Wellington's Regional Land Transport Plan
Working Paper 2 – Background Trends and Issues

Data & Analysis Team
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1. Introduction

1.1 Policy context for RLTP working papers

The Regional Land Transport Programme represents the Wellington region’s bid for funding from the National Land Transport Fund (NLTF) which is administered by the New Zealand Transport Agency (NZTA). The current Regional Land Transport Programme, covering the period 2012 to 2015, reflects both the national direction provided in the Government Policy Statement on Land Transport Funding 2012/13-2021/22 (GPS) – which includes a focus on economic growth and productivity, value for money and road safety – and the Wellington region’s priorities and outcomes in the Regional Land Transport Strategy (RLTS).

From 1 July 2015, the Land Transport Management Act (2013) requires that the RLTS and Regional Land Transport Programme be consolidated into a new planning document called the Regional Land Transport Plan (RLTP). The Wellington Regional Transport Committee is developing the new RLTP to be adopted in April 2015. The RLTP will set out the region’s land transport objectives, policies, measures and targets for at least 10 years, i.e. for the period 2015 to 2025 (with a view to the strategic approach for development of the land transport network over the longer term, of up to 30 years). The RLTP will identify the transport activities for funding in the short term (up to six years) and the regional priority to be given to these projects.

As shown in Figure 1, the RLTP will address the challenges facing the region in terms of its transport network, relating to four key areas – economic growth, safety, resilience and liveability. The figure shows the benefits associated with addressing the challenges, then these feed into a list of eight key objectives and associated outcomes. How these outcomes are measured, and the targets relating to the objectives, are the focus of this set of RLTP working papers.

The new RLTP needs to reflect changes to the purpose and decision-making criteria in the Land Transport Management Act (LTMA) with a new focus on aiming for an ‘effective, efficient, and safe’ transport network and to reset targets out to 2025 (the targets are out to 2020 for the existing RLTS). It is therefore timely to review the region’s outcomes and targets to ensure that they are relevant and measurable.

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1 Note that funding is not guaranteed for all projects included in the RLTP. Final decisions regarding funding are taken by the NZTA.
2 The Regional Transport Committee comprises Greater Wellington Regional Council (GWRC), the city and district councils in the Wellington region, and NZTA.
3 Definitions of these terms may be found at GWRC (2015): Regional Land Transport Plan 2015 (for consultation), p.141.
1.2 Overview of RLTP working papers

In order to inform the RLTP policy framework, a series of five working papers have been developed. There is a set of measures and targets associated with the RLTS for 2010-2040. The RLTP for 2015 will also contain a comparable set of measures and targets, but with changing circumstances and patterns of behaviour, and developments in the region since the last set were established, some revision is appropriate.

The five working papers start with a review of the current situation for the Wellington regional transport network, look at trends and influences in recent years; pressures and issues relating to the region’s transport network; and arrive at a revised set of targets and measures for the RLTP, informed by modelling and by actual trends.

The five working papers, of which this is the second, are as follows:
This paper begins the process of transition from RLTS to RLTP by reviewing the region’s land transport outcomes and associated targets which are determined by the strategic objectives for the region. The paper focuses on whether the targets are relevant, measurable and achievable, and the extent to which the work carried out by the Greater Wellington Regional Council can influence progress towards achieving these targets. The purpose of this paper is to provide information to guide the development of SMART targets – specific, measurable, achievable, realistic and time-bound – for the 2015 RLTP, which will cover the period 2015 to 2025.

Working Paper 2: Background Trends and Issues
This paper summarises demographic and transport-related trends over the last 10 to 20 years, suggests how these trends might develop in the short to medium term and the implications that this might have for future travel demand and the transport system. It arrives at a summary of trends and issues affecting the region’s transport network and identifies areas where future travel demand growth may occur. The purpose of this paper is to provide an evidence base for the development of an ‘expected future’ scenario that will be used to inform the development of RLTP targets.

Working Paper 3: Transport Modelling Approach
Drawing upon information presented in Working paper 2, this paper outlines the infrastructure, land use and economic assumptions that form the basis for the development and modelling of a number of future scenarios in the Wellington Transport Strategy Model (WTSM). This paper provides a description of the scenarios that are modelled in the WTSM. The modelling produces an ‘expected future’ for the Wellington region’s transport network, and a range of alternative scenarios as key assumptions are varied. The scenario results are analysed in Working paper 4.

Working Paper 4: Development of Future Scenarios
This paper presents the results from the WTSM scenarios modelling in Working paper 3 and outlines how the different future scenarios that are modelled result in different travel patterns. The modelled impacts of the scenarios are compared according to key performance indicators. The results of ‘revised future’ modelling are presented with revisions to two central expected future assumptions based on 2014 policy decisions. Drawing upon the modelling and information presented in the background paper, the ‘expected future’ scenario is developed further, and this is the expected future that forms the basis for the development of the RLTP targets.

Working Paper 5: Targets Development
This final working paper brings together the analysis from the first four working papers to produce a revised set of targets and measures for the RLTP. The purpose of this paper is to outline and provide rationale behind a set of targets that are considered challenging, yet achievable, and will help the region make progress towards a range of strategic objectives and outcomes.
A glossary of terms for the five working papers is provided as a separate document.

1.3 Outline of this working paper
This working paper is structured as follows.

Section 2 provides an overview of recent population and employment trends, including the spatial distribution of recent growth in population and employment and future projections.

Section 3 looks at recent changes in vehicle ownership across New Zealand and the Wellington region.

Section 4 summarises the region’s existing state highway, local road, freight and public transport networks, commenting upon issues and opportunities.

Section 5 uses census journey-to-work data to identify recent changes in travel patterns and model preferences at both a regional and local authority level.

Section 6 summarises recent trends relating to public transport patronage, active modes, road traffic, modal share, freight trips and congestion.

Section 7 takes recent observed trends, recent travel patterns and forecasts and develops several broad views of the future in terms of public transport patronage, active modes and road traffic.

Section 8 looks at reliability and resilience issues affecting the regional transport network.

Section 9 summarises recent trends in safety on the regional roading network using casualties as a proxy. Data are presented relating to motor vehicle, walking and cycling casualties on the regional network and how they might change into the future.

Section 10 provides a summary of current and future transport-generated carbon dioxide emissions, together with commentary on how these trends might develop into the future.

Section 11 concludes.

It must be noted that throughout this working paper, data showing recent trends are obtained from many different sources. As far as possible, consistency has been maintained across data in terms of the date ranges covered.

Given that a census was undertaken in 2001 and 2013, providing a wealth of relevant information, many of the comparisons focus upon this 12-year period. In several instances, however, the availability of incomplete, shorter or longer time series data means that the date ranges vary.

When presenting projections and forecasts, the horizon years may also vary. For example, many projections are for the period to 2025 to reflect the RLTP forecast period, while population and employment projections derived from
data used for the Wellington Transport Strategy Model relate to 2031, since this is a key forecast year used in the model.

2. **Population**

2.1 **Recent trends**

The composition of the Wellington region’s population changes over time, due to factors such as external migration (to and from outside New Zealand), internal migration (within New Zealand), changes to the birth rate and an ageing population. The most uncertain of these factors is external migration.

**Figure 2** shows how the Wellington region’s population grew over the 12 years to 2013 (left-hand scale). For comparative purposes the New Zealand population over the same period is also provided (right-hand scale).

**Figure 2 Population in Wellington region and New Zealand, 2001 to 2013**

Between 2001 and 2013 the population of the Wellington region grew by around 50,000, equivalent to an average growth rate of 0.9% per annum and overall growth of 12% over the period in question.

The growth rate was slightly higher between 2001 and 2006 compared with 2006 to 2013, due to lower net migration during and following the global financial crisis (GFC) which began in late 2007 and has had long-lasting effects on the global economy.

The average rate of growth in population for the Wellington region was similar to that for New Zealand between 2001 and 2013.

The distribution of this increase in population across the region was not even. **Table 1** shows the change in population by local authority area, highlighting that growth rates associated with Wellington City and Kapiti were much greater (1.3% and 1.2% per annum respectively) than growth rates associated with the other local authority areas.
In 2013, Wellington City (191,000) and Lower Hutt (98,000) accounted for 61% of the region’s population, whilst Kapiti accounted for 10%.

### Table 1 Population between 2001 and 2013, by local authority area (‘000s)

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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington City</td>
<td>164</td>
<td>179</td>
<td>191</td>
<td>15.6%</td>
<td>11.5%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Lower Hutt</td>
<td>95</td>
<td>98</td>
<td>98</td>
<td>2.2%</td>
<td>0.5%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Upper Hutt</td>
<td>36</td>
<td>38</td>
<td>40</td>
<td>2.0%</td>
<td>1.8%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Porirua</td>
<td>47</td>
<td>49</td>
<td>52</td>
<td>1.2%</td>
<td>3.2%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Kapiti</td>
<td>42</td>
<td>46</td>
<td>49</td>
<td>3.8%</td>
<td>2.9%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Wairarapa</td>
<td>38</td>
<td>39</td>
<td>41</td>
<td>0.4%</td>
<td>0.4%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Region</td>
<td>424</td>
<td>449</td>
<td>471</td>
<td>25.2%</td>
<td>22.4%</td>
<td>47.6%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3,737</td>
<td>4,028</td>
<td>4,242</td>
<td>229%</td>
<td>214%</td>
<td>504%</td>
</tr>
</tbody>
</table>

Source: Statistics NZ, usual resident population

**Figure 3**, a graphical representation of **Table 1**, shows how growth between 2001 and 2013 in Wellington City and Kapiti tracked above the New Zealand average, whilst growth in all other local authority areas tracked below the national and regional average.

The relatively high growth rates seen in Wellington City (17%) and Kapiti (16%) between 2001 and 2013 were primarily a result of:

- the completion of large housing developments in Kapiti
• new sections and subdivisions being developed in Wellington City’s northern suburbs
• a large number of new apartment dwellings in and around the Wellington City CBD, contributing to the increase in popularity of city living

Lower growth rates between 2001 and 2013 were seen in areas such as Lower Hutt (3%) and, to a lesser extent, Wairarapa (8%), Porirua (9%) and Upper Hutt (11%).

In Wellington City, Kapiti, Lower Hutt and Upper Hutt, population growth between 2001 and 2013 was relatively linear – i.e. growth rates between 2001 and 2006 were similar to growth rates between 2006 and 2013.

In Porirua and the Wairarapa, however, population growth in the period 2006 to 2013 (around 7%) exceeded population growth in the preceding period, when Porirua saw 3% growth, and Wairarapa 1%.

Table 2 shows the change in residential population between 2001 and 2013 for Wellington City, broken down into six distinct geographic areas, together with the percentage of the total increase in population over the period in question that can be attributed to each area.

<table>
<thead>
<tr>
<th>Area</th>
<th>2001 population</th>
<th>2013 population</th>
<th>Absolute increase in population (2001 to 2013)</th>
<th>% increase in population (2001 to 2013)</th>
<th>% of total increase in Wellington City population (2001 to 2013)</th>
</tr>
</thead>
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<tr>
<td>Tawa</td>
<td>12.7</td>
<td>13.5</td>
<td>0.9</td>
<td>6.8%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Northern suburbs</td>
<td>44.9</td>
<td>52.8</td>
<td>7.8</td>
<td>17.5%</td>
<td>28.9%</td>
</tr>
<tr>
<td>Western suburbs</td>
<td>30.7</td>
<td>33.9</td>
<td>3.2</td>
<td>10.5%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Southern suburbs</td>
<td>27.4</td>
<td>30.4</td>
<td>3.0</td>
<td>11.0%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Eastern suburbs</td>
<td>26.4</td>
<td>28.8</td>
<td>2.4</td>
<td>9.0%</td>
<td>8.8%</td>
</tr>
<tr>
<td>CBD</td>
<td>21.7</td>
<td>31.5</td>
<td>9.8</td>
<td>45.2%</td>
<td>36.2%</td>
</tr>
<tr>
<td>Total</td>
<td>163.8</td>
<td>191.0</td>
<td>27.1</td>
<td>16.6%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: NZ Census

Nearly two-thirds of the growth in population between 2001 and 2013 occurred in Wellington’s northern suburbs and the CBD. In percentage terms, Wellington City CBD had the greatest increase in population (45%) between 2001 and 2013, due in part to the increasing popularity of living in apartments within the CBD, and accounted for 36% of population growth seen within Wellington City between 2001 and 2013.

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4 Statistics NZ, usual resident population
Residents of Wellington City CBD are generally less likely to drive and take public transport than an average resident of Wellington City for some of the following reasons:

- for most people living in the CBD, walking/cycling will be the most efficient means of commuting to work
- new apartment dwellings generally have limited parking spaces and limited/restricted on-road parking, leading to lower levels of car ownership
- typical CBD residents are young professionals with no children or older couples with no dependents, further reducing the need for them to own or use a car
- most amenities, such as supermarkets and entertainment precincts, are within easy walking distance of CBD apartments
- the CBD is the focal point of the bus/rail network, meaning that public transport is an easy and viable option on occasions when people need to travel to other areas within Wellington City and elsewhere within the region

2.2 Population projections

Figure 4 shows a range of population growth forecasts for the region, developed for the GWRC’s Wellington Transport Strategy Model (WTSM) and derived from Statistics NZ projections. These projections were made in 2012 using the latest information available at that time and remain the preferred basis for population projections that underpin the development of the 2015 RLTP.

‘Low’, ‘medium’ and ‘high’ projections were produced to highlight different possible views of the future out to 2031.

Figure 4 Wellington region population growth projections, 2013 to 2031, high, medium and low scenarios

Source: Statistics NZ/WTSM

Looking at historic population projections developed by GWRC for the WTSM (and also based upon Statistics NZ projections) and comparing against observed population data over the same period, population growth in the Wellington region has been shown to largely follow the ‘medium’ growth trajectory. Therefore analysis presented in this working paper continues to assume a ‘medium’ population and employment growth trajectory out to 2031.

Looking at the medium population projection presented in Figure 4, growth over the period from 2013 to 2031 is likely to be focused in Kapiti (18%) and Wellington City (16%), a continuation of recent trends.

Other areas show lower forecast population growth – 1% in Lower Hutt and Upper Hutt, 3% in Porirua – whilst the Wairarapa shows a slight decrease in population.

Across the region as a whole, population growth between 2013 and 2031 is projected to be around 9% (estimated to be around 7% between 2013 and 2025).

Large variations exist between the ‘low’ and ‘high’ projections across all local authorities, highlighting the level of uncertainty that exists when trying to forecast changes in population.

2.3 Wellington City’s CBD intensification

The increasing popularity of living in the CBD is not unique to Wellington or to New Zealand as a whole – it is occurring throughout the developed world.

Wellington City’s Urban Development Strategy\(^6\) envisages future growth within Wellington City being focused around transport nodes, the CBD, a ‘growth spine’ from the CBD out to Adelaide Road, Newtown and onto Kilbirnie, and further extension of the northern suburbs.

Residential growth that is focused in and around the CBD and with close proximity to transport nodes is likely to result in lower vehicle and public transport growth rates than if this growth were to occur in other outlying areas in the region, for the reasons outlined in section 2.1. This trend and its possible implications for travel demand are discussed later in this working paper.

2.4 Population age structure

At a regional level, the structure of the Wellington region’s population changed as follows between 2001 and 2013, according to the censuses:\(^7\)

- the percentage of the population aged over 55 increased from 19.7% to 24.2%
- the percentage of the population aged over 65 increased from 11.1% to 13.2%

\(^7\) http://profile.idnz.co.nz/greater-wellington/five-year-age-groups
• the percentage of the population aged between 20 and 55 decreased from 51.6% to 49.3%

Figure 5 gives an indication of how the region’s population structure is forecast to change over the 12 years to 2025. It draws upon Statistics NZ projections and population profiles from the Wellington Region Community Profile\(^8\) forecasts; these forecasts have been produced by a demographic information provider known as .id.

Figure 5 Change in Wellington region population – 2013 to 2025

Source: Statistics NZ/.id

Key forecast trends to note are as follows:

• the number of people under 18 years of age is forecast to stay largely the same (reducing in percentage terms)

• there is forecast to be an increase in the number of 20 to 24 year olds, due to temporary migration associated with university students

• the number of people aged between 25 and 40 is forecast to reduce slightly

• the number of people aged 40 and over is forecast to increase significantly, with the biggest absolute increase occurring in the 55 to 70 age bracket and the largest percentage increase associated with those aged over 70

These likely future trends can be explained in relation to the baby-boomer generation reaching retirement age, average life expectancy continuing to increase and birth rates remaining low.

Whilst migration to New Zealand may be expected to dampen these forecast trends, it is unlikely that it would be sufficient to offset the increase in the proportion of the population aged over 55, particularly since some people migrating to New Zealand are also likely to be over 55.

\(^8\) [http://profile.id.nz.co.nz/greater-wellington](http://profile.id.nz.co.nz/greater-wellington)
Forecasts suggest that there may be a 36% increase in the number of people aged over 65 living in Wellington City between 2013 and 2025. If an increase of a similar magnitude were to occur across the rest of the region, the percentage of the region’s population aged over 65 may increase from 13.2% in 2013 to nearer 17% in 2025.

2.5 Trip rates by age group

Each age group has different travel patterns. The New Zealand Institute of Economic Research (NZIER), in a report prepared for the NZTA documenting the National Long-Term Land Transport Demand Model (NLTDM)\(^9\) that it developed, categorises the population as follows:

- 0 to 24 year olds – lower VKT, higher public transport travel demand;
- 24 to 60 year olds (‘working age’) – higher VKT, lower public transport demand; and
- 60+ years old – lower VKT, higher public transport travel demand.

**Figure 6** provides an estimate of the percentage of annual car and public transport trips made by age group, together with the population (by age group) in 2013.

**Figure 6 Percentage of annual car and public transport trips, and population, by age group, 2013**

![Figure 6](source: NZ Ministry of Transport/UK Department for Transport/Statistics NZ)

Whilst approximate, the data presented above shows that in 2013:

- persons under 30 years of age accounted for around 40% of the population, 15% of car trips and 50% of public transport trips.

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\(^9\) [http://forecast.idnz.co.nz/wellington/population-age-structure](http://forecast.idnz.co.nz/wellington/population-age-structure)

• 30- to 60-year-olds accounted for around 40% of the population, 65% of car trips and 30% of public transport trips
• persons aged 70 or older accounted for around 10% of the population, 7% of car trips and 12% of public transport trips

An ageing population, as highlighted in section 2.4, may result in an increase in off-peak travel demand, particularly for public transport. However, the percentage of the population categorised as being in the labour force is likely to remain constant through time. Furthermore, it is expected that more people will end up working into their late 60s and early 70s – more in both absolute and relative terms.

2.6 Employment trends and forecasts

Alongside population, employment is another key determinant of travel demand. The spatial distribution of both employment and population determine the nature of travel that is required in order for people to reach their place of work. Increasing employment means more people travelling to work.

2.6.1 Unemployment rates

Figure 7 shows the Wellington region and New Zealand unemployment rates between 1987 and 2014.\(^\text{11}\)

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{wellington_unemployment.png}
\caption{Wellington region and New Zealand unemployment rate, 1987 to 2014}
\end{figure}

The data show that the regional and national trends are similar. The regional unemployment rate peaked at 9.5% (1993), 6.5% (1999) and 7.0% (2013).

\(^{11}\) http://www.stats.govt.nz/infoshare/; Household Labour Force Survey – HLF; Table: Labour Force Status by Sex by Regional Council (Annual-Jun); Wellington and Total All Regional Councils
The lowest regional unemployment rate (2.9%) was seen in 1987; in more recent times, the period between 2001 and 2008, largely characterised by solid economic growth, saw the unemployment rate varying between 4% and 5%.

Whilst the unemployment rate started to drop after its post-GFC peak in 2013 (7.1%), it remained at elevated levels (around 6% in June 2014) compared to levels seen between 2001 and 2008. This signifies that some slack still existed in the economy, with an additional 1 to 1.5 percentage point drop required in order to bring the unemployment rate down to around 4%, a figure that it could be said equates to full employment.\textsuperscript{12}

2.6.2 Regional employment between 2001 and 2012

Figure 8 shows employment and population within the Wellington region between 2001 and 2012.

It shows that employment grew strongly between 2001 and 2008, before declining slightly between 2008 and 2012 as a result of the GFC, whilst population grew at a fairly constant rate throughout the whole period.

Table 3 highlights differences in the population and employment (measured as full-time equivalents or FTEs) growth rates between 2001 and 2012.

<table>
<thead>
<tr>
<th></th>
<th>2001-2008 (7yr)</th>
<th>2008-2012 (4yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment (FTEs)</td>
<td>+16%</td>
<td>-3%</td>
</tr>
<tr>
<td>Population</td>
<td>+8%</td>
<td>+3%</td>
</tr>
</tbody>
</table>

Between 2001 and 2008, the employment increased by 16% whilst the population grew by 8%. Between 2008 and 2012, the employment fell by 3%.

\textsuperscript{12} Even during prosperous times, unemployment rates will never reach 0% as there will be a mismatch between available jobs and the skills of potential workers. Therefore an unemployment figure of between 3% and 5% is often considered to denote ‘full employment’ \url{http://en.wikipedia.org/wiki/Structural_unemployment}
whilst the population grew by around 3%, reflecting an increase in the unemployment rate.

2.6.3 Employment by local authority area

Table 4 shows the number of employees (FTEs) within the Wellington region in 2011, categorised by the local authority area within which their place of employment was located. For comparative purposes the population is also provided.

Table 4 Number of employees (FTEs) and population, by local authority area, 2011 (‘000s)

<table>
<thead>
<tr>
<th></th>
<th>Regional total</th>
<th>Wellington City</th>
<th>Porirua</th>
<th>Lower Hutt</th>
<th>Upper Hutt</th>
<th>Kapiti</th>
<th>Wairarapa</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011 FTEs</td>
<td>220.6</td>
<td>123.1</td>
<td>15.6</td>
<td>40.4</td>
<td>11.0</td>
<td>13.8</td>
<td>16.5</td>
</tr>
<tr>
<td>% of total regional FTEs</td>
<td>100%</td>
<td>56%</td>
<td>7%</td>
<td>18%</td>
<td>5%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>2011 population</td>
<td>471</td>
<td>191</td>
<td>40</td>
<td>98</td>
<td>52</td>
<td>49</td>
<td>41</td>
</tr>
<tr>
<td>% of total regional population</td>
<td>100%</td>
<td>40%</td>
<td>8%</td>
<td>21%</td>
<td>11%</td>
<td>10%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: Statistics NZ

The data show that of the 221,000 FTEs within the region, 56% were located within Wellington City.

Wellington City had a greater percentage share of jobs than population, whereas the other local authority areas had a greater percentage share of population than jobs, highlighting the level of intra-local authority travel that is required in order for people to commute from home to work.

2.6.4 Future employment projections

Figure 9 shows in absolute and percentage terms how employment within the Wellington region is projected to increase in the period to 2031 under a ‘medium’ growth scenario. Population growth rates by TA, covered previously in section 2.2, are also provided for means of comparison.
The forecasts show that:

- in percentage terms, employment growth rates are not expected to vary greatly between local authority areas, in contrast to population growth, where Wellington City and Kapiti are forecast to grow at a notably faster rate than other areas

- the regional employment growth rate is expected to be higher than the population growth rate with employment expected to recover post-GFC

- in absolute terms, Wellington City accounts for around 60% of the expected regional growth in employment (~15,000 jobs) and around 70% of regional growth in population (~30,000 people)

The relationship between population and employment and the spatial distribution of both are the key determinants of travel patterns in the region.

### 2.6.5 Working from home

An emerging trend is one where people are taking advantage of technological improvements in communications, including via internet, mobile phones, and cloud computing, to work remotely, and thereby reducing the need to travel.

The recent 2013 Census showed a small increase in the proportion of persons in the Wellington region working from home out of all journey-to-work trips, from 5.6% in 2006 to 6.2% in 2013.
This recent trend is likely to continue into the future. This would then imply that the forecast increase in employment may translate into a smaller percentage increase in journey-to-work trips, as a growing percentage of the workforce works from home.

2.6.6 Age composition of the workforce

Figure 11 shows that, between 1991 and 2013, the age composition of the New Zealand workforce changed significantly. Note that no data were readily available for Wellington region.

Figure 11 Age composition of the New Zealand workforce, 1991 to 2013
The 15- to 44-year-old age group as a percentage of the total workforce, declined from around 71% of the workforce in 1991 to nearer 55% in 2013. Persons aged over 55 rose from around 10% of the workforce in 1991 to around 22% of the workforce in 2013. The percentage of people aged over 65 in the workforce increased threefold between 1991 and 2013.

These changes in the composition of the New Zealand workforce were due to the following factors:

- the baby boomer generation (persons born between 1946 and 1964) have been entering the higher age brackets
- there have been falling birth rates since the baby boomer period
- there has been an upward trend in people’s health and physical ability to work to a later age
- there was an increasing trend for people in older age groups to keep active, including working part-time
- many people have needed to continue to work in order to supplement their pensions and fund their retirement

### 2.7 Summary

Key points noted in this section are as follows:

#### Population

- there was a 12% increase in regional population between 2001 and 2013, similar to the national trend over the same time period
- between 2001 and 2013, Wellington City and Kapiti had much higher population growth rates than other local authority areas
- between 2001 and 2013, the population of Wellington City grew 17%, driven by a 45% increase in population in Wellington City CBD during this period.
- CBD residents tend to have different travel patterns – lower levels of car ownership, increased use of active modes and public transport – compared to the population as a whole
- projections suggest that the regional population will increase by around 9% between 2013 and 2031 under a ‘medium’ growth scenario
- population growth to 2031 is forecast to be focussed on Wellington City (16% growth) and Kapiti (18% growth)
- growth in Wellington is likely to be focussed on the Wellington City CBD, northern suburbs and growth spine, possibly resulting in a relative increase in public transport and active mode trips and a decrease in car trips
- the number of people aged 65 and over living in the Wellington region increased from 11.1% in 2001 to 13.2% in 2013. Estimates suggest that this figure could reach 17% in 2025, the result of a 36% increase in people aged over 65 living within the region.

- persons of working age (defined as 24 to 60 years old) generally have high car and low public transport trip rates, whilst the younger adults and older adults outside this range generally have higher public transport trip rates and lower car trip rates.

**Employment**

- the unemployment rate in June 2014 (~6%) was still elevated compared with peak levels during previous economic cycles (~4%).

- whilst there was a 3% reduction in employment between 2008 and 2012 due to the recession, population grew by 3% during this period.

- Wellington City (56%) and Lower Hutt (18%) contained around 74% of all jobs within the region in 2011.

- 12% growth in employment is expected between 2013 and 2031, compared to population growth of around 9%.

- over 60% of regional employment growth and 70% of regional population growth is forecast to occur in Wellington City.

- in absolute terms, most new jobs will be added in Wellington City CBD.

- technological improvements are resulting in more people working remotely, reducing the frequency with which they need to travel.

- the percentage of the labour force aged 65 increased from 2.7% in 2006 to 5.2% in 2013; projections suggest that this trend will continue into the future.
3. Vehicle ownership

Changes in population and employment are the main drivers behind changes in travel demand and travel patterns. A key consideration for people when choosing a mode of travel for a particular journey is the relative difference in costs (both monetary and time-based costs) between available options – private vehicle, public transport, walking and cycling.

For households/people with no access to a motor vehicle, the available choices are limited to public transport, walking and cycling. These people are said to be ‘captive’ public transport users.

3.1 Light vehicle ownership per capita

Figure 12 shows light vehicle ownership per capita, by region, for the whole of New Zealand between 2000 and 2013.

The data show the following:

- The Wellington region had the lowest level of light vehicle ownership in New Zealand in 2013. The low level in Wellington region is a function of its compact urban form, concentration of jobs in Wellington City CBD, good public transport network and large student population.


- Between 2000 and 2013, the difference in per capita light vehicle ownership between the Wellington region and New Zealand as a whole grew larger.
3.2 **Access to a motor vehicle**

Changes in the proportion of the population having access to a motor vehicle will affect travel demand patterns.

**Figure 13** shows the percentage change in all households and households with no motor vehicle, by local authority area, between 2001 and 2013.

The regional total shows an increase in the number of households and a marginal fall in those with no vehicles, which implies that regional vehicle ownership rates increased over the period 2001 to 2013.

In all local authority areas except Wellington City, the percentage of households with no motor vehicle decreased during the period in question. Meanwhile, there was an increase in the number of households in every area except Lower Hutt.

In Wellington City, however, the number of households without a motor vehicle increased at a greater rate than the number of households as a whole increased, implying that vehicle ownership levels decreased between 2001 and 2013.

**Figure 13 Percentage change in total households and those with no vehicle, 2001 to 2013**

The increase in the percentage of households in Wellington City having no motor vehicle is a reflection of the fact that over one-third of the population growth during this period occurred within Wellington City CBD and was primarily associated with new apartments/townhouses.\(^\text{13}\)

Occupants of such dwellings are less likely to need a car, as they tend to live within walking or cycling distance of most amenities, public transport stops, and their places of employment. Furthermore, many new apartment dwellings

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\(^{13}\) Section 2.1, Table 2: ‘Change in usual residential population between 2001 and 2013, Wellington City, by area (‘000s)’
have a limited number of parking spaces available to owners (and often these parking spaces come at an extra cost to the owner), dissuading people from owning/operating a motor vehicle.

The same data as Figure 13 are presented in Figures 14 and 15, broken down into two distinct time periods. Figure 14 shows the data for 2001 to 2006 and Figure 15 shows the data for 2006 to 2013.

**Figure 14** Percentage change in total households and those with no vehicle, 2001 to 2006

![Figure 14](image)

Source: NZ Census

**Figure 15** Percentage change in total households and those with no vehicle, 2006 to 2013

![Figure 15](image)

Source: NZ Census

Between 2001 and 2006, most local authority areas saw sharp decreases in the percentage of households with no motor vehicle (apart from Wellington City).
Across the whole region, there was a 4% decrease in the number of households with no vehicle, implying an increase in vehicle ownership levels.

Between 2006 and 2013, however, the decreases were much less pronounced than between 2001 and 2006 and the increase in the proportion of households without a motor vehicle in Wellington City was more pronounced. Since Wellington City accounted for 40% of the population within the region in 2013, this increase was reflected in the increase in no vehicle households across the region as a whole, implying a slight reduction in average vehicle ownership levels.

These recent data confirm the trends highlighted by the MoT vehicle ownership data presented in section 3.1, which showed no significant per capita increase in vehicle ownership levels between 2005 and 2013.

Whilst the increasing popularity of city living contributed to this emerging trend, it is possible that other factors – increasing oil prices, ability to work from home due to technological improvements – have also contributed.

An important question faced by policymakers is whether rates of car ownership will continue to increase, as per the long-term trend (prior to 2005), whether they will remain relatively unchanged, or whether they will decrease into the future. The latter two scenarios imply that a saturation level in terms of vehicle ownership may have already been reached.

### 3.3 Vehicle ownership and VKT

Figure 16 shows, at a national level, how per capita VKT and vehicle ownership changed between 2001 and 2011. Note that this graph is taken from transportblog.co.nz.

![Figure 16 Trends in per capita VKT and vehicle ownership, 2001 to 2011](http://www.transport.govt.nz/research/newzealand/vehiclefleestatistics)

Source: transportblog.co.nz

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After initially increasing, per capita vehicle ownership dropped between 2007 and 2011 and in 2011 was 6% greater than in 2001. VKT increased between 2001 and 2004, then decreased between 2004 and 2011, with a small upturn in 2007. Per capita VKT was 2% lower in 2011 compared with 2001 and fell by 6% between its peak in 2004 and 2011.

### 3.4 Vehicle licence holders by age group

**Figure 17** shows the percentage of New Zealanders who held a driver’s licence, by age group, in 2003 and 2013.

**Figure 17 Percentage of New Zealanders holding a driver’s licence, by age group, August 2003 and August 2013**

![Bar chart showing percentage of New Zealanders holding a driver's licence by age group from 2003 to 2013.](source)

The figure shows that only the percentage of over 65s holding licences increased between 2003 and 2013; all other age groups showed a decrease in the percentage of people holding licences. The decrease was most pronounced for persons aged between 18 and 24, declining from 76% to 70%.

Similar data were obtained for licence holders in Sydney as part of a research paper prepared for the Australasian Transport Research Forum 2011. This research looked at data across years 1991-1998 and 2004-2008 and described the development of car ownership models for the Sydney area. It found that between the periods 1991-1998 and 2004-2008, the percentage of young people (categorised in this research as persons aged between 17 and 35 years of age) having a vehicle licence declined, mirroring the trends outlined in **Figure 17** relating to New Zealand.

The Sydney research suggests a number of possible reasons for this recent trend, all of which are also applicable to New Zealand:

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• an increase in the prevalence of young people living at home, further reducing the need to drive a car

• housing development being focused on areas with easy access to public transport with sufficient frequency, geographical coverage and reliability

• migration from overseas, with migrants less likely to hold a vehicle licence than persons born in Australia

• young people choosing to live close to where they work, reducing the need to drive

From the list above, it is clear that urban intensification, and economic and social factors mean that over time fewer young people in Sydney tend to hold a driver’s licence, and these findings are also applicable to New Zealand.

The main question arising from both pieces of research is whether young people are delaying learning to drive until they can afford the cost of learning to drive and acquiring a car, or whether they will continue to not own a car at all in the longer term.

3.5 Summary

Key points to note from this section are as follows:

• the Wellington region has the lowest level of per capita vehicle ownership in the country according to MoT data (0.61 cars per household in 2013).

• per capita light vehicle ownership across the Wellington region increased slightly between 2000 and 2013

• the gap between Wellington and national per capita light vehicle ownership figures steadily increased between 2000 and 2013

• according to the census, between 2001 and 2006, the percentage of households categorised as having no vehicle decreased significantly in all areas of the region apart from Wellington City where it increased slightly

• between 2006 and 2013, the percentage of households with no vehicle decreased slightly in all areas of the region apart from Wellington City where it increased considerably

• the net results across the region between 2006 and 2013 was an increase in the percentage of households categorised as having no vehicle

• the census and MoT data show the same patterns of a slight reduction in per capita vehicle ownership across the region between 2005 and 2013
4. Wellington region’s transport network

This section provides an overview of Wellington region’s transport network, including the roading network (state highways and local roads) and rail network for; the coverage/reach of the region’s public transport services (buses and trains); and key issues and constraints affecting travel on the network for private and commercial vehicles (including freight) and public transport.

4.1 State highway network

Two major state highways (SH) are the only routes connecting the Wellington region with the rest of the North Island:

- **SH1** – from Auckland, to Taupo, Palmerston North, Kapiti, Porirua, and Wellington City.
- **SH2** – from Napier to Hastings, Wairarapa, Upper Hutt, Lower Hutt and Wellington City.

SH1 and SH2 are predominantly two-lane roads (one lane each way) from the lower/central North Island to Mana, (SH1) which is 6km north of Porirua, and Upper Hutt (SH2). From Mana and Upper Hutt both routes become dual carriageways for the majority of the distance to Wellington City.

Between Paekakariki and Porirua, SH1 passes through Pukerua Bay and along the coast, an area with relatively slow speeds and historically high accident rates. SH1 is classified as a motorway between Porirua and Johnsonville; at Ngauranga Interchange, SH2 and SH1 merge, creating a six-lane motorway (three lanes each way) between this point and Aotea Quay in Wellington City, where CentrePort and the Interislander ferry terminal are located.

Between Aotea Quay and Wellington International Airport, SH1 travels through Wellington City CBD. Along this stretch, SH1 varies between a two-lane and four-lane road and is characterised by a large number of signalised intersections, two tunnels that act as capacity constraints on the network and a number of other ‘pinch-points’ such as the Basin Reserve, Vivian Street and Ruahine Street.

Travel times along both SH1 and SH2 are relatively slow and variable at peak times. Congestion occurs in many locations, most notably:

- Kapiti Coast – Waikanae to Paraparaumu
- Paekakariki to Pukerua Bay
- Ngauranga to Aotea Quay
- Wellington inner-city bypass
- Cobham Drive to Basin Reserve
- key intersections along SH2 between Upper Hutt and Petone
• Petone to Ngauranga

The Ngauranga Interchange, where SH1 and SH2 meet, is also a major constraint upon the network and restricts the amount of traffic that can head towards Aotea Quay (AM peak) or can head out from the CBD (particularly towards Kapiti, Porirua and Hutt Valley) at any one time.

Capacity between Aotea Quay, Wellington City CBD and the airport is tight at peak times, as reflected in traffic congestion, with the associated variable travel times compared with the inter-peak.

SH58 is the state highway route connecting Kapiti and Porirua with the Hutt Valley via Judgeford and the Haywards Hill. It provides an alternative to travelling between Porirua and the Hutt Valley via Ngauranga Interchange. Given the hilly topography of this route, heavy commercial vehicles generally favour travelling via Ngauranga Gorge when trying to access the Hutt Valley from Porirua and the Kapiti Coast area despite the Ngauranga route being longer.

To summarise, issues and constraints on the state highway network are as follows:

• SH1 and SH2 are the two major routes into and out of Wellington City
• travel times along both routes are quite variable at peak times
• the Ngauranga Interchange is a major congestion point on the network
• due to the topography of SH58, heavy commercial vehicles prefer to travel through Ngauranga Intersection when going between Porirua and the Hutt Valley.
• congestion between Aotea Quay and Wellington International Airport at peak times, result in some drivers choosing to use alternative routes to SH1, e.g. Evans Bay Parade and Oriental Parade

Several proposed and committed infrastructure projects are expected to address some of these issues and constraints. Most of these projects are part of the SH1 Wellington Northern Corridor, one of the Roads of National Significance (RoNS) identified by the Government as essential state highways requiring upgrading. The road infrastructure projects assumed to be completed by 2025 are as follows:

• Airport to Mt Victoria Tunnel (part of the RoNS): widening of Wellington Road and Ruahine Street and duplication of Mt Victoria tunnel
• Basin bridge (part of the RoNS): bridge for SH1 westbound from Patterson Street to Buckle Street, separating north-south traffic to east-west traffic.

Inner city bypass improvements (part of the RoNS): upgrade to key intersections to increase capacity along the bypass

Terrace tunnel duplication (part of the RoNS): additional lane for southbound traffic

Ngauranga to Aotea Quay (part of the RoNS): 4-lanes on SH1 between the SH1 / SH2 Ngauranga interchange and the Aotea Quay interchange, in both directions

Transmission Gully (part of the RoNS): new 4-lane motorway between MacKays and Linden, with interchanges at SH58, eastern Porirua and Kenepuru

MacKays to Peka Peka (part of the RoNS): new 4-lane expressway between MacKays and Peka Peka, through Paraparaumu and Waikanae

Peka Peka to Otaki (part of the RoNS): new 4-lane expressway between Peka Peka and Otaki, including a bypass of Otaki

Petone to Grenada: new east-west link between the Hutt Valley at Petone and Tawa/Porirua at Grenada North.

SH58 / SH2 grade-separation: Grade-separated interchange between SH58 and SH2

4.2 Local road and bus network

The local road network within the region provides access to the state highway network, major areas of employment and major regional and local centres.

Within Wellington City, arterial routes provide access between outlying suburbs and Wellington City CBD, with buses and general traffic sharing many of these routes with pedestrians and cyclists.

Along many of these routes, bus users and motorists experience relatively slow and variable travel times at peak due to the following:

- the presence of signalised intersections
- high traffic volumes compared with off-peak conditions
- a higher number of buses than in the off-peak, which start and stop more frequently than other vehicles
- interactions between road users that travel at different speeds – cars, buses, cyclists, pedestrians
- side friction along the road due to side streets, on-street parking, curb build-outs and other obstacles

• a lack of public transport priority measures

The speed and variability of public transport travel times the reliability and the overall attractiveness of public transport as an alternative to the private car.

4.3 Rail network

The rail network consists of the North Island Main Trunk (NIMT) and the Wairarapa line, both of which run parallel to SH1 and SH2, respectively.

Both rail lines are important commuter arteries, bringing over 13,000 people into Wellington City CBD during the AM peak every day. The NIMT is also an important freight artery, bringing freight from across the North Island to the Interislander terminal and CentrePort in Wellington City.

Constraints and issues on the rail network include:

• a single track section between Paekakariki and Pukerua Bay (referred to as north–south junction) limits the number of freight and commuter train paths that are available (a tighter constraint at peak times with more commuter services per hour)

• a single track section between Trentham and Upper Hutt limits service frequencies on this section of the network

• there is a lack of passing loops on the network, affecting scheduling flexibility.

• several sections on the network, including Pukerua Bay to Paekakariki, and Ngauranga to Petone, are vulnerable to damage from a serious storm or earthquake. Similarly, many tunnels on the network could also be affected during a seismic event.

Proposed and committed investment aimed at addressing some of the issues/constraints, delivered through the Wellington Regional Rail Plan, includes:

• additional Matangi rolling stock

• double tracking between Trentham and Upper Hutt

• upgrading signalling infrastructure

• more double tracked sections between Pukerua Bay and Paekakariki (north–south junction)

• modifications on the approach to Wellington railway station and CentrePort

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18 Greater Wellington Regional Council, Wellington CBD PT Cordon Survey, 2014
19 Full title is Wellington Regional Rail Plan 2010–2035 'A Better Rail Experience'.
4.4 Freight transport

Freight transport within the Wellington region is largely focused upon the Interislander terminal and CentrePort, with SH1 and the NIMT the main arteries along which freight can access the port area from the lower and central North Island.

One of the major industrial areas within the region is situated at Seaview in Lower Hutt, accessible from SH2 at Petone. Freight traffic heading between Seaview and areas to the north largely travels along SH2 to Ngauranga Gorge and then onto SH1 to head northwards. A limited proportion of traffic will enter and exit the region via SH2 to the north, which involves travelling along the Rimutaka Hill road between Wairarapa and the Hutt Valley.

The major issues affecting the region’s transport network in relation to the movement of freight are:

- a lack of capacity and gauge constraints on the rail network;
- peak congestion around the port area on both the rail and highway networks;
- variable peak travel times along SH1 and SH2, affecting the movement of freight along this corridor; and
- poor east-west linkages, i.e. Hutt Valley to Porirua, Kapiti and the north. As mentioned in section 4.1, heavy good vehicles tend to avoid SH58 due to its challenging topography and take the longer route through SH1 and SH2.

4.5 Access to the airport

Wellington International Airport is the major air gateway for the region, carrying nearly 5.4 million passengers during 2014\(^{20}\).

One of the major issues facing the airport and limiting its ability to expand is peak hour traffic congestion between the airport and Wellington City CBD.

The Airport to Mount Victoria tunnel and Basin Reserve Bridge projects are expected to help to relieve congestion and increase flows for both public transport passengers and motorists on the state highway between Wellington International Airport and Wellington City CBD. These projects are expected to improve access for all people wishing to travel to the airport.

4.6 Summary

In summary, issues affecting the current transport network noted in this section are as follows:

- there are two state highway and two rail routes into and out of the region, both of which are prone to disruption in the case of a serious seismic or weather-related event

\(^{20}\) https://www.wellingtonairport.co.nz/2014-annual-review/
• too many vehicles use the state highway network during peak times, particularly along SH1 between Kapiti and Wellington City CBD, and between Wellington’s eastern suburbs/Wellington International Airport and Wellington City CBD

• these peak traffic volumes increase average road travel times and variability to above off-peak levels

• rail network constraints occur at the north–south junction (Kapiti line) and between Trentham and Upper Hutt (Hutt Valley line); a lack of passing loops also restricts capacity and affects scheduling flexibility

• as a consequence of limited and/or ineffective public transport priority measures, general traffic and buses using the same roads, and general congestion, public transport travel speeds and variability are adversely affected, particularly along the main arterial routes leading to Wellington City CBD

• insufficient roading capacity and adversely affected travel times for traffic heading to and from CentrePort, Cook Strait ferries and Seaview Industrial Estate, potentially affects the competitiveness of CentrePort relative to other ports in New Zealand
5. Census travel patterns and trends

The New Zealand Census, undertaken every five years for the whole country,\textsuperscript{21} provides a range of information about the Wellington region that is of interest in relation to the region’s land transport network.

Of particular interest are the journey-to-work data which capture journey details – origin residence, destination workplace, mode of transport – for all journeys to work undertaken within the region on census day.

An overview of these data is presented in this section to provide an understanding of travel patterns and modal share across the region in 2013 and how they have changed since 2001.

The analysis focuses on the 12-year period between 2001 and 2013 rather than the seven-year period between 2006 and 2013 for a number of reasons:

\begin{itemize}
  \item the RLTP horizon (2015 to 2025) covers a similar length of time (10 years)
  \item between 2006 and 2013, the GFC affected travel patterns in the short term – looking at medium-term data between 2001 and 2013 removes some of these short-term variations
\end{itemize}

The data presented below are summarised at a local authority level\textsuperscript{22} using the following criteria:

\begin{itemize}
  \item persons working from home or not working are not included in the analysis
  \item persons whose method of travel to work is listed as ‘other’, ‘not known’ or ‘motorcycle’ are combined and included in the modal share analysis as ‘other’ but are not used when looking at absolute numbers
\end{itemize}

This section presents the following information, focusing on changes between 2001 and 2013:

\begin{itemize}
  \item all journey-to-work trips by origin residence\textsuperscript{23}
  \item all journey-to-work trips by destination workplace\textsuperscript{24}
  \item all ‘intra-’\textsuperscript{25} and ‘inter-’\textsuperscript{26} sector trips, by origin residence and destination workplace
  \item all journey-to-work trips, by mode and origin residence
  \item mode share of all journey-to-work trips, by origin residence
\end{itemize}

\textsuperscript{21} with the exception of the 2011 being carried out instead in 2013, with subsequent censuses taking place at five-year intervals starting from 2018

\textsuperscript{22} The three local authorities in the Wairarapa are aggregated

\textsuperscript{23} Categorised as local authority area

\textsuperscript{24} Categorised as local authority area

\textsuperscript{25} Intra-sector trip = trip solely within one sector (i.e. both origin and destination within the same local authority area)

\textsuperscript{26} Inter-sector trip = trip between different sectors (i.e. origin and destination in different local authority areas)
• all journey-to-work trips to Wellington City CBD: by origin residence; by mode and origin residence; and by origin residence (mode share)

Note that for brevity, origin residence is simply referred to hereafter as ‘origin’ and destination workplace is simply referred to as ‘destination’.

The area categorised as Wellington City CBD for this census-based analysis is shown in Figure 18, represented by the pink shaded area.

**Figure 18 Census area units categorised as Wellington City CBD**

5.1 Regional journey-to-work trips by origin (local authority area)

**Figure 19** shows the journey-to-work trips across all local authority areas in 2001 and 2013 by origin, in terms of local authority area, with the changes between 2001 and 2013 clearly illustrated by the red shaded areas. The data show that there were small to moderate increases in the number of trips across all areas, with the total number of trips across the region increasing by 18,500 (11.3%) during this period, from 163,600 to 182,100.
Wellington City was the main origin for journey-to-work trips, with 46% of trips in 2013, representing an increase of 14.9% compared with 2001, or roughly 10,800 additional trips. There was also an increase of 1.4% in its share of region-wide journey-to-work trips over the period.

Kapiti saw the largest percentage change in workplace trips between 2001 and 2013 (26%), equating to over 3,400 additional trips.

### 5.2 Regional journey-to-work trips by destination (local authority area)

Figure 20 shows the journey-to-work trips across all local authority areas in 2001 and 2013 by destination. The data show that Wellington City was the destination for over 60% of region-wide journey-to-work trips in 2013. In absolute terms, Wellington City saw a 17% increase in terminating journey-to-work trips between 2001 and 2013.

Whilst Lower Hutt was the next most popular destination, accounting for 18% of region-wide journey-to-work trips in 2013, it experienced a marginal decline in terminating journey-to-work trips between 2001 and 2013.
The remaining local authority areas each accounted for less than 8% of terminating region-wide journey-to-work trips.

5.3 Intra- and inter-sector journey-to-work trips, by origin and destination

Figure 21 shows intra-sector and inter-sector journey-to-work trips, by origin and destination, in 2001 and 2013. The intra-sector trips are signified by the darker colours in the columns, and the inter-sector trips are signified by the lighter colours in the columns.

Taking the data for Wellington City by origin as an example, in 2001 88% of journey-to-work trips originated and terminated in Wellington City whilst only 12% of journey-to-work trips originated in Wellington City and terminated elsewhere in the region.

In 2013 the comparable figures were 90% and 10% respectively, indicating that the proportion of Wellington region’s population living and working within Wellington City increased between 2001 and 2013.

By comparison, over 60% of journey-to-work trips that originated in Porirua in 2001 and 2013 finished in other local authority areas.
Looking at the data categorised by destination, nearly 70% of journey-to-work trips to Wellington City originate from within Wellington City. Over 90% of journey-to-work trips to destinations within Kapiti and Wairarapa originated from within the same local authority area.

The local authority with the highest numbers of jobs was Wellington City and it also has the highest percentage of self-contained trips as employees do not need to commute great distances to work. Areas such as Porirua and Kapiti had a much lower percentage of self-contained trips as people commuted to other areas, particularly Wellington City, for work.

Across the whole region, around 70% of trips had their origin and destination in the same local authority area. Given that Wellington City contained around 40% of the regional population and over 60% of regional jobs in 2013, Wellington City trends have a major influence on regional trends.

5.4 Regional journey-to-work trips to Wellington City CBD

5.4.1 Regional journey-to-work trips to Wellington City CBD by origin

Figure 22 shows the number of journey-to-work trips to Wellington City CBD in 2001, by origin, together with additional trips added between 2001 and 2013. Also shown is the percentage of all 2013 journey-to-work trips, by origin, that went to Wellington City CBD.
Overall, around two-thirds of journey-to-work trips to Wellington City CBD originated from Wellington City. Between 2001 and 2013, the number of journey-to-work trips between origins in Wellington City and destinations in Wellington City CBD increased by around 17%.

Kapiti saw a 52% increase in journey-to-work trips to Wellington City CBD between 2001 and 2013, generated largely by residential development that occurred within the Kapiti area. Other local authority areas saw smaller increases in journey-to-work trips to Wellington City CBD between 2001 and 2013.

In 2013, 59% of journey-to-work trips originating from Wellington City ended in Wellington City CBD, with between 20% and 30% of journey-to-work trips originating from other local authority areas ending in Wellington City CBD.

An exception to this is the Wairarapa, where only 5% of originating journey-to-work trips were destined for Wellington City CBD.

5.4.2 Regional journey-to-work trips to Wellington City CBD by mode and origin

Figure 23 shows regional journey-to-work trips to Wellington City CBD by mode and origin in 2001 and 2013.

It can be seen that the number of car trips to Wellington City CBD from within Wellington City declined between 2001 and 2013. There was also a small decline in car trips from Lower Hutt to Wellington City CBD.

Across the other local authority areas, the number of car journey-to-work trips to Wellington City CBD increased slightly between 2001 and 2013.
Public transport trips to Wellington City CBD increased across the region, largely driven by a 23% increase in public transport journey-to-work trips to Wellington City CBD originating from Wellington City and a 20% increase from Lower Hutt.

Active mode trips to Wellington City CBD from within Wellington City increased by 59% between 2001 and 2013. The number of walking trips to work increased by 52%, the single strongest absolute increase shown in the figure, while the number of journey-to-work trips by cycle increased by over 100%, albeit from a much smaller base.

### 5.4.3 Mode share of journey-to-work trips to Wellington City CBD by origin

**Figure 24** shows the mode share of all regional journey-to-work trips to Wellington City CBD by origin in 2001 and 2013.

It can be seen that in 2013 the public transport mode share was greatest for trips originating from the Wairarapa (67%), followed by Lower Hutt, Upper Hutt and Kapiti (all around 45%). This highlights the importance and effectiveness of the rail network in transporting people to and from Wellington City CBD, due to rail being the only public transport option for long distance commuter journeys between Wellington City CBD and the far-away TAs of Kapiti and Wairarapa.

Across the Wellington region the 2013 public transport share was 33%, up from 31% in 2001.
The car mode share of journey-to-work trips to Wellington City CBD decreased in all authority areas between 2001 and 2013. Across the whole region, car trips accounted for 39% of journey-to-work trips in 2013 compared to 48% in 2001. In 2013, Porirua had the highest car journey-to-work mode share at 55% followed by Kapiti at 49%.

Given that most walking and cycling trips are largely internal to their originating local authority area, it is unsurprising that Wellington City has the highest walking (26%) and cycling (5%) mode share of trips to Wellington City CBD.

Between 2001 and 2013, the cycling mode share of journey-to-work trips to Wellington City CBD from Wellington City increased by 2% and the walking mode share of journey-to-work trips to Wellington City CBD increased by 6%.

These increases were largely driven by residential development that occurred between 2001 and 2013 being focused on Wellington City CBD, in close proximity to the main employment areas and thus favouring active modes over car and public transport.

5.5 Total regional journey-to-work trips

5.5.1 Regional journey-to-work trips by mode and origin

Figure 25 shows the total number of journey-to-work trips in the region, by mode and origin, in 2001 and 2013.

Across the region, the number of journey-to-work trips increased by 11%, broadly in line with the 12% increase in population that occurred over the same period.
Kapiti (26%) and Wellington City (15%) saw the greatest increases in journey-to-work trips.

**Figure 25 Regional journey-to-work trips, by mode and origin, 2001 and 2013**

Kapiti had the highest percentage growth in public transport trips between 2001 and 2013 (74%), mainly driven by residential development generating increased demand for rail services between Kapiti and Wellington City CBD. In absolute terms, however, Wellington City added the most public transport trips between 2001 and 2013.

Across the region, the number of public transport journey-to-work trips increased by 20% between 2001 and 2013, an increase in per capita terms.

The number of car trips across the region increased by 5,500 between 2001 and 2013 (5% in percentage terms), implying a per capita decline in journeys to work by car.

Wellington City accounted for 75% of all active mode journey-to-work trips. Between 2001 and 2013, walking and cycling journey-to-work trips originating within Wellington City increased by 47% and 93% respectively, driving an overall 36% increase in region-wide active mode journey-to-work trips.

**5.5.2 Mode share of regional journey-to-work trips by origin**

*Figure 26* shows the mode share of regional journey-to-work trips by origin in 2001 and 2013.

It can be seen that the car mode share decreased across all local authority areas between 2001 and 2013. The greatest decrease, from 57% to 50%, occurred in Wellington City. Reductions in car mode share are also evident in Kapiti and Lower Hutt where the car mode share of journey-to-work trips in 2013 was 74% and 69% respectively.
Across the region, the car mode share declined from 67% in 2001 to 62% in 2013.

The public transport mode share of journey-to-work trips increased in all areas except Porirua where it decreased from 16% to 14%. Across the region, the public transport mode share increased from 16% to 17%. Whilst at face value this might not appear to be a large increase, it equates to a 20% increase in the total number of public transport trips over the period.

The active modes – walking and cycling – both increased their mode share across the region between 2001 and 2013 from 10% and 2% to 12% and 3%, respectively.

The active mode share of journey-to-work trips was highest in Wellington City (24%) followed by Wairarapa at 9%.

Walking journey-to-work mode share in Wellington City increased from 16% to 20% between 2001 and 2013, partially explaining the reduction in car mode share witnessed over the same period.

### 5.6 Summary

The census data for the Wellington region in 2001 and 2013 showed a large increase in the number of journey-to-work trips made by active modes (36%) and a moderate increase made by public transport (20%). By comparison, the number of journey-to-work trips undertaken by car increased by only 5%. Given the increase in population of about 12% between 2001 and 2013, there was a per capita increase in active mode and public transport journey-to-work trips and a per capita decrease in car journey-to-work trips over this period.
For journey-to-work trips categorised by originating local authority area, Wellington City and Lower Hutt had the highest public transport mode share at 20% and 16% respectively. Public transport accounted for between 11% and 13% of all journey-to-work trips originating from Kapiti, Porirua and Upper Hutt. The figure for the Wairarapa was just 5%.

Travel patterns and trends varied between the local authority areas as follows:

- around 70% of journey-to-work trips were self-contained, with the origin and destination located within the same local authority area
- Wellington City dominated the region, with 46% of journey-to-work trips by origin and over 60% of journey-to-work trips by destination in 2013
- for the regional journeys to work, 26% of car trips, 56% of active mode trips and 78% of public transport trips terminated in Wellington City CBD
- over 50% of journey-to-work trips originating from Upper Hutt were to workplaces outside the local area, particularly Lower Hutt and Wellington City
- over 50% of journey-to-work trips originating from Porirua were to workplaces outside the local area, particularly Wellington City
- the rail network accounted for around 45% of journey-to-work trips to destinations within Wellington City CBD, highlighting the importance of the rail network as a means of transporting people to and from Wellington City CBD and taking pressure off the road network
6. General travel patterns and trends
Section 5 presents changes in travel patterns in 2001 and 2013, drawing upon data from the New Zealand Census. This section looks at recent travel patterns and observed trends drawn from a variety of different sources. The data relate to:

- public transport patronage and boardings per capita
- road travel and VKT
- active mode trips
- freight trips (road and rail)
- road traffic congestion

6.1 ‘Current’ travel patterns according to the Wellington Transport Strategy Model
The GWRC’s Wellington Transport Strategy Model (WTSM) is described in WP3. In summary it is a tool used by the GWRC to model and forecast aspects of the region’s transport network based on observed data from a range of sources and a number of assumptions, explained in WP3.

In the baseline model of the WTSM, built using 2011 data, approximately 1.15 million vehicle-based trips (car, road freight and public transport combined, excluding rail freight) were made every day across the region. At the time of writing this remains the ‘current’ model, therefore it is referred to as the current situation.

The nature of these trips is classified as follows:

- **by time of day** – A large proportion of private vehicle (including road freight) and public transport trips occur during peak periods (7am to 9am and 4pm to 6pm). Evidence from the Wellington region suggests that around 50% of weekday public transport trips and 40% of weekday car trips occur during peak periods.

- **by purpose** – Around 80% of trips occurring in the peak periods are commuter trips. In the inter-peak, the majority of trips are categorised as ‘other’ – shopping and leisure related. During an average work day, around 10% to 15% of trips are categorised as ‘employer’s business’ trips, whilst across the region around 5% of trips on the region’s roads are heavy commercial vehicle (HCV) trips.

- **by distance** – Some trips are long-distance trips (e.g. Kapiti to Wellington City) whilst others will be shorter distance trips, to local shops for example. In general, the average trip length is longer in the AM peak than in the inter-peak due to the proportion of commuters (who travel longer distances) travelling during peak periods compared with inter-peak periods.
• **by mode** – The private car is the dominant mode of travel across the region, with the current regional public transport mode share sitting at around 15% during the peak periods (it is nearer 6% to 7% during inter-peak periods). When looking at trips to and from Wellington City CBD only, the public transport mode share is much greater (over 30%). Note that a sizeable proportion of shorter distance trips are made by active modes – walking and cycling.

### 6.2 Public transport patronage and boardings per capita

This section looks at public transport patronage trends, expressed in both absolute terms and as boardings per capita. The latter is a way of looking at the relative attractiveness and popularity of public transport across conurbations of different sizes as it strips out the effect that the size of the conurbation has upon patronage.

#### 6.2.1 Annual patronage trends

**Figure 27** shows the region’s peak, off-peak and total annual public transport patronage between 2001/02 and 2012/13.

![Figure 27 Public transport patronage, 2001/02 to 2012/13](source: Metlink website, [www.metlink.org.nz](http://www.metlink.org.nz))

Public transport patronage increased by 17% between 2001/02 and 2012/13, from around 30.5 million trips per annum to over 35 million.

The growth in off-peak trips over the period (23%) was greater than the growth in peak period trips (12%). The absolute number of annual peak and off-peak trips was roughly similar in 2012/13.

The public transport patronage growth rate of 17% was slightly higher than the population growth rate of 12% between 2001 and 2013 (as stated in section 2.1), implying that the number of boardings per capita increased.
6.2.2 Uneven patronage growth, 2001 to 2012

Public transport patronage did not grow at a constant rate between 2001 and 2012. Table 5 shows the average annual increase in patronage, categorised by mode (bus and rail), travel time periods (peak and inter-peak) and date range (2001 to 2005 and 2005 to 2012).

Table 5 Period and average annual growth in public transport patronage, Wellington region, 2001 to 2005 and 2005 to 2012

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Off-Peak</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Period growth</td>
<td>Annual growth</td>
<td>Period growth</td>
</tr>
<tr>
<td>Bus</td>
<td>20.6%</td>
<td>-5.6%</td>
<td>20.6%</td>
</tr>
<tr>
<td></td>
<td>4.8%</td>
<td>-0.8%</td>
<td>4.8%</td>
</tr>
<tr>
<td></td>
<td>17.1%</td>
<td>5.7%</td>
<td>17.1%</td>
</tr>
<tr>
<td></td>
<td>4.0%</td>
<td>0.8%</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>18.6%</td>
<td>0.5%</td>
<td>18.6%</td>
</tr>
<tr>
<td></td>
<td>4.4%</td>
<td>0.1%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Rail</td>
<td>6.4%</td>
<td>1.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td></td>
<td>1.6%</td>
<td>0.3%</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>14.8%</td>
<td>3.1%</td>
<td>14.8%</td>
</tr>
<tr>
<td></td>
<td>3.5%</td>
<td>0.4%</td>
<td>3.5%</td>
</tr>
<tr>
<td></td>
<td>9.2%</td>
<td>2.3%</td>
<td>9.2%</td>
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<tr>
<td></td>
<td>2.2%</td>
<td>0.3%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Combined</td>
<td>14.6%</td>
<td>-2.4%</td>
<td>14.6%</td>
</tr>
<tr>
<td></td>
<td>3.5%</td>
<td>-0.3%</td>
<td>3.5%</td>
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<tr>
<td></td>
<td>16.5%</td>
<td>5.3%</td>
<td>16.5%</td>
</tr>
<tr>
<td></td>
<td>3.9%</td>
<td>0.7%</td>
<td>3.9%</td>
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<tr>
<td></td>
<td>15.5%</td>
<td>1.2%</td>
<td>15.5%</td>
</tr>
<tr>
<td></td>
<td>3.7%</td>
<td>0.2%</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Source: Metlink website, www.metlink.org.nz

There were higher average annual growth rates between 2001 and 2005 than between 2005 and 2012 across modes and travel time periods, ranging from 1.6% (peak rail) to 4.8% (peak bus). Between 2005 and 2012, peak period bus patronage declined by a total of 5.6%, leading to an overall decline in peak period public transport patronage of 2.4%.

Whilst the GFC can partly explain lower growth rates between 2005 and 2012, as this would have resulted in reduced demand for work-related travel, public transport growth rates started to slow several years prior to the GFC at a time when the economy was relatively buoyant.

An additional explanation for the fall in public transport growth rates seen between the two periods may be that travel demand is perhaps reaching a ‘saturation level’, following which the only growth in trips (car and public transport combined) will be linked to growth in population. In tandem with recent residential development around Wellington City CBD (as stated in section 2.1) favouring active modes, these factors could partly explain why little or no growth in public transport patronage occurred between 2005 and 2012 as people tend to use active modes more within Wellington City than any other local area as demonstrated in section 5.

It should be noted that following the introduction of the Matangi trains in 2010/2011 (see section 4.3), rail patronage increased as a result of improved reliability, which contributed to nearly offsetting the declines in patronage that were observed between 2005 and 2010.
Table 6 compares public transport patronage growth rates against population and employment growth rates between 2001 and 2012.

<table>
<thead>
<tr>
<th></th>
<th>Public transport patronage</th>
<th>Population</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Period growth</td>
<td>Annual growth</td>
<td>Period growth</td>
</tr>
<tr>
<td>2001 to 2005</td>
<td>14.6%</td>
<td>3.5%</td>
<td>4.8%</td>
</tr>
<tr>
<td>2005 to 2012</td>
<td>-2.4%</td>
<td>-0.3%</td>
<td>6.7%</td>
</tr>
</tbody>
</table>

Source: Metlink website, www.metlink.org.nz

Between 2001 and 2005, employment grew at a faster rate (2.2% per annum) than population (1.2% per annum), the economy expanded and unemployment fell. The increase in public transport patronage was greater (3.5% per annum), suggesting that it was linked to the improving economy and also to other factors such as rising fuel prices generating modal shift from car to public transport.

In the subsequent period between 2005 and 2012, employment and population still grew, although at lower average annual rates than in the previous period, which is attributed primarily to the GFC. Public transport patronage, however, declined during this period at an average rate of 0.3% per annum. This suggests that people either started to travel less or chose other modes – car or active modes – for some journeys.

6.2.3 Boardings per capita

Figure 28 shows estimated public transport boardings per capita for 10 Australasian cities. For this analysis South-East Queensland (SEQ) includes Brisbane, the Gold Coast and the Sunshine Coast, and Sydney and surrounds includes Newcastle and Wollongong.

In 2011/12, Wellington had an average of around 80 boardings per capita,27 ranking it third behind Sydney (in 2010/11, the most recent data available from the data source) and Melbourne in 2011/12. Given the fact that Melbourne and Sydney are both ‘transfer-oriented networks’,28 whereas Wellington is not, if these data were adjusted to relate solely to trips (i.e. home to work) rather than boardings then Wellington figures would be much closer to those for Melbourne and Sydney.

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27 The quoted figure for Wellington differs slightly from the figure of 72 quoted in the Wellington Regional Public Transport Plan 2011-2021. Whilst the source of the data cannot be verified, the relativity between Wellington and other cities is of more interest in this analysis than the absolute value.

28 Where many trips involve multiple legs (such as bus then rail) these would be recorded as two boardings. Sydney and Melbourne, due to their size and extensive public transport network, have many multimodal, multi-legged in peak periods. Wellington, due to its size and urban form, has relatively few multimodal, multi-legged trips.
The data show that public transport usage was higher in Wellington than most other Australasian cities and significantly higher than Auckland’s figure of about 50. This is attributed to Wellington’s regular rail network serving outlying suburbs, an efficient and comprehensive bus network serving inner suburbs and the fact that the unique topography of Wellington creates several natural ‘bottlenecks’ (e.g. eastern suburbs to Wellington City CBD) that the public transport network can effectively exploit. One example of this is the limited access for vehicles from the airport and suburbs including Miramar and Hataitai into Wellington City CBD, with only one tunnel available for private vehicles, the other alternative being to take a much longer and less direct route around the coast. The buses however can use the Hataitai bus tunnel, which is open only to buses, and offers direct services into the CBD.

Compared to cities such as Auckland, where public transport patronage is relatively low, Wellington is a mature centre with a comprehensive and highly patronised public transport system.

6.3 Historic data and analysis relating to traffic volumes on New Zealand’s roads

This section presents historic data for: traffic volumes on state highways across New Zealand and for the Wellington region; an overview of trends in leisure habits for New Zealanders; the relationship between VKT and GDP in New Zealand; traffic volume indices in selected developed countries; and the effect of fuel prices on travel demand for New Zealand.

6.3.1 State highway traffic volumes

Figure 29 shows the state highway traffic volumes across New Zealand between 1989 and 2012, indexed to 1989 levels, where traffic is measured in terms of VKT. It shows that over this period, the total volume of traffic on the state highways increased by around 65%, whilst heavy vehicle traffic specifically increased by around 110%.
The rate of growth was not constant through time. Between 1989 and 2000, heavy vehicle and ‘all vehicle’ (heavy vehicles plus light vehicles) growth rates were similar, averaging about 4% to 5% per annum.

The growth rate for all vehicles began to slow between 2000 and 2005 and flattened out between 2005 and 2012. By contrast, between 2000 and 2005 the heavy vehicle traffic growth rate increased compared to the previous period (1989 to 2000), although between 2005 and 2012 the heavy vehicle traffic growth remained broadly flat, mirroring the trend for all vehicles.

**Figure 29 New Zealand state highway traffic volume growth (indexed to 1989)**

![State Highway Traffic Volume Indexed Growth](source: NZTA)

**Table** 7 shows the period growth (total and indexed to 1989) and annual average traffic volume growth rates for three date ranges between 1989 and 2012, where traffic volume is measured in terms of VKT.\(^{29}\) It shows that traffic volume growth rates have progressively slowed through time. Between 2005 and 2012, traffic on the state highway network declined by around 1%. Given that heavy vehicle traffic during this period increased by around 3%, this implies a decline in car VKT of around 2%.

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\(^{29}\) A ‘car’ indicator has been estimated by taking the ‘all vehicles’ indicator (which includes heavy vehicles) and removing the component of growth that is attributed to heavy vehicles, assuming that 5% of VKT is due to heavy vehicle trips. Whilst approximate, this method is considered appropriate in order to provide a broad estimate of car traffic volume growth rates.
Table 7 New Zealand state highway traffic growth, by vehicle class, 1989 to 2012

<table>
<thead>
<tr>
<th></th>
<th>Indexed growth (1989 = 1.00)</th>
<th>Total growth</th>
<th>Growth p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1989 to 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All vehicles</td>
<td>1.63</td>
<td>63%</td>
<td>4.5%</td>
</tr>
<tr>
<td>HCV</td>
<td>1.81</td>
<td>81%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Car (estimated)</td>
<td>1.61</td>
<td>61%</td>
<td>4.4%</td>
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<td></td>
<td>2000 to 2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All vehicles</td>
<td>1.04</td>
<td>3.7%</td>
<td>0.7%</td>
</tr>
<tr>
<td>HCV</td>
<td>1.12</td>
<td>12.7%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Car (estimated)</td>
<td>1.03</td>
<td>2.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>2005 to 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All vehicles</td>
<td>0.99</td>
<td>-1.2%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>HCV</td>
<td>1.03</td>
<td>2.9%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Car (estimated)</td>
<td>0.98</td>
<td>-1.7%</td>
<td>-0.3%</td>
</tr>
</tbody>
</table>

Source: NZTA

6.3.2 Wellington traffic volumes

This section presents traffic volumes on the region’s roads in terms of VKT for 2000/01 and 2011/12 and also shows aggregate traffic counts from the region’s state highways for 2006 to 2012.

Figure 30 provides estimates of total annual VKT on the region’s roads between 2000/01 and 2011/12, broken into local roads and state highways.

Figure 30 Regional road VKT, Wellington region, 2000/01 to 2011/12 (millions)

It shows that VKT on state highways remained largely unchanged over the period, varying between 1600 and 1700 million km per annum. A similar flat trend was observed for VKT on local roads, largely varying between 1800 and 1900 million km per annum between 2000/01 and 2011/12, suggesting that overall VKT across the region (local roads plus state highways) remained largely unchanged over the period.

**Figure 31 Combined annual average daily traffic (AADT) for state highway count sites across Wellington region, 2006 to 2012**

![Graph showing combined annual average daily traffic (AADT) for state highways](image)

Source: NZTA/Wellington region local authorities

**Figure 31** presents aggregated traffic counts obtained from a number of locations on the region’s state highways between 2006 and 2012. It shows that traffic volumes, measured in terms of aggregated traffic counts, remained relatively static between 2006 and 2012, supporting the VKT trend shown in **Figure 30**.

Given that the region’s population grew by over 10% between 2001 and 2012, as shown in **Table 6**, flat traffic volumes over this period implies a decrease in per capita VKT of around 10% across the region.

**Figure 32** shows inbound traffic volumes crossing a cordon around Wellington City CBD in the AM peak (7am to 9am) between 2002 and 2013. It shows that traffic volumes crossing the cordon declined by around 15% between 2004 and 2013, highlighting an even more pronounced decline than is evident from looking at regional VKT data and suggesting that changing travel patterns had a greater impact upon traffic volumes heading to Wellington City CBD than across the region as a whole.
6.3.3 Leisure trips

Figure 33 is taken from the 2012 Roy Morgan ‘State of the Nation’ survey and shows the trends in leisure activities undertaken by New Zealanders over the period from December 2001 to December 2011. Of note is the fact that the percentage of people who took a day trip by car declined from 53.9% to 45.7%.

The data appear to suggest that over the period, people were travelling less over time for leisure purposes, potentially providing another explanation for
little/no growth in observed regional traffic volumes between 2000/01 and 2011/12 (Figure 30).

6.3.4 Relationship between VKT and GDP

Figure 34 shows the relationship between per capita VKT, GDP and earnings between 2001 and 2011 for New Zealand. The figure is taken directly from transportblog.co.nz, with links provided to the source VKT, GDP and earnings data. Of particular interest for this working paper is the relationship between VKT and GDP.

Figure 34 Trends in per capita VKT, GDP and earnings, 2001-2011

![Figure 34 Trends in per capita VKT, GDP and earnings, 2001-2011](http://transportblog.co.nz/2013/04/30/trends-in-vehicle-travel-in-nz)

Figure 34 shows that whilst GDP per capita increased between 2001 and 2011, VKT per capita fell over the same period. Initially, VKT growth kept track with growth in earnings per capita, but since 2005, earnings continued to grow whilst VKT per capita declined.

This emerging trend suggests that the economy became more efficient in terms of vehicle travel, with an increase in GDP not requiring (or resulting in) a corresponding increase in VKT, as has been the case in the past.

The recent expansion of the service sector can partly explain this trend, with a growing percentage of goods that contribute to GDP not needing to be physically transported (they can be delivered electronically), as opposed to primary goods such as dairy and forestry where products still need to be physically shipped.

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33 NZ Treasury – service sector contribution to GDP increased from 66% (2004) to 71% (2011)
A shift in the mix of goods being transported from lower value primary goods towards higher value secondary goods might also explain why GDP has grown yet state highway VKT has remained largely flat. The commodities boom during the 2000s that saw commodity prices rising at a faster rate than inflation and earnings might also explain why transported volumes could remain flat while prices (and hence GDP) increased at a much faster rate.

A society that is increasingly reliant on technology, including widespread access to the internet from home and on the move, leading to an increase in the popularity of working from home and the ability for people to communicate remotely without having to meet face to face, is another factor that is influencing the relationship between VKT and GDP.

With the New Zealand service sector and high value goods sectors forecast to continue to expand, combined with commodities continuing to trade at inflated prices due to demand from emerging economies, it is possible that the trend seen in recent years – a decrease in VKT relative to GDP – might continue into the future.

6.3.5 Developed world road traffic growth rates

Figure 35 presents road traffic growth volume indices for a selection of developed countries between 1990 and 2009. Each country shows a similar trend over the period, with rising traffic volumes in the 1990s, and flattening out from the early 2000s.

Research undertaken in the US at the US PIRG Education Fund and Frontier Group found that those areas that experienced the greatest decrease in driving (measured in terms of VKT per capita) between 2001 and 2010 were some of

the areas least affected by the GFC, suggesting that changing travel patterns are due not only to economic factors, but perhaps also reflect a shift towards a ‘smarter’, more efficient, high-tech economy, where a rising GDP may not necessarily result in a proportional increase in travel.

Given the pace of technological advances, this trend may continue into the future. Furthermore, within New Zealand, it is likely that the trend will be most pronounced in regions such as Wellington that have a high value, high-tech, service-oriented economy together with a highly educated workforce and high levels of internet connectivity.

6.3.6 Effect of fuel price on road travel demand

Figure 36 shows how fuel prices have changed through time, both in nominal and real terms (adjusted for the Consumers Price Index or CPI).

Between 1985 and 1999 the cost of fuel decreased in real terms (i.e. removing the effects of inflation). Combined with vehicle efficiency improvements, which reduce vehicle operating costs, and a decrease in the price of vehicles, the net result was rapid growth in vehicle trips between 1985 and around 2000.

Between 2000 and 2012, however, the cost of fuel increased in real terms. Whilst vehicle efficiency improvements partly offset this increase, the overall cost of motoring still rose between 2000 and 2012 at a greater rate than the cost of other goods.

![Figure 36 Average quarterly petrol prices, New Zealand, 1974 to 2012](source: transportblog.co.nz)

Research undertaken by Booz Allen Hamilton\(^{35}\) undertaken in 2007 for Land Transport New Zealand suggested that a fuel price elasticity of -0.2 could be applied to the New Zealand market. This means that for every 10% increase in the price of fuel, the consumption of fuel falls by 2%, which is reflected in lower VKT and use of more fuel efficient vehicles. Given that between 2000 and 2012 the price of fuel increased by about 80% in real terms, using the suggested elasticity value (-0.2), a 16% decrease in VKT might be expected.

\(^{35}\) http://www.nzta.govt.nz/resources/research/reports/331/docs/331.pdf
However, there will also be impacts on travel demand over time from a growing population and increasing employment. Between 2001 and 2013 the Wellington region’s population grew by around 12%.  

The combination of an observed 12% increase in population and a 16% decrease in VKT for a given level of population implies a small increase in VKT across the region between 2000 and 2012. Looking at observed VKT trends for the Wellington region (Figure 30), no appreciable increase in regional VKT occurred between 2000 and 2012, which possibly reflects that the effects on VKT from an increasing regional population and rising fuel prices might have been counterbalancing each other.

When the cost of a commodity such as fuel increases, those most affected will be people for whom fuel accounts for the largest proportion of their total expenditure. Such users are likely to be people on low incomes, including young people, and those for whom travelling is not discretionary.

6.4 Active mode share

Sections 6.2 and 6.3, respectively, showed that public transport patronage and traffic volumes were relatively flat from the mid-2000s onwards. These patterns are related to the increase in travel by active modes.

Figure 37 presents data from the annual GWRC and Wellington City Council (WCC) CBD cordon survey which captures all persons – vehicle occupants, public transport users, pedestrians and cyclists – crossing a cordon surrounding Wellington City CBD between 7am and 9am, collected during a one-week period in March of each year.

Figure 37 Persons crossing Wellington City CBD cordon, by mode, AM peak, 2001 to 2013

![Graph showing mode share trends from 2001 to 2013]

Source: WCC/GWRC annual CBD cordon survey

Table 8 shows the number of persons (by mode) crossing the cordon, together with the mode share and the growth rates between 2001 and 2013.

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36 NZ Census
Table 8 Persons crossing the Wellington City CBD cordon, 2001 and 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Vehicle occupants</th>
<th>Average vehicle occupancy</th>
<th>Public transport</th>
<th>Cycle</th>
<th>Walk</th>
<th>Total people</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person trips crossing CBD cordon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>41,538</td>
<td>1.37</td>
<td>22,291</td>
<td>1,276</td>
<td>12,340</td>
<td>77,445</td>
</tr>
<tr>
<td>2013</td>
<td>36,758</td>
<td>1.39</td>
<td>26,850</td>
<td>2,091</td>
<td>14,754</td>
<td>80,453</td>
</tr>
<tr>
<td>Change</td>
<td>-4,780</td>
<td>0.02</td>
<td>4,559</td>
<td>815</td>
<td>2,414</td>
<td>3,008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Vehicle occupants</th>
<th>Average vehicle occupancy</th>
<th>Public transport</th>
<th>Cycle</th>
<th>Walk</th>
<th>Total people</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mode share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>53.6%</td>
<td>28.8%</td>
<td>1.6%</td>
<td>15.9%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>45.7%</td>
<td>33.4%</td>
<td>2.6%</td>
<td>18.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Change</td>
<td>-7.9%</td>
<td>4.6%</td>
<td>1.0%</td>
<td>2.4%</td>
<td>0.0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth between 2001 and 2013</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>-11.5%</td>
<td>20.5%</td>
<td>63.9%</td>
<td>19.6%</td>
<td>3.9%</td>
<td></td>
</tr>
</tbody>
</table>

Source: WCC/GWRC annual CBD cordon survey

Table 8 shows that:

- the total number of people crossing the cordon increased by 3.9% between 2001 and 2013 (~77,000 to 80,000). By comparison, the regional population increased by 12% during this period.

- the vehicle occupant mode share declined by 7.9% to 45.7% whilst the public transport mode share increased by 4.6% to 33.4%.

- the number of public transport, cyclist and pedestrian trips crossing the cordon in the AM peak increased between 2001 and 2013, whilst the number of motor vehicle trips decreased.

- active modes showed the highest growth rates between 2001 and 2013, with the number of walking and cycling trips increasing by 19.6% and 63.9% respectively, increasing the active mode share from 17.5% to 20.9% of trips.

- vehicle occupancies remained relatively unchanged between 2001 and 2013.

The data show an apparent disconnect between the growth in trips crossing the cordon (4%) and the growth in population and employment within the region (12%). Whilst no specific evidence exists to support this view, one possible explanation might be the increase in apartment dwellings located within the CBD cordon between 2001 and 2013, meaning that a much greater percentage of CBD workers lived within the cordon (and did not cross it on their way to work) in 2013 compared with 2001.

The increasing popularity of active modes is supported by data from the 2013 Census and is likely to be due to a number of reasons:

- acknowledgement of the health benefits of walking/cycling and a general trend towards people leading more sustainable lifestyles
• in terms of cycling, a ‘critical mass’ effect has been seen, whereby seeing cyclists on the road encourages more people to cycle, creating a safety in numbers effect

• increased residential development in the Wellington City CBD and around the CBD fringe, resulting in walking/cycling being the most convenient commuting option for many of these people

• high fuel prices and the increasing cost of parking and congestion, resulting in people considering other modes instead of the private car or public transport

6.5 **Freight**

The region generates and attracts many road, rail and sea freight trips each year. Wellington is a major freight hub, primarily for the export of primary products and the transport of goods between the North and South Islands.

Freight trips are not evenly distributed across the network, however, with the majority of HCV trips confined to the state highway network, mainly transporting goods between the Interislander terminal, CentrePort, Seaview and markets in the lower and central North Island.

6.5.1 **Nationwide freight volumes**

*Figure 38* shows the quantity of freight transported throughout New Zealand by road and rail between 2004 and 2011. This includes all freight to and from CentrePort and the land component of freight trips that cross the Cook Strait.

*Figure 38* Freight tonne-km by road and rail, 2004 to 2011

![Graph showing freight tonne-km by road and rail, 2004 to 2011](image)

Source: Ministry of Transport

*Figure 39* shows that between 2004 and 2011, the quantity of freight transported throughout New Zealand initially increased, then fell slightly during the GFC before recovering to peak in 2011. This slight net increase over the period in question may be considered within the context of a growing population and increasing GDP.
Several factors can potentially explain why road and rail freight did not increase substantially between 2004 and 2011:

- the primary and secondary sectors of the economy, which account for the majority of freight, accounted for 29% of GDP in 2011, down from 34% in 2004.
- suppliers and producers are becoming more efficient, with imports increasingly being landed close to their final destination and exports leaving from their nearest port

6.5.2 Freight volumes by mode and destination

**Figure 39** and **Figure 40** show freight flows by origin and destination region, respectively, in 2012 using Ministry of Transport data, and 2042 using Ministry of Transport freight forecasts. All freight is included.

It can be seen that a relatively small percentage of national freight flows originated from, or terminated in, the Wellington region in 2012. Auckland Canterbury were the dominant regions in terms of freight volumes in 2012 and are forecast to increase their dominance in 2042.

**Figure 39 Freight flows by origin regions, 2012 (observed) and 2042 (forecast)**

![Figure 39](source: Ministry of Transport Freight Forecasts)

**Figure 40 Freight flows by destination regions, 2012 (observed) and 2042 (forecast)**

![Figure 40](source: Ministry of Transport Freight Forecasts)
It is possible that congestion on the state highway network at peak times and capacity constraints on the rail network affect the competitiveness of CentrePort compared to competing ports in the North Island, in part reflected in the relatively small freight flows for Wellington region seen in Figure 39 and Figure 40.

Whilst congestion on the state highway network will have an impact on freight travel times and thus the attractiveness of CentrePort relative to other ports, there are other possible reasons for the relatively low volumes of freight going through CentrePort as follows:

- evidence suggests that freight users try to avoid travelling at peak times, due to the potential costs incurred by being caught in congestion
- whilst the state highway is relatively congested at peak times, spare capacity exists during off-peak periods, with observed HCV volumes higher during the off-peak than the peak, suggesting that most freight trips already occur during the off-peak
- for exporters, congestion on the way to the port or at the port may result in them changing their destination (port) or re-timing their journey

6.6 Traffic congestion

When demand is greater than available capacity, travel times on the region’s roads can be relatively slow and variable. Such a scenario regularly occurs during the AM peak and, to a lesser extent, PM peak period, resulting in:

- reduced road travel speeds and reliability for all vehicles including private cars, public transport and freight
- delays for emergency vehicles
- increased times and variability of trips resulting in increased costs for the transportation of freight

Congestion on the road network can also affect the reliability, and thus the attractiveness to users, of bus services in areas where bus priority lanes are not provided. It can also negatively affect the amenity of people living along transport corridors and other road users (namely cyclists and pedestrians) through noise and vehicle emissions.

Travel times and travel time variability along six routes in the Wellington region are gathered by NZTA on a quarterly basis. The results in this section of the working paper are based upon those surveys. It should be noted that the surveys are undertaken during one week (in March) and generally consist of around three travel time runs per route/direction/day (one for each peak period) over five consecutive weekdays.

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37 Waikanae to airport; Upper Hutt to Wellington City CBD; Paremata to Seaview; Petone to Wainuiomata; Karori to Wellington City CBD; Island Bay to Wellington City CBD.
Given that the sample is relatively small, combined with the fact that travel times can vary from one day to the next for a number of reasons, an element of the year-to-year variation in congestion can be attributed to statistical variation.

6.6.1 Travel speeds – NZTA

**Figure 41** shows average travel speeds in the Wellington region using the NZTA survey data, by daytime period, between March 2004 and March 2013.

*Figure 41 Wellington average travel speeds, March 2004 to March 2013*

![Graph of average travel speeds](image)

Source: NZTA quarterly congestion monitoring surveys

It shows that average travel speeds remained broadly unchanged throughout the period in question.

**Figure 42** shows average motorway travel speeds over the same period, also broken down by time of day. It can be seen that the average motorway travel speeds declined between 2004 and 2011, driven by a decrease in AM peak travel speeds. This decline flattened off during the two years to March 2013 largely reflecting AM peak travel speeds recovering slightly.

*Figure 42 Motorway speeds in Wellington, March 2004 to March 2013*

![Graph of motorway speeds](image)
Non-motorway state highways and local arterial roads (not shown here) exhibited a similar pattern of falling speeds until 2011 and some recovery in the subsequent two years.

The morning peak has consistently been the slowest time period on the motorway network for the following reasons:

- most inbound commuter trips are made between 7am and 9am and directly coincide with school trips, whereas demand in the evening peak is spread over a much longer period of time – 3.30pm/4pm to 7pm, thus placing less pressure on the network
- bottlenecks on the network, such as Ngauranga Interchange, Terrace Tunnel and Mount Victoria Tunnel, have a significant impact upon travel speeds in the AM peak as they reduce capacity at key locations, restricting the access of vehicles to Wellington City CBD
- in the PM peak these bottlenecks largely occur at the start of someone’s journey, as they leave the CDB, with traffic running at higher speeds once through these bottlenecks

6.6.2 Overall congestion indicator – NZTA

Figure 43 presents an average congestion indicator for the Wellington region, with congestion expressed in terms of seconds/km and calculated from knowledge of free-flow travel speeds and congested travel speeds.

Between 2005 and 2013, the average congestion indicators covering the strategic road network remained relatively unchanged across all time periods.\(^{38}\) This indicates that regional congestion remained relatively unchanged despite economic and population growth and reflects traffic volumes and VKT statistics presented earlier in this working paper which also remained relatively

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38 NZTA Travel Time Surveys
stable during this period. Despite this flat trend, severe congestion continues to occur along some key sections of the network and is expected to worsen in the future due to additional traffic volumes generated by population growth.

Looking at strategic roads across the whole region, congestion is most severe in the AM peak period, with the average delay per kilometre travelled varying between 25 seconds and 35 seconds during the period from 2005 to 2013.

Whilst the four-year period 2010 to 2013 showed a gradual decrease in congestion, the levels remained elevated compared with other time periods and the all-day average.

Inter-peak congestion levels were the lowest across all time periods and remained relatively unchanged between 2005 and 2013, ranging from around 10 seconds to 15 seconds delay per kilometre travelled.

Evening peak average congestion levels varied between 19 seconds and 26 seconds delay per kilometre travelled during the period 2005 to 2013. 39

6.7 Summary

Key points to note from this section are:

- public transport patronage grew by around 16% between 2001 and 2005 but remained largely unchanged between 2005 and 2013
- road VKT across the Wellington region did not change significantly between 2001 and 2013, effectively decreasing in per capita terms
- traffic (all vehicles) entering Wellington City CBD in the AM peak declined by 9% between 2001 and 2013
- little or no growth in traffic volumes since 2000 is not unique to New Zealand; similar trends have occurred elsewhere in the developed world
- between 2002 and 2012, people’s leisure habits changed, with fewer people making day trips by car and more people staying at home to watch TV or use a computer, signifying a more sedentary lifestyle
- evidence from the US suggests that areas that have seen the greatest decrease in traffic volumes since the recession are high-tech areas least affected by the recession, implying that technological improvements are lessening people’s need to travel
- fuel prices increased by 80% in real terms between 2000 and 2012, increasing the cost of motoring and affecting people’s travel choices
- active modes (cycling and walking) increased in popularity between 2001 and 2013, driven by population growth in and around Wellington City CBD and a broader societal shift in popularity towards active modes

• road and rail freight demand within the region remained broadly flat between 2001 and 2012

• congestion on strategic routes remained largely unchanged between 2001 and 2012, in line with VKT that was also broadly flat over the same period
7. **Future trends and forecasts**

The data presented in this working paper relating to travel on the region’s land transport network have shown patterns and trends in the use of the network over recent years, generally for the period 2001 to 2013 or as close as the data availability allows. The trends identified in this working paper can be broadly summarised as follows:

- little or no growth in road travel, or a decline when expressed in per capita terms
- growth in the number of public transport trips
- considerable growth in the number of active mode trips
- growth in overall travel demand was broadly linked to growth in population

This period of relatively low growth in Wellington region’s road travel occurred during a period when the both the population and economy grew, implying that road travel demand is not linked purely to these factors. Lifestyle (including residential developments affecting travel demand, and health choices affecting the use of active modes), employment (location and flexibility of working locations and hours), fuel prices, and alternative modes and routes for freight transport, are just some of the factors identified above.

This section looks at the key factors that might affect future travel demand and suggests how travel demand within the Wellington region might be expected to change out to 2025 (RLTP horizon). 40

7.1 **Population growth and travel demand**

As demonstrated above, prior to 2000, travel demand (private motor vehicle VKT and, to a lesser extent, public transport trips) was increasing at a faster rate than the population because, in simple terms, as people got wealthier and the relative cost of travelling decreased, they could afford to travel more often.

In subsequent years, however, this link between GDP and VKT has started to decouple, with the economy growing at a faster rate than VKT.

These trends and international research suggests that travel demand in the developed world may be reaching saturation levels, where increasing wealth will not necessarily lead to further increases in the amount of travel that people undertake.

If this is the case, it is likely that any growth in travel demand in the future would be mostly driven by increases in population. Such a scenario would result in a 9% increase in travel demand (trips) across the Wellington region between 2013 and 2031 if the medium population growth forecasts (showing growth of 9% during this period) were to be realised.

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40 Note that the population/employment forecasts relate to 2031 as they are based on demographic inputs to WTSM (WTSM only models 2021, 2031 and 2041). In this instance an estimate of growth to 2025 is provided.
As population growth rates vary between local authority areas, however, the resulting growth in travel demand would not be evenly distributed across the region and would largely be driven by population changes and where people live, work and play.

### 7.2 Factors affecting future travel demand

Future travel demand will be affected by the following:

- changes in population and employment
- changes in economic variables – fuel price, public transport fares, inflation, etc.
- roading and public transport infrastructure investment

The relative difference between the cost of travelling by car and the cost of travelling by public transport will in part determine people’s modal choice in the future. An increase in the cost of travel relative to any increase in income and general inflation will affect how much travel people undertake. Population, infrastructure and travel costs will all affect future travel demand and future travel demand patterns.

### 7.3 Population and employment

Section 2 of this working paper documents recent population and employment trends together with future projections. In summary:

- the region’s population is forecast to grow by around 9% between 2013 and 2031 (estimated 7% between 2013 and 2025), with most of this growth focused on the local authority areas of Kapiti and Wellington City
- growth within Wellington City is likely to be focused on existing transport nodes, the ‘growth spine’ and further intensification of residential development in Wellington City CBD
- employment growth is forecast to be around 12% between 2013 and 2031 (9% between 2013 and 2025). Whilst growth, in percentage terms, is forecast to be relatively evenly spread across the region, in absolute terms over 60% of net jobs are forecast to be located in and around Wellington City CBD

With considerable future growth likely to be focused in and around Wellington City CBD, this may favour active modes and public transport ahead of the private car.

### 7.4 Economic parameters

The main factors that will affect future travel costs and the future attractiveness of car and public transport are as follows:

- vehicle operating costs – fuel prices and vehicle fuel efficiency improvements
7.4.1 Vehicle operating costs

Figure 44 presents New Zealand Ministry of Economic Development (MED)\textsuperscript{41} fuel prices from 1990 to 2011, and forecasts to 2030. It shows that the price of fuel is forecast to increase between 2011 and 2030 at a rate broadly equivalent to what was seen between the late 1990s and 2011.

Figure 44 Actual and forecast retail petrol prices, New Zealand, 1990 to 2030 (c/l, including carbon, based on real 2010 prices)

The MED forecasts are based upon a range of assumptions relating to the exchange rate, oil price and emissions price. Given that population and GDP growth in emerging economies is leading to increased oil consumption, combined with the fact that it is becoming increasingly more costly to extract oil, many observers believe that a ‘high oil price’ future will be the norm. If this were to be the case then it is likely that the trends that have been seen over the past decade would continue and that growth in traffic volumes would be subdued, regardless of how the population and economy might evolve.

Whilst vehicle operating costs may not increase at the same rate as the cost of fuel, due to vehicle fuel efficiency improvements, the forecast increase in fuel costs will likely outweigh improvements to vehicle efficiency and fleet composition (for example, an increase in the prevalence of electric vehicles).

7.4.2 Public transport fares

Public transport fares within the Wellington region can (at the time of writing) be increased by a maximum annual rate equal to consumer price inflation.

\textsuperscript{41} Now MBIE – Ministry for Business, Innovation and Employment
(using the CPI) plus 1%. Research undertaken in Auckland by Ian Wallis Associates looking at the relationship between public transport fares and GDP over the period 1994 to 2008 found that public transport fares increased, in real terms, by a rate equivalent to GDP (1.8% per annum). The study also found that there was an elasticity of 0.25 between GDP and public transport fares. This roughly equates to a 0.45% increase in real terms per annum in public transport fares that can be attributed to rising GDP. In the absence of any Wellington-specific data it is assumed that this relationship is applicable in the short to medium term (2013 to 2031) for the Wellington region.

7.4.3 GDP and inflation
It is assumed that both GDP and inflation will increase by 1.8% per annum on average (based on historic data and Treasury forecasts).

7.4.4 Parking costs
Parking availability is finite within Wellington City CBD. In recent years the market has responded to these pressures by increasing the cost of parking in order to manage demand.

It is unlikely that significant new parking capacity will be delivered between 2015 and 2025, given that available land is limited and likely to be purchased and developed for higher value use (offices and residential dwellings) rather than parking, combined with efforts to develop a more sustainable city focusing on active modes and public transport.

Therefore it is assumed that the cost of parking will continue to increase at above inflation rates into the future.

7.4.5 Overall
In summary, parking costs are assumed to increase at the greatest rate between 2013 and 2025, following by vehicle operating costs and public transport fares.

Under these settings the attractiveness of travelling by public transport, all other things being equal, would increase relative to the attractiveness of travelling by car, potentially leading to modal shift from car to public transport.

7.5 Previous forecasts
Figure 45 presents car traffic growth data from 1970 to 2040 for forecasts for Great Britain and England. The period from 1970 to 1989 shows observed data for Great Britain. Forecasts are shown for Great Britain and England that were made between 1989 and 2011, together with the growth that actually occurred, and forecasts are made out to 2025 and 2035 as shown.

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42 The maximum permissible annual fare increase for the Wellington region. In reality, recent fare increases have been below the maximum.
All forecasts made from 1989 onwards have forecast a return to ‘business as usual’ growth, characterised by the trend seen in the 1970s and 1980s. Whilst the more recent forecasts, produced following 10 years of little growth in the 2000s and a preceding period (1990 to 2000) of low growth, do forecast less rapid growth, they nevertheless still assume that growth will resume a similar trajectory to what has occurred over the long term, dating back to 1970.

Such mechanistic forecasting is not unique to the UK; it has been commonplace across the developed world since the mid-1990s, with actual traffic volumes failing to meet forecast traffic volumes.

The transport future depends on whether growth takes one of the two following paths:

- whether recent flat traffic growth is just considered to be a ‘blip’, following which business as usual growth will occur
- if this is the case then the current approach to modelling and forecasting can still be considered valid and can be used to plan for growth
- whether a fundamental shift in travel patterns has occurred and the new ‘future’ will be characterised by lower car ownership levels, high fuel prices, less travel and perhaps a more ‘efficient’ economy in terms of travel (i.e. efficiency here refers to the ability to increase GDP generation while travel demand increases at a much lower rate, or not at all)
- if this is the case then transport practitioners will need to re-examine their attitudes towards traffic forecasts and investment decisions

### 7.6 A conventional transport future

A view of the light vehicle VKT for New Zealand taken from the NLTDM for 2000 to 2041 can be seen in Figure 46. The median light vehicle VKT series
represents a ‘business as usual’ view of the future where there is a return to the so-called ‘trend’ growth.

**Figure 46** Light vehicle VKT, New Zealand, 2000 to 2041

The model assumes that VKT increases at a faster rate than GDP, with the freight component of any growth forecast to increase by a rate 1% per annum greater than the GDP growth rate.

Two points can be taken from the results of this model:

- it assumes that the ‘blip’ between (approximately) 2003 and 2012 is just a pause with a return to trend growth forecast in the near future
- the percentile estimates highlight the large degree of uncertainty that is present in any forecasts, with fuel price and vehicle operating cost assumptions the two most significant factors that contribute to this uncertainty

**Figure 47** shows public transport patronage (measured in passenger kilometres) for the period 2000 to 2041, with predictions from the NLTDN.
It shows that whilst public transport demand is forecast to increase between 2011 and 2041, the rate of increase is continually slowing, which according to the model a result of the cost of motoring is becoming more affordable compared with the cost of travel by public transport.

As a consequence, the public transport mode share across the whole of New Zealand declines from around 2.2% to 1.8%, compared with an increase from 1.5% to 2.2% over the 10 years to 2011.

The difference between the 25th and 75th percentile estimates for public transport passenger kilometres is much less than for VKT (Figure 46), suggesting that public transport patronage is much less sensitive to assumptions in the model than VKT, reflecting less sensitivity to external factors such as the price of fuel.

As regional transport policy settings by the GWRC and Wellington’s local councils tend to have objectives to increase public transport patronage and modal share, it is possible that if trends such as those predicted by the NLTDM were to materialise then policy measures – increasing fare subsidies, travel demand management measures – may be required in order to maintain and boost public transport patronage.

7.7 A future based on recent trends

Evidence presented in this working paper suggests that the future for the Wellington region, based upon recent trends, might be characterised by:

- moderate population growth – 7% between 2013 and 2025
- growth in travel demand linked to population growth, as was observed between 2000 and 2013
• growth focused upon areas such as Wellington City CBD, favouring active modes and public transport

• an increasingly efficient and smart economy, where increasing GDP is not necessarily accompanied by an increase in travel demand

• a persistently high oil price, further suppressing growth in VKT

• young people travelling less

• public transport becoming slightly more affordable, relative to the private car

This section outlines how this future might translate in terms of changes in demand for travel by public transport, by car and by active modes, demand for freight travel, and congestion on the roading network.

7.7.1 Car, public transport and active modes forecasts

Based on recent trends, growth in overall travel demand is not expected to exceed 7% between 2013 and 2025. This assumes that no per capita growth in trips occurs, with any growth in trips linked to population growth.

It is felt that the popularity of active modes will continue to increase into the future for the following reasons:

• further residential development is planned for Wellington City CBD and Wellington’s inner suburbs. Development of this nature will encourage trips to be made by active modes.

• an increasing recognition of the health benefits of cycling and walking.

• an anticipated increase in expenditure on cycling infrastructure and safety measures, particularly in Wellington City, and efforts to increase the cycling and walking mode share across all local authority areas

As a result it is expected that active mode trips will increase in the future in per capita terms.

It is expected that the cost of travelling by public transport will increase at a slower rate than vehicle operating costs, with public transport becoming more attractive relative to travelling by car. Combined with the fact that forecast changes in population are likely to focus growth along public transport corridors within Wellington City, this is expected to result in a per capita increase in public transport travel and a per capita decrease in car travel.

This outcome assumes that improved car travel times as a result of the RoNS schemes will be counterbalanced by improved public transport infrastructure including BRT, RS1 and integrated ticketing.

43 Excluding HCVs (freight)
44 Car, public transport and active modes
45 http://wellington.govt.nz/services/parking-and-roads/cycling/we-support-cycling
Whilst the RoNS projects may encourage people to move from public transport to car travel, in reality, if the public transport level of service continues to improve and parking constraints remain (as assumed) then modal shift from public transport to car as a result of the RoNS will be limited.

It is therefore thought that the public transport mode share will increase slightly, active mode share will increase significantly (from a low base) and car mode share will continue to decline.

7.7.2 Freight

Figure 48 shows the number of annual freight tonne-km in New Zealand between 1992 and 2030 (road and rail combined), using data from the Ministry of Transport Freight Forecasts. Actual data are shown to 2009 and forecasts thereafter.

The figure shows that, according to the baseline scenario, the future growth rate is predicted to be lower than the growth rate seen over the preceding period from 1992, with forecast growth between 2013 and 2030 of around 15%.

A ‘high growth’ scenario (with a 50% growth in freight trips forecast between 2013 and 2030) is also presented, acknowledging the fact that a degree of uncertainty is present in any forecast.

Figure 48 Freight tonne-km, New Zealand, 1992 to 2030

Source: Ministry of Transport

The forecast growth in New Zealand freight tonnage at 15% is lower, in percentage terms, than the forecast increase in GDP over the same period.

One explanation for this possible future trend is that the proportion of GDP attributed to the service sector of the economy, which steadily increased between 1971 and 2006 (Figure 49), is likely to increase further in the future.

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46 BRT = bus rapid transit, RS1 = regional rail plan scenario 1, RoNS = Wellington Roads of National Significance plus Petone to Grenada link road. More information is provided in WP3 entitled ‘Transport Modelling Approach’.
Service sector goods do not necessarily need to be transported to markets in a conventional sense, as is the case with primary products such as milk and forestry products.

Whilst the primary industry sector of the economy will continue to grow, it is thought that the continued growth in the service and high-value goods sectors of the economy may mean that freight traffic will grow at a much lower rate than has historically been the case.

7.7.3 Future congestion

Increased road traffic congestion in the future due to growth in vehicle numbers and VKT is likely to be offset to a certain extent by planned capacity improvements in the form of the RoNS and P2G, resulting in improved travel times and reducing congestion primarily along SH1 from Kapiti to Wellington City CBD and the airport.

Under a future scenario where the anticipated capacity improvements are delivered and where growth in traffic volumes is proportional to growth in population, peak period congestion levels might improve compared to the 2013 levels.

7.7.4 Public transport travel times and travel time reliability

Public transport levels of service in the future will be affected by changes in road traffic volumes and congestion, public transport infrastructure investment and changes to public transport service routings.
It is likely that projects such as BRT, RS1, integrated ticketing, optimisation of the Golden Mile, rationalisation of bus stops and limited further bus priority measures will improve bus and rail travel times and travel time reliability. The increases are likely to be small and incremental, however, unless travel demand management measures, and more widespread bus priority measures, are implemented in the future.

Accessibility to the public transport network is also likely to improve, largely as a result of population growth being focused in areas within existing comprehensive public transport coverage, leading to an increase in accessibility.

### 7.8 Summary

The balance of evidence presented in this working paper suggests that the expected future for transport will be relatively low growth in travel demand, with any growth linked to rising population.

In summary:

- population growth (~7%) and employment growth (~10%) is forecast between 2013 and 2025 under a ‘medium growth’ scenario.
- fuel prices and parking costs are expected to continue to increase faster than inflation rates, with public transport fares increasing at a more moderate rate. The net effect would be a future scenario where the cost of travelling by car increases at a faster rate than the cost of travelling by public transport, making public transport slightly more affordable.
- prior to 2000, GDP and VKT followed a similar trend, with travel demand increasing as the economy grew. Since 2000, this relationship has started to decouple, with much lower levels of VKT growth despite a growing economy.
- these recent trends point towards a future where growth in travel demand is controlled by population and employment growth, with little or no per capita growth in overall travel demand.

Under the future scenario described above, a view of the future in 2025 might be one where:

- active modes trips increase in popularity, driven largely by the location of residential and employment development and resulting in a per capita increase in active mode trips
- public transport trips increase slightly in per capita terms, driven by population growth and infrastructure investment

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47 Measures in terms of the percentage of the region’s population within a set walking distance of a bus stop or rail station
• car travel increases at a much slower rate, equivalent to a per capita decline, largely driven by development favouring active modes/public transport and continued parking constraints in Wellington City CBD

• congestion is reduced, particularly at peak times, with increases in traffic volumes outweighed by roading capacity improvements delivered by the Wellington RoNS

• bus travel times and bus travel time reliability improve slightly, driven by infrastructure projects
8. Reliability and resilience

8.1 Introduction

This section looks at two key aspects of the roading network that are important to consider in any transport policy setting, namely reliability and resilience.\textsuperscript{48} These terms are defined as follows:

- **Reliability** is a measure of the predictability and variance of public transport and general road travel times from one day to the next.

- **Resilience** is a measure of the ability of the region’s transport network to cope with day-to-day ‘incidents’ such as road traffic accidents and temporary slips. It also relates to how susceptible the region’s transport network is to being severely disrupted by a major event such as an earthquake, and how long it might take for key routes and lines of communication to be re-established in the aftermath of such an event.

8.2 Reliability

The unique topography of Wellington, constrained by hills and the harbour, which results in the regional transport network linking Wellington City and other local authority areas in the region being concentrated along a few strategic corridors, means that the number of connections (routes) between key centres/suburbs and Wellington City CBD is fairly limited.

These connections effectively act as natural pinch-points and capacity constraints on the network as general traffic, including public transport vehicles, are funnelled through these routes, with no other travel options. Therefore disruption along one of these corridors, especially during peak periods, can have potentially far-reaching effects across the network.

8.2.1 Roading network

As mentioned above, given the limited number of routes between many suburbs/areas and the Wellington City CBD, an incident such as a road traffic accident can have a large impact on a lot of people as it will not be easy for large volumes of traffic to travel via alternative routes without incurring vastly increased travel times and/or increased congestion.

As stated in section 4, an incident on SH1 or SH2 will effectively cut off thousands of people from Wellington City CBD until it is cleared, given that these two state highway routes are essentially the only routes connecting Kapiti and Porirua (SH1) and the Hutt Valley (SH2) with Wellington City. This demonstrates how susceptible the network is to severe disruption should one of these key arteries be affected by an incident.

The suburban areas and corresponding ‘pinch-points’ between them and key populated regions are set out below:

- **Miramar** – two routes (Cobham Drive and Moa Point Road) into Kilbirnie and Lyall Bay

\textsuperscript{48} Note that reliability and resilience become key terminology in the draft RLTP that these working papers contribute to. See in particular the Policy Framework chapter of the draft RLTP.
• **Eastern suburbs** – three main routes via: Mount Victoria Tunnel, Crawford Road and Manchester Street (plus the longer coastal route via Evans Bay and Oriental Parade)

• **Brooklyn** – essentially one road into Wellington City CBD, which is Brooklyn Road

• **Karori** – two roads out of the suburb towards Wellington City CBD, with Karori tunnel acting as a further constraint

• **Northern suburbs (Johnsonville, Khandallah)** – excluding SH1 there are three roads linking this area with Wellington City CBD

• **Porirua and Kapiti** – SH1 is the only link between Kapiti and Porirua and Wellington City, whilst SH58 is the only east–west link between Porirua and the Hutt Valley

• **Hutt Valley** – SH2 is the only link with Wellington City

• **Wainuiomata** – one road into Hutt City

• **Wairarapa** – SH2 is the only link between the Wairarapa districts and the Hutt Valley

Evidence from the NZTA congestion monitoring surveys and the GWRC Annual Monitoring Report suggest that travel times on many of the state highway and urban arterials are relatively slow and variable at peak times. This is caused by capacity constraints, side friction effects (defined in section 4.2), and interactions with other road users. Within urban areas there is also more interaction of general traffic with buses as services tend to be concentrated in urban areas for local routes.

### 8.2.2 Public transport network

The travel speeds for public transport vehicles on key arterial routes into Wellington City CBD can be relatively slow and variable at peak times (see section 6.6.1 which shows travel speeds on Wellington roads). For public transport vehicles, bus priority measures are in place in Wellington City, but their effectiveness is limited as they are relatively few in number. Looking at the CBD in particular, there are relatively slow travel times along the Golden Mile (the route from Wellington railway station to Courtenay Place) even with bus priority measures in place, due in part to the sheer number of buses travelling along this route at peak times, creating bus congestion.

Bus travel times outside the CBD are slightly faster and more reliable, which may be attributed to lower levels of congestion on local roads further from the CBD.
Perceptions of bus reliability deteriorated slightly over the 10-year period from 2003 to 2013, from 62% considering the bus services to be reliable in 2003 to 56% in 2013.\(^49\)

Reliability on the rail network increased markedly as a result of the introduction of new Matangi rolling stock and its superior reliability, combined with recent infrastructure investment. Given the improvements planned as part of the Regional Rail Plan RS1 scenario it is expected that rail network reliability will improve into the future.

8.3 Resilience

Many of the constraints on the public transport network highlighted in section 8.2 are also resilience issues, primarily because many of these natural pinch-points occur on parts of the network that would be prone to disruption should a serious seismic event or other natural disaster occur.

The connections that would cause disruption to a large number of people should they be compromised during a seismic or other natural hazard event are listed in Table 9, together with an indication of how important this connection is in a strategic sense:

<table>
<thead>
<tr>
<th>Locations</th>
<th>Mode</th>
<th>Hazard</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH1 – Ngauranga Gorge</td>
<td>Car</td>
<td>Slip</td>
<td>High</td>
</tr>
<tr>
<td>SH2 – Petone to Ngauranga</td>
<td>Car</td>
<td>Storm/earthquake</td>
<td>High</td>
</tr>
<tr>
<td>SH1 – Pukerua Bay to Paekakariki</td>
<td>Car</td>
<td>Storm/slip</td>
<td>High (medium after TG)</td>
</tr>
<tr>
<td>SH1 – Ngauranga to Aotea</td>
<td>Car</td>
<td>Earthquake</td>
<td>High</td>
</tr>
<tr>
<td>SH2 – Rimutaka Hill</td>
<td>Car</td>
<td>Slip</td>
<td>High</td>
</tr>
<tr>
<td>Rail – Johnsonville Line</td>
<td>Rail</td>
<td>Earthquake/slip</td>
<td>Low</td>
</tr>
<tr>
<td>Rail – North – South Junction</td>
<td>Rail</td>
<td>Earthquake/slip</td>
<td>High</td>
</tr>
<tr>
<td>Rail – Tunnels (Kapiti Line)</td>
<td>Rail</td>
<td>Earthquake</td>
<td>High</td>
</tr>
<tr>
<td>Rail – Petone to Ngauranga</td>
<td>Rail</td>
<td>Storm/earthquake</td>
<td>High</td>
</tr>
<tr>
<td>SH58</td>
<td>Car</td>
<td>Slip</td>
<td>Medium</td>
</tr>
<tr>
<td>Hataitai Bus Tunnel</td>
<td>Bus</td>
<td>Earthquake</td>
<td>Medium</td>
</tr>
<tr>
<td>Mount Victoria Tunnel</td>
<td>Car</td>
<td>Earthquake</td>
<td>Medium</td>
</tr>
<tr>
<td>Cobham Drive</td>
<td>Car</td>
<td>Tsunami</td>
<td>High</td>
</tr>
<tr>
<td>Karori Tunnel</td>
<td>Car</td>
<td>Earthquake</td>
<td>Medium</td>
</tr>
<tr>
<td>Seatoun Tunnel</td>
<td>Car</td>
<td>Earthquake</td>
<td>Low</td>
</tr>
</tbody>
</table>

Source: Wellington Region Emergency Management Office

Note: TG refers to the Transmission Gully project which will provide an alternative route into the city.

Figure 50 shows the earthquake-related geological hazards that could affect Wellington region’s state highways. It highlights how Wellington relies essentially on two routes out of the region – SH1 and SH2 – with both routes

susceptible to land slips and/or earthquake-induced landslides at multiple locations.

It also shows how Transmission Gully could improve network resilience by providing an alternative route out of the region.

Figure 50 Earthquake-related geological hazard effects on the Wellington region’s state highways

Table 10 gives an indication of how long it might take to restore road connections in the region following an earthquake.

<table>
<thead>
<tr>
<th>Area</th>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington City CBD</td>
<td>Road</td>
<td>120 days</td>
</tr>
<tr>
<td>Western Wellington</td>
<td>Road connection to Porirua and Tawa</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Porirua</td>
<td>Road connection to the Wellington City CBD area</td>
<td>3 weeks</td>
</tr>
<tr>
<td></td>
<td>Road connection to the Wellington City CBD area</td>
<td>8 – 10 weeks</td>
</tr>
</tbody>
</table>
Upper Hutt  |  Road connection to Lower Hutt  |  3 days to 2 weeks
Kapiti  |  Road connection to the upper North Island  |  1 – 4 days

Source: (WeLG/WREMO 2013)

The key point to take from Table 10 is that it would likely be a matter of weeks or months before key road links could be restored. Even then, the likely capacity following restoration could be considerably lower than the full capacity – for example, one lane might be available in each direction through Ngauranga Gorge instead of the full three lanes each way.

It is worth noting that it would likely take even longer to restore the main rail links in the region following a major seismic event.

8.4 Summary

- Wellington region’s transport network has two main road corridors (SH1 and SH2) and two rail corridors providing access between Wellington City CBD and the rest of the region.
- these corridors are highly susceptible to damage in the case of a seismic event.
- Wellington’s unique topography and urban form results in traffic being ‘funnelled’ down a limited number of corridors in order to access key centres such as Wellington City CBD.
- these corridors are ‘pinch-points’ and act as capacity constraints on the network, adversely affecting travel speeds and variability in travel times for vehicles using these corridors, particularly during peak periods.
- given the limited number of alternative routes, an incident along one of these corridors can result in considerable disruption.
- the reliability of the bus network is hampered by buses sharing local roads with general traffic, with the number of dedicated public transport lanes limited.
- rail reliability increased considerably as a result of the introduction of the new Matangi trains.
- it would be likely to take weeks or months to restore transport connections around the region in the case of a serious seismic event or other natural hazard.
9. Safety

Improved road safety is a high priority at both a national and regional level. This section outlines trends in road user casualties between 1997 and 2013, with data sourced from the NZTA Crash Analysis System. This section focuses on three distinct categories:

- accidents involving motor vehicles
- accidents involving cyclists
- accidents involving pedestrians

9.1 Motor vehicle occupant casualties

The total number of motor vehicle occupant injury casualties recorded across the region during 2013 (road user casualties excluding cyclist and pedestrian injury casualties) was 897 (Figure 51), a record low when looking at historic information dating from 1997.

Figure 51 Regional injury casualties, all road users (excluding walking and cycling), by local authority area, 1997 to 2013

![Figure 51](image)

Source: NZTA, Crash Analysis System

It can be seen that in every year for every local authority area, Wellington City had the highest number of injury casualties.

There was a gradual increase in road user casualties between 2001 and 2007 followed by a steady decline in injury casualties thereafter.

The general downward trends are likely to be due to a combination of:
• actions aimed at targeting accident black spots
• safety infrastructure improvements
• police enforcement of traffic laws
• road safety educational programmes and campaigns
• improved vehicle safety standards

9.2 Cyclist injury casualties

Figure 52 shows cyclist injury casualties between 1997 and 2013.

The number of cyclist injury casualties across the region doubled from around 75 in 2000 to 150 in 2008, before dropping between 2008 and 2013 to just above 100. In the context of a doubling of cycling trips between 2000 and 2013, the risk to any individual cyclist fell slightly between 2000 and 2013. The majority of cyclist injury casualties occurred in Wellington City as this was where most cycling trips took place.

9.3 Pedestrian injury casualties

Figure 53 shows pedestrian injury casualties between 1997 and 2013.

Source: NZTA, Crash Analysis System

50 Greater Wellington Regional Council, 2012/13 Annual Monitoring Report on the RLTS
Whilst the number of pedestrian injury casualties fluctuated over the period, there was an overall slight downward trend between 2000 and 2013, which should be placed in the context of an increasing number of walking trips, implying a net improvement in safety for pedestrians on the transport network.

It is thought that this improvement is partly due to:

- the development of safer pedestrian zones around busy urban nodes
- improved infrastructure (crossings, speed cameras)
- designated slow speed zones
- driver and pedestrian education campaigns
9.4 Overall recent trend and outlook

In recent years, an overall downward trend in regional injury casualties has been seen across all modes, as shown in Figure 54.

Figure 54 Regional injury casualties, by mode, 1997 to 2013

![Graph showing regional injury casualties from 1997 to 2013]

Source: NZTA, Crash Analysis System

These improvements have been achieved through a raft of measures outlined above in sections 9.1 to 9.3.

The NZTA, alongside local and regional authorities, continues to place road safety as a number one priority, focusing on achieving further improvements and progress towards a ‘Vision Zero’ future.

Given the emphasis that is likely to be placed upon road safety in the future, it is expected that the downward trend in regional injury casualties will continue.

9.5 Summary

In summary:

- motor vehicle injury casualty numbers peaked in 2007 before declining to around half in 2013
- walking and cycling injury casualties also peaked in 2007 and fell between 2007 and 2013, while the popularity of both walking and cycling rose significantly
- given recent trends and continuing investment in safety programmes and safety infrastructure projects injury casualties across all modes are expected to continue to decrease into the future
10. **Climate change and carbon dioxide emissions**

Land transport is one of the many contributors towards climate change due to the carbon dioxide (CO\(_2\)) emissions from motor vehicles.

Tracking and forecasting emissions from both public and private vehicles is difficult as CO\(_2\) emissions are related to several factors:

- VKT
- fleet composition – including HCVs cars, all in a range of models and sizes
- vehicle fuel efficiency – related to fleet age as newer cars are generally more fuel efficient than older cars
- the evolution and increasing popularity of hybrid and electrically powered vehicles

10.1 **Transport-generated CO\(_2\) emissions**

Figure 55 shows regional transport-generated CO\(_2\) emissions, expressed in absolute and per capita terms, between 1999 and 2013.

**Figure 55 Wellington region transport-generated CO\(_2\) emissions, 1999 to 2013**

![Graph showing regional CO\(_2\) emissions between 1999 and 2013.](source)

Regional transport-related CO\(_2\) emissions rose between 1999 and 2005 before declining between 2005 and 2013. In 2013, regional transport-related CO\(_2\) emissions were at their lowest level since 1999. When expressed in per capita terms, annual transport-related CO\(_2\) emissions fell by an average of around 12% between 1999 and 2013.

10.2 **Future transport-generated CO\(_2\) emissions**

Future transport-generated CO\(_2\) emissions will be governed by a number of factors:

- population and employment growth rates will drive future travel demand.
• modal choice – public transport generates lower emissions per passenger kilometre travelled than the private car. Active modes generate no emissions.

• vehicle fleet composition – more fuel efficient, more environmentally friendly vehicle engines will have lower CO\textsubscript{2} emission rates. The MoT forecast that fuel efficiency will improve by around 20% between 2011 and 2031\textsuperscript{51}.

• taxation and government policy – if introduced, increases in fuel duty, a congestion charge, road tolls, a carbon tax, and registration and import charges for more fuel efficient vehicles, would all affect travel demand and transport-generated CO\textsubscript{2} emissions.

• travel demand ‘saturation’ – emerging evidence suggests that people’s propensity to travel is reaching a saturation point, with per capita trip rates perhaps having peaked.

Uncertainties associated with forecasting assumptions make it difficult to accurately forecast levels of future transport-related CO\textsubscript{2} emissions. However, given recent trends and future expectations of influencing factors, it is likely that transport-generated CO\textsubscript{2} emissions will continue to fall into the future.

10.3 Summary

In summary:

• between 2005 and 2013, CO\textsubscript{2} emissions from road transport decreased, as improvements in vehicle fuel efficiency outpaced growth in traffic volumes.

• in 2013 regional transport-generated CO\textsubscript{2} emissions were the lowest since 2000. Expressed in per capita terms, emissions decreased by around 10% compared to 2001.

• vehicle fuel efficiency improvements are expected to continue to outpace any increase in vehicle travel demand, leading to further absolute and per capita decreases in transport-generated CO\textsubscript{2} emissions in the Wellington region.

\textsuperscript{51} Ministry of Transport Fleet Emissions Model
11. **General summary and conclusions**

This working paper has summarised:

- population trends and projections, including where recent growth was focused and where future growth is likely to be focused
- how the shape and location of future residential development might affect travel demand and travel demand patterns
- the historic correlation between GDP and travel demand, the fact that this relationship started to break in 2000 and the implications for travel patterns in the future
- employment trends and projections, including where recent growth was focused and where future growth is likely to be focused
- car ownership trends since 2000, particularly relating to young people, and how these trends might develop in the future
- a general overview of the region’s roading network, and the public transport network, and current constraints and issues
- how travel patterns across the region changed between 2001 and 2013, with reference to the New Zealand Census
- trends in public transport patronage, road travel volumes, freight traffic, the popularity of active modes, and congestion, between 2000 and 2013
- how the main cost drivers of public transport patronage – fuel price, public transport fares, parking costs – are expected to increase into the future, together with their impact upon the relative attractiveness of travelling by car and public transport
- a view of the future, where trend growth pre-2000 returns
- a view of the future based on trends since 2000 where growth in travel demand is largely driven by growth in population – a scenario that is found in this analysis to be more likely
- future trends relating to public transport patronage, road travel volumes, freight traffic, the popularity of active modes, and congestion between 2013 and 2025
- network reliability and resilience, focusing on issues and constraints and where improvements might be made in the future
- recent motor vehicle, cyclist and pedestrian casualty trends, and an indication of how these trends might change in the future
- observed regional transport-generated CO\(_2\) emissions and how they might change in the future
The key general points relating to future trends and travel patterns that can be taken from this working paper are as follows:

- the assumptions upon which forecasts of future travel demand are based, including population, employment, fuel price, public transport fares and GDP, are subject to a degree of uncertainty and variability.

- travel demand forecasts are subject to uncertainty and represent a view of the future using a particular set of variables.

- between 2001 and 2013, regional population increased at a slightly higher rate than travel demand (VKT), equating to a slight decline in per capita terms. Car trips were relatively flat, public transport patronage increased and the popularity of active modes increased dramatically.

- based on data summarised in this working paper, future trends and travel patterns are expected to largely be shaped in the short to medium term (2013 to 2025) by a continuation of recent trends.

- such a future would see per capita growth in active mode and (to a lesser extent) public transport trips, driven by the location of proposed future residential development favouring non-car modes.

- growth in car trips would decline in per capita terms, with parking in Wellington City CBD remaining a constraint.

- overall, future growth in travel demand across all modes is expected to be directly linked to population growth. Therefore in per capita terms across all modes, zero or little growth in travel is envisaged.