



greater WELLINGTON  
REGIONAL COUNCIL

# Census 2013:

## Journey to Work Analysis

**FOR FURTHER INFORMATION**

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## 1 Purpose

This document has been developed as a reference guide for transport planners in the region. It provides a summary of 2013 Census journey to work (JTW) travel patterns, and includes trends over time where possible. The document does not, however, provide any reasoning and explanation for observations and trends over time.

**The document should be read alongside Appendices A, B, C and D that contain tables and figures that are referenced in the report.**

## 2 Analysis Scope

### 2.1 Data Obtained

For the Wellington region, an origin–destination matrix at the Census area unit level (AU) of JTW trips by means of travel to work from the 2013 Census was obtained from Statistics New Zealand.

The conditions of the data request was as follows:

- Gainfully employed aged 15 years and over
- Origin = AU of usual residence (both private and commercial dwelling)
- Destination = Workplace AU
- 197 Wellington region AUs

### 2.2 Analysis Level

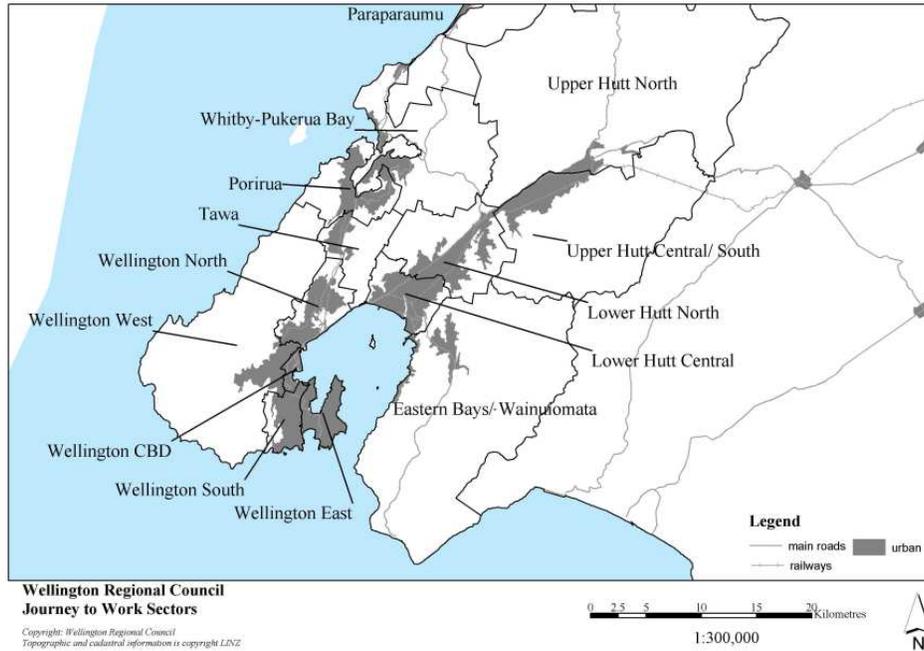
The analysis was conducted at the Land Use Model zone level (BERL sectors), which segments regional travel into 17 sectors:

- Wellington City split into **six** - CBD, East, North, South, West and Tawa.
- Porirua City split into **two** - Porirua, Whitby–Pukerua Bay.
- Hutt City split into **three** - Central, North, Eastern Bays/Wainuiomata.
- Upper Hutt City split into **two** - Central/South, North.
- Kapiti Coast split into **three** - Paraparaumu, Waikanae, North Kapiti.
- Wairarapa

These sectors are designed to differentiate trip-making behaviour without the amount of data being too complicated.

**Figure 1** below shows the 17 sectors. A larger version of the map is provided in **Appendix D**.

**Figure 1 Wellington region sector system**



**Table 1** below shows the 17 sectors, together with the total number of 2013 Census journey to work trips according to origin residence (home), destination workplace (work) and whether trips are internal to the sector (i.e. origin and destination in same sector). This provides an indication of the number of journey to work trips that each sector generates and attracts.

**Table 1 Wellington region sector system**

Local authority area	Sector	JTW trips by origin residence	JTW trips by destination workplace	JTW trips internal to sector
Wellington City	<i>CBD</i>	10,599	77,484	7,896
	<i>East</i>	18,420	9,426	5,100
	<i>North</i>	23,475	9,891	4,896
	<i>South</i>	25,230	12,954	5,700
	<i>West</i>	18,873	6,999	3,639
	<i>Tawa</i>	7,941	3,681	1,449
Porirua City	<i>Porirua</i>	10,599	9,258	3,651

	<i>Whitby-Pukerua Bay</i>	10,941	3,690	2,277
<b>Hutt City</b>	<i>Central</i>	19,863	26,583	8,352
	<i>North</i>	16,866	6,510	3,117
	<i>Eastern Bays / Wainuiomata</i>	10,146	2,448	1,845
<b>Upper Hutt City</b>	<i>Central / South</i>	13,377	9,054	4,797
	<i>North</i>	6,105	795	606
<b>Kapiti Coast</b>	<i>Paraparaumu</i>	13,863	7,599	5,832
	<i>Waikanae</i>	4,716	2,271	1,557
	<i>North Kapiti</i>	3,330	2,106	1,737
<b>Wairarapa</b>	<i>Wairarapa</i>	19,476	15,063	14,763
<b>Unidentified</b>			28,002	
<b>Total</b>		<b>233,820</b>	<b>233,820</b>	<b>233,820</b>

Trips to ‘unidentified’ areas represent where a destination/workplace could not be determined from the information provided in the census. Some 1996 data are also presented at the regional level, as information at a sector level is not available.

The results for all sectors should be considered in the context of both their geographic size and overall number of originating / terminating journey to work trips.

### 2.3 Analysis Mode

The travel modes include the following:

- Private auto (drove a private car, truck or van)
- Company auto (drove a company car, truck or van)
- Passenger (in a car, truck, van or company bus)
- Train
- Public bus
- Walk (walked or jogged)
- Bicycle
- Motorcycle (includes power cycle)
- Other (taxi, ferry, helicopter or aeroplane)
- Not stated
- Did not work
- Worked at home
- Total (all the above)

### 2.4 Analysis Outline

The analyses that were undertaken are set out below:

- Sector Origin–Destination (Residence–Workplace)
  - ◆ Total journeys Origin–Destination (OD) matrix
  - ◆ A separate OD matrix for each mode
  - ◆ Modal share OD matrices
- ODs Ranked by Mode
  - ◆ Top 10 ODs by total journeys
  - ◆ Top 10 ODs by mode
- Origin Sector
  - ◆ Journeys by mode: number
  - ◆ Journey by mode: percentage
- Destination Sector
  - ◆ Journeys by mode: number
  - ◆ Journeys by mode: percentage
- Sectors Ranked by Mode
  - ◆ Destination sectors ranked by mode
  - ◆ Origin sectors ranked by mode
- Self-Sufficiency
  - ◆ Percentage of journeys within origin sector

## 2.5 Analysis Limitations

Analysing the composition of the JTW can provide valuable insights into current travel behaviours, and possible implications for planning. There are however limitations with using JTW data for policy development, that need to be fully recognised:

- JTW data only represent commuting trips within the region, and commuting trips form only around 20% of total annual trips (according to the NZ Household Travel Survey produced by the Ministry of Transport). Also, whilst JTW data may be used as a proxy for peak travel behaviour (as work trips are mainly undertaken during the peak when the network is most constrained), commuting trips still only form approximately 50% of AM peak travel demand<sup>1</sup>. The JTW data will however provide valuable insights into longer distance travel in the region in the peak which will predominately comprise of commuting trips (as education/shopping/social trips are likely to be more localised).
- JTW data are comprised of survey responses about main means of travel to work (greatest distance); as such multi-modal trips such as bus–rail, walk–rail, or car–rail could be classed as rail and the access component (bus, walk, car) not recorded. Subsequently, the JTW trips will not match the use of PT, car and active modes, as the dataset ignores trip legs other than the main leg. Also, even though respondents are asked for main mode by distance, it is clear (from

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<sup>1</sup> Source; Wellington Transport Strategy Model (WTSM)

looking at the data) that some individuals have not understood the question – as evident for example by some very long walk trips that would have likely been walk–rail trips (and should have been classed as rail).

- The means of travel to work is asked for on the census day, and does not therefore represent average behaviour. There have been cases in the past where respondents have displayed abnormal behaviour on census day to support an agenda.
- Whilst the origin of JTW trips is well understood (the household location of the census respondent), the destination of JTW trips can be more problematic. Respondents are asked for the address of their place of work, and some are not completed fully such that a geocode can be determined (and are therefore given an ‘undefined’ destination/workplace).
- Due to census confidentiality, some data points are rounded to the nearest three, which can distort information where there are small sample sizes.

Despite these limitations, however, the Census is the most comprehensive national and regional data set containing information on current travel behaviour. Furthermore, the consistency of the data collection methodology allows for comparisons and trends to be drawn between current and historic Census data.

### 3 Results of 2013 Census JTW Analysis

#### 3.1 Origin–Destination

Origin–Destination matrices were developed for each mode and for total journeys. Modal share matrices were also developed for each mode showing the proportion of total journeys that used that mode.

These matrices are attached in **Appendix A, Tables 1–25**.

There were several observations:

- The Wellington CBD is the major workplace destination, with 37.6% of JTW journeys (where destination is known), or 77,484 trips, going there.
- The next largest workplace destination sector is Lower Hutt Central, with 12.9% of journeys (26,583 trips).
- The other sectors are substantially smaller in terms of JTW destinations, with the next largest being the Wairarapa at 7.3% (15,063 trips) and Wellington South at 6.3% (12,954 trips).
- The private car is the major mode for all destinations.
- The only exception to the domination of the private car is for trips to the Wellington CBD where public transport and walking also form a significant proportion of trips.

#### 3.2 Origin–Destination Ranked by Mode

A key aspect of this analysis is the ability to identify the size of JTW movements between different areas, and the relative importance of different modes for different movements. In this regard the 10 largest movements for each mode of travel were identified, and these are shown in **Appendix A, Table 26**.

There were several observations:

- The largest single OD movement was within Wairarapa (due to the large area covered) with 14,763 trips, followed by journeys from Wellington South to Wellington CBD, 12,633.
- However, the importance of the Wellington CBD, which is physically much smaller than the other sectors, is shown in that six of the 10 largest movements have it as their destination.
- There is a focus of the train service to the Wellington CBD – all 10 largest movements by train were to the CBD.

#### 3.3 Destination and Origin by Mode

The number of trips by each mode, and modal share, was determined for each residential origin sector and for each workplace destination sector. The results are shown in **Appendix A, Tables 27–30**.

There were several observations:

### **Residential origin sector mode share**

- The private car is the major JTW mode with 46.6% of all journeys by this mode, similar to the 2006 level of 46.9% (but markedly lower than 50% in the 2001 JTW analysis).
- The main exceptions to this are Wellington CBD at 11.2%, Wellington South at 31.6% and Wellington West at 37.0%.
- Overall private car use tends to increase with distance from the Wellington CBD with the outlying areas of Upper Hutt North, North Kapiti, Wairarapa and Eastern Bays/Wainuiomata having 54–62% of JTWs by private car.
- Train use was the highest in Tawa, 22.2%, followed by Lower Hutt Central at 15.9% and Whitby–Pukerua Bay with 15.4%.
- Bus use was highest in Wellington East at 21.4%, followed by Wellington South, 19.7% and Wellington West, 18.1%.
- Walking was highest in Wellington CBD at 68.8%, followed by Wellington South at 26.4% and Wellington West at around 22.3%.

### **Workplace destination sector mode share**

- Again, the private car was the major JTW mode with 46.6% of all journeys by this mode. The exception to this is the Wellington CBD at 29.2%.
- The train's major role is in serving the Wellington CBD as a workplace destination with limited usage to other sectors.
- The public bus has a wider role, making a significant contribution in other areas of Wellington City in addition to the CBD.
- Walking also has a wider role. Wellington City had the highest walking proportion, particularly Wellington West, South and CBD at 18.0–19.2%, and Wellington North at 11.0%, followed by Eastern Bays/Wainuiomata (9.0%) and North Kapiti at 8.9%.

## **3.4 Sectors Ranked by Mode**

Both the residential origin sectors and the destination workplace sectors were ranked by mode to show where each mode makes its major contributions. The results are shown in **Appendix A, Tables 31–32**. The findings of this analysis were distorted to some extent by the relative size of each sector (with the larger sectors at the top because of the number of residents/jobs); however, they do provide some interesting insights.

### **Residential origin sector**

- Wellington North provided the largest number of car drivers, 10,344 trips, followed by the Wairarapa with 8,583 trips, and then by Lower Hutt Central with

7,860 trips and Lower Hutt North with 7,743. This could be mostly related to the size of the sectors involved.

- Lower Hutt provided the most train passengers, with Tawa next – given the relative small size of Tawa it is clearly a highly train dependent area.
- Wellington South provided the most bus passengers, followed by Wellington East, North and West, respectively, together accounting for more than 75% of all JTW bus trips.
- Wellington North had the most car passengers of any region, accounting for 13.5% of the total. Porirua is next with 9.2%, followed by Lower Hutt Central, Wellington South and Lower Hutt North, all with 8.0% each.

### **Workplace destination sector**

Wellington CBD and Lower Hutt Central are considerably larger than other workplace sectors and therefore had the highest number of journeys by nearly all modes.

### **3.5 Self-Sufficiency**

The proportion of journeys that were made within the sector was assessed for each sector, and the results shown in **Appendix A, Table 33**. Clearly the areas involved are not equal in terms of physical size and/or population; however, some observations should be noted:

- The highest proportion of trips within the sector was in the Wairarapa with 88.8% (of known destinations); the lowest was in Upper Hutt North with 11.8%.
- The smallest sector, the Wellington CBD, had the second highest proportion of internal trips with 80.8%.
- Apart from the Wellington CBD, all the other Wellington City sectors were between 21% and 31%.

## **4 Comparison between JTW in the 2013, 2006 and 2001 Censuses**

### **4.1 Comparison of Origin–Destination Trips**

The number and mode share of OD trips are compared between 2013 and 2006. These matrices are attached in **Appendix C, Tables 34–58**.

There were several observations:

- On the 2013 Census day, the number of total trips was similar to the 2006 level, up by 156.
- The proportion of auto trips decreased between 2006 and 2013 by 1.8%. This 1.8% is the sum of a 0.8% fall in the number of passenger trips (implying an increase in car occupancies), and the remaining 1.0% coming from a fall in private and company auto trips. The proportion of public transport trips grew by about 0.5% compared with the year 2006 (bus up 0.1%, train up 0.4%). The proportion of active modes on 2013 Census day had increased by 1.7% compared with that on 2006 Census day, with about half of the increase coming each from walking

and cycling. It should also be noted that there was a fall in the 'not stated' mode category between 2006 and 2013 of 1.5%.

- The largest single OD movement increase was within Wellington CBD, with 2,166 more journeys as the inner city population continued to grow. The second largest increase was within Wairarapa, with 1,452 more journeys.
- Wellington CBD supplied the largest increase in walking trips, with 1,617 more trips and an increase in the proportion by 1.6% from 2006, followed by the Wellington South–Wellington CBD OD pair, with an increase of 549 trips and 2.8% increase in the proportion.

## 4.2 Comparison of Origin Trips

**Tables 59 and 60 in Appendix C** show the comparison of the number of trips by each mode and the modal share for each residence sector between 2013 and 2006. **Table 61 in Appendix C** shows the comparisons of both the number of trips and the proportion of total trips made by each means.

There were several observations:

- As a residence, Wellington CBD had the largest increase in walking when compared with the results of the 2006 Census, with 1,518 more trips and 2.7% increase in the proportion.
- The second largest increase in walking was in Wellington South, with 681 more walk journeys and 3.4% increase in the proportion.
- The largest increase in private car trips was for Paraparaumu residents, with 888 more trips (3.4%), followed by Wellington North with 375 trips (0.8%).
- Paraparaumu also had the largest increase in the amount of train trips as an origin, with 186 more compared with 2006. Similar absolute increases were seen from Waikanae, Lower Hutt Central and Wairarapa.
- The largest increase in bus use was from Wellington North with 462 trips (up 2.0% as a proportion of the total trips), followed by Wellington CBD with 282 more trips. There were significant falls in bus use from the Wellington South and Wellington East sectors, of 351 and 297 trips, respectively.
- The largest increase in total trips was in Wellington CBD, with 1,917 more journeys, followed by Paraparaumu with 1,008 more trips. Lower Hutt North saw the largest fall in trip numbers of 1,209.

## 4.3 Comparison of Destination Trips

**Tables 62 and 63 in Appendix C** show the comparison of the number of trips by each mode, and modal share for each workplace sector between 2006 and 2013. **Table 64 in Appendix C** shows the comparisons of both the number of trips and the proportion of total trips made by each means.

There were several observations:

- As a workplace, Wellington CBD had the largest increase in public transportation trips, with 1,794 more journeys by train and 1,095 more by bus.

- Wellington CBD also had the largest increase in walking and cycling, with 2,343 more walking trips and 1,266 more cycling trips.
- Car-based trips increased to all destinations except Wellington West and Lower Hutt Central. The single largest increase in car use was in private cars going to Wellington CBD, at 1,719, although there was a fall in company car use and passenger numbers, giving a net car use change of 1,011 trips. There were also net increases of between 650 and 855 to Wellington North, East and South; to Porirua and to the Wairarapa. There was however a decrease in car-based mode share of 1.8%, half of which was due to reduced passenger numbers.

#### 4.4 Comparison of Self-Sufficiency

**Table 65 and Figure 23 in Appendix C** show the comparison of self-sufficiency between the years 2001, 2006 and 2013.

There were some observations:

- The commercial areas of each TA tend to have a higher self-sufficiency, with Wellington CBD, Porirua, Lower Hutt Central, Upper Hutt Central/South, and Paraparaumu/Waikanae all being above the average. Larger geographic areas such as North Kapiti and the Wairarapa also had large degrees of self-sufficiency due partly to the size of the sector.
- Overall there has been little change in overall self-sufficiency between 2001 and 2013. There were generally increases in the Wellington City suburbs (apart from Wellington North and Tawa). There were marginal increases in Porirua and Upper Hutt North and no change for Whitby/Pukerua Bay. All other residence sectors saw reductions in self-sufficiency, the largest fall in Paraparaumu, followed by Upper Hutt Central/South, North Kapiti and Lower Hutt Central, respectively.

#### 4.5 Mode and Geographic Time Series 1996–2013

**Figures 17 to 20 in Appendix C** show a comparison of trips by mode (1996–2013), and trips by residence/workplace (2001–2013).

- After total JTW trip numbers increasing between in the 2001 and 2006 censuses, there was a slight reduction in 2013.
- The use of private car as a mode fell in 2013 after increasing both in 2001 and 2006. Train and bus patronage flattened off in 2013 after increasing in previous censuses. The number of people walking/jogging to work modes have continually increased between 1996 and 2013. Bicycle and motorcycle use had increased in 2013 after declines in previous years.
- Almost all sectors have seen a steady growth in JTW trips by residence, with the growth being more marked in the Wellington CBD and Paraparaumu. The growth by workplace destination has been focussed more towards the CBD, with other sectors showing minimal or stagnant growth.

#### 4.6 Car Occupancy

**Figures 21 and 22 in Appendix C** give a time series of average car occupancies by geographic residence and workplace sector.

- Overall, car occupancies reduced slightly between 2001 and 2013 (from 1.11 to 1.09).
- Porirua as a residence sector had higher car occupancies than the rest of the region, although these have been falling slightly since 2001 (from 1.19 in 2001 to 1.17 in 2013).
- As a workplace destination, the Wellington CBD had by far the highest car occupancies in 2013 at around 1.18, although this was down from 1.20 in 2006.

## **5 Summary**

Analysing the composition of the JTW can provide valuable insights into current travel behaviours, and possible implications for planning. There are however limitations with using JTW data for policy development that need to be fully recognised; in particular JTW only comprises around 20% of the total travel in the region.

The 2013 data clearly show that the Wellington CBD is the primary regional workplace destination, with Lower Hutt Central being the next largest (but only about a third of the trips to the CBD). Private car is by far the major mode for all destinations apart from trips to the CBD, where public transport and walking also form a significant proportion.

The 2013 Census saw a slight fall in the number of total JTW trips, after an increase between 1996 and 2006. Active modes (walking and cycling) have increased in absolute terms and as a share of total JTW trips. The same was true for motorcycle trips though from a very small base. Public transport – train and bus – rose marginally. There was a fall in all car-based modes in absolute and proportional terms. Much of the increase in walking trips has been a result of residential development in the Wellington CBD and inner city. There was a significant reduction in the number and share of respondents who did not state which mode they used.

For JTW trips where the destination is known, 37.5% of trips in 2013 were within the same sector. Self-sufficiency is higher for areas of significant employment such as the CBD and TA economic centres, with many sectors showing over 40% of residential trips working in the same sector. The trend in overall self-sufficiency has not changed since 2001, but there have been large reductions in self-sufficiency in Paraparaumu, Upper Hutt Central/South, North Kapiti and Lower Hutt Central since 2001.