COMPONENTS OF THE TRANSPORT SYSTEM: DEMAND AND SUPPLY

The transport system contributes to New Zealanders social and economic wellbeing by connecting people to work, education, recreation and each other, enabling social interaction. Delivering an integrated transport system that is well placed to meet New Zealand's future needs, will require consideration of how policy levers can be applied to influence both the demand for and supply of transport.

TRANSPORT DEMAND

Transport demand refers to the movement of people and goods in order to access opportunities or to satisfy a need. Key factors which impact the scale and shape of demand include:

Land Use

The use of land is the primary driver and shaper of transport demand. Different patterns of land use generate different patterns of transport demand. Changing the scale and density of land use directly impacts on the nature of transport demand, by determining the degree to which people need to travel in order to access jobs, education, services and facilities, and shaping the options they have for making those trips.

Increased land use density will generally decrease the demand for private vehicle travel and increase the demand for public transport and active modes. Conversely, in areas of low population density, transport options such as public transport networks may not be as viable and may mean that individuals are more reliant on private vehicles to meet their transport needs.

Cost of Transport

Cost is an important factor in shaping transport demand. Vehicle purchase and registration fees affect the number and type of vehicles purchased, while fuel prices and emission fees affect the type of vehicle used. A road toll may shift some trips to alternate modes, routes and destinations. Congestion pricing may shift travel times, mode choice and the total number of trips that occur. Residential parking fees are likely to affect vehicle ownership, while the cost and convenience of commuter parking influences peoples choices about how they travel to and from work. A time-variable parking fee can affect when trips occur.

All businesses are impacted by the cost of transport; particularly those who are involved with the movement of goods. The different costs associated with air, road and rail based freight movements for the type of good being transported are important considerations for businesses. An inefficient transport system with poor journey time reliability can also impose costs through lost productivity and missed opportunities

Regulation

Some of the regulatory settings which influence transport demand include the minimum age for acquiring a learner's licence, licensing of passenger vehicle services and rules regarding the weight of trucks. Ideally regulation should seek to minimise 'red tape' and enable innovation, this needs to be balanced with the requirement to keep customers and the transport system safe from harms.

Technology

Digital technology can be integrated with the physical environment, allowing customers to be connected to information, services and social networks. In this regard, technology can potentially shape transport demand by replacing the need to travel. While travel in light passenger vehicles has increased in recent years, New Zealand's travel per capita has decreased.[1] A reason for this is due to technological advances that allow for many activities (such as shopping, business transactions and social interactions) to be conducted online, reducing the need to travel.

Technology is increasingly enabling the provision of personalised transport services and real time information which helps users best decide how, when and where they travel. Technology can make travel more convenient, with easier connections. Integrated ticketing and payment options allow passengers to travel through cities on a single ticket with ease, encouraging the use of multiple modes. This provides the customer with flexibility and convenience, and makes public transport a more attractive option.

TRANSPORT SUPPLY

Transport supply refers to the provision of transport infrastructure, vehicles and services across all modes. The following sections outline key elements of the land transport supply by mode – road, rail, public transport and active modes. For each mode the text covers the current role played by that mode, current challenges facing the mode, and how the mode might evolve into the future

Mode neutrality

Mode neutrality means considering all transport modes when planning and investing, and basing decisions on the merits of each mode to deliver positive social, economic and environmental outcomes. Mode neutrality is about not having a preference for one mode over another. There are many options for delivering solutions to network problems. This may include specific transport infrastructure or delivering a change in type of transport demand or service people and businesses need. To do this our investment criteria and policy approach needs to look at the merits of each mode equally in terms of determining the best transport solution. It requires realising opportunities to increase the role for other modes that can provide appropriate services for customers while also delivering more sustainable environmental outcomes, and improved urban form outcomes.

Active Mobility (Walking and Cycling)

In 2015, walking made up 13 percent of total time travelled and 17 percent of the number of trip legs.[1] Older and younger people walk more than those between 25-64, and people with no car driver licence, no access to vehicles and on low income walk far more than others.[2] There is significant variation in walking mode share around New Zealand, with Wellington an exception in terms of its high rates of walking due to a higher inner city population.

Walking and cycling offers significant public health and environmental benefits, and support the creation of healthy, accessible and vibrant cities. They are the most affordable modes of transport and play an important role in providing choice to customers. However, since the late 1980s cycling trips have declined significantly.[1] Cycling's share of trip legs is only 1% nationally[1] with perceived safety and actual risk key barriers discouraging people from cycling.

Mode share for walking and cycling varies between centres, with land use patterns, the quality of networks and levels of service (comfort, perceived safety, convenience) influencing uptake. While current cycling numbers are relatively low there is high demand for better infrastructure. Research into customer attitudes and preferences indicates that people want to use bikes more. Seventy-five percent[3] of people in urban centres say that they would like to ride more if the network better met their needs.

The 2014-2018 Urban Cycleway Programme was designed to accelerate the development of cycling networks in urban areas across New Zealand, and improve safety (and perceptions of safety) for people on bikes. This investment of over $333m is having a positive impact on the number of people using bikes. Auckland, for example, has already seen an increase of 45,000 people using bikes in 2016 compared to 2015.[4]

Work with the Ministry of Health is improving understanding of the significant health benefits that result from active mobility, and how the transport system can be designed to better support positive health outcomes instead of compounding health problems through road trauma, air and noise pollution and physical inactivity. Work undertaken in 2010 estimated the annual national cost of physical inactivity at $1.3 billion.[5]

Challenges

The cycling network in our main urban areas still needs significant investment to meet customer needs. By the end of June 2018, cycling networks in New Zealand's larger centres will typically be only 25-40% fit for purpose in terms of providing safe connected journeys to key destinations.[6] Further investment and appropriatex land use decisions are necessary to give customers safe and convenient travel choices, and to improve access to key destinations such as schools, workplaces, urban centres, recreational facilities and public transport hubs.

There are challenges integrating new cycling infrastructure into existing roading and pedestrian networks. Reconciling vehicle and people movement (and parking) in urban areas often leads to conflicting modal priorities. Providing multi-modal transport networks with high levels of service for walking and cycling, and a high quality local environment, can conflict with the movement of vehicles. The layout of street networks and urban design treatment also influence uptake of active modes. Walking in particular relies on the availability of safe, convenient and comfortable routes to encourage participation. Delivery of these routes relies on careful integration between transport network, land-use and urban design.

Five focus areas for investment in cycling have been identified for the shorter term:

- target the completion and promotion of strategic urban networks in rapidly growing urban centres.
- continue to grow and connect safe urban cycling networks in regional centres.
- promote economic development through the provision of safe on-road links between the New Zealand Cycle Trail Great Rides and other cycle trails.
- encourage increased cycling, including through BikeShare schemes that are integrated with public transport networks and emerging Mobility as a Service platforms. Also encourage activities that maximise use of cycling infrastructure, such as engagement, education and promotion.
- lift the confidence and capability of cyclists, especially young cyclists entering the transport system for the first time.

New Zealand Cycling Network

Figure 01

Investment in walking follows similar principles to investment in cycling, focusing on safe and easy access to public transport hubs, and supporting local journeys within and surrounding activity centres.

The future

Bike share schemes and rapid growth in e-bikes have the potential to change how people get about, by improving access to cycling and the changing the cycling experience. Electric bike sales have doubled year on year since 2013 and grew by 13,000 between 2015 and 2016.[7] BikeShare schemes are being planned in Auckland, Wellington, Christchurch, and Queenstown and will feed into future Mobility as a Service and other travel demand management initiatives. The use of cycle counters to monitor the number of people using the cycling network will enable smarter, targeted investment.

Investment in measures to encourage new users of active modes and improve road user behaviour will continue to be important to complement infrastructure investment. A national cycling education system is in development and will be established in time for the 2018-21 National Land Transport Programme.

Walking is expected to increase, particularly in urban areas and activity centres targeted for intensification. In these areas the focus will be on creating high quality public spaces, and providing safe and enjoyable walking facilities. Additional focus areas will be supporting walking trips to and from school, and integration of walking with other modes, particularly public transport.

In new development areas getting the transport network right is vital to creating walkable neighbourhoods. Providing neighbourhoods with more route choices, more direct routes, and good proximity to core destinations is essential for increased walking.

Designing walking infrastructure for universal access will be important to ensuring that all users can move around our towns and cities safely and easily.

Public Transport

Public transport – generally considered to be public train, bus and minibus, and ferry services – provides mobility to a large and diverse range of customers. Like many developed cities of scale, New Zealand's largest and fastest growing cities rely on public transport, underpinned by a core rapid transit network. Although very few services are self-funding (and thus require public subsidy to supplement fares), the economic, environmental and social benefits conferred by public transport considerably outweigh the costs of providing it.

To provide safe, convenient door-to-door trips for users, public transport needs to be integrated with walking and cycling networks. This so-called 'first and last mile effect' of public transport is often considered another good opportunity to incorporate physical activity into everyday routines.

The reasons for providing public transport can be split into two broad categories, Rapid Transit and Accessibility.

Rapid Transit

Rapid transit refers to public transport services catering for the mass movement of people, particularly commuters. In larger urban centres limited space, significant road congestion, limited and expensive parking, and long commutes, make public transport the most efficient and effective transport mode for many journeys. Typically, high frequency urban buses, metro rail and ferry services cater for this demand.

Challenges

The provision of rapid transit services in New Zealand presents a number of significant challenges:

- servicing an increasing demand for rapid transit services in Auckland and Wellington. Each city has unique requirements, such as faster than expected population growth in Auckland. Key planned growth areas and future urban-zoned land are often a long way from employment and education centres, requiring public transport network expansion if high car reliance is to be avoided.
- insufficient corridor space in some parts of central Auckland, Wellington and Christchurch to accommodate growing demand for peak period bus services, with corresponding impacts on amenity and the quality of public spaces in surround areas.
- Christchurch has rebuilt in a more dispersed pattern following the 2010-11 earthquakes, and a revised network is required to optimise the capacity of urban transport networks and support the central city rebuild.
- Queenstown is experiencing strong growth in population and visitor numbers, and existing networks are increasingly at or exceeding capacity. Investigations into future transport needs will consider options for the mass movement of people between Frankton (including Queenstown Airport) and Queenstown town centre.
- affordability of large new infrastructure is a significant challenge for national and regional government, especially for new dedicated public transport networks such as busways, light rail transit, and metro rail.
- increasing customer expectations regarding the quality and convenience of services, including comfort levels, safety, accessibility of vehicles and connections to other networks.
- development and integration of new types of public transport such as Mobility as a Service, integrated ticketing and payment systems, and bike share schemes
- the ability of the regulatory and funding environment to support public transport to keep pace with the increasing rate of change and innovation.

Accessibility

In the context of public transport accessibility refers to the provision of services to enable people that are transport disadvantaged to access basic community activities and services, such as work, education, healthcare, welfare, shopping and social connections.

These people may not have access to a vehicle (or may chose not to own a vehicle), may be too young or too old to drive, or may be physically or legally unable to drive.

Challenges

The provision of accessibility services in New Zealand presents a number of significant challenges:

- the financial viability of supplying appropriate public transport services in smaller centres. Relatively small populations and dispersed land use patterns mean such services tend to have relatively low patronage and require high subsidies. These services often struggle to compete with car travel in areas that experience low levels of congestion and affordable (or in many cases free to the user) parking.
- traditional public transport services have focused on larger vehicles travelling on fixed schedules along set routes that don't necessarily align well with people's travel requirements,
- supporting access to essential services in ageing, rural communities
- increasing customer expectations regarding the quality and convenience of services, including comfort levels, safety, accessibility of vehicles and connections to other networks.
- development and integration of new types of public transport such as Mobility as a Service, integrated ticketing and payment systems, and bike share schemes
- the ability of the regulatory and funding environment to supports public transport to keep pace with the increasing rate of change and innovation.

The future

As well as traditional modes, emerging technologies and customer expectations indicate the future for public transport will be different from the past. Some of the influences we expect are:

- ongoing demand for rapid transit networks and services in the largest and fastest growing cities. Greenfield expansion and intensification, road network capacity pressure, as well as customer preferences will drive the need for significant improvements to public transport networks and services in large and growing cities.
- demand for access services is likely to remain strong, particularly as populations age and fewer people feel the need to hold driver's licences and own cars. This will be accompanied by increasing customer expectations for personalised journeys, better targeted to their needs.
- increased connectivity; increased access to information; rapidly evolving technology (sometimes called disruptive technology); increased awareness of environmental issues and expectations for solutions; and heightened customer demands will all shape the future of public transport. This environment will support and enable a range of innovations including:
- demand responsive services (often smaller scale and bespoke) that do not operate to a fixed route
- mobility as a Service (MaaS) – the integration of different modal choices into a single basket of transport services, for example public transport, cycling, ride share, hire car etc
- single payment channels to pay for all transport services
- increased integration of transport modes and networks, with a blurring between 'private' and 'public' transport.

These initiatives will make it easier for service providers to link across modes, increase choice, and make it easier for customers to access and pay for a range of transport options.

Rail system

The rail network consists of the main trunk line stretching from Auckland to Invercargill (connected across Cook Strait by ferry) with spurs to Northland, Bay of Plenty, Taranaki, Hawkes Bay and the West Coast. Rail serves all ports except for Northport (Marsden), Gisborne and Nelson.

The line from Auckland to Hamilton, the metro lines in Auckland and Wellington, and lines around Christchurch are double tracked. The remaining network is single track with passing loops.

The majority of the rail network is used for freight. Rail transports around 25% of New Zealand's exports and has a natural competitive advantage in moving heavy goods over longer distances.[8] Rail provides a considerably lower carbon alternative to freight transportation when compared with road, with 66% fewer carbon emissions per tonne of freight moved.[9] Almost half of freight tonnage is carried by rail in the Auckland-Hamilton-Bay of Plenty 'golden triangle'. Rail is a critical part of the supply chain for freight to the Port of Tauranga, New Zealand's largest export port.

The Auckland and Wellington metro rail networks are electrified, as is the section of the North Island Main Trunk Line between Hamilton and Palmerston North. The remainder of the network relies on diesel locomotives.

In Auckland and Wellington commuter rail services form an important part of the rapid transit system, particularly supporting movements into and out of the city centres. Across the metro networks, passenger numbers are increasing, particularly in Auckland, driven by service and infrastructure improvements, population growth, and congestion on other networks.

Rail provides some of the most acclaimed luxury tourism journeys in the world via "The Great Journeys of New Zealand", and carries an increasing number of tourist passengers each year.

These three long distance passenger services are:

- Auckland to Wellington (Northern Explorer)
- Christchurch to Greymouth (TranzAlpine)
- Picton to Christchurch (Coastal Pacific – not operating at time of publication due to Kaikoura Earthquake)

National Rail Network

Figure 02

Challenges

Current operational challenges for rail include:

- continuing the South Island Main Trunk Rail Line rebuild effort (Kaikoura Coast) to move goods in the South Island, reconnect communities and ensure New Zealand has an efficient rail network across both islands.
- servicing increased commuter and freight demand on urban networks, particularly in the Auckland region
- maintaining a strong focus on safety including improvements in level crossings. Safety for vehicles, cyclists and pedestrians at level crossings remains a high priority – particularly in Wellington and Auckland with higher numbers of commuter train movements
- building resilience in the network – including planning for extreme weather events and climate change

Rail also faces a number of strategic challenges including:

- clarification of the role of rail within an integrated transport network including the planning, funding, resourcing and value of rail within New Zealand.
- increasing modal share and building on rail's role as a sustainable transport solution, and providing an alternative solution to increasing traffic congestion in urban areas
- working across the transport sector to facilitate integrated transport planning and maximise the value and utility delivered by each mode.

The future

Rail will continue to play a key role in supporting the growth in New Zealand's export trade agenda and providing resilience to the broader transport network.

Rail's existing points of difference are likely to remain: separate corridors, unobstructed access to key freight hubs, low carbon emissions, and its role in reducing road maintenance and upgrade costs, and easing traffic congestion. The ability to provide additional freight capacity on key routes across the network is a prime opportunity for future growth.

In addition, there are expectations of servicing increasing future demand for rapid transit in the metropolitan areas of Auckland and Wellington in the short to medium term. Particularly in south Auckland there will be scope to extend commuter services to support population growth areas.

Exploring and understanding opportunities for rail, both for inter-regional tourism, but also for inter-regional passenger services will be necessary to see what choice and efficiencies can be gained for customers in the future.

Road

Roads are currently the backbone of New Zealand's domestic transport system, supporting journeys by private motor vehicle, heavy vehicle, bus, and bicycle, and on foot. Road corridors also facilitate other important infrastructure including water, power, gas and telecommunications networks.

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

The state highway network connects all the main population centres, sea ports and airports and is one of the country's most important pieces of infrastructure. It makes up 12 percent of New Zealand's total road network [9] but carries 50 percent of the vehicle traffic.

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

The local road network provides coverage across urban and rural areas, and most journeys start and end on the local road network. The local road network is critical to enabling local journeys and connecting the primary sector to wider distribution networks.

The road network supports the majority of freight movements around the country. Road tonnage per kilometre has been increasing over time, up from 19 billion tonne km in 2005/06 to 23 billion tonnes km in 2014/15.[1] This accounts for 84 percent of the total land movement of freight.

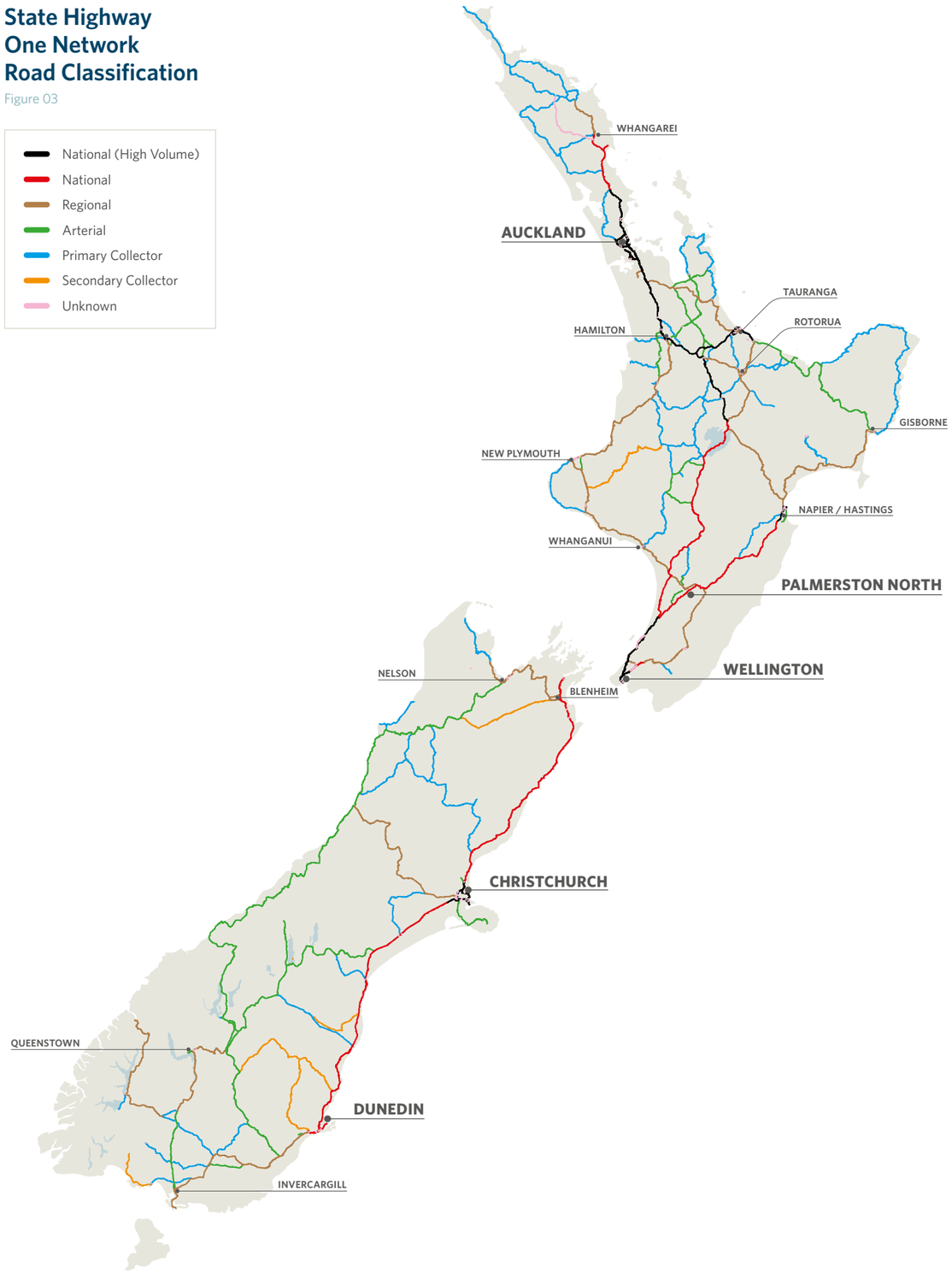
Challenges

Current challenges facing road transport in New Zealand include:

- an ongoing need to reduce harm and fatalities on our roads.
- supporting residential development in high growth urban areas, and associated issues of affordability and liveability.
- increasing transport demand tied to population growth and increased economic activity (including tourism), resulting in congestion and poor travel time reliability, in part because of reliance on the private motor vehicle
- ensuring inter-regional routes have an appropriate level of service. These corridors need to be reliable, resilient, fit for purpose and safe, despite challenges of topography, geology and seasonal impacts.
- ensuring network resilience is actively managed to minimise the risk, occurrence and impact of disruptive events with significant negative social and economic consequences.
- allocation of road space to different modes in urban areas (including provision of parking on street)
- the maintenance of networks and appropriate levels of service in those parts of the country forecast to experience population decline

State Highway One Network Road Classification

Figure 03



The Future

Ongoing population growth will increase demands on the transport system, although the growth will be greater in some parts the country. It is projected that New Zealand's population will reach 5.9 million people by 2043[11] with the main urban centres taking the majority. Supporting this growth will require integrated land-use and transport planning, some network expansion, as well as getting more from existing networks.

Societal changes such as an ageing population and growing participation of older people in the workforce could result in more driving by older New Zealanders, but potentially fewer by younger people who have had a lower rate of applying for their driver licence over recent years.

Technological changes are expected to have a significant impact on how New Zealand's road network is utilised, though timeframes are dependent on many interacting factors including New Zealand's comparatively slow rate of private vehicle turn-over (the current average age of the light passenger vehicle fleet is 14.3 years).[1] In the near term, increasing use of technology for network management presents an opportunity to get a lot more out of our existing road networks.

Personal access to data is increasing customer's ability to plan travel and make informed choices. Mobility as a Service (MaaS), automated ticketing and ride sharing will give customers many different transport options based on time, cost and quality. Electric vehicles will need new infrastructure. Technology can enable smarter transport pricing to help manage demand and get more from existing infrastructure.

In the longer term, connected and autonomous vehicles may deliver increased throughput and make travel time more productive, though these vehicles could also result in increased travel demand. Safety related technologies could bring significant benefits to road users.

Climate change is expected to impact the road transport system. Increased consumer demand for low-carbon transport, electric vehicles, public transport services, and walking and cycling facilities is expected. Climate change may require a review of the location of some roads to reduce vulnerability to flooding and landslides from weather events. With sea levels forecast to rise, coastal erosion and inundation in low lying coastal areas will increase the need for repairs, relocation and preventative measures.

Maritime and Aviation Transport Networks

While the View is focused on the land transport system, it needs to be informed by an understanding of the current and potential role of maritime and aviation transport. This is because ports and airport are key drivers of demand for the land transport system. The View is not the appropriate document to discuss and determine the future direction of the maritime and aviation transport, but it will be informed by any available insights from other sources.

Maritime Transport

As an island nation, coastal shipping and ports are vital to our transport system. Ports are the access point for much of the country's imports and exports, while coastal shipping moves bulky items, particularly longer inter-island movements. The Cook Strait ferry services are a critical link between the North and South Islands for both passengers and freight.

Coastal shipping provides an important means of moving large, bulky items (such as oil, logs, cement and fertiliser) on longer inter-regional journeys within New Zealand. Coastal shipping carries an estimated 14% of all freight tonne kilometres travelled in New Zealand and 2%[1] of tonnage. Coastal shipping adds resilience to the overall transport system by providing additional options and capacity.

Major coastal ports include Northport (Whangarei), Tauranga, Auckland and Lyttelton. Land transport connections to these ports are some of the most important corridors in the New Zealand transport system.

Inland ports continue to develop in New Zealand. They play an important role in the sorting and distribution of freight away from sea ports, freeing up constrained port land for core maritime activities. Key inland ports include Southdown, Wiri, Ruakaka and Rolleston. These facilities influence the type of transport mode that freight is distributed on, so it is vital for them to be located appropriately to ensure a choice or ability to use different transport modes i.e. road freight and rail, or air.

Ports are important for the movement of people. New Zealand currently has commuter ferries in Auckland, Tauranga, Wellington and Christchurch. These ferries remove the commuter from road based travel, helping to reduce peak hour congestion. The country's ports are also used for cruise ships, providing a key tourism link for visitors.

Globally there is a growing trend of using larger ships to move international freight. That trend is emerging in New Zealand and is expected to continue, potentially changing patterns of port use around the country as import/export freight functions (particularly containerised freight) are consolidated in fewer ports. This would result in some types of export freight needing to move longer distances (either by land or coastal shipping) to fewer destinations, namely larger consolidation centres and major container ports.

At present the majority of imports arrive via the three northern-most ports. This trend is expected to continue given these ports are closest to our trading partners, and are well positioned to serve the largest domestic markets located in the upper North Island.

Aviation

The majority of international visitors to New Zealand arrive by air, through Auckland, Christchurch, Wellington, Queenstown and Dunedin airports.

The number of international visitors has increased dramatically in recent years, jumping from 2.6 million in 2011 to 3.5 million in 2016.[1] The increase in New Zealand's visitor numbers impacts how airports connect to the transport system. Airport facilities have undergone or will undergo upgrades to infrastructure to cope with growth in passenger numbers, improving transport connections for many of these centres.

Domestic air travel also plays an important role in supporting business and personal trips within New Zealand. Air travel is increasingly replacing land based trips for longer trips between cities and between the North and South Islands.

Air transport is suited to high value, low volume freight, so while air freight accounts for only 1% of freight movement by volume, by value it represents 22% of imports and 16% of exports (to end of June 2016).[1] Auckland Airport receives the most of New Zealand's air freight (87%), followed by Christchurch, with only a small amount through Wellington.[1] Providing reliable land transport connections to airports is important to enable the movement of people and goods, and supporting the New Zealand economy.

Advances in drone technology will force greater integration of the aviation and land transport systems, with drone movements within towns and cities likely to utilise existing land transport corridors. Appropriate regulatory settings and infrastructure will be required to help ensure the safety (and amenity) of people, vehicles and property on the ground.

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