classes, as shown in the following table. Funding bands provide a level of certainty about future investments in different types of activities. However, they may create distortions between different types of investments, for instance if one activity class offers higher-value projects than another. Activity classes may also make it difficult to adopt mode-neutral solutions to transport projects – for instance, if the rail activity class is fully allocated for a given period, it may necessitate a road investment solution to address growing freight demands.

To help ascertain whether the Government Policy Statement signals any significant changes in spending priorities by mode, the table below compares the mid-point of funding allocations within the Government Policy Statement Activity Classes for 2021/22 with the 2030/31 mid-points, noting the mid-points are not specific targets and are only used for illustrative purposes.

Table 4: Allocation of Funding by Activity Class 2021-2031[66]

	Mid Point $m		Mid Point % of Total	
GPS Activity Class	**2021/22**	**2031/31**	**% 21/22**	**% 30/31**
Road to Zero	$865	$1,110	17%	21%
Public Transport Services	$495	$725	10%	14%
Public Transport Infrastructure	$560	$580	11%	11%
Walking and Cycling Improvements	$138	$100	3%	2%
Local Road Improvements	$200	$95	4%	2%
State Highway Improvements	$1,025	$375	20%	7%
State Highway Maintenance	$850	$1,105	17%	21%
Local Road Maintenance	$705	$880	14%	17%
Investment Management	$78	$88	2%	2%
Coastal Shipping	$13	0%	0%	0%
Rail Network	$145	$145	3%	3%
Total	**$5,073**	**$5,203**		

Overall, NLTF funding is expected to remain constant over time. The combined total of the Activity Class mid-points is expected to increase by only 2.6% between 2021/22 and 2030/31. As costs to build and maintain infrastructure are expected to continue rising, this suggests NLTF resources are likely to be more constrained in the future. This contrasts with recent

[66] Ministry of Transport, *Government Policy Statement on Land Transport* (Wellington: Ministry of Transport, 2020), 34.

significant increases, with the total of combined NLTF and council funding increasing by 15% from 2018/19 to 2019/20.

Within the fund, some rebalancing of priorities is taking place. Funding for road safety investments (Road to Zero), local road and state highway maintenance, and public transport services are projected to increase whilst funding for new roading infrastructure decreases.

Funding for public transport and rail infrastructure is effectively unchanged and hence may not keep up with increasing costs to deliver projects.

Table 5: Waka Kotahi and Council Land Transport Funding[67]

Funding Authority	2018/19 ($m)	2019/20 ($m)
Councils	1,117	1,235
Waka Kotahi	3,544	4,126
Total Combined	4,661	5,361

As an offset to the NLTF projections, there is additional Crown funding for transport infrastructure being provided via the New Zealand Upgrade Programme, with an additional $6.8 billion for a specified programme of projects to be delivered by Waka Kotahi and KiwiRail. This package is comprised of $5.3 billion for roads, $1.1 billion for public transport, and $0.4 billion for walking and cycling.

6.3.2. Port and Airport Funding

Central and local government make a more limited investment in maritime and aviation infrastructure, which is generally provided at cost to users. However, a number of Crown contributions to ports, including from the Provincial Growth Fund (PGF), were confirmed in the past year, including the following examples:

- Wellington's CentrePort - $15 million for climate change response from New Zealand Green Investment Finance.
- Port of Napier - approximately $20 million (in principle) for Phase 1 development of a new inland port.
- Ruakura Inland Port (Hamilton) - $16.8 million from the PGF and $5 million from Hamilton City Council for new roads around the inland port.
- Coromandel's Sugarloaf Wharf – a $19.95 million PGF grant to respond to rising sea levels.

An example of private capital inflows into port infrastructure is Ports of Auckland using additional debt to finance a major investment programme including container terminal automation, a car handling facility and investment at its Waikato Freight Hub. This has increased the port company's debt from $368.0 million to $479.7 million.[68]

[67] "Funding: Major Activities", Waka Kotahi: New Zealand Transport Agency, accessed May 10, 2021, https://www.nzta.govt.nz/planning-and-investment/learning-and-resources/transport-data/data-and-tools/.
[68] Stephen Forbes, "The Auckland Council's Dividends from the Ports of Auckland Will Be Seriously Cut According to New

The ability of airports to fund investment is ultimately linked to revenue from landing charges. For Auckland, Wellington and Christchurch airports, these landing charges are subject to the Commerce Commission's information disclosure regulatory regime.

In the past, there have also been limited Crown contributions to joint venture airports and Crown entities (e.g. Maritime New Zealand). Generally, the Civil Aviation Authority and Maritime New Zealand rely on user charges to recoup costs to deliver services. Air navigation infrastructure provided by Airways is funded by user charges.

6.4. Regulation

The transport regulatory system helps protect New Zealanders from harm and achieve other transport outcomes, with regulatory powers exercised by the transport agencies. The regulatory system requires constant review and renewal to cope with emerging risks, shocks, or disruptive technologies, and this is part of the Ministry of Transport's role.

Parts of the current regulatory system have proven to be flexible and able to deal with emerging issues, but other parts are out of date and changes have been made over time in an ad hoc way.[69] This raises questions about whether the system remains coherent.[70] An important issue that will need to be addressed is ensuring that the regulatory system does not limit the opportunities afforded to New Zealanders by new technological advances in transport.

Within New Zealand, there is a need to ensure that the regulatory powers provided to transport agencies are appropriate and sufficiently empowering to enable effective management of the part of the transport system for which they are accountable and responsible.

6.5. Collaborative Approaches to Regional Programmes

Through the Auckland Transport Alignment Project[71] and Let's Get Wellington Moving,[72] the adoption of collaborative central/local government transport initiatives provides a platform to develop a shared view of outcomes, priorities and funding responsibilities based around a long-term regional transport programme. In Auckland, this process has aided high-level consensus between central and local government around the work programme and funding contributions. It has also been successful in promoting shared outcomes and has directly led to the investigation of pricing options to manage demand.

There have been some well publicised challenges with the Let's Get Wellington Moving programme. The review of Let's Get Wellington Moving noted that "Let's Get Wellington Moving in its current state is at risk of failing to deliver an integrated, cohesive, prioritised and outcomes-driven package of investments" in part due to a process-driven rather than

Projections," *Interest.co.nz*, August 15, 2019, https://www.interest.co.nz/news/101218/auckland-councils-dividends-ports-auckland-will-be-seriously-cut-according-new.

[69] Ministry of Transport, *Briefing to the Incoming Minister - Your Guide to the Transport System 2020* (Wellington: Ministry of Transport, 16 December, 2020), 26 - 27.

[70] Ibid, 26.

[71] Auckland Council, *Auckland Transport Alignment Project* (Auckland: Auckland Council, 2018), https://ourauckland.aucklandcouncil.govt.nz/media/18658/atap-20-final-24042018-1500.pdf.

[72] "Moving Wellington Forward » Let's Get Wellington Moving," Let's Get Wellington Moving, accessed April 14, 2021. https://lgwm.nz/.

outcomes-driven focus.[73] However, both central and local government have reiterated their support for the programme, as an alternative to one-off or unilateral approaches to major urban transport initiatives in Wellington.

Increasing expectations around outcomes from transport investments pose a challenge for developing and delivering large-scale transport investment programmes. Wider objectives beyond providing mobility and transport access include shaping and enabling urban development, improving environmental outcomes, reducing carbon emissions, and improving broader wellbeing outcomes. Meeting multiple objectives within existing funding will require complex trade-offs to be made in a well-informed way. There is a need to ensure sufficient capability and resourcing in land transport delivery agencies and ensure that decision-making processes are transparent.

6.6. Conclusions and Observations

The governance, ownership, funding, and regulation of transport is important for ensuring that the transport system successfully delivers connected journeys of people and goods and meets wider objectives. Effective integration and harmonisation between transport modes is needed.[74]

However, as can be seen in Table 6 below, governance, ownership, funding, and regulation varies within the sector, which may in some cases pose barriers for integration. There are various examples where multiple agencies contribute to the operation of complementary elements of the transport system, but do so through different governance and funding models. This is not necessarily a problem for the sector, as different organisations are needed to accomplish different goals, but it can pose challenges for system integration and delivery of mode-neutral or inter-modal investment approaches.

Table 6: Transport Infrastructure Ownership, Funding, Delivery and Operations[75]

	Road (inc PT, active modes)	**Rail**	**Ports**	**Airport**
Ownership	Crown (Waka Kotahi manages), Councils	Crown (inc via NZRC & KiwiRail)	Councils, private shareholders	Councils, Crown, private shareholders
Governance	Boards, Councils	SOE Boards	Boards, Councils	Boards, Councils
Funding	NLTF (road users), Crown, Councils	Crown, NLTF, rail users	Port users, Crown and Councils	Users (airlines, passengers), commercial operations (on site), land use
Delivery and Operations	Waka Kotahi, Councils	KiwiRail, Regional Councils (metro rail via operator)	Port companies	Airport companies

[73] Let's Get Wellington Moving, *Let's Get Wellington Moving Health Check* (Wellington: Let's Get Wellington Moving, 2020), 1.
[74] Organisation for Economic Co-operation and Development, *Gaps and Governance Standards of Public Infrastructure in Chile Infrastructure Governance Review: Infrastructure Governance Review* (France: OECD Publishing, 2017), 169.
[75] Various sources.

7. How is the Sector Performing?

An overarching trend in the transport sector is the broadening of expectations around the objectives which transport agencies and investments are expected to meet. This marks a significant expansion from focusing on direct outcomes for transport users, such as travel time and travel costs, to include recognition of impacts on environmental performance, urban development, overall wellbeing, and the mitigation of negative environmental and social impacts.

This section focuses on performance relating to the condition of the assets, the operation of the system (including the ability to meet demand), positive and negative impacts on wellbeing, and integration of transport and land use. This section also briefly considers the main impacts of Covid-19 on the transport infrastructure sector.

The analysis here draws upon multiple sources of information. It is important to note that the Ministry of Transport's Transport Outcomes Framework defines a measurable set of transport indicators that relate to the five outcomes sought from the sector. These indicators are published on the Ministry of Transport's website, along with data on transport volumes.[76]

7.1. Asset Condition and Quality

In the World Economic Forum's Global Competitiveness Report 2019, New Zealand is ranked 19th for overall competitiveness out of the 141 countries assessed (a fall of one place since 2018), which is a good performance given our small population and geographical isolation.[77] However, New Zealand's overall competitiveness ranking was reduced due to the assessed inadequate supply and quality of our transport infrastructure, with the country ranked only 57th in this category.

Table 7: World Economic Forum New Zealand Transport Infrastructure Performance[78]

Index Component	Value	Score	Rank/141	Best Performer
2nd pillar: infrastructure 0-100	-	75.5	46	Singapore
Transport Infrastructure 0-100	-	55.8	57	Singapore
Road connectivity 0-100 (best)	80.9	80.9	51	Multiple (3)
Quality of road infrastructure 1-7 (best)	4.5	57.6	52	Singapore
Railroad density km/1000 km^2	15.0	37.4	50	Multiple (24)
Efficiency of train services 1-7 (best)	3.9	48.9	42	Japan
Airport connectivity score	96,703.9	62.0	43	Multiple (8)
Efficiency of air transport services 1-7 (best)	5.5	74.2	30	Singapore
Liner shipping connectivity 0-100 (best)	20.2	20.2	66	Multiple (5)
Efficiency of seaport services 1-7 (best)	4.9	65.6	32	Simngapore

[76] Ministry of Transport, *Transport Indicators 2018/19* (Wellington: Ministry of Transport, 2020). Available online at https://www.transport.govt.nz/area-of-interest/strategy-and-direction/transport-outcomes-framework/. Ministry of Transport, *Statistics and insights* (Wellington: Ministry of Transport, 2020). Available online at https://www.transport.govt.nz/statistics-and-insights/SearchForm.
[77] Klaus Schwab, *The Global Competitiveness Report 2019* (Geneva: World Economic Forum, 2019), 423.
[78] Ibid, 423.

New Zealand spends only around 0.7% of GDP on land transport infrastructure, which is towards the lower end of the range observed across all OECD countries. It should be borne in mind that there is always a need to balance expectations around service levels with the willingness or ability to pay for those.

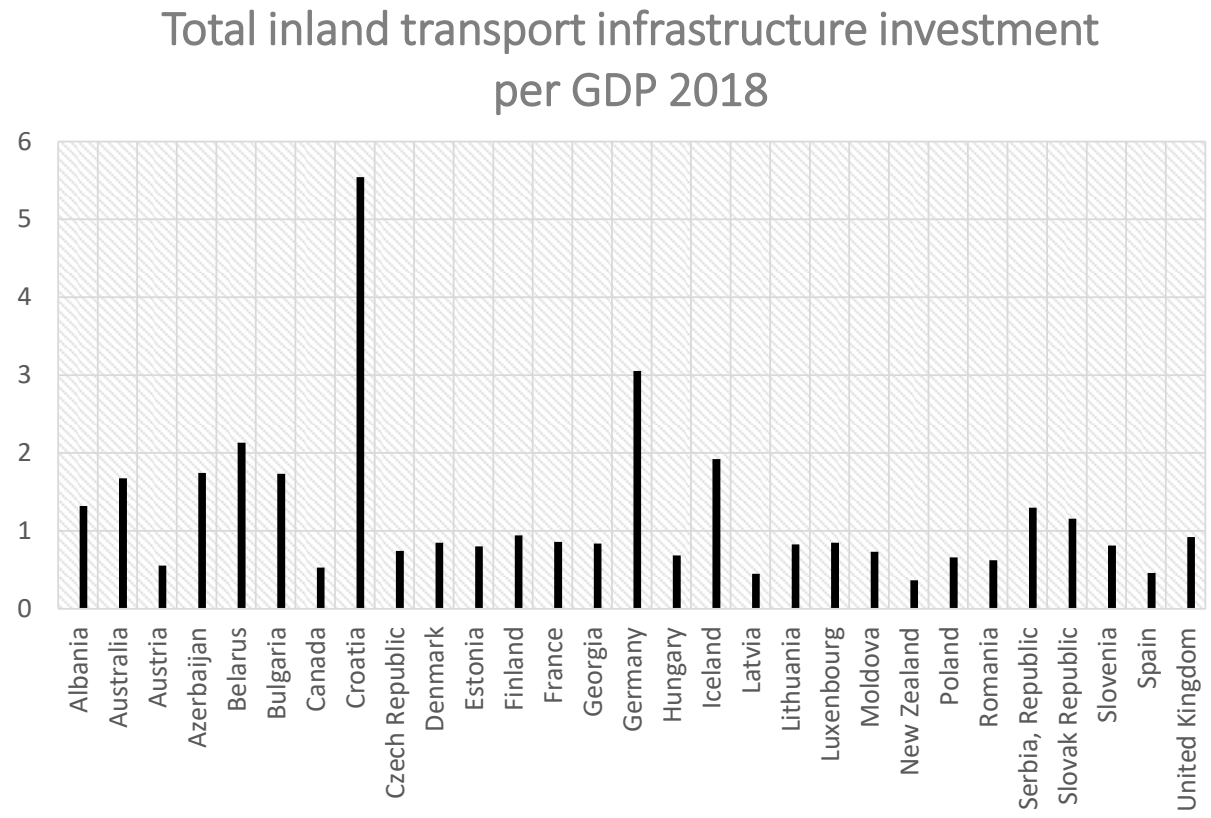


Figure 19: OECD Comparative Infrastructure Spend (% of GDP)[79]

New Zealand may be confronted with a significant transport infrastructure challenge if the decline in Government Policy Statement funding in real terms for new infrastructure (outlined in the previous section) coincides with further cost escalation for the delivery of new infrastructure.

Costs to deliver new transport infrastructure appear to be rising at a rapid rate, both for new transport infrastructure and maintenance of existing infrastructure. For instance, the per-kilometre cost to maintain state highways rose 10% in 2020, while local road maintenance costs rose 5%, and there are also signs of cost challenges for new infrastructure.[80] There is a need for initiatives to help contain cost pressures in this sector.

Rising costs reflect a range of factors. In recent decades, civil construction prices have risen significantly faster than the general consumer price index, indicating ongoing demand-driven cost inflation.[81] The cost of concrete increased by over 8% between Q4 2019 and Q4 2020

[79] "Infrastructure Investment," Organisation for Economic Co-operation and Development, accessed May 10, 2021, https://data.oecd.org/transport/infrastructure-investment.htm.
[80] "Annual Report for the Year Ended 30 June 2020," Waka Kotahi NZ Transport Agency, accessed May 10, 2021, https://www.nzta.govt.nz/assets/resources/annual-report-nzta/2019-20/Waka-Kotahi-Annual-report-2020.pdf.
[81] "Price Indexes for the Construction Industry," Statistics New Zealand, accessed April 8, 2021, https://www.stats.govt.nz/methods/price-indexes-for-the-construction-industry.

whilst the cost of skilled labour increased by around 6%.[82] International evidence and local case studies suggest that changing design and delivery requirements, including higher design standards and the inclusion of broader outcomes in the scope of projects, have also contributed to cost growth.[83] Meanwhile, labour productivity has grown slowly in the construction sector due to lower average skill levels and lower capital intensity in construction than are found in other industries.[84] This is in turn partly a result of uncertainty around future work pipelines, which reduces the confidence to invest in human and physical capital.

7.2. Operational Performance

7.2.1. Road Congestion and the Ability to Meet Demand

The performance of the transport network is probably the most widely reported of all infrastructure classes and the most reported aspect of this performance is road congestion. Congestion matters. As the urban population increases, urban areas tend to become more congested, inhibiting economic development and reducing the quality of life of significant numbers of people.

Across Australasian cities, Auckland has the second highest level of congestion, behind Sydney.[85,86,87] Consequently, a 30 minute peak hour trip in Auckland will take between 20 and 23 minutes longer than the same trip when the network is free-flowing. The additional travel time is between 18 and 19 minutes in Wellington, and between 12 and 13 minutes in Christchurch.

Table 8: Congestion in Auckland, Wellington, and Christchurch[88]

		Auckland	Wellington	Christchurch	Sydney
Congestion Level		31%	28%	21%	33%
Congestion Level inc from 2018		2%	1%	0%	-1%
Lost time per 30 min trip	AM Pk	20 mins	19 mins	12 mins	19 mins
	PM Pk	23 mins	18 mins	13 mins	17 mins

[82] Turner and Townsend, *Australia and New Zealand Market Insight Report: Q4 2020* (Auckland: Turner and Townsend, 2020), 9.
[83] Manny Prunty and David Wessel, "What Is Driving up the Cost of Highway Construction?," *Brookings Institution*, accessed July 15, 2019, https://www.brookings.edu/blog/up-front/2019/07/15/what-is-driving-up-the-cost-of-highway-construction/.
[84] Adam Jaffe, Trinh Le, and Nathan Chappell, "Executive Summary," in *Productivity Distribution and Drivers of Productivity Growth in the Construction Industry* (Wellington: Motu Economic and Public Policy Research, 2016). Over the period 1978–2012, labour productivity for the construction industry grew by 0.6 percent annually, compared with 1.5 percent for all goods-producing industries and 2.1 percent for the business sector.
[85] "Sydney Traffic," Tomtom, accessed February 4, 2021, https://www.tomtom.com/en_gb/traffic-index/sydney-traffic/. A 31% congestion level in Auckland means a congested 30-minute trip will take 31% more time than it would during baseline uncongested conditions. The baseline is derived from the free-flow travel time.
[86] "New Zealand Traffic," Tomtom, accessed February 4, 2021, https://www.tomtom.com/en_gb/traffic-index/new-zealand-country-traffic/.
[87] A 31% congestion level in Auckland means a congested 30-minute trip will take 31% more time than it would during baseline uncongested conditions. The baseline is derived from the free-flow travel time.
[88] "TomTom Traffic Index," Tomtom, accessed April 23, 2021, https://www.tomtom.com/en_gb/traffic-index/.

		Auckland	Wellington	Christchurch	Sydney
Lost time in rush hour per yr		163 hrs	142 hrs	94 hrs	138 hrs
World Rank (out of 416 cities)		105	147	269	86

Between 2018 and 2019, congestion worsened slightly in Auckland and Wellington, meaning that demand is increasing at a greater rate than capacity, and remained stable in Christchurch. By comparison, some Australian cities saw a slight reduction over this period.

Table 9: TomTom Traffic Index Australasian Cities 2019[89]

#	World Rank	City	Country	Congestion Level	
1	86	Sydney	Australia	33%	-1%
2	105	Auckland	New Zealand	31%	2%
3	123	Melbourne	Australia	30%	1%
4	147	Wellington	New Zealand	28%	1%
5	209	Hamilton	New Zealand	25%	-3%
6	212	Brisbane	Australia	25%	0%
7	225	Adelaide	Australia	24%	-1%
8	230	Gold Coast	Australia	24%	-1%
9	242	Hobart	Australia	24%	-2%
10	269	Christchurch	New Zealand	21%	0%
11	288	Perth	Australia	20%	0%
12	290	Tauranga	New Zealand	20%	2%
13	298	Dunedin	New Zealand	20%	1%
14	301	Newcastle	Australia	20%	0%
15	350	Canberra	Australia	17%	-1%
16	394	Wollongong	Australia	13%	0%

Despite significant ongoing investment in urban roading capacity, congestion levels in major cities do not generally reduce and often get worse in the long term. Following extensive analysis of alternative approaches to addressing Auckland's transport challenges, the Auckland Transport Alignment Project concluded that "simply increasing investment to build our way out of the problem is unlikely to be cost-effective in the long run and will struggle to deliver significant access and congestion improvements."[90]

[89] "TomTom Traffic Index," Tomtom, accessed April 23, 2021, https://www.tomtom.com/en_gb/traffic-index/.
[90] "Recommended Strategic Approach," Auckland Transport Alignment Project, accessed May 10, 2021, https://www.transport.govt.nz//assets/Uploads/Report/ATAPRecommendedStrategicApproach.pdf.

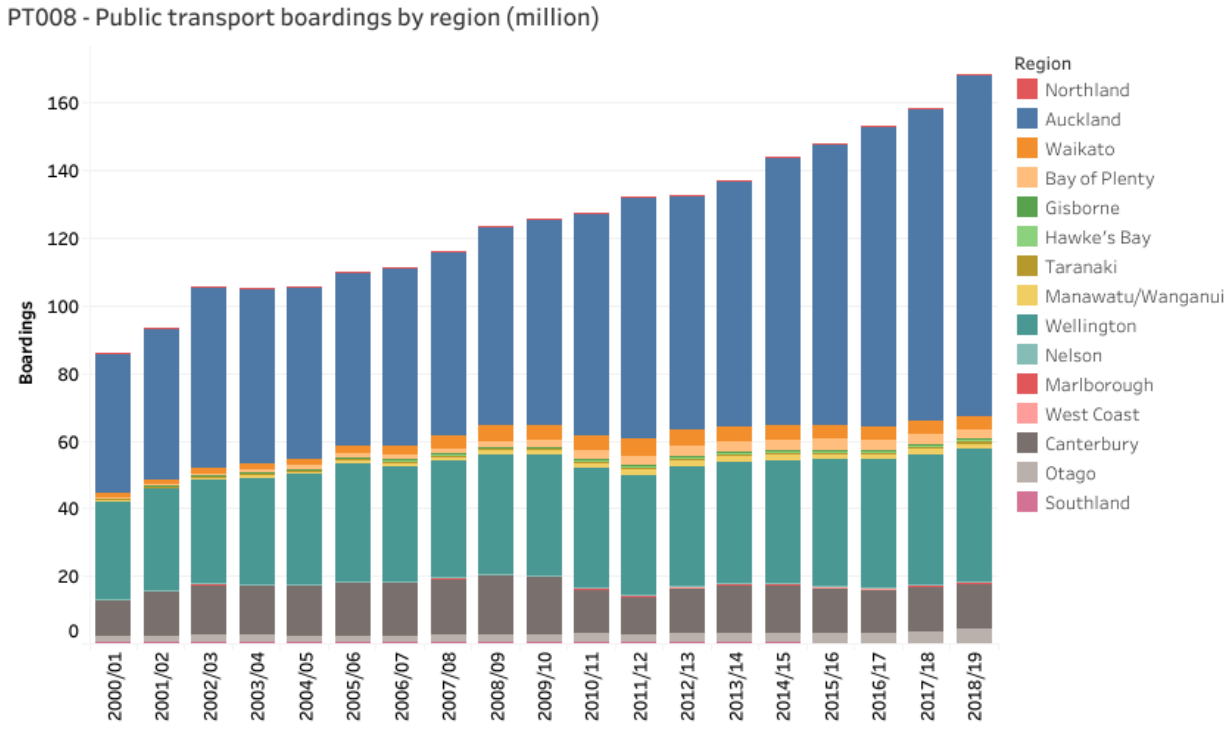
Increasing road capacity to relieve peak-period congestion has not been successful because doing so encourages people to drive more at peak times. International research shows that there is a one-to-one relationship between road capacity increases and increases in traffic volumes – the 'fundamental law of road congestion'.[91] Locally, this effect can be observed in the slow and unreliable peak travel times on urban motorways that have recently been widened. Ultimately, only a combination of supply and demand side measures, of which pricing will be the most effective, will lead to an affordable and sustainable solution to road congestion.[92]

7.2.2. The Use of Public Transport Infrastructure in Main Centres

Congestion is predominantly an urban phenomenon. From the mid-1990s there has been a significant increase in investment in New Zealand's urban public transport infrastructure, particularly in Auckland. This is in response to population growth, a more integrated approach to land use and transport planning, and recognition that roading infrastructure alone will never be able to provide the levels of accessibility necessary to support an efficient urban economy.

Nationally, public transport use rose 37% in the decade ended 2018/19. Auckland accounted for most of this increase, as public transport ridership rose by 72%. However, some other regions, such as Bay of Plenty (44% increase), Nelson (eightfold increase off a very low base), Otago (68% increase), and Taranaki (86% increase) also reported notable increases. Public transport ridership growth was slower in Wellington (11% increase). Although Christchurch had experienced rapid growth in public transport use prior to the 2011 Canterbury Earthquakes, ridership has fallen since then.

[91] Phil Goodwin, "Empirical Evidence on Induced Traffic," *Transportation* 23, no. 1 (1996): 35-54.
Gilles Duranton, and Matthew Turner, "The Fundamental Law of Road Congestion: Evidence From US Cities," *American Economic Review* 101, no. 6 (2011): 2616-52.
WSP and RAND Europe, 2018. *Latest Evidence on Induced Travel Demand: An Evidence Review* (United Kingdom: Department of Transport, 2018). https://www.gov.uk/government/publications/induced-travel-demand-an-evidence-review
Micquel-Àngel Garcia-López, Ilias Paisdis, and Elisabet Viladecans-Marsal, *Congestion in Highways When Tolls and Railroads Matter: Evidence From European Cities* (Barcelona: Institut d'Economia de Barcelona, 2020).
Arthur Downs, *Still Stuck In Traffic: Coping With Peak-Hour Traffic Congestion* (Washington: Brookings Institution Press, 2005).
[92] "Recommended Strategic Approach," Auckland Transport Alignment Project, accessed May 10, 2021, https://www.transport.govt.nz//assets/Uploads/Report/ATAPRecommendedStrategicApproach.pdf.



Source: New Zealand Transport Agency

Figure 20: Annual Public Transport Trips by Region[93]

7.2.3. Port and Airport Infrastructure

Port capacity is driven by a combination of factors including shipping channel depth, the size, type and number of land-side cranes, port land area, and the capacity of land-side transport links. As noted in many studies, port capacity will need to adapt to handle larger vessels, higher volumes and conflicts with other land uses in urban areas.

From a system perspective, this will have flow-on impacts on the land-side infrastructure and transport connections that will be needed. For example, growing international freight volumes have implications for the road and rail networks. Bulk commodities such as coal and logs are generally carried by rail, whilst most containers are transported into and out of ports by road, although this can vary considerably. In the 12 months to 31 March 2016, 78% of twenty-foot equivalent units were transported into and out of ports by road, but during the same period, rail accounted for 44% of twenty-foot equivalent unit movements into the Port of Tauranga, partly reflecting Fonterra's use of rail to move its dairy products to the port.[94]

Previous discussions with stakeholders have identified a number of specific challenges in managing New Zealand's growing international freight task:[95]

- Freight routes connecting major ports, inland ports and urban centres are a key challenge for the sector, particularly as freight volumes grow and as bigger ships come to New Zealand. Congested freight routes in South Auckland are a specific concern,

[93] "PT008 Public transport boardings by region (million)," Ministry of Transport, accessed May 10, 2021, https://www.transport.govt.nz/statistics-and-insights/public-transport/boardings-all-modes/.
[94] Ministry of Transport, *Transport Outlook, Current State 2016* (Wellington: Ministry of Transport, 2017), 33.
[95] National Infrastructure Unit, *Evidence Base 2015 Refresh - Transport Sector* (Wellington: New Zealand Treasury, 2015), 14.

including the connections between MetroPort and the State Highway network. The Port of Tauranga has recently indicated that train capacity between Tauranga and Auckland is also a constraint.

- Availability of land for marshalling and storage space at ports. Some major ports are currently constrained by the area available to them resulting in the implementation of demand management practices, the development of inland port options and/or area expansion through land reclamation.
- Space for high seasonal freight volumes on domestic and international shipping routes. Due to the seasonal nature of many of New Zealand's key agricultural exports, export capacity is at a premium in the productive season. Smoothing the availability of export services to meet demand is a continuing challenge for the sector.

7.3. Impacts on Wellbeing

Transport systems generate a range of external costs beyond congestion (wasted time) including the costs associated with deaths and injuries from accidents, environmental impacts at the global level (e.g. greenhouse gas emissions) and the local level (noise and air pollution), and health costs arising from air and noise emissions.[96]

7.3.1. Safety

Road deaths increased between 2016 to 2018, then saw a reduction in 2019, and further reduction in 2020. However, the current level is still noticeably above the lowest number of deaths per year of 253, recorded in 2013.

Table 10: Annual Road Deaths 2011-2020[97]

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Road Deaths	284	308	253	293	317	327	378	378	352	318

The age-standardised rate for all traffic injury hospitalisations decreased between 2001 and 2014, but has risen steadily since then. The pattern of change is primarily driven by changes in the hospitalisation rate for vehicle occupants (measured in traffic injury hospitalisations per 100,000 people).

[96] Organisation for Economic Co-operation and Development, *Gaps and Governance Standards of Public Infrastructure in Chile Infrastructure Governance Review: Infrastructure Governance Review* (France: OECD Publishing, 2017), 169.
[97] "Safety — Road Deaths," Ministry of Transport, accessed April 14, 2021, https://www.transport.govt.nz/statistics-and-insights/safety-road-deaths/./death-on-nz-roads-since-1921/.

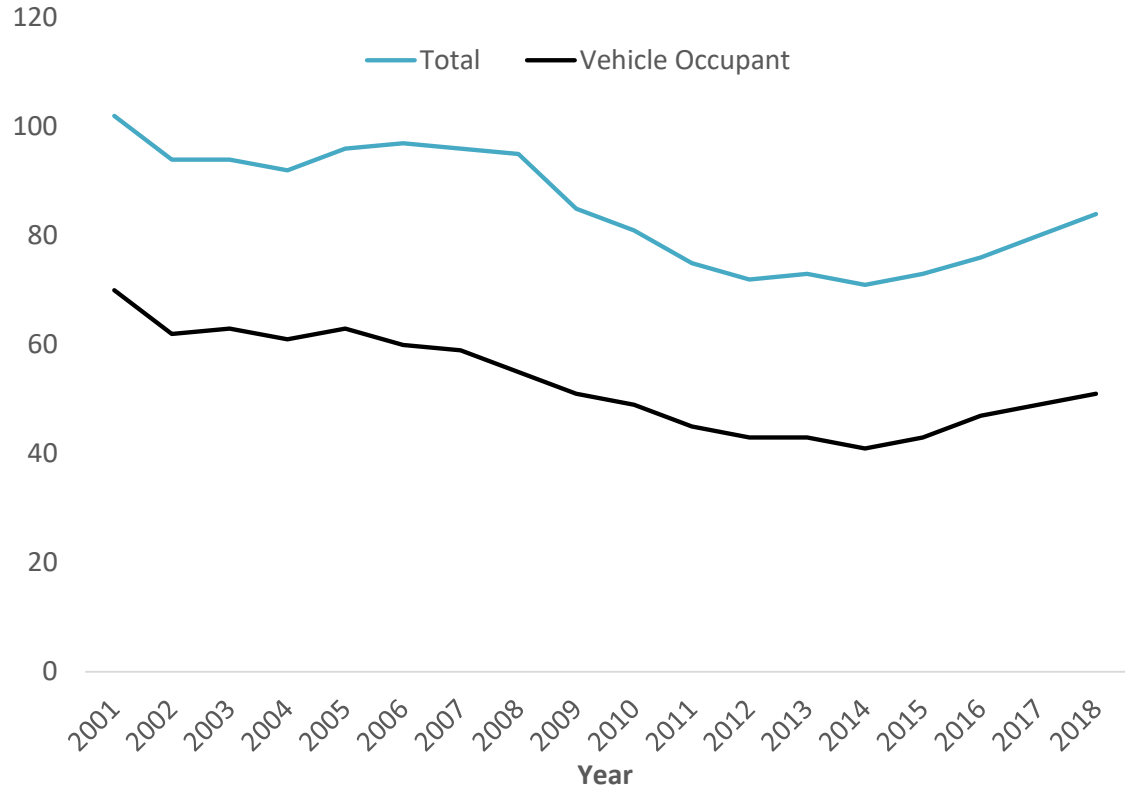
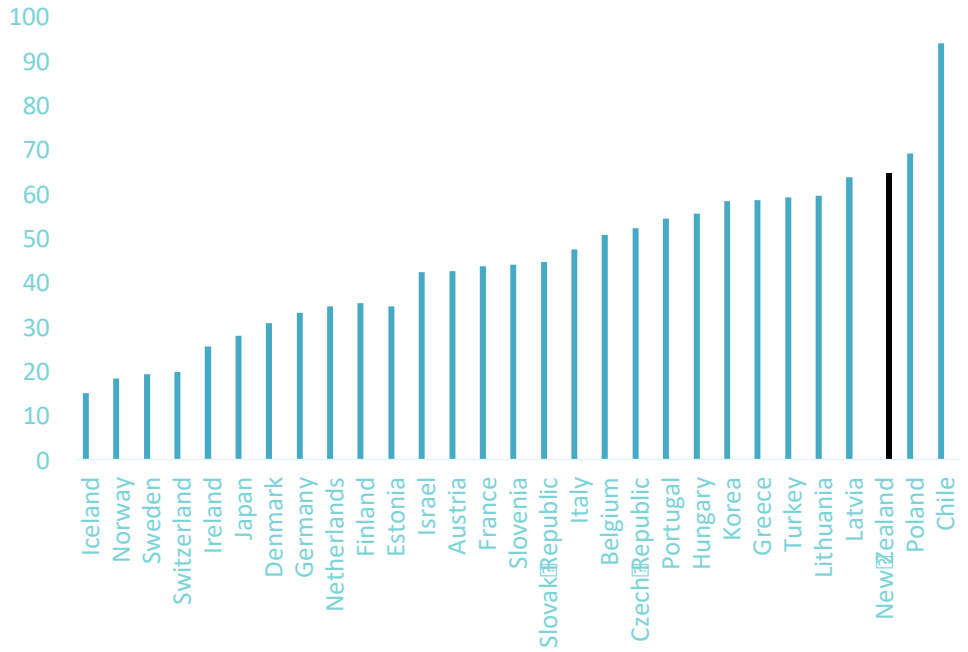


Figure 21: Age-standardised rate - traffic hospitalisations[98]

On an international basis, New Zealand's performance on road safety does not compare favourably, indicating that significant progress is still needed.



[98] Environmental Health Indicators, *Road Traffic Inquiry Hospitalisations* (Wellington: Environmental Health Indicators, Massey University, 2020), 2. https://www.ehinz.ac.nz/assets/Factsheets/Released_2020/Road-traffic-injury-hospitalisations.pdf.

Figure 22: Road deaths per 1 million inhabitants (OECD countries) 2019[99]

7.3.2. Sustainability - Greenhouse Gas Emissions

In 2018 New Zealand's gross greenhouse gas emissions were 78.9 million tonnes, 24% higher than 1990 and 1% lower than 2017.[100] Gross emissions in 2018 were mainly made up of carbon dioxide (44.5%), methane (43.5%), and nitrous oxide (9.6%). Carbon dioxide emissions were mainly produced by transport at 47.0%. Manufacturing industries and construction accounted for 17.9% and electricity and heat production 9.4%.

Emissions from transport were up 2.3% from 2017 levels and up 89.7% from 1990. Transport emissions were mainly made up by road vehicle emissions (90.7%) and domestic aviation (6.7%):

- Road transportation emissions in 2018 were up 2.0% from 2017 and up 101.6% from 1990. They made up 42.6% of all carbon dioxide emissions in 2018.
- Domestic aviation emissions in 2018 were up 12.0% from 2017 and up 17.7% from 1990. They made up 3.2% of all carbon dioxide emissions in 2018.

Land transport is a significant generator of carbon emissions but at the same time offers a significant opportunity to reduce New Zealand's carbon emissions, for example through shifting freight and passenger journeys to lower-emitting modes and through uptake of electric vehicles.

7.3.3. Access and Equity

Access and equity is a very broad subject and here we note two examples of geographical isolation and people's ability to access transport.

New Zealand has many areas that are geographically isolated, with infrastructure networks that are expensive to build and maintain due to climatic, geological and seismic factors. This presents significant resilience challenges. There is currently no clear direction around what level of access is "reasonable" in different parts of New Zealand. Nor what "equitable" access to infrastructure means and how the connectivity benefits (in terms of economic, social, environmental and cultural wellbeing) could be measured when considering infrastructure investments. Determination of what constitutes an acceptable, equitable level of access / connectivity across New Zealand is an important requirement.

As another example, there is the question of all people's ability to access transport. Many councils have adopted broad accessibility action plans which cover a wide range of activities including transport[101] and the Government's Disability Action Plan 2019–2023[102] includes the

[99] "Transport - Road Accidents - OECD Data," Organisation for Economic Co-operation and Development, accessed April 14, 2021, https://data.oecd.org/transport/road-accidents.htm.
[100] "New Zealand's Greenhouse Gas Emissions," Statistics New Zealand, accessed October 15, 2020, https://www.stats.govt.nz/indicators/new-zealands-greenhouse-gas-emissions.
[101] Hamilton City Council, *Disability Action Plan 2019-2020* (Hamilton: Hamilton City Council, 2019), https://www.hamilton.govt.nz/our-city/community-development/advisoryservices/Documents/HCC_Disability%20Action%20Plan%202019-2020_v.01.pdf.
[102] Office for Disability Issues, *Disability Action Plan 2019-2023: Putting the New Zealand Disability Strategy into Action* (Wellington: Ministry of Social Development, 2019), 9.

introduction of a disability awareness programme for bus drivers, to be led by Waka Kotahi. Auckland Transport has adopted an Accessibility Action Plan, which notes that being accessible "means that, as far as can reasonably be accommodated, transport facilities, vehicles, information and services are easy to find out about, to understand, to reach, and to use, for people with accessibility requirements and therefore for everyone, as part of their day-to-day lives. Accessibility, in short, means that anyone, regardless of age or ability, can go safely from A to B without inconvenience or barriers, and with dignity."[103] It is difficult to determine the extent to which this objective is being achieved in practice, but the design and delivery of new infrastructure needs to take this outcome into account. In doing this, it is important to recognise that many people who experience inequitable transport outcomes may wish to travel outside peak times, so to be effective investments will need to be targeted more widely than just commuter related outcomes.

7.4. Transport and Land Use Integration

Transport infrastructure is one of the most powerful and effective 'shapers' of urban development, which is both an opportunity and a risk. By improving accessibility to and from an area, reducing travel costs and making places more attractive to live and work, transport infrastructure can lead and catalyse development.

When used in an integrated way, transport investment can encourage development. However, a lack of co-ordination between land use planning and transport investment can lead to unwanted development outcomes.

Urban growth partnerships and integrated planning exercises are an opportunity to improve outcomes for transport and land use integration. Urban Growth Partnerships are a current initiative intended to foster a long-term and integrated approach to land use and infrastructure planning. In August 2020, Cabinet endorsed the strategic priorities for joint spatial plans for the Hamilton-Waikato and Tauranga-Western Bay of Plenty metropolitan areas and the Queenstown Lakes area.[104] Other earlier initiatives, such as Auckland's Southern Growth Alliance (which is leading a co-ordinated approach to planning and infrastructure around Drury), the Auckland Transport Alignment Project, and Let's Get Wellington Moving are also grounded in the concept of transport investment being used to support land use outcomes.

However, there are still significant co-ordination challenges between the relevant public agencies involved in growth and transport planning and delivery as well as with private developers. This is an area where further concerted effort is both required and justified if transport infrastructure is to be used to its full potential as a city shaping tool.

7.5. Impacts of Covid-19 on Transport Infrastructure

The impacts of Covid-19 will be felt across the transport infrastructure sector for some time to come. Slower population growth is expected in each of the major metros, due to a sharp

[103] Auckland Transport, *Accessibility Action Plan: Delivering a Transport System Which Meets the Needs of All Aucklanders 2020-2022* (Auckland: Auckland Transport, 2020), 7.
[104] "Urban Growth Partnerships," Ministry of Housing and Urban Development, accessed March 29, 2021, https://www.hud.govt.nz/urban-development/urban-growth-agenda/urban-growth-partnerships/.

decline in immigration.[105] Lower levels of growth in both freight and passenger movements are also expected over the next decade. However, no significant changes are expected in the location of transport demand (key origins, destinations and flows of people and goods) through the upper North Island, lower North Island or South Island in 10 years' time.

One potentially significant outcome of Covid-19 will be the impact on urban travel patterns if changes to working habits (from more people working remotely) are persistent. This will be important for passenger transport trips. In the short-term, a significant impact of the increase in remote working has been a reduction in passenger transport patronage and fare revenue. With reduced vehicle trips, there was a temporary impact on the amount of revenue flowing into the National Land Transport Fund.

Prior to the dramatic impact of Covid-19, air passenger numbers through the main airports had increased significantly over the past decade, driven by increased domestic travel, more New Zealanders departing on overseas trips, and growth in the number of international tourists.

Table 11: Air Passengers (2016)[106]

	Domestic passengers	**International passengers**
Auckland (incl international transit passengers)	8.4 million	9.9 million
Wellington	5.1 million	0.9 million
Christchurch	4.8 million	1.6 million
Queenstown	1.3 million	0.5 million
Dunedin	0.9 million	< 0.1 million
All airports	Approx 25 million	13 million

However, with the effects of Covid-19 being felt most strongly at the borders, the impact on airport infrastructure investment has been significant, with the suspension of Auckland Airport's capital works programme being the most visible consequence. Until the resumption of international travel is well underway, there is unlikely to be any significant resumption in this programme.

7.6. Conclusions

The importance of transport for the social and economic wellbeing of New Zealanders means the performance of the sector matters. There are multiple areas where improvement is needed. This includes the management of demand on congested urban roads, the maintenance of asset quality and availability in the face of reducing National Land Transport Fund funding,

[105] Waka Kotahi: New Zealand Transport Agency, *Whakarāpopoto a Aotearoa: Arataki Version 2 National Summary. Our Plan for the Land Transport System 2021-2031* (Wellington: Waka Kotahi: New Zealand Transport Agency, 2020), 6.
[106] Ministry of Transport, *Transport Outlook, Current State 2016* (Wellington: Ministry of Transport, 2017), 47.

further reducing the external costs associated with deaths and injuries, environmental impacts at the global level (greenhouse gas emissions) and the local level (noise and air pollution), and the related health costs arising from air and noise emissions.

8. How is the Sector Responding to What Might Come Next?

8.1. Broadening of Objectives

One of the most significant changes taking place in the transport sector is the broadening of the objectives which public sector transport agencies and investments are now expected to impact upon. This is a challenge which is being responded to in a positive way. For example, major collaborative transport initiatives such as Auckland Transport Alignment Project and Let's Get Wellington Moving take into account the concepts of shaping urban form and improving environmental performance.[107,108]

The adoption of a broader wellbeing-based approach to investment decision making by the Ministry of Transport, Waka Kotahi, and other public sector transport providers is a step towards delivering on broader objectives. But there is also evidence of the real challenges which organisations face when grappling with meeting multiple objectives whilst relying on limited funding, which can require complex trade-offs to be made. Ensuring there is a broadening in the capability and resourcing of the agencies to enable this approach to be truly effective will be a key determinant of success.

8.2. Aligning Transport and Land Use Integration

Population growth puts increasing pressure on existing transport infrastructure and is a primary driver of the need to invest in additional capacity. In the past, the development of the land transport system focused heavily on managing (or keeping pace with) urban growth by building more or larger roads to increase capacity. But as transport infrastructure also exerts a powerful influence over the patterns of growth and subsequent use of transport infrastructure, this often led to dispersed urban growth and a dependency on private car travel.

Aligning transport infrastructure investment and delivery with growth plans is therefore important to support the development of liveable and productive urban areas. This is increasingly recognised in strategic planning documents, but the co-ordination of all aspects of urban planning, infrastructure and development remains an area where significant gains can be achieved. If successful, this has the potential to mitigate urban congestion, improve environmental outcomes from transport, and improve freight efficiency.[109]

The next 10 years will need to see a significant movement towards a more integrated land-use and transport planning approach.[110] This approach will also need to go beyond just transport to encompass co-ordination of all of the infrastructure needed to support planned growth.

[107] "Principles," Let's Get Wellington Moving, accessed April 14, 2021, https://lgwm.nz/principles/.
[108] Auckland Council, *Auckland Transport Alignment Project* (Auckland: Auckland Council, 2018), https://ourauckland.aucklandcouncil.govt.nz/media/18658/atap-20-final-24042018-1500.pdf.
[109] Waka Kotahi: New Zealand Transport Agency, *Whakarāpopoto a Aotearoa:, Arataki Version 2 National Summary. Our Plan for the Land Transport System 2021-2031* (Wellington: Waka Kotahi: New Zealand Transport Agency, 2020), 29.
[110] Ibid, 39.

8.3. Co-ordination of Infrastructure for Urban Growth

An important issue to be taken into consideration for transport and land use integration is the need for a co-ordinated approach to the funding and delivery of all growth-related infrastructure, not just transport. For all the challenges of keeping pace with demand, the National Land Transport Fund combined with Crown funding means that national transport infrastructure (e.g. State Highways and rail) can often be significantly easier to fund and deliver than local transport and other growth-related infrastructure, such as water, wastewater, and stormwater infrastructure. Changes to planning and funding systems may be needed to improve the co-ordination of growth infrastructure.

8.4. Congestion, Demand Management and Funding

A significant proportion of the investment made in transport infrastructure goes towards providing the roading capacity needed to accommodate peak demand, and yet as shown in Section 5, the key transport issue facing most urban areas is the perpetual inability of road networks to meet demand during peak times. This is well understood. The underlying issue is that providing all the capacity needed to meet demand is unaffordable – we simply cannot build our way out of congestion. Exacerbating this issue is the fact that additional peak capacity which initially acts to reduce trip times and the cost of driving, will ultimately encourage more or longer car trips. Unfortunately, the solution of building more road capacity will simply cause the problem of congestion to return, unless demand can be managed too.

Currently, demand for road use is not effectively managed. Apart from a small number of toll roads, demand is simply choked off by congestion and the associated time cost incurred by drivers. Until it is possible to apply both supply and demand side responses to roading capacity, with demand management being used in conjunction with sufficient supporting capacity on public transport and active modes, this unaffordable and inefficient problem will persist and most probably get worse.[111]

The most effective 'lever' for managing demand is road pricing. Pricing approaches can vary, from a simple congestion charge through to a sophisticated blend of fixed and variable charges, which can reflect factors such as road 'wear and tear' or emissions. Pricing offers an opportunity to 'break the cycle' of simply providing additional roading capacity which creates further demand.

8.5. Affordability and Funding

The availability and allocation of funding is a continuing issue for transport infrastructure. Investment in land transport infrastructure is increasingly underpinned by Crown funding, rather than revenues from transport users, reflecting difficulties funding a 'step change' in transport infrastructure through existing mechanisms.

The gradual move to alternative fuels, including through increased uptake of electric vehicles, may exacerbate pressure on transport funding by reducing revenues from petrol taxes. New Zealand faces fewer issues from this transition than some other countries, because the existing

[111] Ministry of Transport, *The Congestion Question: Main Findings* (Wellington: Ministry of Transport, 2020), https://www.transport.govt.nz//assets/Uploads/Report/TheCongestionQuestionMainFindings.pdf.

road user charges system could be extended to cover electric vehicles. However, there is significant opportunity to explore the use of technology to enable a broader based approach to road user charging in the future (for both revenue raising and potentially demand management). The current eRUC scheme is a working example of this approach in terms of raising revenue.[112]

The affordability of infrastructure is a major issue leading to funding pressures, with cost escalation across capital projects a recurring theme, but this is particularly so given the decline in Government Policy Statement funding in real terms and the increasing range of outcomes being sought through transport investment. There is a need for initiatives which can help to contain cost pressures in the sector. Unless successful or additional funding is provided, the result is likely to be a reduction in transport infrastructure being procured and delivered and, ultimately, a reduction in our ability to achieve desired outcomes in the transport sector.

8.6. Certainty of Project Delivery – Pipeline of Future Work

In response to rising cost pressures, more focus is required on identifying and implementing ways of increasing the efficiency of project delivery. This includes providing certainty around a long-term pipeline of projects that will provide the private sector with the confidence to invest in equipment and workforce development needed to deliver this work. This can contribute to growing both industry capacity and capability, and can in turn drive greater delivery efficiency.

8.7. System Approach to Transport

There is a movement toward a system-based, outcomes-driven approach to investment in and management of the transport network. However, as with all new approaches which are at a relatively early stage of implementation, there is work remaining to be done to ensure coherent and effective implementation. This may include consideration of changes to governance, ownership, funding, and regulation to incentivise alignment around a single system approach with common outcomes.

8.8. Freight – A System Approach

With a projected increase in freight volumes, growing road congestion and maintenance costs, and the need to meet emission reduction targets, rail and coastal shipping will need to play a greater role in our freight transport system in the future.

The Future of Rail project proposes to better integrate rail infrastructure into the land transport system, ensuring it is appropriately planned, funded, and maintained. The new rail planning and funding framework takes a longer-term view and provides greater certainty around future investment and maintenance funding. Meanwhile, the New Zealand Rail Plan outlines the government's priority over the coming decade for rail to be a safe, resilient and reliable network, with future investment intended to support growth in passenger and freight rail services.

As noted by KiwiRail, run-down rail networks constrain the ability of rail freight to compete for

[112] "RUC Compliance Made Easy," EROAD, accessed April 23, 2021, https://www.eroad.co.nz/nz/solutions/ruc-compliance/?utm_medium=cpc&utm_source=google&utm_campaign=EROAD-Compliance_Search_NZ&utm_content=undefined&utm_term=%20eruc.

an increasing share of the freight task. There is greater demand for their freight services than they can supply within the constraints of the current rail network and they are now advancing the largest rail capital programme since World War II to improve the resilience and reliability of the network and, therefore, the commercial service and market share of rail freight.

The size of international shipping vessels is increasing, necessitating changes to ports and land transport networks to accommodate larger ships. Overall 'system' capacity will need to be optimised to deal with future demand. To maximise the benefits of a system-based approach to freight, it will be important to recognise the multi-modal aspect of long distance freight transport and to ensure that complimentary system-wide investment is made, including support for coastal shipping where appropriate and in efficient freight routes which connect sea and inland ports to the main urban centres.

8.9. Climate Change, Alternative Fuels and New Technology

Given the significant contribution of the transport sector to our carbon emissions, success in achieving climate targets will be strongly influenced by outcomes within the transport sector.

A significant technological change in road transport is underway through the adoption of alternative fuels and most notably electric vehicles, which will support the move towards carbon neutrality. Uptake to date has been slow, but it is likely to increase in coming years and decades. Cars and vans will increasingly be electric, with the potential to change the nature of the transport issues and opportunities facing New Zealand. KiwiRail's locomotive and ship replacement programmes are expected to result in more fuel-efficient vehicles, while considering opportunities for new low carbon fuel options or further use of electric power.

There is an opportunity for greater coordination between the transport and energy sectors. This could include ensuring adequate electricity generation and transmission capacity to support vehicle fleet electrification and realising opportunities such as vehicle batteries being used to manage the load on the electricity network.

8.10. Digital Networks

The electronic systems and digital networks which support the delivery of transport services, such as integrated ticketing, road information systems, and road management systems will become increasingly important both for transport users and agencies. In the longer term, connected and autonomous vehicles may bring even greater changes to the roads, with the potential to improve safety and free up driving time for work or leisure.

8.11. Changing Patterns of Work After Covid-19

As a consequence of Covid-19, the level of peak commuting trips in main urban areas may be lower than predicted in the future, with changes to the nature of work for some professional services as more people than previously could be expected to continue to work remotely (at least part of the time). Remote working may become a more normal way of working. This trend will require ongoing monitoring in the main urban centres.

9. Conclusion

There has been significant progress made in the transport infrastructure sector, with both increased capital investment and increased scope of investment across all modes. This includes significant new investment in rail, urban public transport, and active modes. Investment is also now expected to contribute towards achievement of a much broader range of outcomes, based around improving overall wellbeing.

Even with the significant increase in public sector investment over the past two decades, transport infrastructure provision continues to struggle to catch up from earlier underinvestment and keep pace with significant urban growth pressures. It will be important to ensure transport investment is well planned and funded on a sustainable basis over the long term, whilst maintaining a balance between service level expectation and affordability.

There is a growing understanding of the critical importance of the relationship between transport and land use. Transport investment can either support or undermine land use planning intentions. Initiatives now underway are designed to ensure a more supportive relationship. However, greater co-ordination of agencies will be required.

There is also a need to improve the planning and delivery of projects. Certainty of a future pipeline of work will be of enormous advantage to the transport planning and construction sectors, enabling investment in human and physical capital that will increase employment, productivity and potentially mitigate against excessive cost escalation.

The movement toward a system-based, mode-neutral, and longer-term approach to planning and funding the transport network is beneficial, given the many journeys that rely on multiple transport modes. Undertaking this with supporting changes to governance, ownership, and regulation to align the sector around a single system approach with common outcomes is an opportunity for further progress.

Due to its significant and rising contribution to New Zealand's carbon emissions, transport will play an important role in progress towards carbon neutrality, both through shifting freight and passenger travel to low-carbon transport modes, and through deploying electric vehicles and alternative fuels. The current road user charges system is well placed to ensure revenue raising is secure with the greater uptake of electric vehicles, but technology changes may offer opportunities to achieve better outcomes from this system.

Technology will also open up the opportunity of moving towards the use of pricing to manage demand on congested roads, which will help break the unaffordable cycle of new road capacity simply leading to more peak demand and the need for even more investment. Work is currently underway in Auckland to investigate the use of pricing to manage demand (The Congestion Question).

The focus on road safety has increased significantly over the last decade, but on an international basis New Zealand's performance on road safety does not compare very favourably, indicating that more progress is still needed here.

Ultimately, the integration of infrastructure with urban land use outcomes, the move to a genuine system-based approach to transport infrastructure (including energy for electric

vehicles), the adoption of demand management in conjunction with supply side investment, and the movement towards carbon neutrality will present some of the greatest challenges and opportunities for the future of transport infrastructure.

10. Appendix 1: Process, Assumptions, and Limitations

10.1. Our Process

This State of Play was developed between August 2020 and May 2021 drawing on publicly available information.

A full list of all literature cited can be found in the reference list.

Findings were cross-checked against the results of a survey of infrastructure asset owners, carried out by Mobius Research and Strategy Limited on behalf of Te Waihanga between September and October 2020, which asked about the issues, risks, and opportunities as perceived by asset owners across the sector.

On completion of the initial draft, we met with individuals from a range of organisations across the sector to get their views on a high-level summary of our findings, and to understand their thoughts on current challenges. We gratefully acknowledge the assistance provided by the Ministry of Transport, Waka Kotahi New Zealand Transport Agency, KiwiRail, Auckland Transport, and the New Zealand Airports Association, whose commentary and guidance has been invaluable.

Limitations

While every effort is made to ensure the accuracy of the information contained herein, Te Waihanga, its officers, employees and agents accept no liability for any errors or omissions or any opinion expressed, and no responsibility is accepted with respect to the standing of any firms, companies or individuals mentioned. Te Waihanga reserves the right to reuse any general market information contained in its reports.

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