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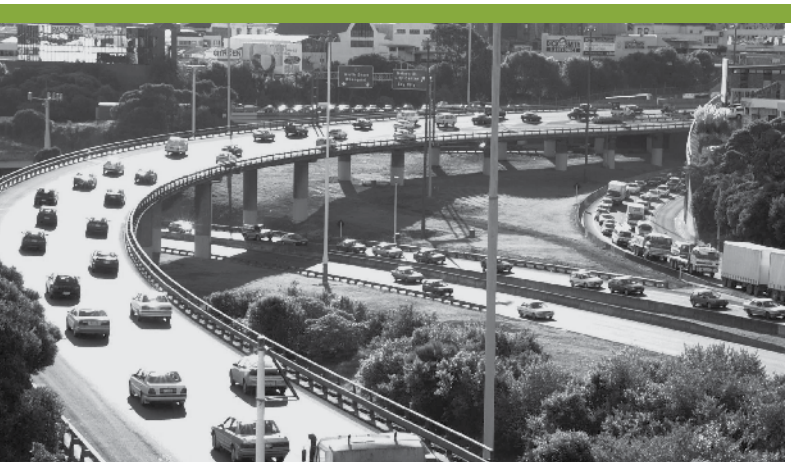
Auckland Transport Alignment Project

Foundation Report



Ministry of Transport
TE MANATŪ WAKA

THE TREASURY
Kaitohutohu Kaupapa Rawa

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Auckland Transport

STATE SERVICES COMMISSION
Te Komihana O Ngā Tari Kāwanatanga

NZ TRANSPORT AGENCY
WAKA KOTAHI

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Executive Summary

The challenge in a nutshell

Auckland plays a critical role in New Zealand's current and future prosperity. It is the country's major centre of population and economic activity. Auckland's large and growing labour market provides opportunities to bring together complementary skills, enable specialisation of activities and a sharing of ideas that supports innovation and productivity.

Transport networks play a vital role in successful cities. It enables access to all the opportunities that the city can provide, including connections to overseas markets. Auckland requires a well-functioning transport system to make the most of its opportunities.

The scale and location of the population and employment growth creates a challenging transport future. Medium growth projections will see Auckland's population increase by over 700,000 over the next 30 years (approximately half again from current levels) and the number of jobs increase by over 270,000.

This growth offers a range of opportunities to improve productivity and prosperity. It adds vibrancy and diversity, which makes Auckland a more exciting and attractive place to live and invest. But growth also presents a host of challenges. The travel demands of a growing population places pressure on Auckland's transport networks. This lengthens travel times, increases variability and reduces access.

The challenge for transport is to identify opportunities and proactively respond to the pressures arising from growth, to deliver economic, cultural, environmental and social benefits to Auckland and New Zealand as a whole. However, this outcome cannot be achieved at any cost. Wise investment will be required to maximise the value from every dollar spent.

What is the Auckland Transport Alignment Project?

The Government and Auckland Council recognise the importance of Auckland's economic success to the national economy. As joint transport investors, they have a shared interest to ensure value for money from transport investments. To this end, the Government and Auckland Council have agreed on the need to improve alignment on a long-term strategic approach to transport in Auckland.

The Auckland Transport Alignment Project aims to align the strategic approach by testing whether better returns can be achieved from transport investment. This includes improvements in the areas of access to employment, congestion results, and public transport mode share. There would also need to be improvements to net benefits from any increase in financial costs.

This foundation report is the first of three project deliverables. It includes:

- An overview of the strategic context for the project and the current transport situation in Auckland
- An outline of future trends and agreed assumptions for the project
- The evaluation framework used to test how different options support the project objectives
- An assessment of future transport challenges.

Where are we now?

Auckland's geography presents a number of major transport challenges and opportunities. Infrastructure and demand are focused into a small number of narrow corridors, leading to congested pinch points across the transport network. Auckland's relatively dispersed employment creates challenges for the efficient provision of public transport.

Over the past decade there has been a very significant increase in transport investment by Government and Auckland Council. Large parts of Auckland's motorway network have been expanded or improved and other major projects are nearing completion. Significant investment in public transport has also taken place, including electrification of the rail network supported by a new fleet of electric trains, substantial bus service improvements and the introduction of a single electronic ticketing system across the public transport network.

These investments have yielded positive results. Although Auckland's population has grown by nearly 300,000 since 2003, traffic surveys indicate that overall peak period congestion has not increased over that period, although inter-peak congestion has become a more serious issue. Public transport use has also increased substantially over the past decade, growing from 50 million to over 80 million annual boardings.

On some metrics, such as the level of inter-peak congestion and the use of walking and cycling, Auckland's transport performance compares well against major Australian cities. However, in other areas Auckland lags behind: particularly its travel time reliability, public transport mode share and overall labour pool access.

Recent transport investments have helped to avoid some of the negative transport consequences of Auckland's recent growth. Continuing on this path will not be easy, as many of the most obvious investments in Auckland's transport system are now complete. The next generation of transport investments will be more challenging, as they will need to be integrated with established uses and generally do not have available corridors set aside.

What does the future hold?

This project has a 30-year planning horizon and therefore relies on a number of assumptions about the future. Uncertainty about the assumptions and their impacts increases the further the project looks out.

The scale and location of population and employment growth is a critical factor influencing Auckland's future travel demand. Two key growth trends are at the heart of Auckland's future transport challenges:

1. Population growth is spread throughout Auckland's urban area and extends into major future urban growth areas to the north, northwest and south. Nearly a third of population growth is projected to occur in areas beyond 20km of the city centre.
2. Employment growth is highly concentrated in a few locations, particularly the city centre, the airport and other regional metropolitan centres. Over a third of employment growth is projected to occur within 5km of the city centre. The growth in service sector jobs, which tend to locate in major centres to benefit from agglomeration, is a key factor behind the projected concentration of employment growth.

Auckland's freight task is projected to increase by 78% over the next 30 years, with a significant majority of freight and commercial travel consisting of internal distribution within Auckland. Continued strong growth in travel demand to and from the port and airport will place pressure on Auckland's transport network connecting people and goods to the rest New Zealand and its overseas markets.

Transport and communications technologies are changing quickly. New vehicle technologies, big data applications, ride-sharing and car-sharing technologies have the potential to make far-reaching changes to the way in which we travel. These could have potentially significant impacts on future travel demand, and the safety, efficiency and capacity of our transport networks. However, there is considerable uncertainty attached to the nature and timing of technological developments in the New Zealand context, and the resulting impacts on the Auckland transport system.

A key challenge for the project is to identify strategic approaches that are able to respond to future opportunities, while maintaining the flexibility to adapt to potential changes in demand, technologies and behaviour as they emerge. Future stages of the project will seek to understand future sensitivity to these variables by testing alternative future scenarios. It will also consider how different transport interventions can retain sufficient flexibility to respond to changing circumstances.

Evaluating alternatives and measuring success

The project has arisen from a desire to achieve better returns from transport investment and deliver the best possible value for money, particularly in relation to four key objectives: accessibility to employment and labour, congestion, public transport mode share, and ensuring net benefits to transport users from increased financial costs. An evaluation framework has been developed to test how different intervention packages perform against these objectives.

The table below shows the objectives and measures that will be used to measure success. The measures are supported by a set of key performance indicators. The evaluation framework recognises the project objectives alone will not achieve all outcomes sought from transport investment and therefore also includes measures relating to other important outcomes.

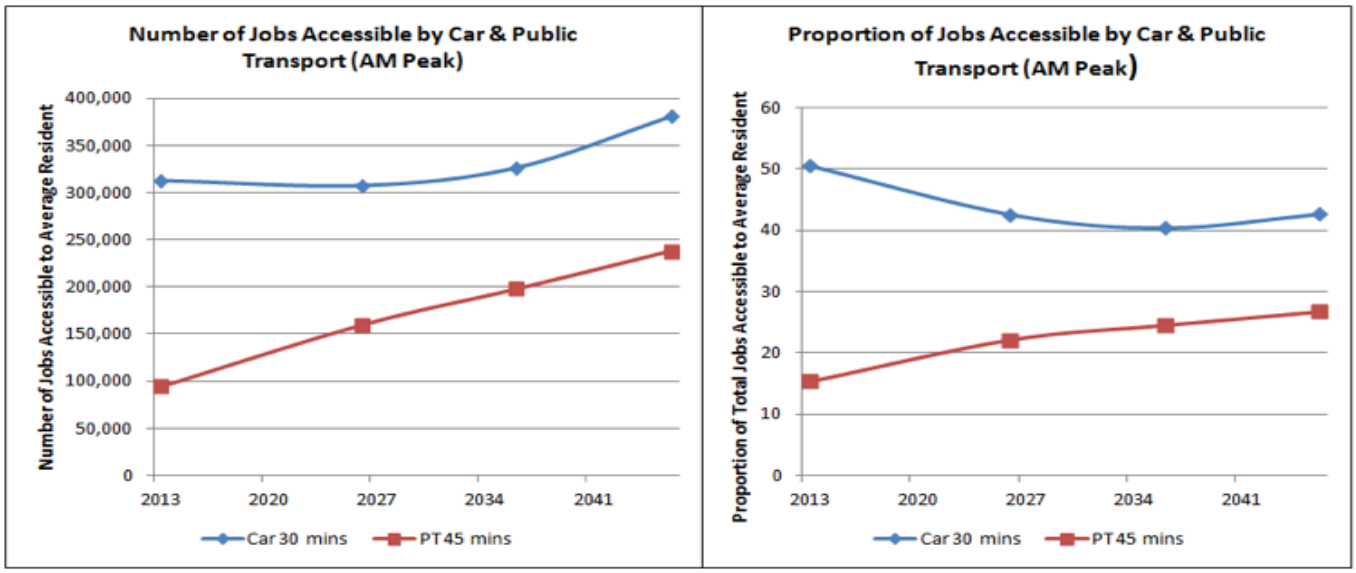
Objectives	Measures
Improve access to employment and labour	• Access to employment and labour within a reasonable travel time
Improve congestion results	• Impact on general traffic congestion • Impact on freight and goods (commercial traffic) congestion • Travel time reliability • Vehicle occupancy
Increase public transport mode share	• Public transport mode share • Public transport mode share where it impacts on congestion
Ensure net user benefits from transport investment	• Net benefits to users from additional transport expenditure
Ensure value for money	• Value for money
Achieve other key outcomes	• Enabling growth • Safety and greenhouse gas emissions • Asset condition • Distribution of costs and benefits by area • Network resilience

Understanding the problem

To gain a better understanding of the problems, an assessment of the future performance of the current 30-year transport plan (the Auckland Plan Transport Network - APTN) was undertaken. The assessment focused on the future performance in 2026, 2036 and 2046 against key project objectives.

Analysis of the APTN against key indicators shows mixed results. There is a projected deterioration in private vehicle accessibility and a related increase in congestion up to 2036. This leads to little overall growth in accessibility by private vehicle until the 2030's. The role of public transport in providing access to employment grows throughout the next 30 years, but with a slower rate of growth beyond the next decade.

These region-wide access trends are shown in the graphs below:



Within Auckland there are important sub-regional differences. Generally, the central (isthmus) area benefits the most while other parts of Auckland experience a much more mixed and patchy transport future. The west and south appear to face the greatest private vehicle access challenges into the future and are also the areas where public transport improvements appear most muted.

With more than a million people projected to be living in the western and southern parts of Auckland by 2046, higher levels of deprivation and a number of key future urban growth areas, the wider impacts of these areas being at least partly excluded from the benefits of Auckland's expanding employment base over the next 30 years are potentially significant.

Congestion is projected to become more widespread and severe over the next 30 years due to increasing travel demand. This is particularly evident on the motorway network and occurs at both weekday peak and inter-peak times. As congestion increases travel time variability is also likely to grow.

An increase in public transport mode share occurs broadly throughout Auckland over the next 30 years, reaching 15% of all peak-time trips by 2046. Improvements are unevenly spread, with a particularly low level of mode share growth occurring in the south. For large parts of the overall transport task, particularly in outer areas of Auckland, public transport's role is not projected to notably increase under the APTN.

Next Steps

The project's next phase will involve testing packages of interventions (including projects, services and policies) to understand how well they contribute to addressing the problems that have been identified. In addition to investments in infrastructure and services that increase system capacity, the project will also assess demand-side interventions that could improve the productivity of the existing transport system.

The analysis to date suggests a need to focus on addressing the following issues:

Access to employment and labour

- an overall decline in access to employment by car between 2013 and 2036, particularly in the west and south
- a low level of improvement in public transport access for people in the south and west, for accessing jobs in the south, and the slowing of public transport access improvements beyond 2026
- the extent to which transport interventions alone can improve access to employment

Congestion

- increased levels of congestion between 2013 and 2036, particularly on the motorway network
- key bottlenecks on the motorways and local road network which impact on overall accessibility and trip reliability

Public transport mode share

- investigation of options to increase public transport mode share, particularly attracting longer trips off the motorway network to reduce congestion
- the low level of public transport mode share growth in South Auckland, particularly in the first decade.

The project's next phases will also look how packages perform against providing value for money, net benefits to users and the other key outcomes identified in the evaluation framework.

Part 1
Introduction

1.1. Auckland's Transport Challenge

New Zealand's cities are homes to most of our population, centres of culture, recreation, social activity and education. They contain our key transport hubs, including those providing access to the rest of the world.

Fundamentally though, cities are centres of economic activity. Their large labour markets bring together complementary skills, enable specialisation of activities and a sharing of ideas that ultimately supports growth and innovation. As a consequence, larger cities with larger labour markets are generally more productive than smaller cities. Broadly speaking, as the effective density of a city doubles, the productivity of its working population increases by 3-8%[1,2].

Transport networks play a key role in cities, enabling access to all the opportunities that a city might provide. Developments in transport networks and technologies have been fundamental in ensuring cities continue to benefit from growth even as their physical size and intensity of demand for travel increases. However, enhancing transport networks and services generally requires significant public investment. Therefore, transport investments, policies and services need to carefully balance supporting a city's wider social, economic and environmental outcomes while delivering value for money.

The Auckland growth opportunity…

Auckland is growing rapidly in New Zealand terms. While population forecasts carry an inherent element of uncertainty, a medium growth rate over the next 30 years would see Auckland's population increase from 1.5 to 2.2 million (approximately 50%). The number of jobs is expected to increase from just under 600,000 to over 850,000 (approximately 40%).

This growth offers the opportunity to capitalise on the benefits of a larger and more diverse labour force, particularly the potential for greater productivity to help maintain and improve the prosperity of New Zealand relative to other major OECD nations. More widely, a growing population will add vibrancy to the city and a greater diversity of social and cultural opportunities, making Auckland a more exciting and attractive place to live.

….and challenges

Realising these benefits from growth is however not assured. Growth presents a host of challenges to a city's infrastructure and the lifestyle of its population. In the transport sector growing demand places pressure on transport networks, reducing performance and creating congestion. Left unchecked or without alternatives for travel, congestion may limit or even reduce the opportunities that a growing city can practically provide to its residents.

The challenge for Auckland's transport system is to at least keep pace with the city's growth, thereby delivering economic, cultural and social benefits to Auckland and New Zealand as a whole. This outcome cannot, however, be achieved at any cost. Wise investment will be required to maximise the value from every dollar spent and avoid simply transforming the costs of growth, such as congestion, directly into a fiscal cost to be borne by ratepayers and taxpayers.

1.2. Background

The Government and Auckland Council both recognise the importance of Auckland's economic success to the national economy. As joint transport investors, they also have a shared interest in ensuring value for money from transport investments. To this end, Government and Auckland Council have agreed on the need to develop an agreed strategic approach that delivers better returns from transport investment than current plans. This challenge has given rise to the Auckland Transport Alignment Project ("the project").

In early 2015 Auckland Council completed consultation on two transport networks: the 'Basic Transport Network' and the 'Auckland Plan Transport Network' as well as options for how the additional expenditure required to deliver the 30-year Auckland Plan Transport Network would be funded. From 2018, Auckland Council estimates that an additional $300 million per year would be required to deliver the Auckland Plan Transport Network.

The Government is committed to ensuring Auckland's transport system is able to meet the city's needs and recognises Auckland will likely need additional investment in transport infrastructure in the coming decades to provide for its significant forecast growth. Before considering additional funding or funding tools, however, the Government wishes to ensure that the future transport programme addresses Auckland's transport challenges and provides value for money.

The purpose of the project, therefore, is to improve alignment between the Council and Government over the way Auckland's transport system should develop.

Project Objectives

The focus of the project is to test whether better returns from transport investment can be achieved in the medium and long-term, particularly in relation to the following objectives:

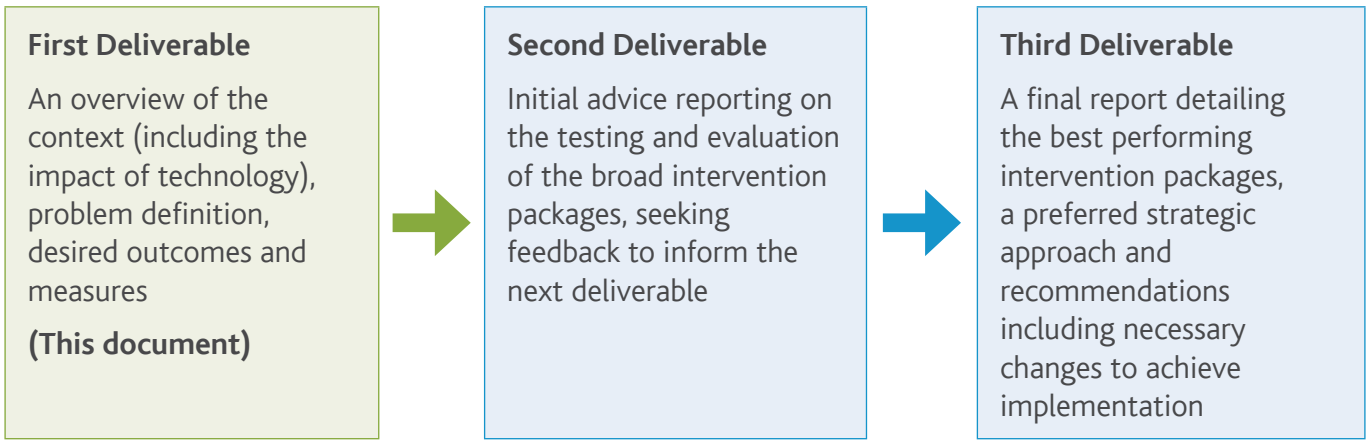
i. To support economic growth and increased productivity by ensuring **access to employment/ labour improves** relative to current levels as Auckland's population grows

ii. To **improve congestion results**, relative to predicted levels, in particular travel time and reliability, in the peak period and to ensure congestion does not become widespread during working hours

iii. To **improve public transport's mode share**, relative to predicted results, where it will address congestion

iv. To ensure any increases in the financial costs of using the transport system **deliver net benefits to users** of the system

The project involves Auckland Council, Auckland Transport, the Ministry of Transport, the New Zealand Transport Agency, Treasury and the State Services Commission. It has three major deliverables:



This foundation report comprises the first deliverable. It includes the following sections:

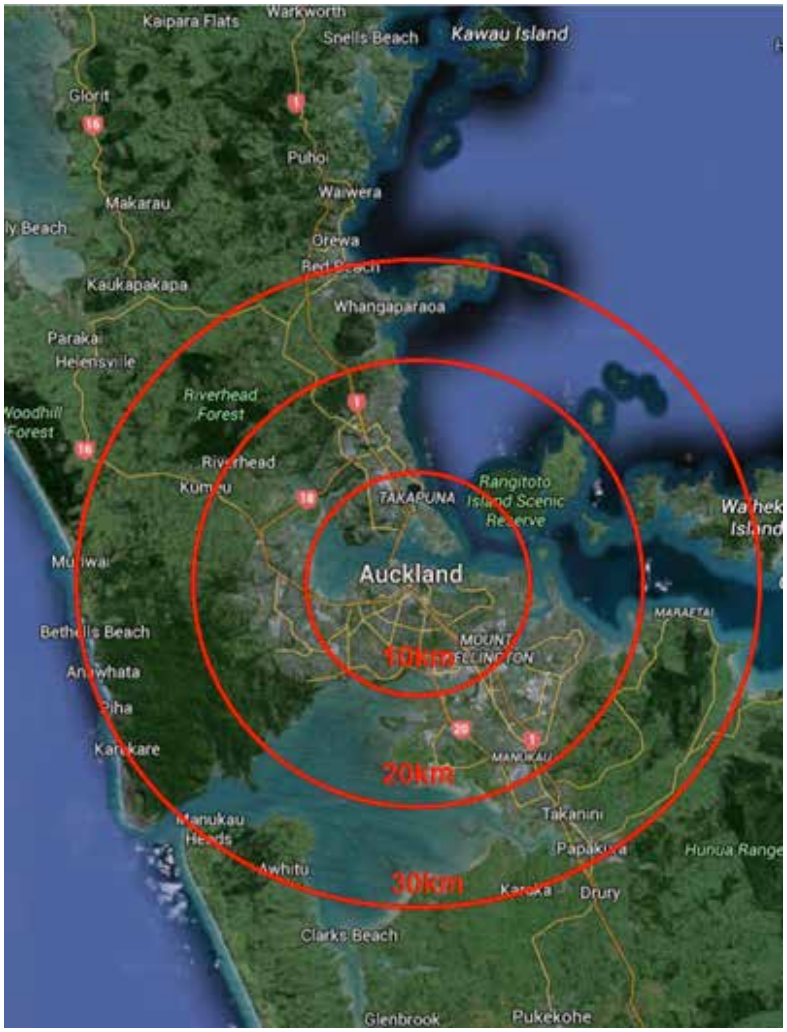
- A summary of Auckland's current transport situation, including recent trends and how Auckland compares with similar cities internationally.
- An outline of future trends that will impact on Auckland's transport system, including growth, changing land-use and travel trends. Uncertainties with future trends are also discussed, including from the impact of changing technology on transport.
- An evaluation framework to test an intervention's (or combination of interventions) contribution to desired outcomes
- A presentation and description of key problems for future stages of the project to focus on, through analysis of forecast results of the Auckland Plan Transport Network.

This report will guide the development and assessment of intervention packages (combinations of transport projects, services and policies) to inform the subsequent project deliverables.

Part 2
Auckland's Current Transport Situation

2.1. The Challenge of Geography

Auckland is a challenging city from a transport and urban growth perspective. Auckland's geography, particularly the location of its harbours, has constrained the city's growth in many directions – limiting opportunities for development in the centre. This has stretched the main urban area to nearly 50 kilometres north-south and over 30 kilometres east-west. A substantial proportion of the area within even 20 kilometres of the city centre is water, as shown below.



Auckland's north-south stretch gives the impression of a sprawling, low density city but this is only partly the case. Geographical constraints have concentrated development, particularly over the past 40 years. In comparing Auckland to Australasian cities, Melbourne has a similar density, with only Sydney being significantly denser than Auckland.[3]

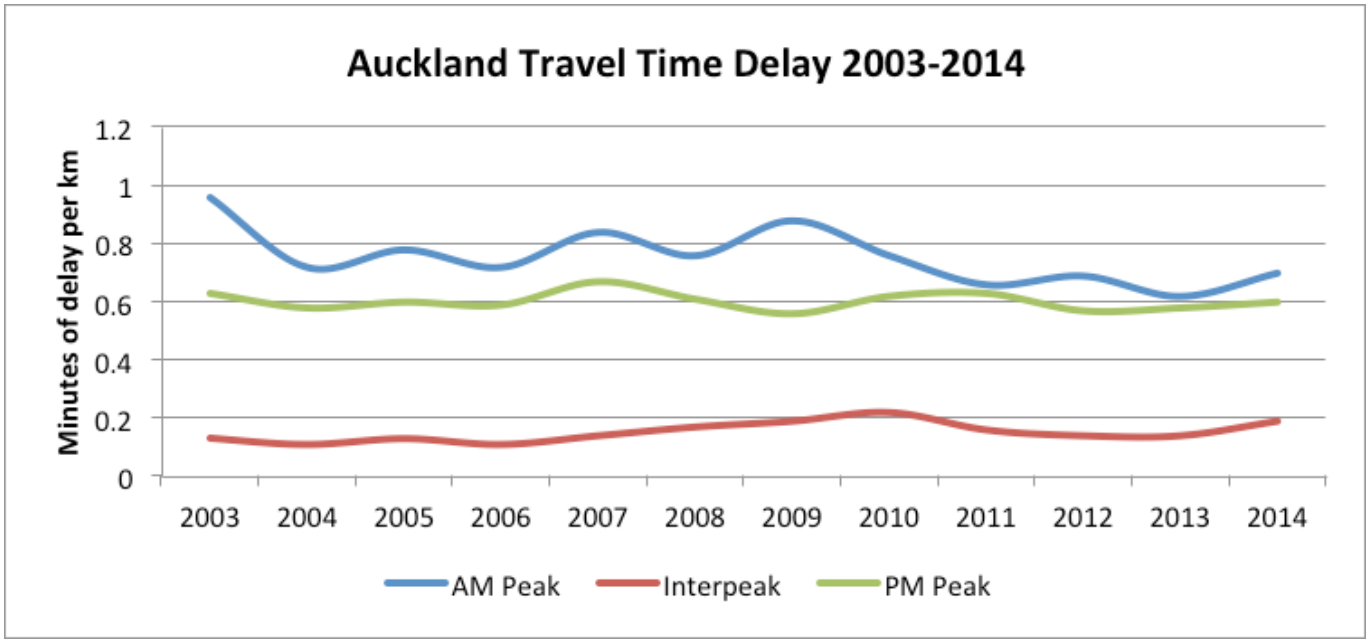
Auckland's geography presents a number of major transport challenges and opportunities. Infrastructure and demand are focused into a small number of narrow corridors, leading to congested pinch points across the transport network. Conversely, this concentration of demand should be well suited to supporting high capacity public transport systems – although Auckland's relatively dispersed employment creates challenges for the efficient provision of public transport.

2.2. Recent Progress

Over the past decade there has been a very significant increase in transport investment by Government and Auckland Council. Large parts of Auckland's motorway network have been expanded or improved and the imminent completion of the Western Ring Route will provide an alternative to State Highway 1 between Albany and Manukau. A number of major local roading improvements have also been progressed, including early stages of the Auckland Manukau Eastern Transport Initiative (AMETI) project, upgrades to many arterial routes and new connections such as Highbrook Drive in East Tamaki.

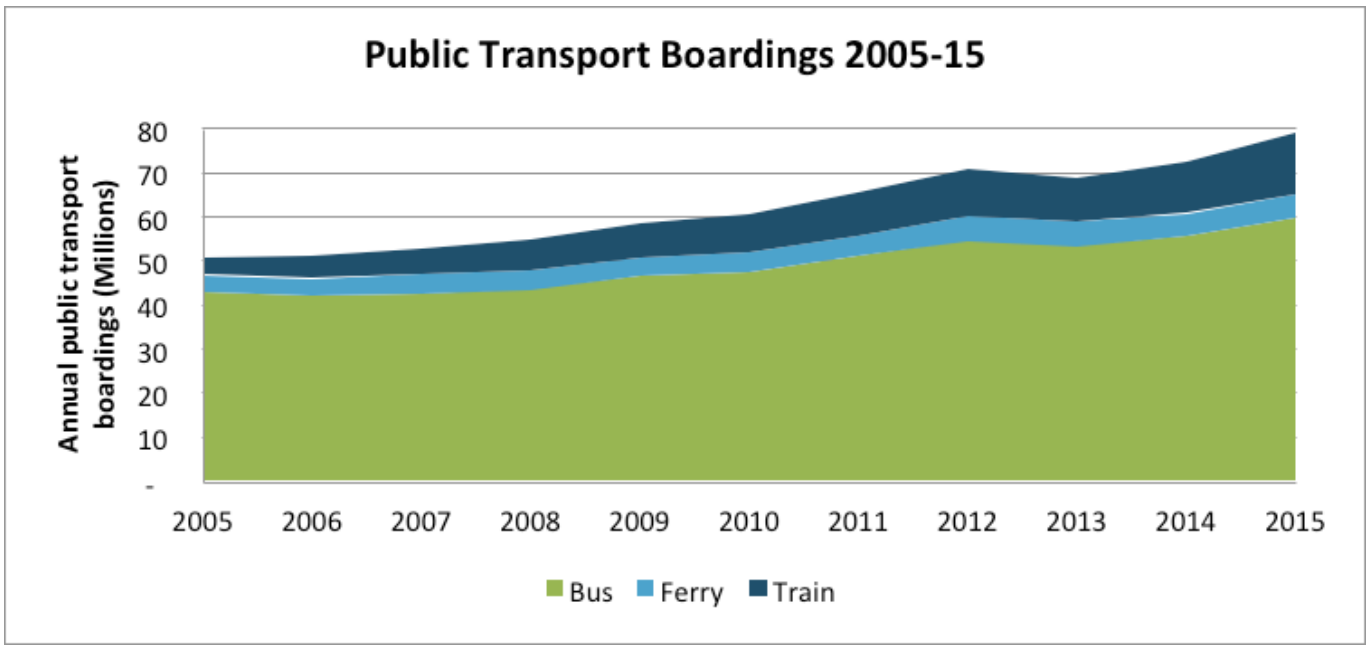
Significant investment in public transport has also taken place. The rail network has been electrified, upgraded and supported by a new fleet of electric trains. The Northern Busway has substantially improved bus operations from the North Shore; there has been expansion of the bus lane network, substantial service improvements and the introduction of a single electronic ticketing system across the public transport network.

These investments have yielded positive results. Although Auckland's population has grown by nearly 300,000 since 2003, traffic surveys have shown a general reduction in congestion during the morning peak and no increase in the evening peak[4]. However, Auckland-wide average measures such as these need to be treated with caution, as they can mask some significant variations between different locations and at different times. There is evidence that travel time variability has increased, especially during the evening peak; and inter-peak congestion has continued to increase over the past decade.



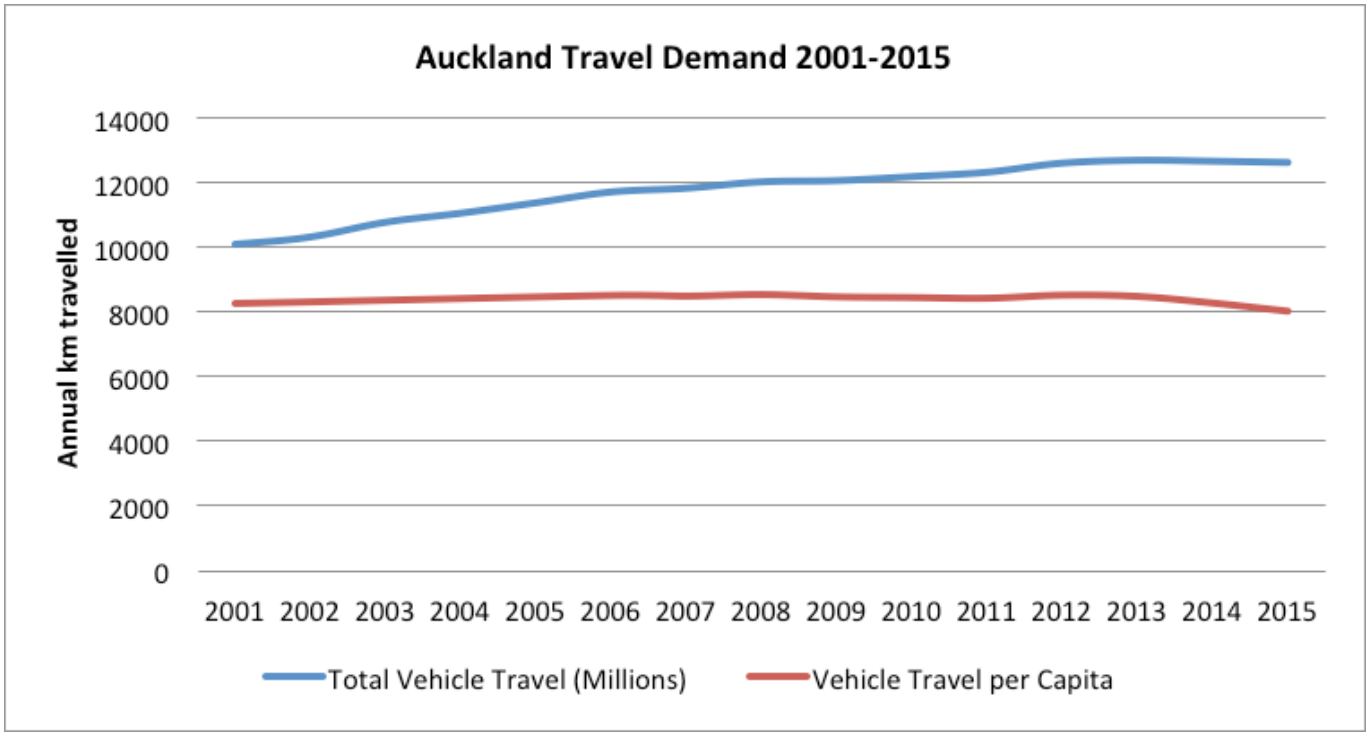
Source: NZTA/Beca Travel Time Surveys

Public transport use has also increased substantially over the past decade, growing from 50 million to over 80 million annual boardings. There has been an increase in public transport mode share for journeys to work (although the proportion of drivers has remained unchanged) and more people at peak times now enter the Auckland city centre by public transport than private vehicle.



Source: Auckland Transport monthly data

Growth in vehicular travel has slowed over the past 10 years, compared to decades of previous growth in both total and per capita travel. Since 2006 per capita annual travel has slightly declined. However, this decline in per capita travel has been outweighed by population growth and total annual travel has increased by approximately 980 million kilometres (8.4%) between 2006 and 2013, as shown below[5]:



Source: Ministry of Transport and NZTA travel demand data

Key Recent Progress Findings:

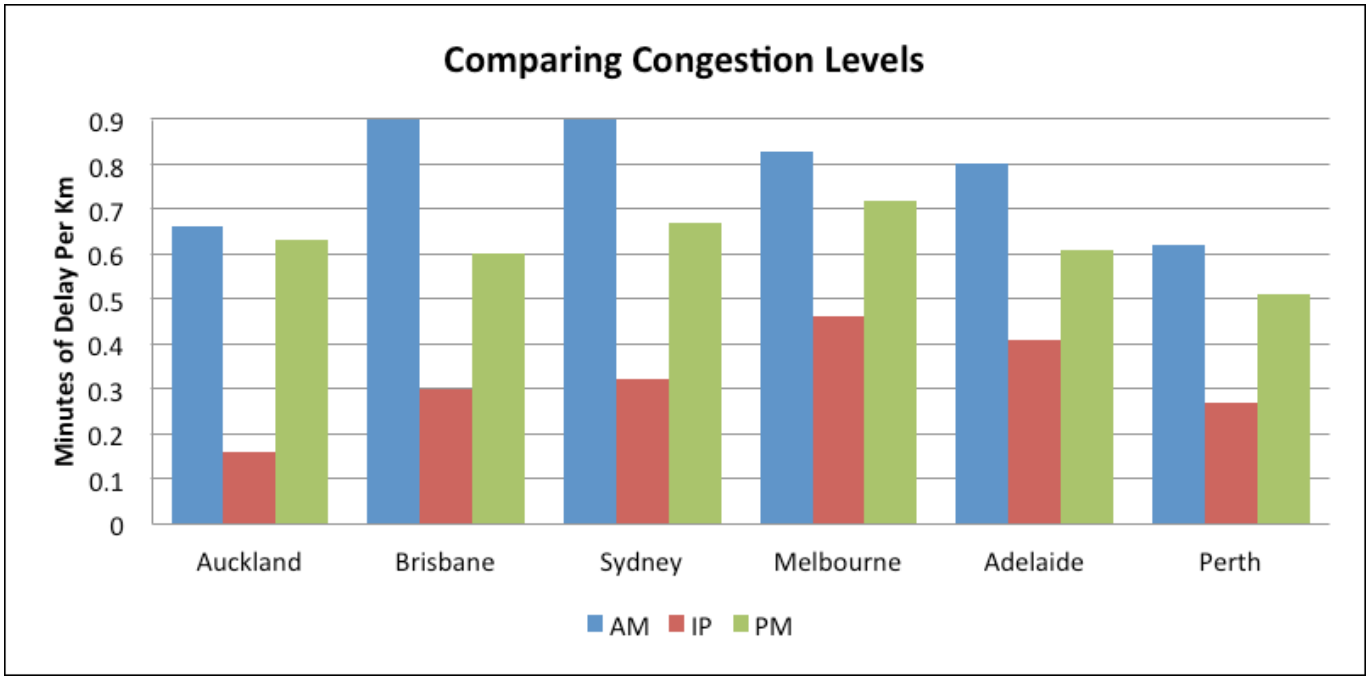
Despite strong population growth, transport investments over the past decade have generally yielded positive results, with improvements in overall peak period congestion results and increased public transport patronage. Continuing on this path will not be easy, however, as many of the most obvious investments in Auckland's transport system are now complete. Most transport corridors set aside in the past have been used and many long planned transport improvements, such as the Western Ring Route, are nearing completion. The next generation of transport investments will be more challenging as they will need to be integrated with established uses and generally do not have available corridors set aside for them.

2.3. International Comparisons

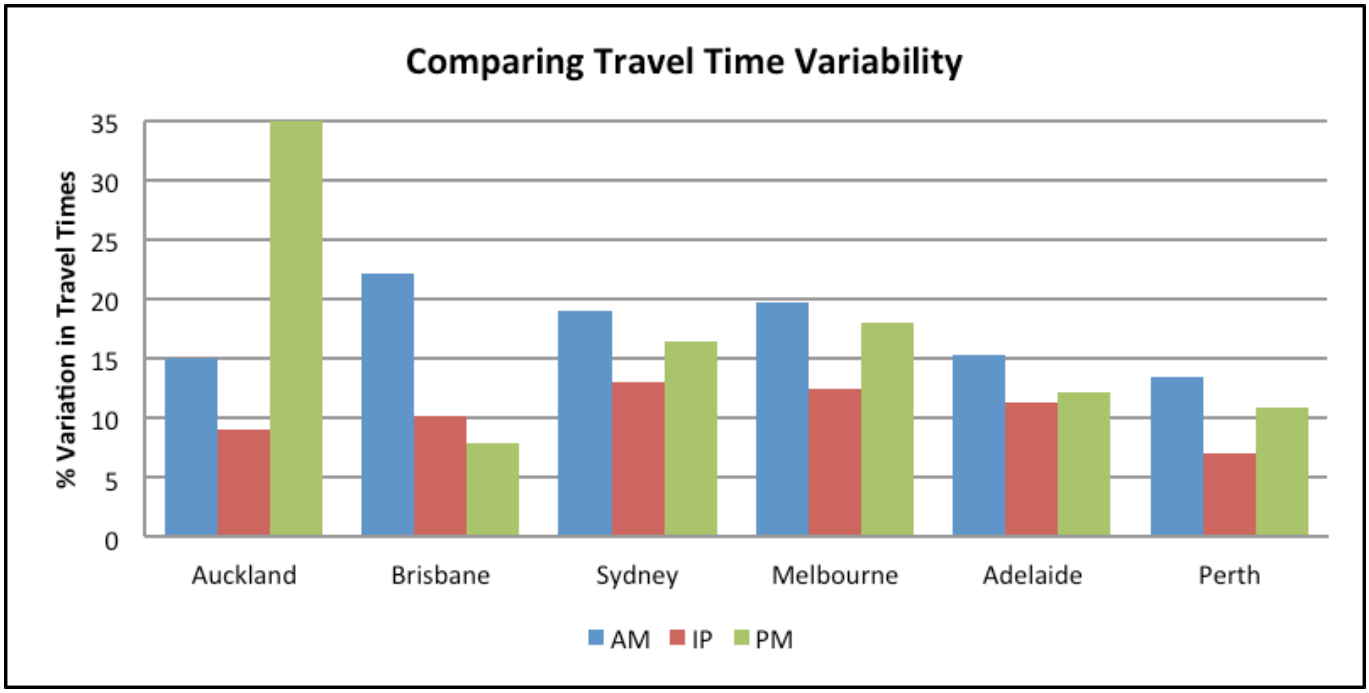
Studies have been undertaken to compare Auckland's transport performance with that of similar cities in Australia and also with Vancouver. Auckland's population is less than Perth, Brisbane, Sydney, Melbourne or Vancouver. On the other hand, it arguably has a more difficult geography, with the urban area less able to spread out evenly in all directions. All these factors impact on travel perceptions and performance.

Comparisons between cities are challenging because of the variety of geographical and social factors that impact on travel experience, as well as the difficulties of measuring performance in a consistent manner. The available analyses must therefore be interpreted with caution.

The charts below suggest that Auckland's transport network is, on average, less congested than in Brisbane, Sydney, Melbourne and Adelaide, but more congested than in Perth[6]. Travel surveys also indicate travel time variability is comparable to that of the Australian cities, except in the evening peak, when Auckland's performance is relatively poor.



Source: NZTA/Beca Travel Time Surveys & Austroads



Source: NZTA/Beca Travel Time Surveys & Austroads

Auckland has significantly lower public transport mode share than major Australian cities, the impact of which is partially mitigated by generally higher rates of working at home, walking and cycling. As a result, Auckland's share of private vehicle commuting is similar to that of Melbourne and Brisbane, lower than Perth's but higher than in Sydney[7].

Access to employment is a critical task for a large city's transport system and on average Auckland compares reasonably well to Sydney and Brisbane, but is behind Perth and Vancouver in terms of the share of total jobs available within a reasonable travel time[8]. Auckland's smaller population, combined with its access challenges, results in a significantly smaller accessible labour pool than all other cities analysed.

Furthermore, access to employment in Auckland varies significantly by location and declines comparatively rapidly beyond the central area. For example, the proportion of Aucklanders who can access more than 20% of the city's jobs within a 45-minute public transport commute is lower than any of the other cities analysed.

Key International Comparison Findings:

Available evidence suggests that while Auckland compares well in some areas with other cities analysed (e.g. congestion, use of active transport modes), it lags behind in other areas such as travel time reliability, public transport mode share and the overall size of its accessible labour pool. Auckland faces challenges to improve performance in these areas in the face of significant growth over the next 30 years

Part 3
Future Trends

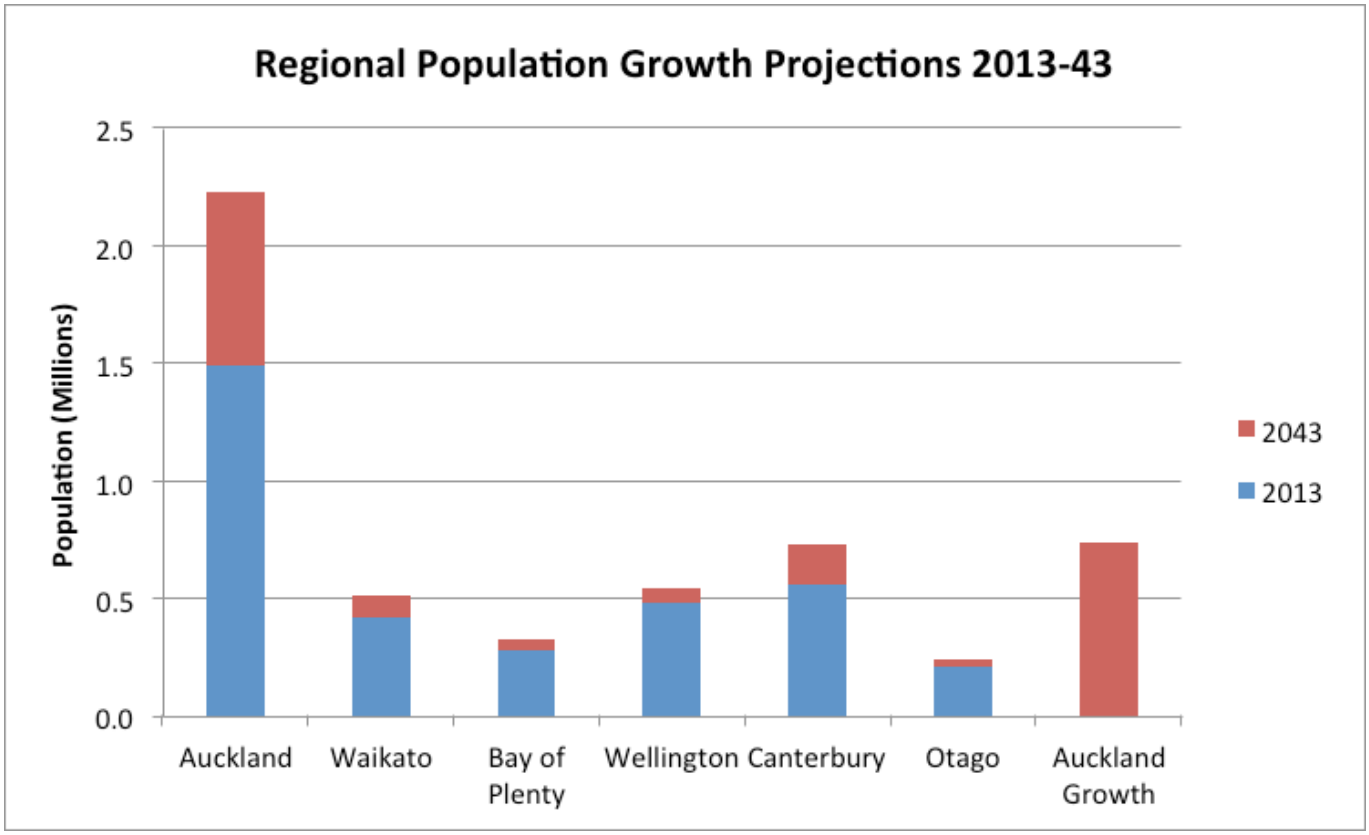
3.1. Introduction

Undertaking long-term strategic transport planning relies upon making a large number of assumptions about the future. Uncertainty about these assumptions and their impact on future transport trends increases as future time horizons for the analysis extend. This section outlines a number of the assumptions, including uncertainties, and their resulting trends that form the baseline for the problem definition in section 5 of this report.

A number of these assumptions may be tested in later stages of the project to develop a better understanding of how different packages of interventions would perform in a range of future scenarios.

3.2. Population and Employment Growth

The key factor increasing travel demand in Auckland over the next 30 years will be population growth. Over the last 30 years, the combination of natural growth and net immigration has increased Auckland's resident population by almost 700,000, and a similar level of growth is projected over the next three decades under a medium population growth scenario. The addition of 700,000 people will take Auckland's population to 2.2 million by 2043.

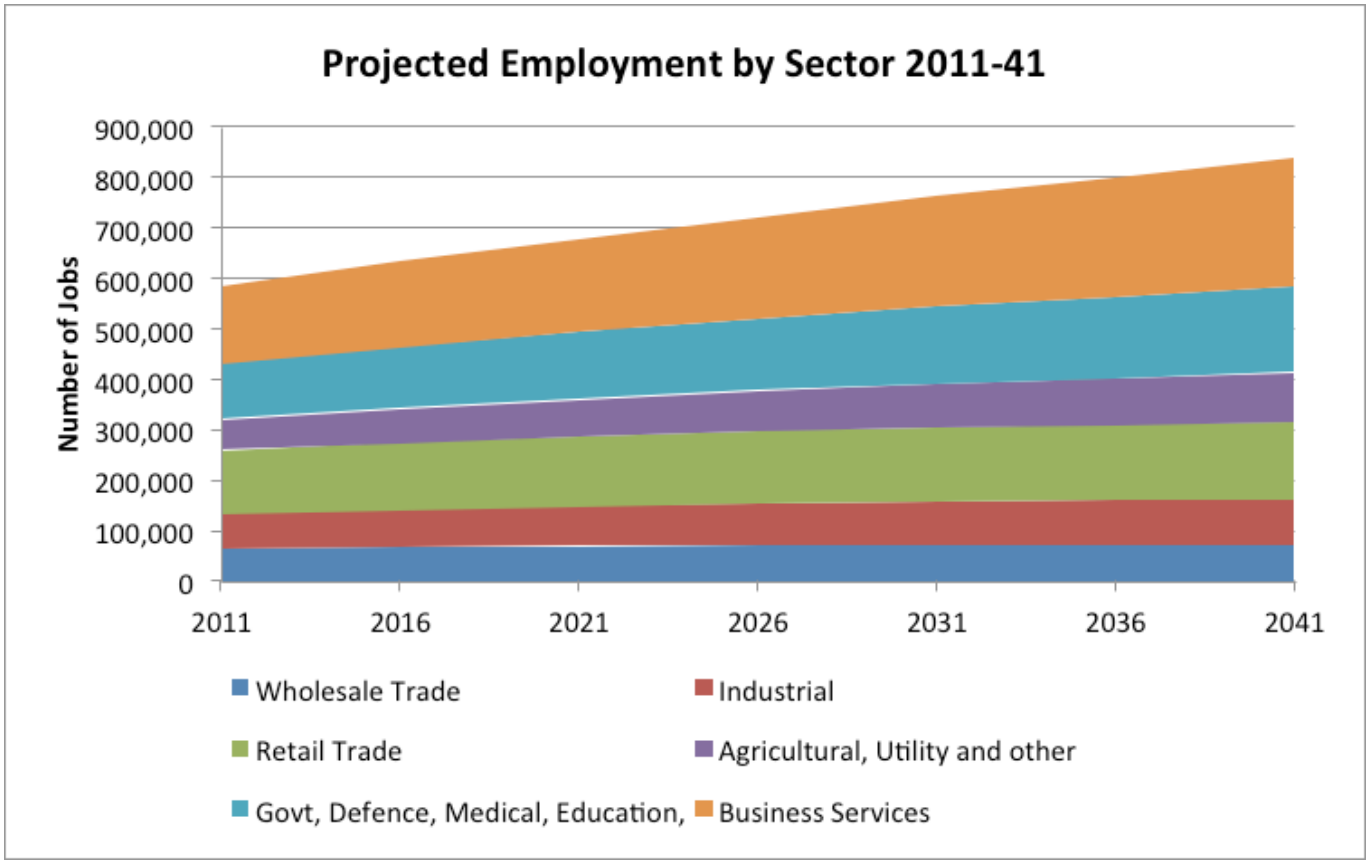


Source: Statistics New Zealand medium population growth projections

Auckland's growth and economic success will be increasingly important to New Zealand's overall economy. Over the next 30 years 60% of New Zealand's population growth is expected to occur in Auckland[9]. However, a lower average age means that the vast majority (over 80%) of the growth in New Zealand's working age population is projected to occur in Auckland.

The number of jobs in Auckland is projected to increase from just under 600,000 to more than 850,000 over the next 30 years. Changes to the structure of Auckland's economy in the future also drive changing transport demands. Auckland is New Zealand's dominant commercial centre, leading the finance, insurance, transport and logistics, and business services industries. The productivity of high skilled service sector jobs that cluster in Auckland is highly dependent upon agglomeration (the clustering of economic activity) and large labour markets.

The pattern of economic growth in Auckland is continuing to compound its structural differences with the rest of the New Zealand economy. The service sector has dominated the city's employment growth over the past decade[10] and this trend is projected to continue, with business services being the largest driver of employment growth, as shown below.[11]



Source: Auckland Council land-use projections

These projections assume that population and employment growth occurs at a reasonably steady rate. In practice, short term population growth can fluctuate significantly based on trends in net-migration. For example, Auckland's population growth rate between 2006 and 2013 was lower than between previous censuses while over the past two years a significant increase in net migration has boosted population growth to near-record levels, with Auckland's population increasing by over 75,000 since 2013.[12,13]

Longer-term population growth could occur at a lower or higher rate than projected by Statistics New Zealand. Past population projections for Auckland have tended to under-estimate the rate of growth; for example, projections in 1996 expected Auckland's population to reach two million around 2060 whereas most recent projections expect that to occur 30 years earlier.

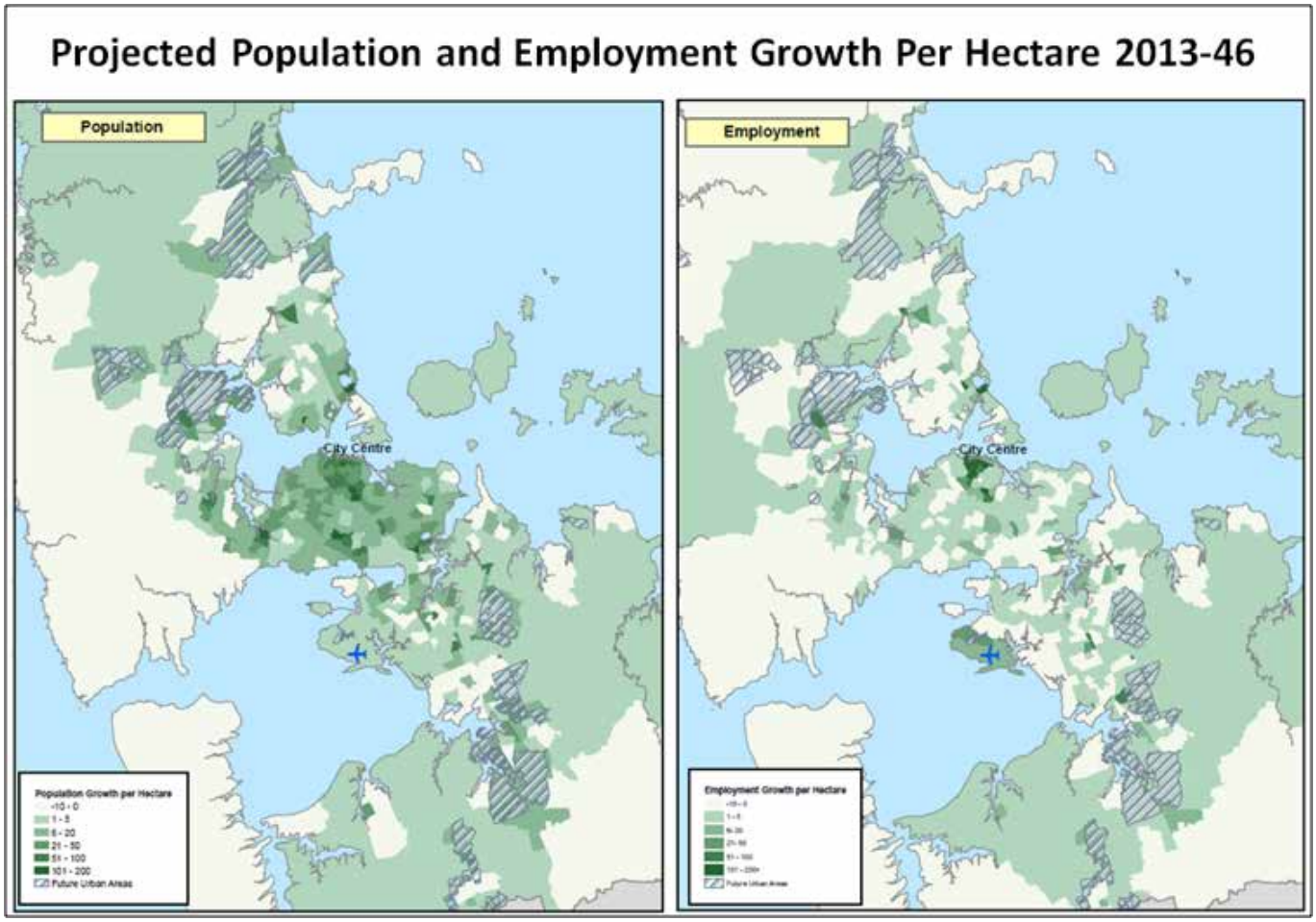
3.3. Location of Population and Employment Growth

The location of population and employment growth across Auckland over the next 30 years will have a significant impact on the transport network's future requirements and performance. The location and timing of growth will be driven by a number of factors including:

- The level of development provided for by statutory land-use planning documents (e.g. the Proposed Auckland Unitary Plan)
- The market attractiveness of development
- The provision of infrastructure and services to support and enable growth (e.g. water and transport infrastructure, schools etc.)
- The locational demands of businesses and how these may change over time

Auckland Council undertakes research and modelling to enable an understanding of where and when future growth is expected to occur. The scenario being used by the project is based off a medium population growth rate and reflects the direction of the Auckland Plan by projecting an approximate split of future household growth of 60% inside the current urban area and 40% through urban expansion[14].

The location of projected household and employment growth in Auckland over the next 30 years is shown in the maps below, as well as the location of future urban growth areas (shaded).

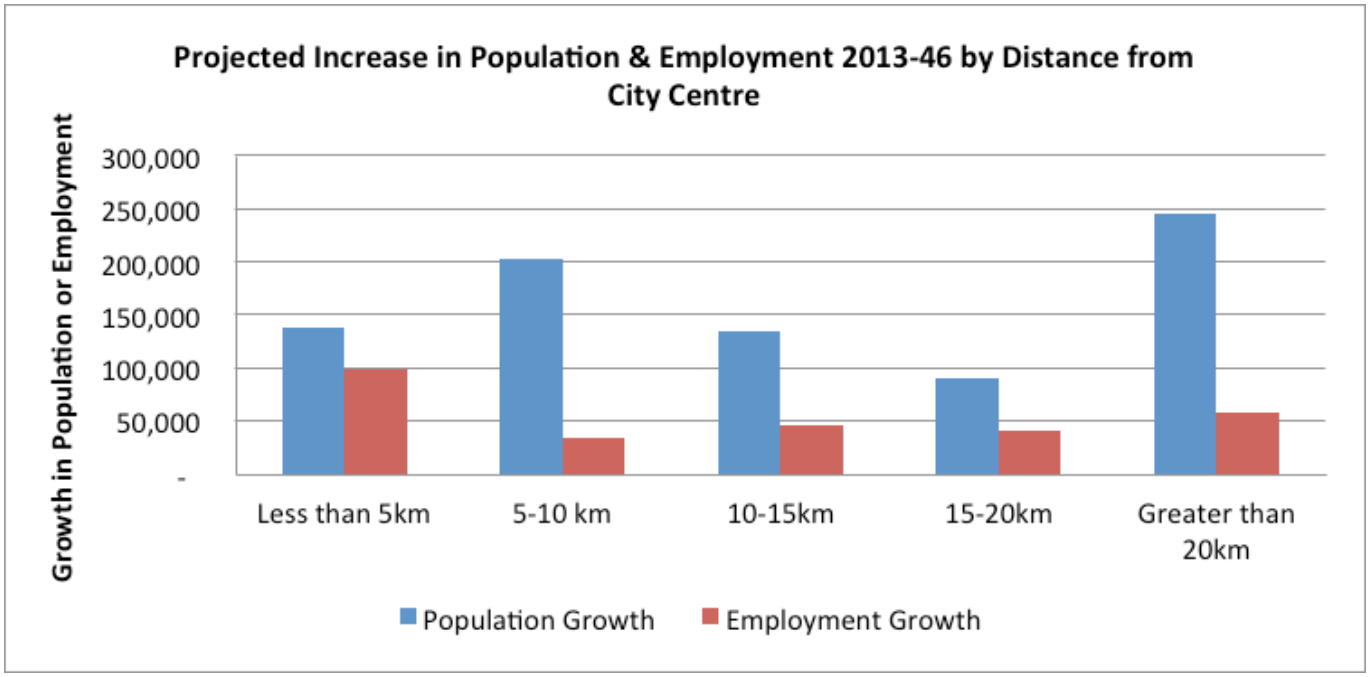


Source: Auckland Council land-use projections

Two key growth distribution trends are highlighted in the maps above.

- Population growth is spread throughout the Auckland urban area and extends into major future urban growth areas to the north, northwest and south of the existing city. Nearly a third of population growth is projected to occur in areas beyond 20 km of the city centre.
- Employment growth is highly concentrated in a few locations, particularly the city centre, the Airport and other major metropolitan centres. Over a third of employment growth is projected to occur within 5km of the city centre. The growth in service sector jobs, which often prefer to locate in major centres to benefit from agglomeration, is a key force behind the projected concentration of employment growth.

The trends are further illustrated in the graph below by comparing the level of population and employment growth over the next 30 years occurring in 5 km bands from the city centre.



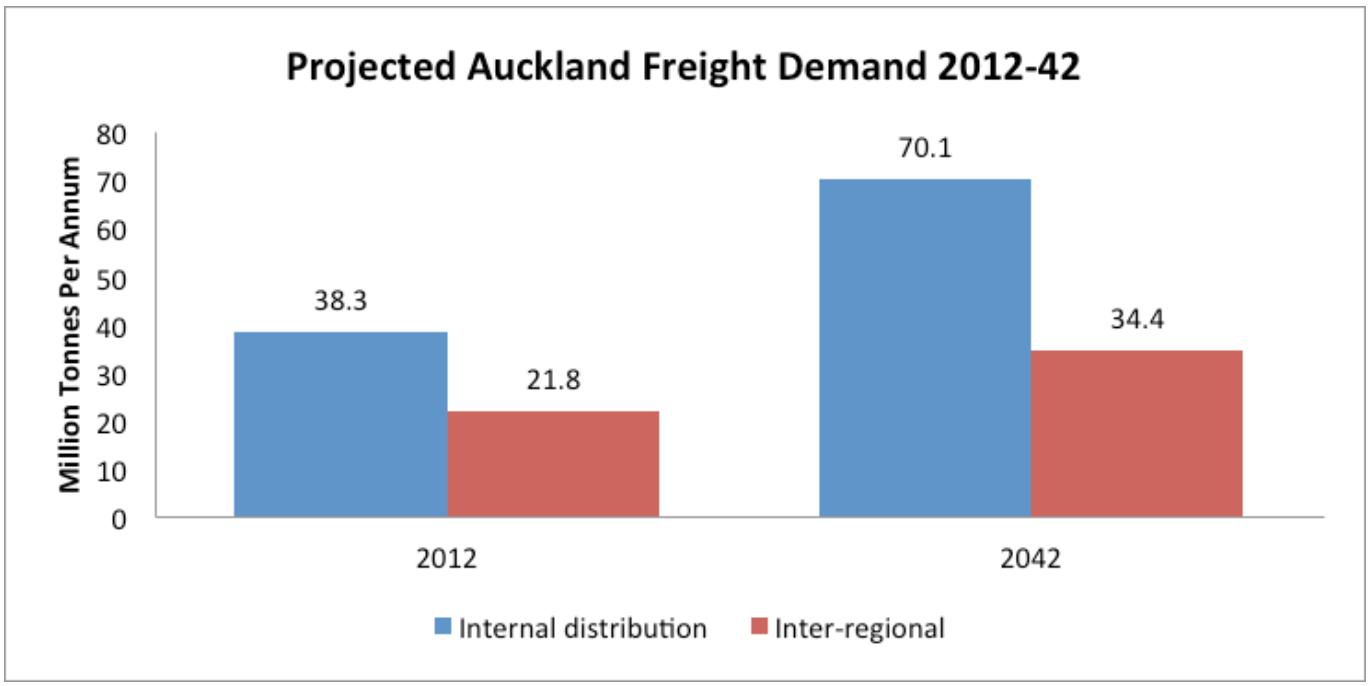
Source: Auckland Council land-use projections

These projected household and employment growth trends will place significant pressure on the transport network through longer trip lengths, especially to major centres. The low level of growth in local employment is also likely to make improvements in employment access by car more challenging, as trips lengthen and become relatively more focused towards major centres with constrained access. Furthermore, the high value of land in major centres presents a key challenge of providing significant people-moving capacity without using extensive amounts of space.

There are a number of uncertainties about the rate and location of household and employment growth in the future, particularly because the Auckland Unitary Plan, which has a significant impact on the amount of development possible within an area, is still under development. Furthermore, the projected location of employment growth represents a significant centralisation of employment, largely based on assumptions about the extent of growth expected in business services jobs in the future.

3.4. Freight Demand

As New Zealand's largest city Auckland has nationally significant freight logistics function in the production and distribution of freight to the rest of New Zealand. Around 22 million tonnes of New Zealand's freight task moves to and from Auckland each year[15]. Recent analysis projects a 78% increase in the size of the future freight task for Auckland over the next 30 years with a significant majority of freight travel being internal distribution within Auckland[16].



Source: Ministry of Transport freight demand study

International/inter-regional freight is likely to be larger scale (i.e. containers) and can be carried by road, rail and coastal shipping. Any consolidation of movements on and off rail and coastal shipping will also require road freight movements within Auckland. Northland, Auckland, Waikato and the Bay of Plenty together produce more than 50% of New Zealand's gross domestic product (GDP). Increased economic interaction between these regions through the establishment and strengthening of supply chains will drive economic growth in the Upper North Island and across the country.

Internal distribution and service trips make up the vast majority of commercial travel within Auckland, with 80% of the freight originating in Auckland being distributed within the region. Some of this internal demand is driven by international and inter-regional movements, with freight being moved initially within Auckland before it is sent on to its final destination. Furthermore, while less visible than heavy commercial vehicles, over 70% of freight kilometres travelled within Auckland are by light commercial vehicles such as couriers and local deliveries[17].

Auckland is New Zealand's main "gateway" to international trade and commerce, including tourism. Auckland International Airport has the highest number of passengers per year in New Zealand, with 14 million passenger movements in 2013, projected to rise to 40 million by 2044[18]. Auckland Airport also handles about 15 per cent of foreign trade by value and on this basis is New Zealand's third largest port

behind Auckland seaport and Port of Tauranga[19]. Growth in passenger numbers and freight from the Airport will increase the demands on Auckland's transport network connecting people and goods to the rest of Auckland and New Zealand.

The Ports of Auckland is the country's largest import container port by volume and value. Approximately $26.4 billion of trade passes through Ports of Auckland each year, roughly 31% of New Zealand's total trade[20]. Around 800,000 containers are moved to and from the port every year, along with bulk imports and exports[21]. MetroPort, operated by the Port of Tauranga, is also an important international gateway for exports and imports. Around 170,000 containers move to and from the terminal by road within Auckland, with rail moving the freight to and from the Port of Tauranga. Currently trains carrying up to 104 containers run five to six times a day to and from this part of Auckland[22].

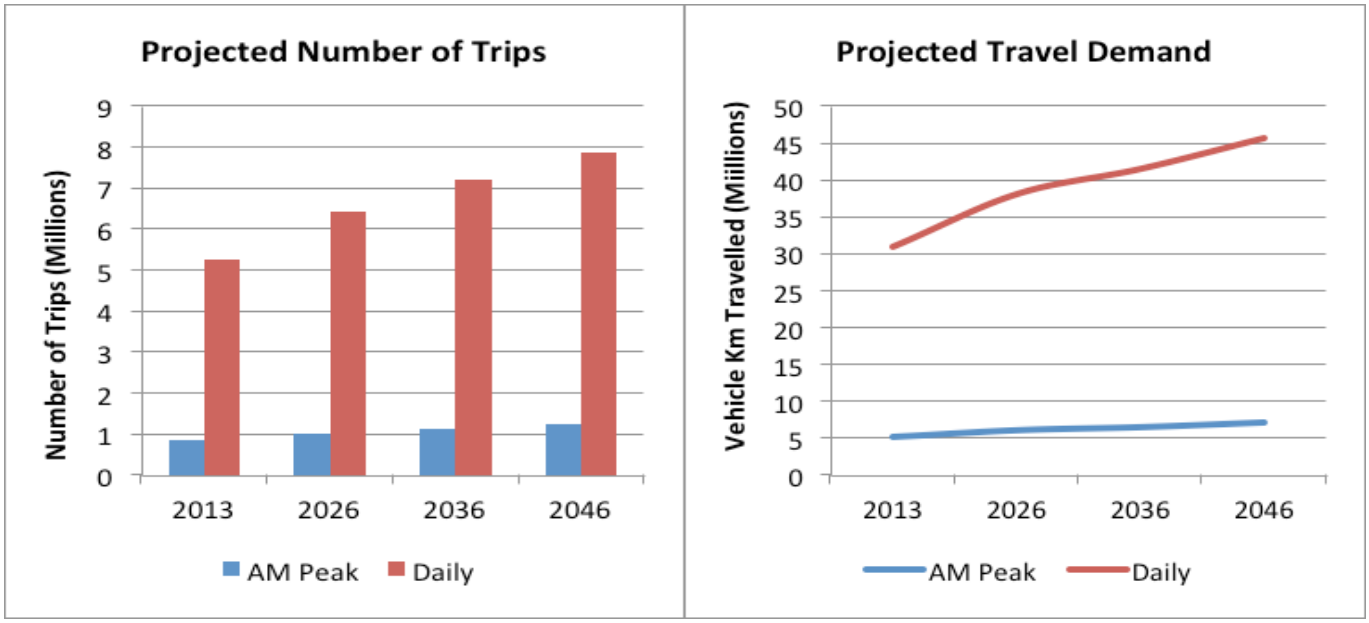
International trends towards bigger ships may result in more concentrated and consolidated import activity in Auckland and/or surrounding ports. The "Port Future Study" is taking place in parallel with the project, and will analyse the future of the Ports of Auckland. The findings of that study will feed into this project as required.

3.5. Projected Travel Demand

As discussed in section 2.2, a decline in per capita travel over the past decade in Auckland has been outweighed by population growth, leading to an overall increase in travel, albeit at slower rates than in earlier decades. This slowing of travel growth is likely to have been caused by a combination of economic variables and cultural and social factors that may be inducing structural change in driving habits and distance travelled. For example, studies both in New Zealand and internationally have highlighted changing travel requirements for 'Millennials' and an increasing age of driver's licence acquisition[23]. The observed plateauing of travel was not anticipated by past travel projections, which often over-estimated nationwide travel demand during the past decade.

Future travel demand projections made by the Auckland strategic transport model are based on a range of input assumptions such as the location and distribution of population and employment growth, the future price of fuel and assumed inter-regional trip growth rates. Many of these assumptions have been updated as part of this project to test their robustness and consistency.

These projections anticipate an increase in travel over the next 30 years, tracking close to population growth meaning per capita travel is projected to stay fairly constant over time. This rate of future growth is higher than what has occurred in recent years, when per capita travel in Auckland has marginally declined. Due to significant projected population growth, it would take a very substantial decline in per capita travel for the overall quantum of travel in Auckland to not continue to grow over the next 30 years.



Source: Auckland strategic transport model outputs (Scenario I9)

However, even small changes in per capita travel demand can result in much higher or lower future demand levels. Furthermore, when combined with the uncertain but potentially significant impacts of changing technologies and the rate of population growth, uncertainty around future travel behaviour and demand levels highlights the importance of Auckland's future transport investments being robust and flexible to changing future circumstances.

3.6. Impacts of Technology

Transport technology is changing quickly. Intelligent Transport Systems (ITS) as well as emerging vehicle and communication technologies have the potential to radically alter the way that transport is delivered in future, with significant impacts on demand and supply. Such changes have the potential to improve network productivity, as well as deliver significant improvements in congestion, safety and environmental outcomes.

Some transport technology developments, such as the uptake of electric vehicles, will impact significantly on some of the broader outcomes sought from transport (such as reducing greenhouse gas emissions) but are considered unlikely to have major effects on the core project objectives, travel demands or network capacity.

In other areas, however, developing transport and communications technologies have the ability to significantly change the nature of travel demand. This raises a number of important questions which will need to be addressed as part of the project, including:

- To what extent will emerging ride-sharing and car-sharing technologies replace individual vehicle ownership with a "mobility as a service" approach to transport; and what impacts is this likely to have on travel demand and the cost of transport?
- How will big data applications be used to help road users make better trip planning decisions, aided by dynamic management of the network?
- What impacts will the development of autonomous and communicating vehicles have on travel demand? Will they encourage new vehicle trips by increasing accessibility, particularly for the disabled and elderly which may be particularly important with an aging population? Will they increase overall travel through 're-positioning trips' or will their improved efficiencies reduce overall vehicle travel?
- How will autonomous vehicles and increased ride-sharing and car-sharing change the way public transport is provided in future, and how will this impact upon its cost-effectiveness and operating costs, and blur the distinction between public and private transportation?
- To what extent will technological change help to improve the performance of the transport network? For example, autonomous and communicating vehicles may increase the capacity or efficiency of Auckland's transport system by enabling vehicles to safely travel closer together, therefore reducing congestion and enabling far more efficient use of existing infrastructure and land by reducing the need for parking.
- When will new technologies become available, and to what extent will they be embraced by New Zealanders?

New technologies present an exciting range of opportunities for the transport sector, with the potential to fundamentally change the nature of transport demand and public sector interventions. However, there is considerable uncertainty attached to the nature and timing of technological developments in the New Zealand context, and the impacts of that they may have on the Auckland transport system. For example, increased travel demand and the financial, regulatory and on-road implications of transitioning to new technology could reduce or even offset any efficiency savings. The timing for uptake of new technologies to reach a point where it significantly improves network efficiency also remains unclear. Investment in transport infrastructure and services will be influenced by the direction of change brought about by technology trends.

The next stage of the project will include a more detailed assessment of the opportunities and uncertainties that technology change presents. This will include the identification of future scenarios which will allow the impacts of different technology futures to be sensitivity tested. A similar approach will be taken to address other key assumptions, such as future population growth and land use projections.

A key challenge for the project will be to identify strategic approaches that are able to respond to future opportunities, while maintaining the flexibility to adapt to potential changes in demand, technologies and behaviour as they emerge.


TOP TRANZ
COSCO

Part 4
Objectives and Evaluation Framework

4.1. Objectives for Auckland

Government and Auckland Council's broad objectives for transport nationally and in Auckland are set out in the Government Policy Statement and the Auckland Plan. The Government Policy Statement highlights key focus areas of supporting economic growth and productivity, improved transport safety and ensuring value for money from investment. The Auckland Plan describes the key role of the transport system in improving liveability and prosperity through creating better connections and accessibility within Auckland, across New Zealand and to the world.

Although there are differences in emphasis, both parties have a shared intention for transport investment to support and enable:

- Planned growth through delivering better access for people and goods to places of employment and businesses
- Improved living standards for people through enabling better connections and accessibility to participate in work and society
- Improved access to domestic and international markets
- Minimising harm (e.g. safety and environmental) from transport

The project's Terms of Reference articulate a desire to achieve better returns from transport investment and deliver the best possible value for money, particularly in relation to:

- Improving accessibility to employment and labour
- Improving congestion results
- Improving public transport mode share
- Ensuring net benefits to transport users from increased financial costs

The project objectives alone will not achieve all the broad outcomes sought from transport investment. A number of other key transport outcomes and demand on transport expenditure, such as maintaining existing assets and providing a basic level of infrastructure to enable growth, will require significant investment over the next 30 years and also need to be taken into account in the evaluation process.

The relationship of the project objectives to both interventions and the broad outcomes sought by Government and Auckland Council is shown in the diagram below.

Interventions:

- Infrastructure investments
- Service provision
- Policies

Project Objectives:

- Achieve better returns from investment & value for money
- Improve accessibilty
- Improve congestion results
- Improve public transport mode share
- Ensure net benefits to transport users

Other Key Outcomes

Broad Outcomes:

- Economic growth & productivity
- Improved quality of life & living standards
- Supporting growth
- Minimising harm

4.2. Evaluation Framework

An evaluation framework has been developed to test how the current 30-year transport plan and different packages perform against the objectives set out in the terms of reference, a broad overall requirement to achieve value for money and other key outcomes. The intention of the evaluation framework is to also reveal the impacts of choices between different packages.

For each objective, measures and key performance indicators (KPIs) have been developed to enable evaluation. For each measure there are headline KPIs that will be reported on and secondary KPIs that will primarily be used for analysis but may be reported on where they significantly add value to informing key decisions and trade-offs.

Objective	Measure	Headline KPI
Improve access to employment and labour	Access to employment and labour within a reasonable travel time	• Jobs accessible by car within a 30-minute trip in the AM peak • Jobs accessible by public transport within a 45-minute trip in AM peak • Proportion of jobs accessible to other jobs by car within a 30 minute trip in the inter-peak
Improve congestion results	Impact on general traffic congestion	• Per capita annual delay (compared to maximum throughput) • Proportion of travel time in severe congestion in the AM peak and inter-peak
	Impact on freight and goods (commercial traffic) congestion	• Proportion of business and freight travel time spent in severe congestion (in the AM peak and inter-peak
	Travel time reliability	• Proportion of total travel subject to volume to capacity ratio of greater than 0.9 during AM peak, PM peak and inter-peak.
	Increase vehicle occupancy	• Average vehicle occupancy
Increase public transport mode share	Public transport mode share	• Proportion of vehicular trips in the AM peak made by public transport
	Increase public transport where it impacts on congestion	• Proportion of vehicular trips over 10km in the AM peak made by public transport

Objective	Measure	Headline KPI
Increased financial costs deliver net user benefits	Net benefits to users from additional transport expenditure	• Increase in financial cost per trip compared to savings in travel time and vehicle operating cost
Ensure value for money	Value for money	• Package benefits and costs

In addition to the project objectives, a number of other key outcomes will be evaluated through the framework below:

Other Key Outcomes	Measure	Headline Key Performance Indicator
Support access to housing	Transport infrastructure in place when required for new housing	• Transport does not delay urbanisation in line with timeframes of Future Urban Land Supply Strategy.
Minimise harm	Safety	• Deaths and serious injuries per capita and per distance travelled
	Emissions	• Greenhouse gas emissions
Maintain existing assets	Effects of maintenance and renewals programme	• Asset condition levels of service • Renewals backlog
Social inclusion and equity	Impacts on geographical areas	• Accessibility from high deprivation areas • Distribution of impacts (costs and benefits) by area
Network resilience	Network vulnerability and adaptability	• Impact in the event of disruption at vulnerable parts of the network

Part 5
Understanding the Problem

5.1. Evaluating the Auckland Plan Transport Network

This section outlines the preliminary results of assessing the 'Auckland Plan Transport Network (APTN)' against the project objectives. The APTN was developed by Auckland Transport, the NZ Transport Agency and Auckland Council to inform the 2015 Regional Land Transport Plan and Long-term Plan.

This assessment is intended to highlight key areas where the transport strategy could be modified to achieve better returns from the planned transport investment. The assessment will also inform the development of intervention packages.

The table below briefly outlines key components of the APTN and the timing of their completion (by decade).

Completion date of Major Interventions in APTN		
2015-2025	**2025-2035**	**2035-2045**
• City Rail Link • Accelerated Motorway Project Package • AMETI (Panmure to Pakuranga) • East West Connections • Western Ring Route • Puhoi-Warkworth • Implementation of new public transport network • Infrastructure to support Special Housing Areas	• AMETI (Pakuranga to Botany) • Penlink • Northwestern Busway • Rail electrification to Pukekohe • Warkworth-Wellsford • Major infrastructure to support future urban growth	• Additional Waitemata Harbour Crossing • Rail to Auckland Airport • Widening of outer urban motorways • Major infrastructure to support future urban growth

The evaluation framework outlined above has been used to test how the APTN performs against the project objectives. This is an initial analysis using the Auckland strategic transport model and baseline assumptions, the results of which are summarised in the following sections.

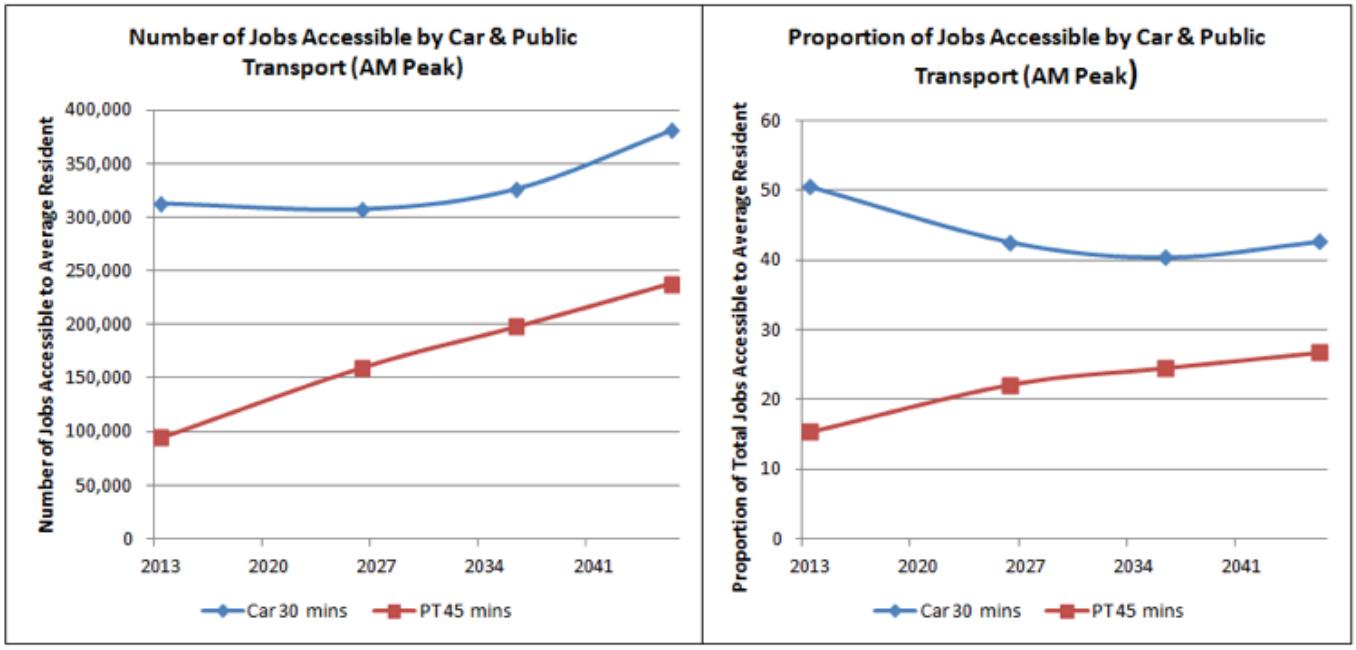
While the strategic transport model results provide a useful overview of future performance, some care is needed in interpreting region-wide average results, as they can mask some significant local variations. Furthermore, the model results do not paint a complete picture of all of the issues that need to be addressed. Further refinement incorporating additional information in areas such as freight, as well as testing different future scenarios that consider more significant changes in demand patterns that may arise from factors such as changing technology, will be undertaken in later stages of the project.

5.2. Access to Employment and Labour

Improving accessibility requires many aspects of the transport system to be operating effectively, to ensure the travel speeds are high enough, that wait times for public transport are short enough and that capacity of the system to cope with demand is sufficient. It also requires effective integration between land use and transport, principally to support effective access between residential areas and key employment areas.

While access to employment and labour are a critical measure of transport supporting desired economic outcomes, the location of employment is generally a good proxy for the location of other services (health, education, social support etc.), meaning that this measure can also be used to assess accessibility more broadly.

Analysis of how well the APTN provides for access to employment and labour during the morning peak period tells a mixed story over the next 30 years, with public transport improvements throughout the period (but slowing down over time) while improvements to car access occur mostly beyond 2030.



With private vehicles projected to account for around 75% of motorised journeys to work in 2036, the number of potential jobs available to the majority of travellers within an average commute time is not projected to increase until the 2030s (and actually marginally decreases up to 2026). This is despite the total number of jobs in the region increasing by around 30% over the same period. Essentially, longer trip times are offsetting the benefits of additional employment growth for the majority of commuters in the next 15 years.

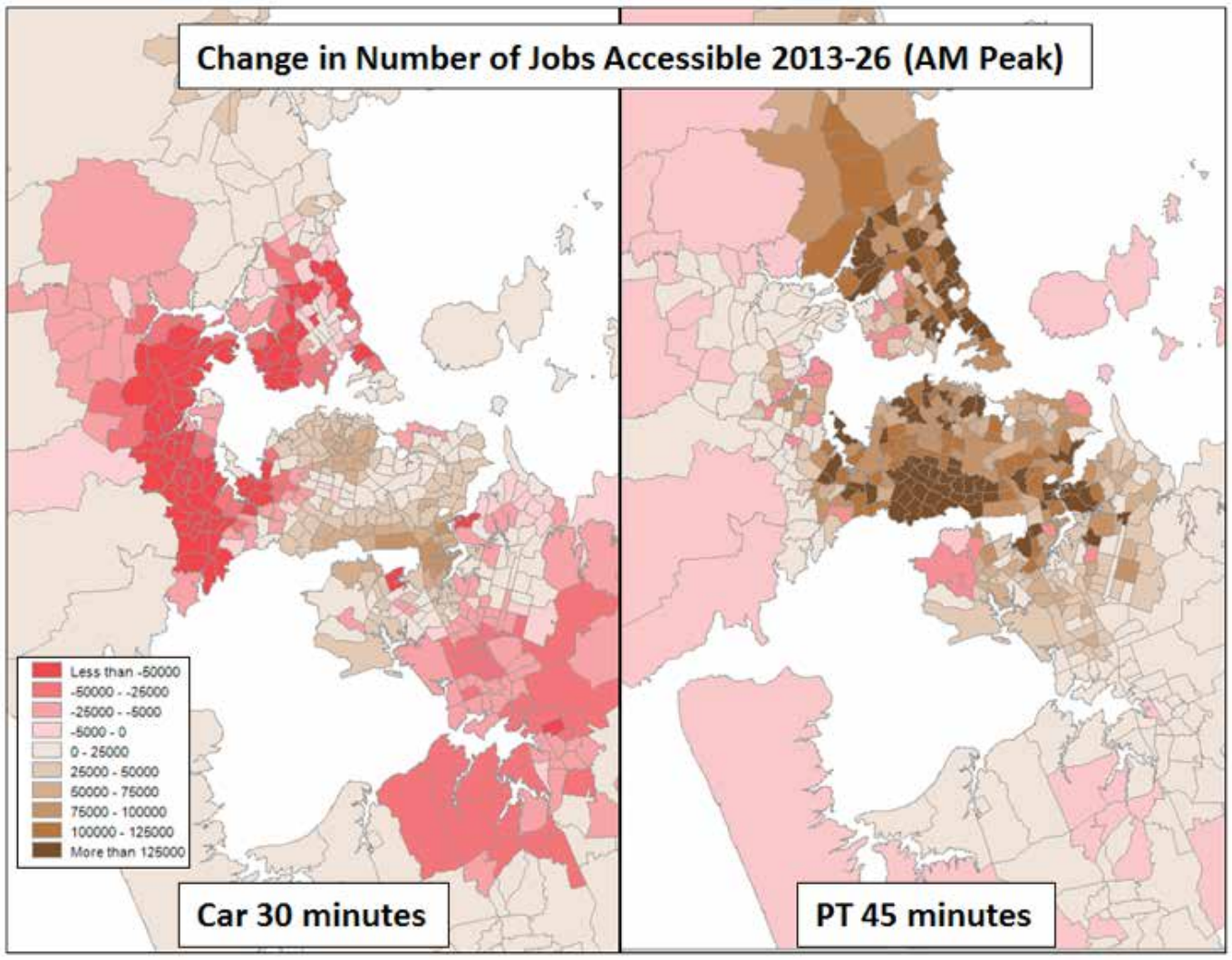
These regional figures mask some important variations between different parts of the region and over time. Access to employment by both car and public transport for those living in the central (isthmus) part of Auckland appears to improve throughout the next 30 years, reflecting the general growth in employment as well as its projected centralisation. However, increased congestion for cars and road-based public transport is likely to have a negative impact on access to some employment locations, such as the

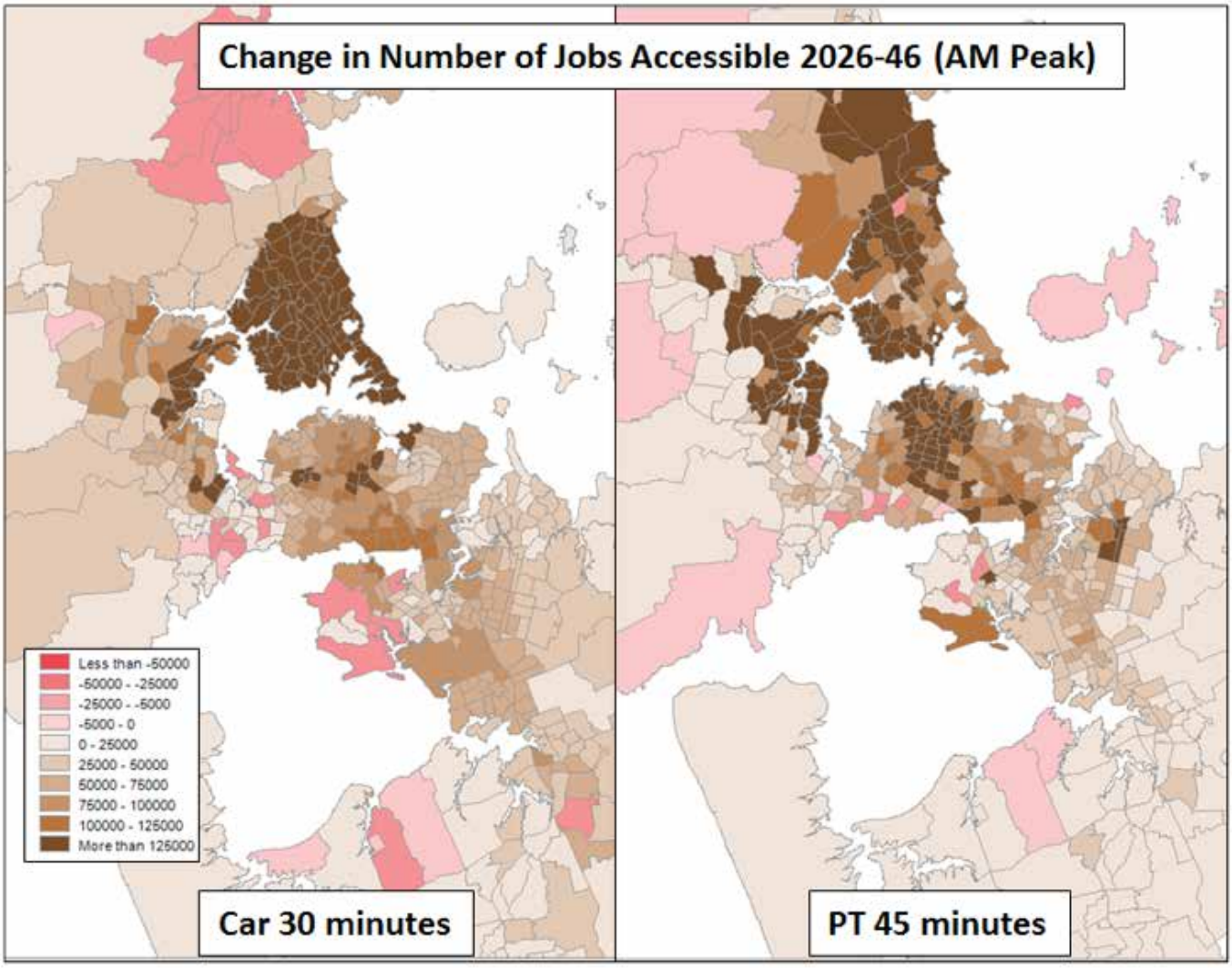
city centre. Further work will be needed to understand the extent of this problem, and how it should be addressed.

Access to employment from the north, west and south tells a much more mixed story:

- In parts of the north car access declines up to 2026 while the whole area sees a significant increase in car access after 2026. Public transport access for the area generally improves throughout the whole period, particularly after 2026.
- In the west car access sees a steep decline up to 2026, most likely the result of the area being 'pushed out' of being able to reach the city centre in a 30-minute trip. There are modest improvements after 2026 overall, with some areas seeing more significant gains. Public transport access improvements mostly occur after 2026.
- In the south there are widespread declines in car access up to 2026, with some subsequent improvement. Public transport improvements are generally modest throughout the whole 30-year period, with only isolated areas of significant increases.

These trends are illustrated in the maps below:

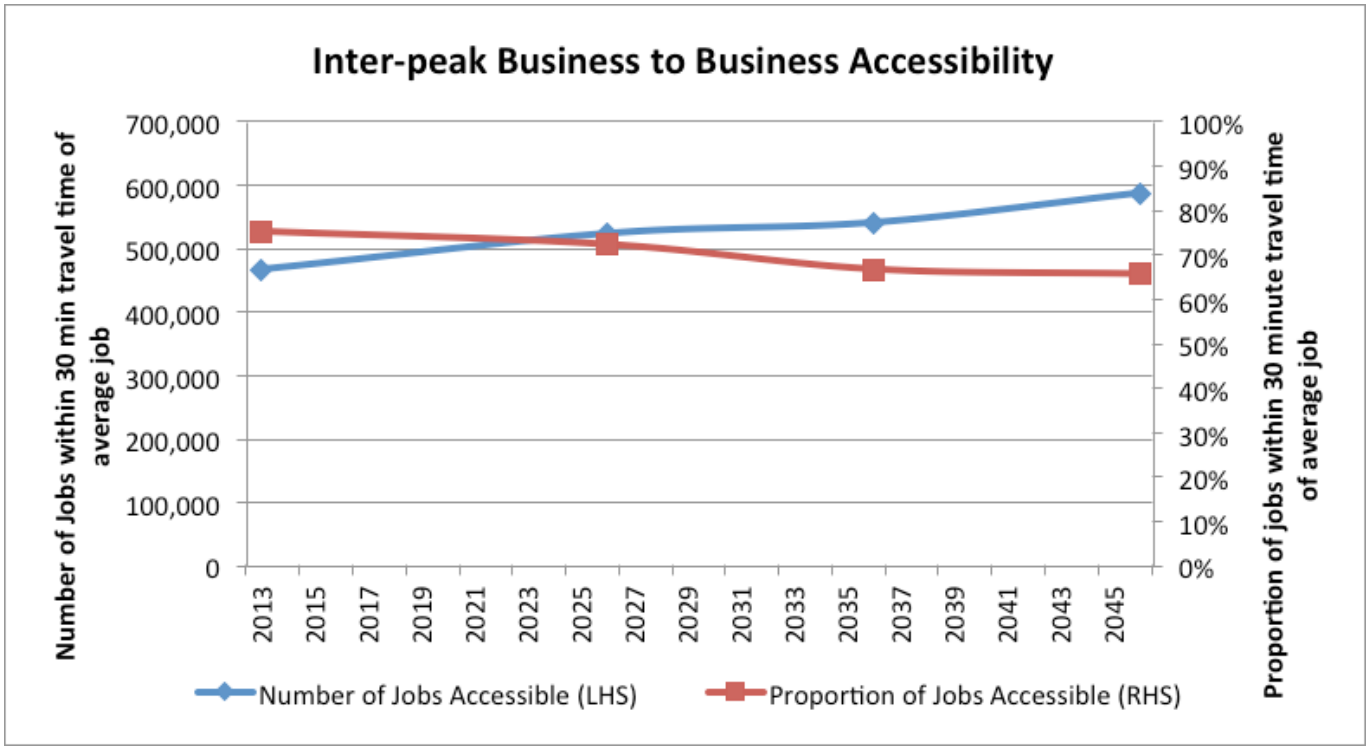




These accessibility projections highlight a significant unevenness to future employment accessibility and a growing polarisation of access to employment in the future. By 2046 more than a million people will be living in the western and southern parts of Auckland, nearly half the region's population. However, these areas see relatively little improvement in their access to employment over time, particularly by private vehicle. The wider implications of these areas being at least partly excluded from the benefits of Auckland's expanding employment base over the next 30 years are potentially significant, particularly given they include parts of Auckland with higher levels of deprivation, as well as a number of key future urban growth areas.

Part of the decline in access to employment by car is related to trips destined for the city centre and is not unexpected due to the significant constraints on increasing private vehicle access to this location. However, there are also major challenges for trips accessing jobs in the south, especially to the Airport area.

Accessibility between businesses is an important consideration for economic productivity and for the movement of services and freight – especially during the weekday inter-peak period when many of these 'on the clock' trips occur. The graph below tracks how the proportion and number of jobs within a 30-minute private vehicle travel time of the 'average job' changes over the next 30 years:



The number of jobs reachable between businesses in the inter-peak period grows at a moderate but steady rate over the next 30 years. This is due to overall employment growth outweighing the impacts of a steady increase in inter-peak congestion. Parts of Auckland seeing particular improvements include the Airport up to 2026 and for areas in the northwest after 2026. These localised improvements appear strongly linked to major projected employment growth in these locations.

Overall the accessibility findings highlight the transport challenges in providing for increasingly concentrated employment growth coupled with widespread dispersed population growth. This distribution of projected future growth appears particularly challenging to adequately provide for car accessibility in the south and west, yet it is in these same locations that public transport access improvements generally appear lowest. The extent to which these challenges can be addressed through transport interventions will need to be explored in the next stage of the project.

Key Accessibility Findings:

The development of intervention packages in the next stage of the project will need to focus on the following key issues:

- Addressing an overall decline in access to employment by car between 2013 and 2036, particularly in the west and south
- Addressing the low level of improvement in public transport access for people in the south and west, for accessing jobs in the south and the slowing of regional public transport access improvements beyond 2026.
- Investigate the extent to which accessibility challenges can be addressed by transport interventions

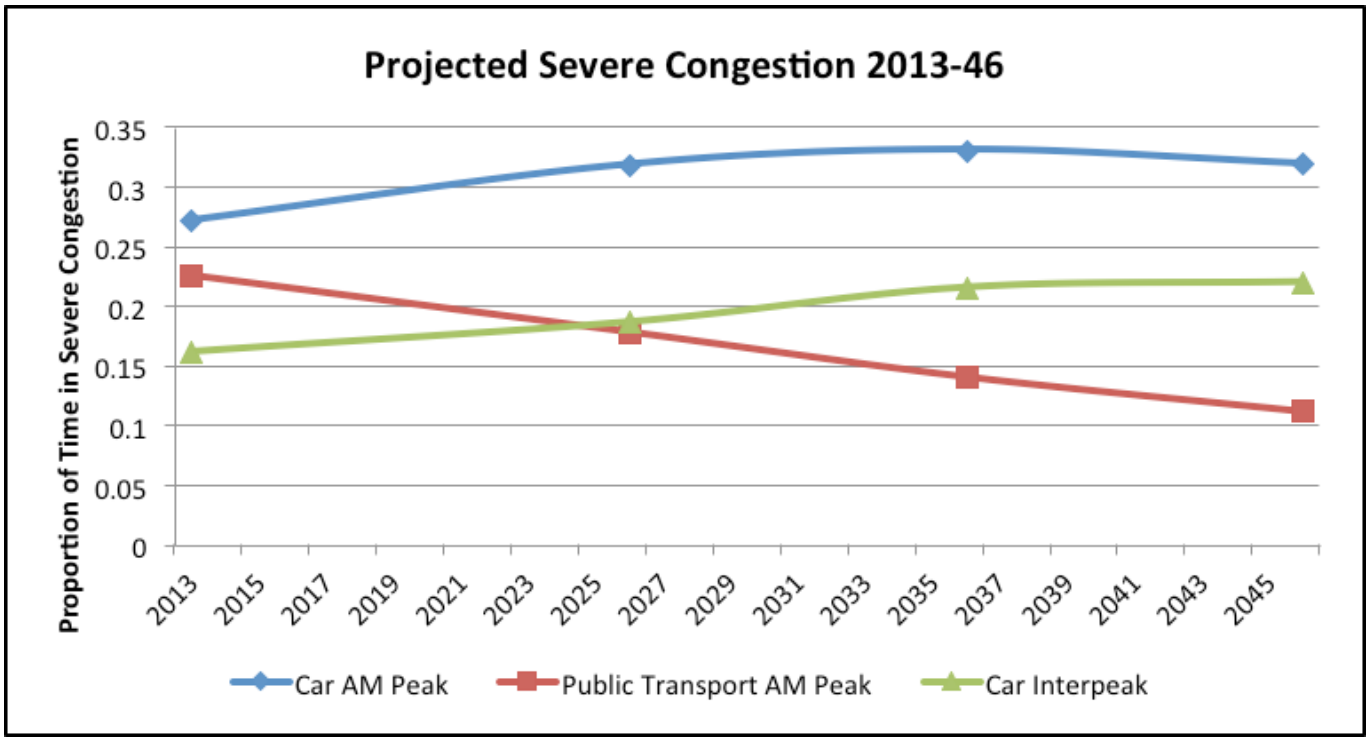
5.3. Congestion

Some level of congestion is a by-product of a successful city and generally cities with very low levels of congestion are either relatively small or in decline. However, congestion adds significant costs to doing business and moving freight, can reduce accessibility and quality of life and is a key concern for Auckland's travelling public. Congestion also impacts on the reliability of travel, adding costs by forcing travellers to add extra time to their journey to allow for the potential of delay.

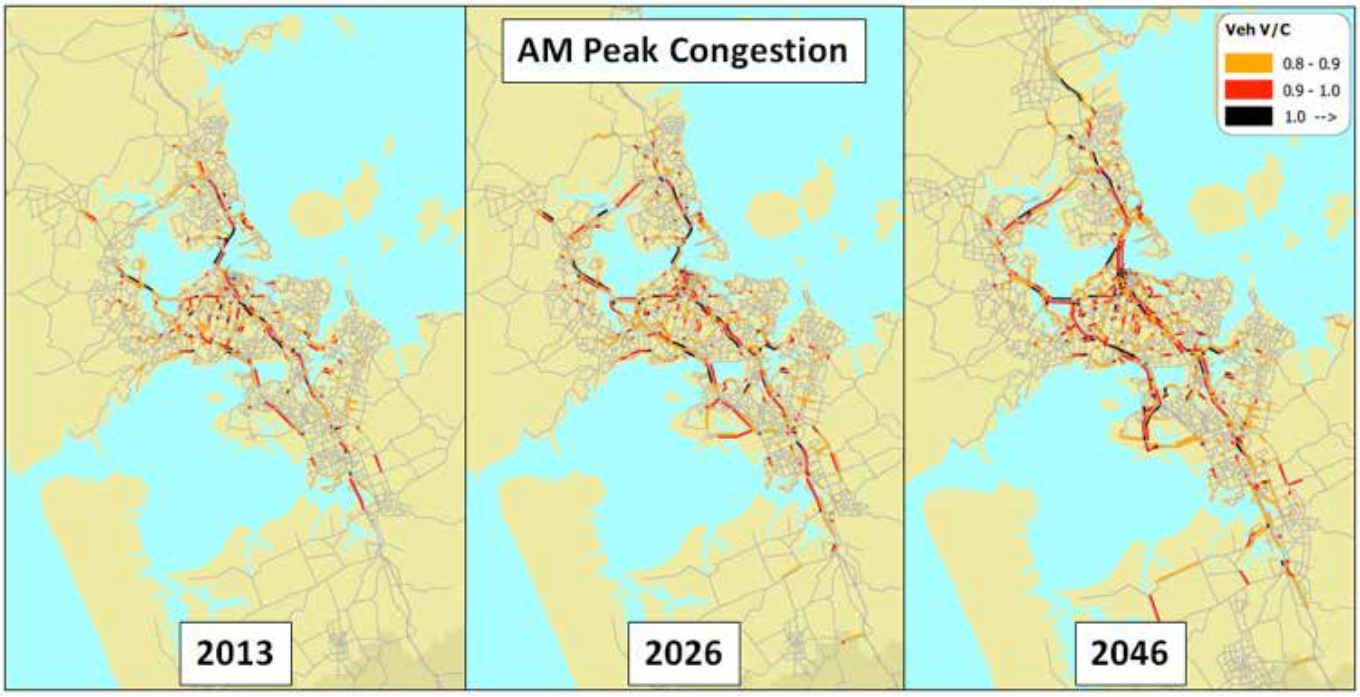
Analysis of the APTN highlights an increase in congestion over the next 20 years, with a subsequent reduction after 2036. In 2036 analysis suggests just under a third of travel time in the morning peak will be spent in congested conditions. While peak time congestion is projected to reduce from 2036 to 2046, inter-peak congestion continues to increase. By 2036, around 22% of inter-peak travel (an average of conditions between 9am and 3pm) is expected to be in congested conditions, influenced by a spreading of peak period conditions continuing later into the morning and beginning earlier in the afternoon.

Congestion is expected to particularly impact on the movement of freight. Time spent in congested conditions on the strategic freight network is forecast to increase by 45% by 2036. Inter-peak congestion on the strategic freight network is expected to double by 2036, reaching current peak period conditions.

In contrast, a key success of the APTN is that the impact of congestion on public transport at peak times is projected to decrease over time, due to an increased proportion of public transport trips being taken either on rapid transit services (e.g. rail and busways) or on bus services that utilise bus lanes. Projected congestion levels are shown in the graph below:

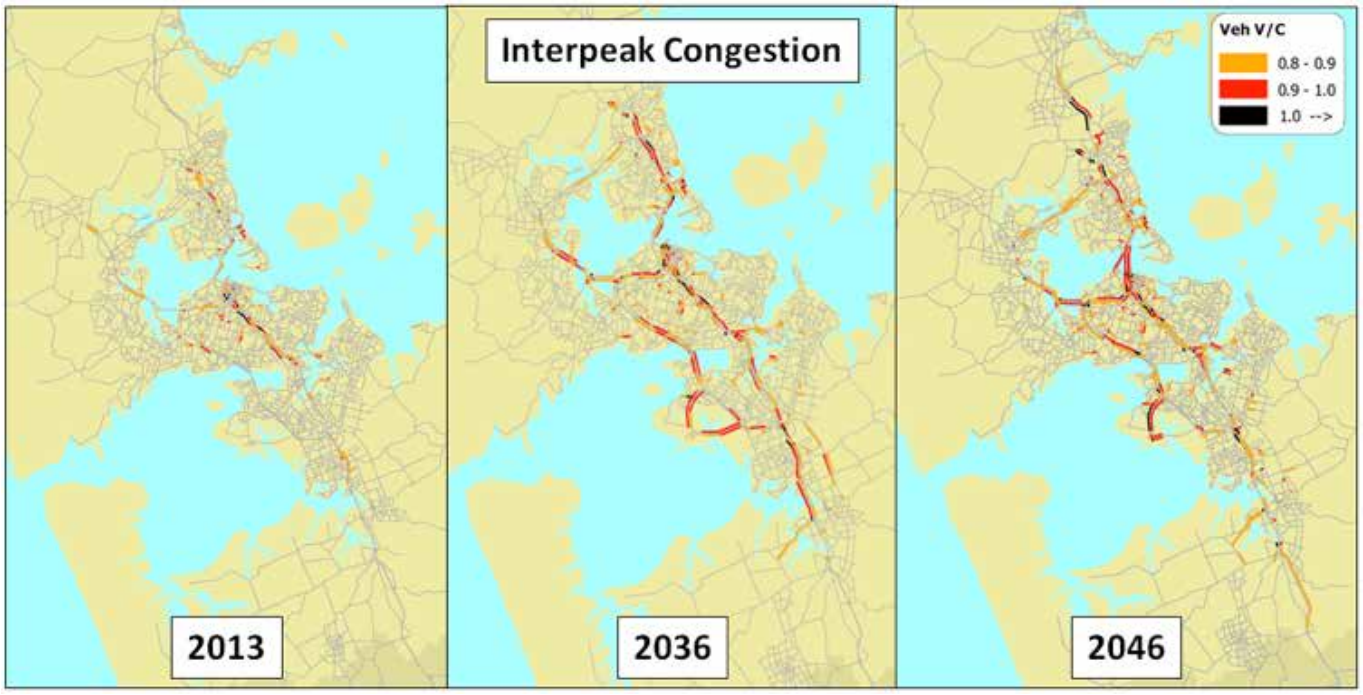


Modelling analysis of volume to capacity ratios, which provide a good indication of congestion levels, suggest that congestion problems will be experienced most on the motorway network. By 2046 in the AM peak, most of the motorway network is projected to experience some level of congestion (indicated by the coloured plots on the maps below) with some areas experiencing severe congestion (indicated by red and black). Much of the increase in peak congestion occurs before 2026 and either stabilises or improves towards the end of the 30-year period.



Outside the motorway network congestion is generally limited to specific locations during the AM peak, although it is important to note that the strategic modelling tools are likely to under-estimate localised congestion off the motorway network.

The projected increase in inter-peak congestion occurs almost exclusively on the motorway network. By 2036, inter-peak congestion is forecast to be as widespread on the motorway network as the current morning peak. Subsequent performance improvements do occur out to 2046.



The impact of congestion and unreliability is likely to be particularly pronounced for commercial and freight travel, which generally cannot rely on a public transport alternative and occurs mostly during the inter-peak period. Given the forecast congestion on the motorway network, unreliability will particularly impact on strategic freight movements, including freight to and from the ports and airports along with inter-regional freight movement.

Furthermore, with nearly three-quarters of daily trips in 2046 projected to be made by private vehicles, the impacts of congestion and poor reliability will continue to be felt by the majority of travelling Aucklanders

Key Congestion Findings:

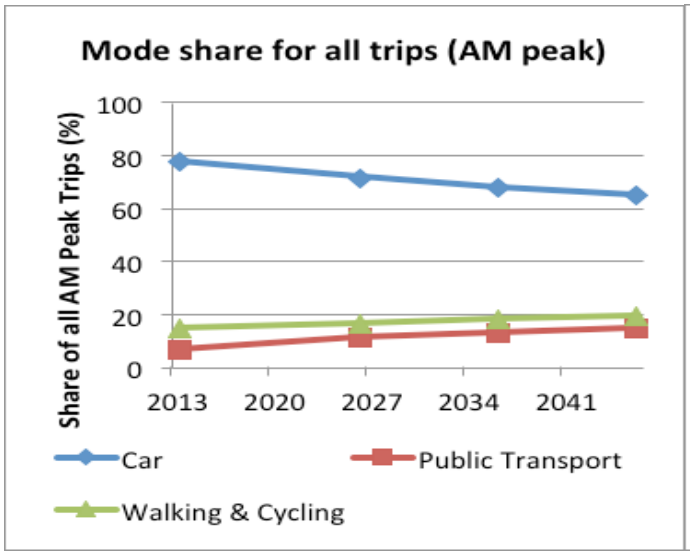
The development of intervention packages in the next stage of the project will need to focus on the following key issues:

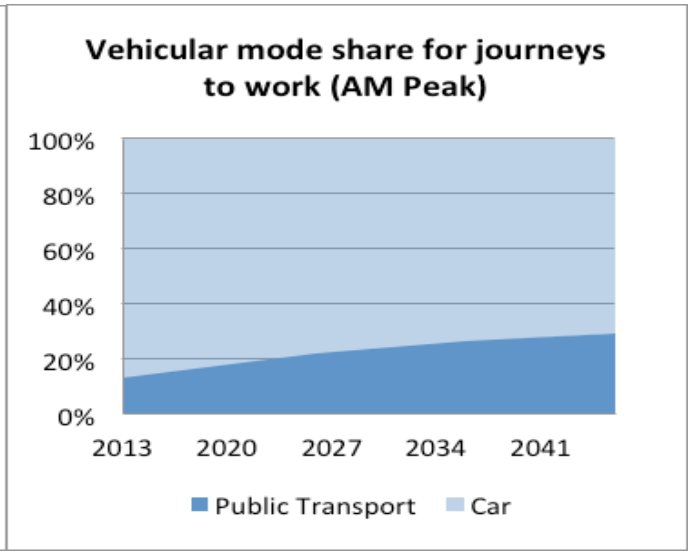
- Addressing a widespread increase in congestion between 2013 and 2036, particularly on the motorway network
- Addressing key bottlenecks on the motorways and local road network, particularly where they impact on overall accessibility and trip reliability

5.4. Public Transport Mode Share

Public transport carries a significant number of people efficiently along corridors of high demand, using space efficiently when compared to private vehicles. This attribute is particularly important in more intensive locations such as major centres where space is very valuable. Conversely, public transport often struggles as an attractive, cost-effective transport option in lower density areas, particularly when serving dispersed employment or low-intensity employment areas.

In the future, total mode share of public transport in Auckland is projected to remain relatively small compared to private vehicles. However, because public transport trips are focused at peak times, to major centres of employment (especially the city centre) and can be long (especially rail or busway trips), they play a critical role in supporting projected employment growth and reducing the impacts of congestion. Public transport is not projected to play such a significant role in the inter-peak period, as it is generally less attractive for the more dispersed travel occurring during this period.

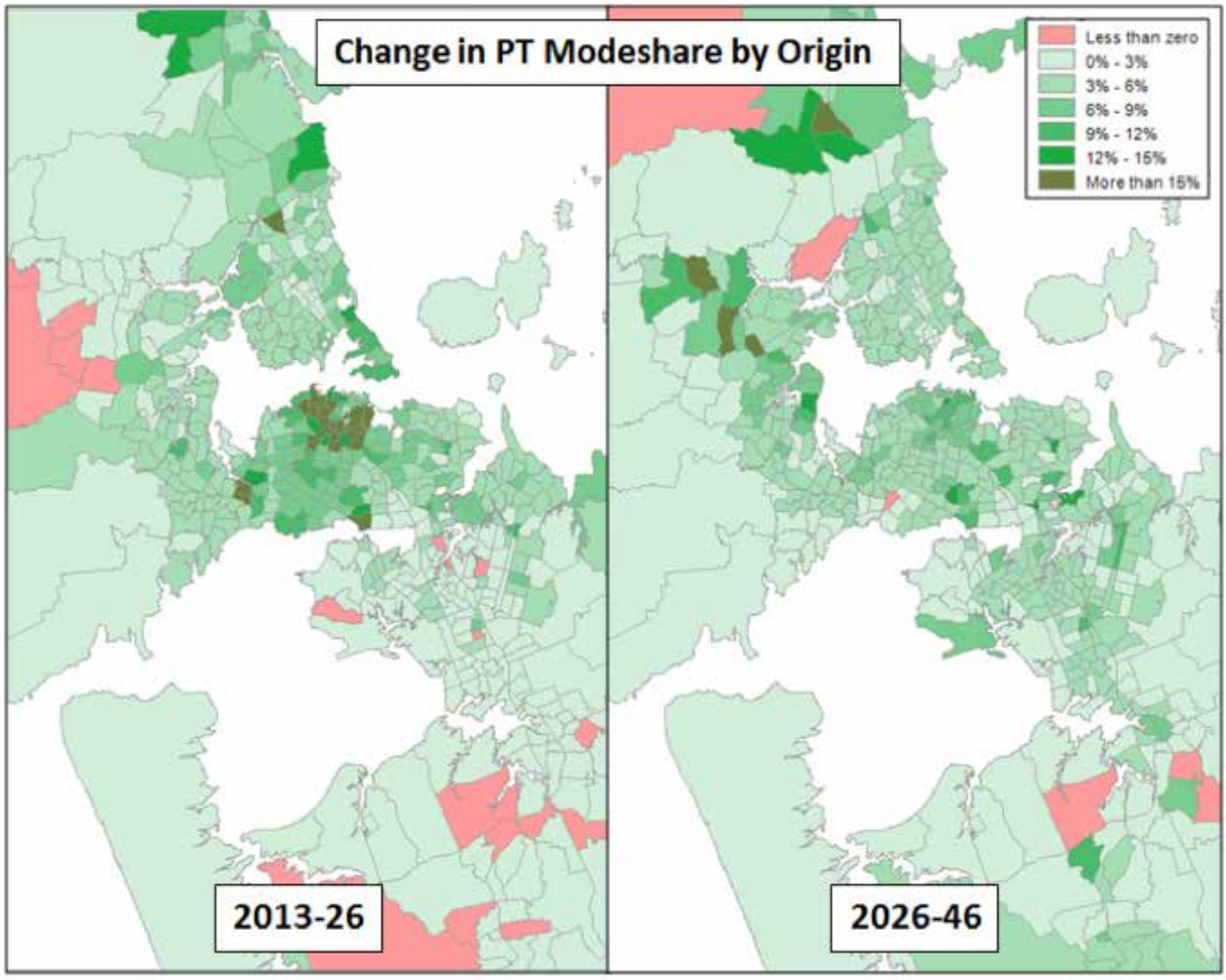


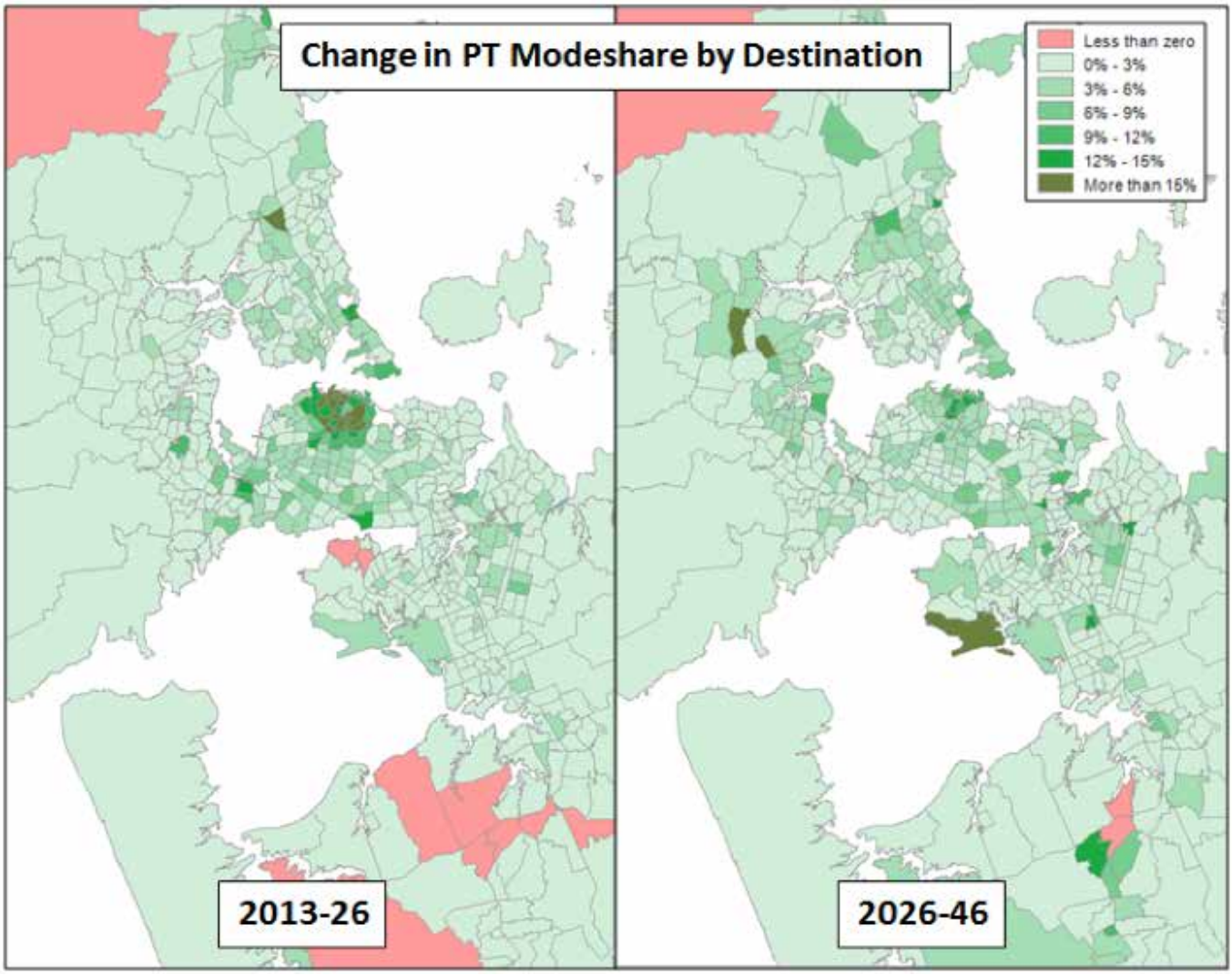


Public transport mode share is projected to increase steadily over time, with morning peak share lifting from 7% of all trips in 2013 to 15% by 2046. This would give Auckland a higher public transport mode share than Perth and Brisbane had in 2011, but lower than the mode shares of Sydney and Melbourne in 2011. For vehicular journeys to work in the AM peak, public transport has a higher share, growing from 13% in 2013 to 29% in 2046. It is notable that most of this increase occurs between 2013 and 2026, with a slower level of modal shift after 2026.

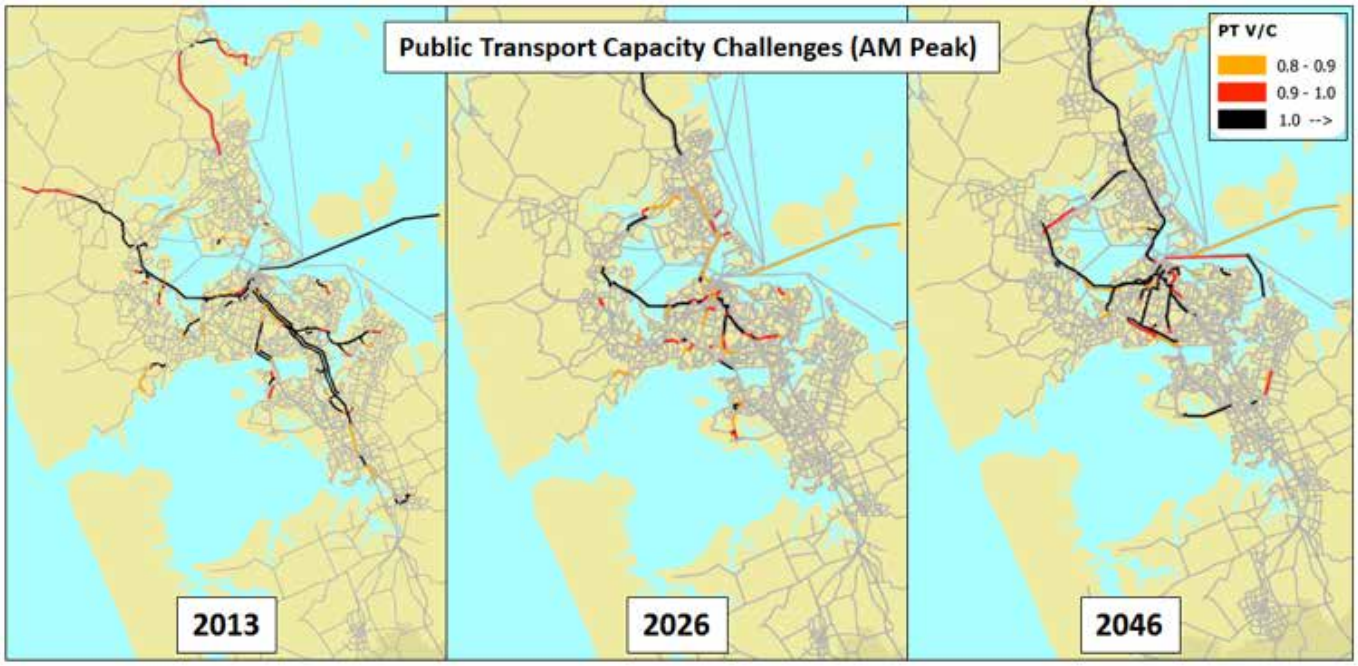
The importance of public transport in serving longer trips to major centres is further illustrated through the share of all personal distance travelled. In this case, public transport's share travelled increases from 11% in the 2013 morning peak to 19% in 2046. Due to their short distance, active modes account for around 1% of travel by distance.

Mode share growth up to 2026 appears to be focused on trips from the central area heading towards the city centre and its immediate surrounds. After 2026 the most significant growth is focused in the far north and northwest areas. Growth in the share of journeys taken by public transport to, from and within the south is limited throughout the 30-year period. Mode share growth for trips heading to the city centre and its surrounds slows down considerably after 2026, with the most significant growth by destination occurring for trips to the Airport and the northwest.


Change in PT Modeshare by Origin
Less than zero
0% - 3%
3% - 6%
6% - 9%
9% - 12%
12% - 15%
More than 15%
2013-26
2026-46


Change in PT Modeshare by Destination
Less than zero
0% - 3%
3% - 6%
6% - 9%
9% - 12%
12% - 15%
More than 15%
2013-26
2026-46

A key constraint on public transport mode share growth will be capacity constraints, where the level of demand cannot be provided for by the planned level of service. Projected public transport capacity constraints (indicated by situations where the volume of demand nears or exceeds service capacity) are highlighted in red and black below.



Typically, these constraints should be able to be resolved by providing additional services (i.e. operating more buses, trains or ferries) but in some cases this may be challenging due to infrastructural constraints such as the number of buses on particular corridors exceeding feasible levels. The main locations where simply providing more services may be challenging are on key approaches to the city centre from the north, west and south. The Auckland strategic transport model does not fully reflect the impacts of these capacity constraints, but more detailed analysis suggests a significant decline in bus speeds on busy routes over the next 30 years. If this is not addressed, it is likely to negatively impact on mode share growth.

Overall, the APTN analysis highlights that public transport mode share growth needs to make a greater contribution to reducing congestion, particularly for long trips where people using private vehicles are utilising highly congested motorway corridors. Notably, the analysis suggests that rail service levels included in the APTN do not appear to be a sufficiently attractive transport option to be driving major mode share change for areas served in the south and west.

Key Public Transport Mode Share Findings:

The development of intervention packages in the next stage of the project will need to focus on the following key issues:

- Investigate options for increasing public transport mode share, particularly attracting longer trips off the motorway network to reduce congestion
- Address the low level of public transport mode share growth in the south, particularly between 2013 and 2026

5.5. Net User Benefits

It is important to assess whether further increases to transport investment in Auckland generate net benefits for those who will be paying the extra costs. Policy interventions such as road pricing achieve improved performance of the transport network through raising the financial cost of travelling. It is important to weigh up the costs and benefits of pricing interventions to establish whether the additional financial costs of a road pricing charge are outweighed by the time savings benefit they provide to road users.

The APTN has not been assessed against this objective at this stage of the project. Intervention packages will however be compared against the APTN as part of later stages of the project.

Part 6
Next Steps

6.1. Testing Intervention Packages

The analysis in the previous section has highlighted a number of transport problems that are expected to accompany Auckland's growth over the next three decades, even with the significant investments proposed in current transport plans. Although the analysis did not specifically evaluate value for money, the results suggest that there are likely to be opportunities to deliver better outcomes by making some changes to the transport interventions that have been proposed.

The next phase of the project will examine these opportunities in more detail. This will involve the testing of different intervention packages (combinations of infrastructure investments, services and policies) to develop an understanding of the extent to which different interventions will contribute to the project objectives. In addition to investments in infrastructure and services that increase system capacity, the potential for demand-side interventions that improve the productivity of the existing transport system also needs to be assessed.

The next phase will be undertaken in two steps, which will inform the second deliverable:

1. Testing of specific interventions using a combination of transport modelling and analysis of previous work to understand the impact of major interventions
2. Using the findings from step one to create more realistic full 'packages of interventions' for comparative testing

The analysis to date has highlighted some key issues for the next phase of the project to examine in more detail:

Objective	Issues to address and investigate
Improve access to employment and labour	• An overall decline in access to employment by car between 2013 and 2036, particularly in the west and south • The low level of improvement in public transport access for people in the south and west, for accessing jobs in the south and the slowing of regional public transport access improvements beyond 2026. • The extent to which the accessibility issues faced in the west and south can be addressed by transport interventions
Improve access to employment and labour	• How widespread congestion becomes between 2013 and 2036, particularly on the motorway network • Key bottlenecks on the motorways and local road network, particularly where they will be impacting upon overall accessibility and trip reliability
Improve public transport mode share	• Options for increasing public transport mode share, particularly attracting longer trips off the motorway network to reduce congestion • The low level of public transport mode share growth in the south, particularly between 2013 and 2026

In addition to the issues outlined in section 5 above, there are some areas where the initial model-based analysis has not been sufficient to determine the full extent of future network problems. An example of this is freight transport, where further work will be needed in the next phase of the project to more clearly identify the issues and options that exist.

The next phase of the project will also include an assessment of the impact that different future scenarios for population growth, land use projections and technology futures may have on the project objectives.

6.2. Value for Money

The next phase of the project will test the intervention packages against all four project objectives, together with the other outcomes that form part of the evaluation framework in section 4.2. An important part of this next phase will be testing the extent to which transport interventions deliver value for money. The project's terms of reference outline a shared desire to achieve better value for money from transport investment in Auckland than will be achieved from current plans. Assessment of the intervention packages will need to demonstrate this outcome.

Developing, maintaining and operating the transport system has major costs – both public costs for Council and Government, and private costs for households and businesses. These costs have increased significantly over the last decade to address Auckland's growing transport demands. However, a decision to substantially increase investment in upgrading Auckland's network imposes an opportunity cost for taxpayers, ratepayers and transport users. Investment made to upgrade the network is money that cannot be invested to fund other government, council or individual priorities.

Assessing value for money will require understanding and measuring the total social benefits of a package of projects and ensuring they exceed the cost of the package. Achieving best possible value for money means that the package offers the greatest possible social benefits relative to its cost. Transport improvements create a wide variety of potential benefits to both users and non-users, including:

- Travel time savings
- Vehicle operating cost savings
- Impact on CO2 emissions
- Savings in accident costs
- Improved reliability and greater throughput
- Increased competition and agglomeration

This project's objectives encompass the bulk of the social benefits that can be expected from transport projects. An understanding of how those objectives are met helps to understand the effects of a particular package of projects. However, only a value for money measure reveals how the benefits stand in relation to the costs.

Endnotes & References

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[10] Infometrics and Auckland Council http://ecoprofile.infometrics.co.nz/Auckland

[11] Source: Scenario I9 land use

[12] Auckland Profile – initial results from the 2013 census (page 6), available online at: http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/Documents/aucklandprofileinitialresults2013census201405.pdf

[13] In the June 2014 year Auckland's population grew by 34,000 (2.3 percent), in the June 2015 year population grew by 43,500 (2.9 percent), to reach 1.57 million - Subnational Population Estimates: At 30 June 2015, available online at: http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/SubnationalPopulationEstimates_HOTPAt30Jun15/Commentary.aspx

[14] This projection, known as "Scenario I9" has been developed by Auckland Council and Auckland Transport. It reflects the likely location and timing of growth in newly urbanised areas (as outlined in the Future Urban Land Supply Strategy). However, Scenario I9 does not reflect the Proposed Auckland Unitary Plan's zoning and development controls within the existing urban area as these are currently being decided upon as part of the independent hearings process for that Plan. Given this, the land use assumptions do not imply wider endorsement outside of the project.

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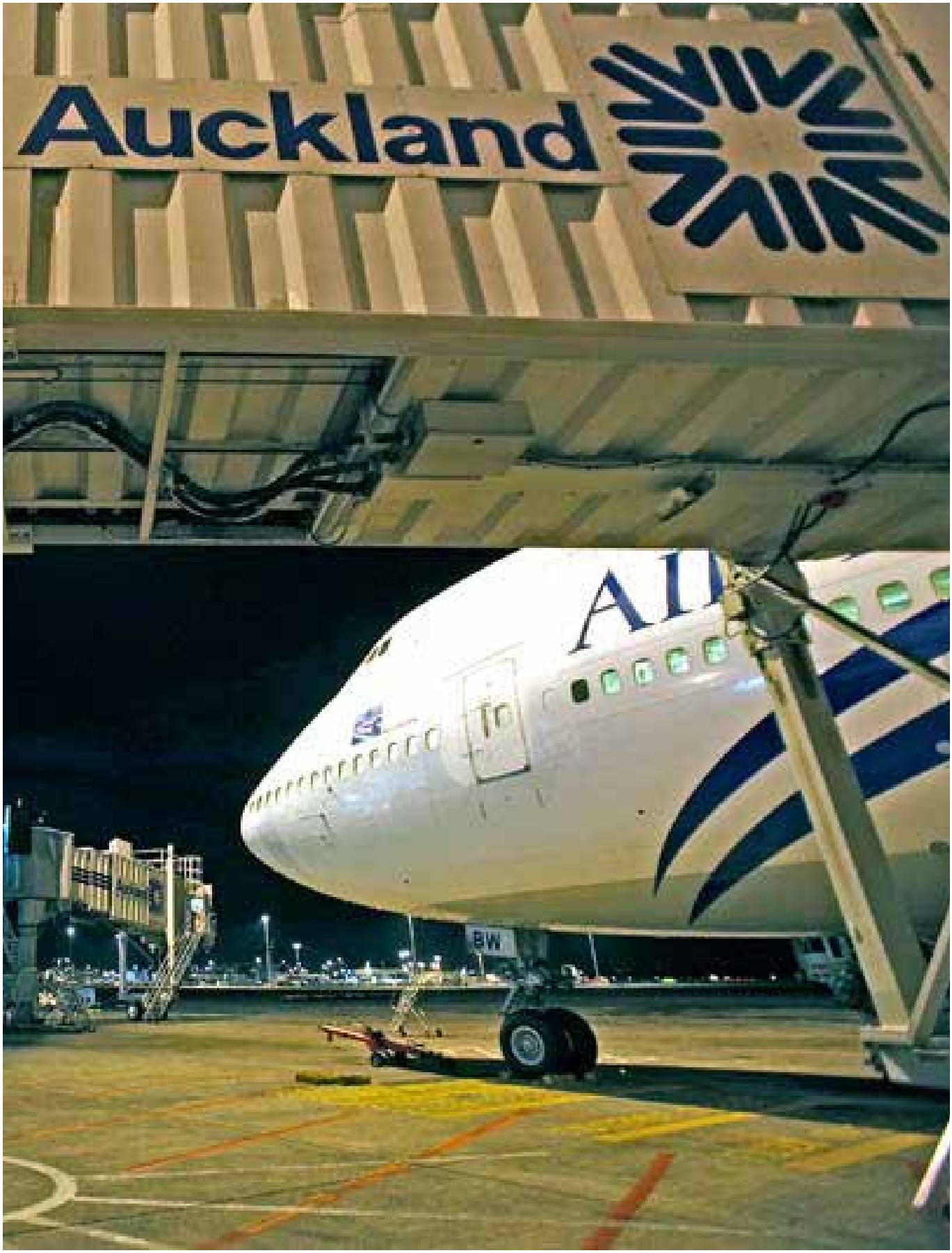
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