Walkable Catchments Analysis at Auckland Train and Northern Busway Stations - 2013

December 2013  Technical Report 2013/014

Auckland Council
Technical Report 2013/014
ISSN 2230-4525 (Print)
ISSN 2230-4533 (Online)

ISBN 978-1-927266-63-2 (PDF)
This report has been peer reviewed by the Peer Review Panel using the Panel’s terms of reference

Submitted for review on 26 September 2013  
Review completed on 20 December 2013  
Reviewed by 2 reviewers

Approved for Auckland Council publication by:

[Signature]

Name: Greg Holland  
Position: Manager, Research, Investigations and Monitoring  
Date: 20 December 2013

**Recommended citation:**  

© 2013 Auckland Council

This publication is provided strictly subject to Auckland Council's copyright and other intellectual property rights (if any) in the publication. Users of the publication may only access, reproduce and use the publication, in a secure digital medium or hard copy, for responsible genuine non-commercial purposes relating to personal, public service or educational purposes, provided that the publication is only ever accurately reproduced and proper attribution of its source, publication date and authorship is attached to any use or reproduction. This publication must not be used in any way for any commercial purpose without the prior written consent of Auckland Council. Auckland Council does not give any warranty whatsoever, including without limitation, as to the availability, accuracy, completeness, currency or reliability of the information or data (including third party data) made available via the publication and expressly disclaim (to the maximum extent permitted in law) all liability for any damage or loss resulting from your use of, or reliance on the publication or the information and data provided via the publication. The publication, information, and data contained within it are provided on an “as is” basis.
Walkable Catchments Analysis at Auckland Train and Northern Busway Stations - 2013

Lindsay Wilson

Research, Investigations and Monitoring Unit
Auckland Council
Executive summary

In 2010, the Auckland Regional Transport Authority (ARTA, now Auckland Transport) commissioned a survey to examine if an 800-metre radius from Papatoetoe train station was representative of the walking distance for rail passengers. The findings from the Papatoetoe survey showed that the median walking distance to the train station was 1200 metres rather than the assumed 800 metres.

Based on the survey findings, Auckland Council’s Research, Investigations and Monitoring Unit has sought to test for more evidence if an 800-metre radius walkable catchment area was representative of the walking distance for other train stations in Auckland.

Using a similar research methodology as the Papatoetoe train station survey, passengers arriving at New Lynn, Glen Innes and Mt Albert train stations were surveyed in March 2012.

The results of the three train station surveys showed that:

- more than 50 per cent of respondents walked further than 800 metres to get to a train station;
- more than 15 per cent of respondents walked further than 1500 metres to get to a train station; and
- walking is the most significant mode of travel for trips less than 2000 metres.

Due to only four train stations being surveyed, and given the generally low response rate of these surveys, RIMU decided additional research should be conducted to further test for evidence that an 800-metre radius is representative of the walkable catchment area for a train station in Auckland.

As a result, in March 2013 a further 12 train stations were surveyed along with five Northern Busway Stations.

The results of the 12 train station surveys show that:

- walking was the most common mode of arrival at nine of 12 stations. Ellerslie (73%) and Newmarket (69%) recorded the highest percentage of respondents walking to stations. Manurewa recorded the smallest percentage of respondents walking (41%)
- for trips under 2km, walking was the dominant mode of arrival at four stations: Glen Eden, Henderson, Newmarket and Ōtāhuhu
- at four stations more than 50 per cent of respondents walked further than 800 metres to get to a train station;
- at six stations more than 15 per cent of respondents walked further than 1500 metres to get to a train station; and
Newmarket Station returned the lowest median walking distance to a train station with 446 metres. Ellerslie Station recorded a slightly higher median walking distance with 569 metres. The highest median walking distances were recorded at Papakura with 971 metres followed by Panmure with 917 metres.

Newmarket and Henderson are two dominant stations in terms of walking to the station. In particular, it is notable that at least 50 per cent of customers who walked, travelled from relative large catchment areas (3.4km for Henderson and 2.4km for Newmarket).

The results of the five bus station surveys show that:

- the median walking distance ranged from 588 metres at Akoranga to 2727 metres at Albany
- at four of the stations, 50 per cent of respondents walked further than 800 metres. The exception was the Akoranga Station, where over 80 per cent of respondents walked between 400-800 metres
- walking was the most significant mode of travel for trips less than 2000 metres at three stations, including Akoranga, Constellation and Smales Farm. In contrast, only a small number of respondents walked to the Albany (13%) and Sunnynook (14%) stations
- Smales Farm had the lowest median walking distance at 588 metres. That is, 50 per cent of the people who walked to Smales Farm bus station walked less than 588 metres, and the other 50 per cent walked more than 588 metres. Akoranga had a similar median walking distance of 590 metres. In contrast, the median walking distances to Constellation and Sunnynook were 1199 and 1141 metres. Meanwhile, the median walking distance to Albany was 2727 metres.

Overall, the results from the surveys show that an 800-metre radius is accurate for some stations, but underestimates the actual walking distance for others.
# Table of contents

Executive summary..................................................................................................................i

1.0 Background......................................................................................................................4
  1.1 Walkable catchments and centres..................................................................................4
  1.2 Reasons for surveying busway and rail services users .............................................5
  1.3 Survey purpose ..........................................................................................................6
  1.4 Findings from previous train station surveys .............................................................7
  1.5 Busway surveys.........................................................................................................12

2.0 Methods ..........................................................................................................................13
  2.1 Methodology ..............................................................................................................13

3.0 Results and discussion....................................................................................................18
  3.1 Rail survey results .....................................................................................................18
  3.2 Mode and distance travelled to train stations .........................................................21
  3.3 Walking to the station ...............................................................................................28
  3.4 Busway survey results...............................................................................................33
  3.5 Mode and distance travelled to busway stations .....................................................34
  3.6 Walking to the station ...............................................................................................37
  3.7 Results for individual busway stations ....................................................................38

4.0 Summary and recommendations ....................................................................................44

5.0 Acknowledgements.........................................................................................................46

6.0 References.......................................................................................................................47
1.0 Background

1.1 Walkable catchments and centres

A walkable catchment is the area covered by the walking distance that an average person will walk to get to meaningful destinations before considering other modes of transport.

A walkable catchment with a 400-metre radius is usually associated with a five-minute walk to a town or neighbourhood centre and an 800-metre radius is associated with a 10 minute walk to a regional centre or a place with a major transport service such as rail.

There is no definitive authority on why a walkable catchment should be 400 or 800 metres or any other distance, but what is commonly agreed is that the walkable catchment area is an easy walk for the average person.

Based on these distances, walkable catchments are usually drawn and represented as a perfect 400-metre or 800-metre circle over a centre, but in practice walkable catchments have irregular shapes because they cover the actual on-the-ground distance and not the linear (as the crow flies) distance as shown in figure 1.

Figure 1: Example of a walkable catchment

Source: (Urban Design Toolkit, Ministry for the Environment 2009)

The concept of walkable catchments is a widely recognised and used planning concept in New Zealand and overseas (Calthorpe 1993; Duany and Plater-Zyberk 1991; Ministry for the Environment 2009).

In the context of urban planning in Auckland, the 2012 Auckland Plan identifies a network of centres to accommodate the future population and employment growth in the region. In the plan, the centres will provide the focal points for communities, foster economic activity, support the public transport system and maximise investment in infrastructure. A centre is a defined area that comprises a concentrated mix of public and private activities, and is
supported and sustained by a surrounding residential area that is within an easy 10 minute walking distance to these activities (Auckland Council 2012).  

While the distances may only vary by walking an additional 200-400m (or 2½ – 5 minutes) an additional 200m walk is a significant factor given that an 800m walkable catchment potentially includes 200ha of land and a 1000m walkable catchment potentially includes 300ha of land and a 1200m walkable catchment potentially includes 450ha of land.

1.2 Reasons for surveying busway and rail services users

The Auckland Plan also identifies a network of centres to accommodate the future population and employment growth in the region. In the plan, a centre is a defined area that compromises a concentrated mix of public and private activities, and is supported and sustained by a surrounding residential area and a public transport system that is within an easy 10 minute/800m walking distance to these activities. If this works, this 10 minute/800m template may be replicated throughout centres and major transport hubs in Auckland.

But is a 10 minute/800m walk applicable for train stations in Auckland? Or are train users prepared to walk further than 10 minutes/800m? This 10 minute/800m design feature is being promoted (and if successful will be replicated around Auckland) without much scrutiny or evidence. As all cities are different, it may be that in Auckland, a city with urban development that continues to sprawl and is primarily a car-based development, may have a different willable catchment area greater than 10 minutes/800m.

In terms of monitoring the above requirement, this project intends to test if the pedestrian mode share is the most significant mode type for short trips (less than 2km) to and from train stations and whether a 10 minute/800m walk is representative of the catchment area for rail public transport in the Auckland region.

As a guide, the Auckland Plan identifies a 10 minute walk as an example of an easy walking distance, but notes that there will be variations on this based on the size, role and function of different centres in the region. When detailed planning is undertaken in these centres, the actual walkable catchment (which will be influenced by subdivision, street and block pattern, and topography) is refined to reflect any constraints to accessibility to these centres.
1.3 Survey purpose

This project intends to test if the pedestrian mode share is the most significant mode type for short trips (less than 2km) to and from train stations and whether a 10minute/800m walk is representative of the catchment area for rail public transport in the Auckland region.

In summary, the purpose of this project is to:

• Determine whether or not an 800-metre radius circle (10minute walking distance) is representative of the catchment area for 12 train stations and 5 Northern Busway stations in the Auckland region;

• assess whether the values observed at Papatoetoe, New Lynn, Mt Albert and Glen Innes train stations are representative of other train stations in the region;

• develop a typology of train stations in the Auckland region; and

• conduct similar surveys at the five Busway Stations to identify how far bus passengers are travelling to a busway station.

In addition, the project seeks to investigate:

• if the currently accepted catchment areas of 800m for train stations are relevant to Auckland, and determine if it is universal across the region by surveying and analysing 12 train stations in the Auckland region; and

• if the currently accepted catchment areas of 800m for the Northern Busway stations are relevant to Auckland.

To gain an understanding of the distance travelled by passengers to/from 12 train stations and 5 Northern Busway stations in the region, a survey was conducted between 7am-7pm in March/April 2013.

This was an intercept survey conducted face-to-face, with the questionnaire filled in by surveyors at the train/bus station and a control count obtained to determine the response rate.

Given that Auckland Transport conducts an annual busway monitoring survey of passengers, there was an opportunity to include our questions into their survey and save on costs.

The busway stations include:

1. Akoranga
2. Smales Farm
3. Sunnynook
4. Constellation Park and Ride
5. Albany Park and Ride

Twelve train stations were surveyed in 2013. RIMU identified Onehunga, Ōtāhuhu, Manurewa and Pukekohe as important stations to survey as they are either inside the Southern Initiative area or have been identified as a priority centre for development in the Auckland Plan over the next three years. Initial discussions with the Transport Strategy Unit have identified the remainder of the stations to survey.
The 12 stations surveyed include:
1. Manurewa
2. Ōtāhuhu
3. Panmure
4. Papakura
5. Newmarket
6. Henderson
7. Onehunga
8. Pukekohe
9. Glen Eden
10. Meadowbank
11. Sturges Road
12. Ellerslie

1.4 Findings from previous train station surveys

To understand walking to public transport hubs better, ARTA (now Auckland Transport) commissioned a project in 2010 to test for evidence through a pilot survey if an 800-metre radius walking distance was representative of the walkable catchment area for rail public transport at Papatoetoe train station (Beca Infrastructure Ltd 2010).

Auckland Council followed this up with a further three stations in 2012. The results of these four surveys are included in this section.

Papatoetoe train station was identified as the sample train station and the survey was conducted on Tuesday 22 June 2010, 7am-7pm. A total of 120 valid responses were obtained from people walking to the train station, which translates to a response rate of 11 per cent.

2 A valid response is where a respondent provided an answer on how they got to the station (mode of travel) and the location (address) of where they left before coming to the station. The address is critical, as it determines the distance travelled to the train station.
Table 1: Median (50th) and 85th percentile walking distances to train stations

<table>
<thead>
<tr>
<th>Train station</th>
<th>Walking distance for 50% (median) of respondents</th>
<th>Walking distance for 85% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papatoetoe</td>
<td>1200m</td>
<td>2180m</td>
</tr>
<tr>
<td>New Lynn</td>
<td>1125m</td>
<td>2116m</td>
</tr>
<tr>
<td>Glen Innes</td>
<td>943m</td>
<td>1526m</td>
</tr>
<tr>
<td>Mt Albert</td>
<td>862m</td>
<td>1617m</td>
</tr>
</tbody>
</table>

The 50th (median) and 85th percentile walking distances to the four train stations are shown in Table 1. New Lynn and Papatoetoe train stations had similar median walking distances (1100-1200 metres) whereas Mt Albert and Glen Innes had median walking distances of around 850 – 950 metres.

That is, 50 per cent of respondents walked more than 1100-1200 metres to get to either New Lynn or Papatoetoe train station and 50 per cent walked further than 850 – 950 metres to get to Mt Albert and Glen Innes train stations.

To further understand how far people were walking to the train stations, the 85th percentile was also calculated. That is, 15 per cent of respondents walking to the train station walked more than 1500 - 2180 metres to get to a train station.

Table 2: Mode of travel to train stations

<table>
<thead>
<tr>
<th>Mode of travel to train station</th>
<th>Papatoetoe</th>
<th>New Lynn</th>
<th>Glen Innes</th>
<th>Mt Albert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>45%</td>
<td>33%</td>
<td>35%</td>
<td>71%</td>
</tr>
<tr>
<td>Car</td>
<td>51%</td>
<td>39%</td>
<td>53%</td>
<td>28%</td>
</tr>
<tr>
<td>Bus</td>
<td>2%</td>
<td>26%</td>
<td>12%</td>
<td>1%</td>
</tr>
<tr>
<td>Cycle</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Base: n= 595
Figure 2 and table 2 show the mode of travel used to get to the four original train stations. The predominant mode of travel to the train station was by car (either as a driver or as a passenger) or walking.

Some significant findings of the previous surveys show that:

- Mt Albert had the highest proportion of respondents walking to the station (71%) with both New Lynn and Glen Innes showing similar proportions of people walking (33-35%).
- Glen Innes had the highest proportion of people arriving in a car (53%) followed by Papatoetoe (51%) then New Lynn (39%) and Mt Albert (28%).
- New Lynn had the highest proportion of respondents arriving by bus (26%) followed by Glen Innes (12%).

Figure 2: Mode of travel Papatoetoe, New Lynn, Glen Innes and Mt Albert train stations

Base: n=595
1.4.1 Trips under 2km

Figure 4 and table 3 show the proportion of trips that were less than two kilometres to a train station. Any distance greater than 2000 metres has been excluded in this analysis.

Overall, for trips less than 2000 metres to any one of the three train stations, walking was the most popular mode of travel.

The results for Mt Albert show that nearly all of the respondents (92%) walked to the train station, with the remaining respondents arriving by car (8%).

Walking to the train station was also the most popular mode of transport for respondents arriving at New Lynn and Glen Innes with both recording similar proportions of walkers (60%-65%).

The proportion of respondents arriving by car to New Lynn and Glen Innes train stations was also very similar (28%-34%).
Figure 4: Mode of travel for trips less than 2km to New Lynn, Glen Innes and Mt Albert train stations

Table 3: Mode of travel to train stations for trips less than 2km

<table>
<thead>
<tr>
<th>Mode of travel</th>
<th>New Lynn</th>
<th>Glen Innes</th>
<th>Mt Albert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>65%</td>
<td>60%</td>
<td>92%</td>
</tr>
<tr>
<td>Car</td>
<td>28%</td>
<td>34%</td>
<td>8%</td>
</tr>
<tr>
<td>Bus</td>
<td>6%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Cycle</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Base: n=202

Base: n= 262
1.5 Busway surveys

There are no known previous studies recording how far people travel to Northern Busway Stations in Auckland. Given that Auckland Transport conducts an annual busway monitoring survey of passengers, there was an opportunity to include our questions into their survey and save on costs. As part of this project, surveys were undertaken at the five Busway Stations to identify how far bus passengers are travelling to a busway station. This will help determine if the currently accepted catchment areas of 800m for the Northern Busway stations are relevant to Auckland.
2.0 Methods

2.1 Methodology

This section outlines the methodology used to gain an understanding of the mode and distance travelled by people using rail and bus transport. The approach for the 2013 survey is similar to that used for the 2012 survey to enable a comparison of results.

Identifying train stations to survey

The first task was to identify the train stations to survey. The focus was on relatively high-patronage stations but which has a mix of surrounding land-use conditions. Together with Papatoetoe, the basis for selecting any station was to build up a list of results for a cross-section of station types in Auckland. The 12 stations selected were agreed in conjunction with Auckland Council’s Transport Strategy Unit.

Questionnaire

For the 2013 survey, changes were made to the 2012 questionnaire to simplify and reduce the time taken to complete a questionnaire, whilst still obtaining the critical information to identify the mode of transport and distance travelled to the station. The changes further simplified the survey by just asking four questions.

1. How did you get to the station?
2. What address did you just travel from?
3. What is the purpose of your trip?
4. Which station will you get off?

An example of the 2013 survey questionnaire is in Appendix 2.

Permission to survey

Permission to survey passengers at train stations was required from Auckland Transport for safety and operational reasons. Auckland Transport gave consent to survey at all 12 train stations based on the following conditions:

- the survey has to be conducted behind the yellow line (away from the train tracks);
- the survey should not obstruct any passengers; and
- the safety of both passengers and surveyors at a train station is paramount.
Train station site visit

A site visit of the 12 stations was conducted prior to the survey to gather information about the characteristics of each station. This included the size and location of the station platforms, and the location and the number of entry and exit points to and from the station platforms. This information was used to determine the number of surveyors required for each station.

Survey date

The 2013 surveys were undertaken through March on a single day for 12 hours from 7am to 7pm\(^3\). Surveys were not conducted on rainy days as this could influence the results. The actual survey dates are listed below:

<table>
<thead>
<tr>
<th>Train Station</th>
<th>Date Surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puakeho</td>
<td>Tuesday 12 March</td>
</tr>
<tr>
<td>Sturges Rd</td>
<td>Thursday 26(^{th}) March</td>
</tr>
<tr>
<td>Papakura</td>
<td>Thursday 7(^{th}) March</td>
</tr>
<tr>
<td>Manurewa</td>
<td>Wednesday 6(^{th}) March</td>
</tr>
<tr>
<td>Henderson</td>
<td>Tuesday 19(^{th}) March</td>
</tr>
<tr>
<td>Panmure</td>
<td>Wednesday 13 March</td>
</tr>
<tr>
<td>Ōtāhuhu</td>
<td>Tues 5th March</td>
</tr>
<tr>
<td>Ellerslie</td>
<td>Thursday 14(^{th}) March</td>
</tr>
<tr>
<td>Glen Eden</td>
<td>Thursday 26(^{th}) March</td>
</tr>
<tr>
<td>Onehunga</td>
<td>Thursday 21(^{st}) March</td>
</tr>
<tr>
<td>Meadowbank</td>
<td>Wednesday 27(^{th}) March</td>
</tr>
<tr>
<td>Newmarket</td>
<td>Wednesday 20(^{th}) March</td>
</tr>
</tbody>
</table>

\(^3\) Conducting transport surveys in March is common, as it is traditionally a high patronage period as there are no public holidays in March, all students are back at school or tertiary institutions and most people are back at work.
Face to face interview

The technique employed to gather data for the project is essentially an intercept survey, whereby people are approached (intercepted) and asked to participate in the survey. If the respondent is willing, they are asked for a response to all the questions in the survey.

The objective of the survey was to obtain two critical pieces of information from a respondent. The first is “how did you get to the station?” and the second question is “what is the address that you left from before coming to the train station?” Answers to these two questions would make it possible to identify how passengers travelled to the train station and the distance they travelled. Only respondents arriving at a train station were included in the results.

Measuring the distance to a station

All responses were checked and are entered into an Excel spreadsheet. The data is then geo coded and to generate the walkable catchment maps using Network Analyst.
Busway survey

Questionnaire

For the 2013 survey, changes were made to the 2012 questionnaire to simplify and reduce the time taken to complete a questionnaire, whilst still obtaining the critical information to identify the mode of transport and distance travelled to the station. The changes further simplified the survey by just asking four questions.

1. How did you get to the station?
2. What address did you just travel from?
3. What is the purpose of your trip?
4. Which station will you get off?

A copy of the 2013 survey questionnaire is in Appendix 2.

Permission to survey

Auckland Transport conduct an annual busway monitoring survey of passengers, so there was an opportunity to include our questions in their survey and save on costs. This also meant RIMU did not require additional permission to survey.

Bus station site visit

A site visit of the five stations was conducted prior to the survey to gather information about the characteristics of each station. This included the size and location of the station platforms, and the location and the number of entry and exit points to and from the station platforms. This information was used to determine the number of surveyors required for each station.
Survey date

The 2013 surveys were undertaken in March on a single day for 12 hours from 7am to 7pm\(^4\). Surveys were not conducted on rainy days as this could influence the results. The Actual survey dates were

<table>
<thead>
<tr>
<th>Bus Station</th>
<th>Survey Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akoranga</td>
<td>Wednesday 13th March</td>
</tr>
<tr>
<td>Albany</td>
<td>Wednesday 13th March</td>
</tr>
<tr>
<td>Constellation Drive</td>
<td>Wednesday 13th March</td>
</tr>
<tr>
<td>Smales Farm</td>
<td>Wednesday 13th March</td>
</tr>
<tr>
<td>Sunnynook</td>
<td>Wednesday 13th March</td>
</tr>
</tbody>
</table>

Face to face interview

The technique employed to gather data for the project is essentially an intercept survey, whereby people are approached (intercepted) and asked to participate in the survey. If the respondent is willing, they are asked for a response to all the questions in the survey.

The objective of the survey is to obtain two critical pieces of information from a respondent. The first is “how did you get to the station?” and the second question is “what is the address that you left from before coming to the train station?” Answers to these two questions would make it possible to identify how passengers travelled to the train station and the distance they travelled. Only respondents arriving at a train station were included in the results.

Measuring the distance to a station

All responses were checked and are entered into an Excel spreadsheet. The data is then geo coded and to generate the walkable catchment maps using Network Analyst.

\(^4\) Conducting transport surveys in March is common, as it is traditionally a high patronage period as there are no public holidays in March, all students are back at school or tertiary institutions and most people are back at work.
3.0 Results and discussion

3.1 Rail survey results

A total of 2669 responses were collected during the rail survey. Table 4 below summarises the number of responses by mode for the 12 stations.

Table 4: Survey responses for all 12 train stations

<table>
<thead>
<tr>
<th>Train Station</th>
<th>Car</th>
<th>Walk</th>
<th>Bus</th>
<th>Cycle</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pukekohe</td>
<td>59</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>110</td>
</tr>
<tr>
<td>Sturges Rd</td>
<td>104</td>
<td>127</td>
<td>1</td>
<td>0</td>
<td>232</td>
</tr>
<tr>
<td>Papakura</td>
<td>146</td>
<td>128</td>
<td>7</td>
<td>2</td>
<td>283</td>
</tr>
<tr>
<td>Manurewa</td>
<td>115</td>
<td>100</td>
<td>29</td>
<td>2</td>
<td>246</td>
</tr>
<tr>
<td>Henderson</td>
<td>54</td>
<td>112</td>
<td>15</td>
<td>0</td>
<td>181</td>
</tr>
<tr>
<td>Panmure</td>
<td>93</td>
<td>104</td>
<td>9</td>
<td>1</td>
<td>207</td>
</tr>
<tr>
<td>Ōtāhuhu</td>
<td>76</td>
<td>102</td>
<td>1</td>
<td>3</td>
<td>182</td>
</tr>
<tr>
<td>Ellerslie</td>
<td>53</td>
<td>170</td>
<td>7</td>
<td>3</td>
<td>233</td>
</tr>
<tr>
<td>Glen Eden</td>
<td>125</td>
<td>171</td>
<td>5</td>
<td>1</td>
<td>302</td>
</tr>
<tr>
<td>Onehunga</td>
<td>42</td>
<td>99</td>
<td>4</td>
<td>0</td>
<td>145</td>
</tr>
<tr>
<td>Meadowbank</td>
<td>71</td>
<td>112</td>
<td>0</td>
<td>1</td>
<td>184</td>
</tr>
<tr>
<td>Newmarket</td>
<td>72</td>
<td>251</td>
<td>35</td>
<td>6</td>
<td>364</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1010</td>
<td>1526</td>
<td>114</td>
<td>19</td>
<td>2669</td>
</tr>
</tbody>
</table>

Base: n=2669
Figure 5: Mode of travel to train stations

Base: n=2669

Table 5: Mode of travel to station per cent

<table>
<thead>
<tr>
<th>Train Station</th>
<th>Walk</th>
<th>Car</th>
<th>Bus</th>
<th>Cycle</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pukekohe</td>
<td>45%</td>
<td>54%</td>
<td>1%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Sturges Rd</td>
<td>55%</td>
<td>45%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Papakura</td>
<td>45%</td>
<td>52%</td>
<td>2%</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td>Manurewa</td>
<td>41%</td>
<td>47%</td>
<td>12%</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td>Henderson</td>
<td>62%</td>
<td>30%</td>
<td>8%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Panmure</td>
<td>50%</td>
<td>45%</td>
<td>4%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Ōtāhuhu</td>
<td>56%</td>
<td>42%</td>
<td>1%</td>
<td>2%</td>
<td>100%</td>
</tr>
<tr>
<td>Ellerslie</td>
<td>73%</td>
<td>23%</td>
<td>3%</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td>Glen Eden</td>
<td>57%</td>
<td>41%</td>
<td>2%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Onehunga</td>
<td>68%</td>
<td>29%</td>
<td>3%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Meadowbank</td>
<td>61%</td>
<td>39%</td>
<td>0%</td>
<td>1%</td>
<td>100%</td>
</tr>
<tr>
<td>Newmarket</td>
<td>69%</td>
<td>20%</td>
<td>10%</td>
<td>2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: 2669
Comparing the 12 stations

The following section provides a general comparison of the 12 train stations. Detailed results of the individual stations are presented in section 3.2 -

Figure 4 and table 4 shows the mode of travel used to get to a train station. Some significant findings of the 2013 results show that:

- Ellerslie had the highest proportion of respondents walking to the station (73%) with both Newmarket and Onehunga showing similar proportions of people walking (69-68%).

- Ellerslie and Newmarket had the highest number of respondents walking to the respective stations during the 7-9am period with 78, followed by Glen Eden with 73.

- Pukekohe had the highest proportion of people arriving in a car (54%) followed by Papakura (52%), and Manurewa (47%). Interestingly, respondents arriving by car to made up almost the rest of respondents (28%).

- Manurewa had the highest proportion of respondents arriving by bus (12%) followed by Newmarket (10%).

Table 6: Mode of travel between 7-9am

<table>
<thead>
<tr>
<th>7-9am totals ONLY</th>
<th>Car</th>
<th>Walk</th>
<th>Bus</th>
<th>Cycle</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pukekohe</td>
<td>19</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>43</td>
</tr>
<tr>
<td>Sturges Rd</td>
<td>63</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>163</td>
</tr>
<tr>
<td>Papakura</td>
<td>98</td>
<td>51</td>
<td>5</td>
<td>1</td>
<td>253</td>
</tr>
<tr>
<td>Manurewa</td>
<td>57</td>
<td>21</td>
<td>7</td>
<td>2</td>
<td>144</td>
</tr>
<tr>
<td>Henderson</td>
<td>36</td>
<td>39</td>
<td>5</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td>Panmure</td>
<td>70</td>
<td>38</td>
<td>3</td>
<td>0</td>
<td>181</td>
</tr>
<tr>
<td>Ōtāhuhu</td>
<td>61</td>
<td>42</td>
<td>1</td>
<td>3</td>
<td>168</td>
</tr>
<tr>
<td>Ellerslie</td>
<td>36</td>
<td>78</td>
<td>6</td>
<td>0</td>
<td>156</td>
</tr>
<tr>
<td>Glen Eden</td>
<td>104</td>
<td>73</td>
<td>2</td>
<td>1</td>
<td>284</td>
</tr>
<tr>
<td>Onehunga</td>
<td>34</td>
<td>58</td>
<td>3</td>
<td>0</td>
<td>129</td>
</tr>
<tr>
<td>Meadowbank</td>
<td>41</td>
<td>56</td>
<td>0</td>
<td>1</td>
<td>139</td>
</tr>
<tr>
<td>Newmarket</td>
<td>41</td>
<td>78</td>
<td>16</td>
<td>2</td>
<td>178</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>660</strong></td>
<td><strong>576</strong></td>
<td><strong>48</strong></td>
<td><strong>10</strong></td>
<td><strong>1954</strong></td>
</tr>
</tbody>
</table>
3.2 Mode and distance travelled to train stations

This section provides a general comparison of the 12 train stations. Figures 7-16 show the mode of travel used to get to a train station by distance interval. These numbers give a useful indication of the mode/distance split for each station, but they are only percentages. Therefore, it is important to refer to the sample size total underneath the graphs.

Some significant findings of the 2013 results show that:

- At the Ellerslie Station, walking trips under 800m made up 49 per cent of total trips for all modes, followed by Newmarket (43%) and Ōtāhuhu (38%). Ōtāhuhu also had the highest percentage of respondents driving to the station for trips under 800m with 19 per cent.

- Panmure had the highest percentage of respondents walking to the respective stations for trips between 800-1200m (35%) followed by Meadowbank (21%). For this same distance interval, Onehunga had the highest percentage of respondents arriving by car (20%) followed by Pukekohe (13%).

- Glen Innes had the highest percentage of respondents walking between 1200-1800m to get to the station (24%). Papakura had the highest proportion of respondents arriving who walked between 1800-2000m. Ellerslie had the highest proportion of respondents who drove between 1200-1800m (11%).

- Across the 12 stations, walking trips between 1800-200m were only a small percentage of total mode share.

- Onehunga had the highest percentage of respondents who walked between 2000-5000m (13%), followed by Ellerslie and Ōtāhuhu (12%). For trips between 2000-
5000m, Glen Eden had the highest percentage of respondents arriving by car (32%) followed by Onehunga.

**Figure 7: Mode and distance travelled to Newmarket Station**

Base: n= 320

**Figure 8: Mode and distance travelled to Manurewa Station**

Base: n= 207
Figure 9: Mode and distance travelled to Meadowbank Station

Base: n=178

Figure 10: Mode and distance travelled to Panmure Station

Base: n=92
Figure 11: Mode and distance travelled to Papakura

Base: n= 282

Figure 12: Mode and distance travelled to Henderson Station

Base: n= 167
Figure 13: Mode and distance travelled to Ōtāhuhu Station

Base: n= 119

Figure 14: Mode and distance travelled to Ellerslie Station

Base: n= 127
Figure 15: Mode and distance travelled to Onehunga Station

Base: \(n=215\)

Figure 16: Mode and distance travelled to Sturges Road Station

Base: \(n=248\)
Figure 17: Mode and distance travelled to Glen Eden Station

Base: n=299

Figure 18: Mode and distance travelled to Pukekohe Station

Base: n=200
3.3 Walking to the station

The information in this section is only based on the respondents who walked to a train station. All other modes of transport to the stations have been excluded so the analysis only focuses on people walking to a train station. The data includes walk distances for a whole 12 hour period capturing people both on their “inbound” trip and their “outbound” trip.

Table 7 shows the 50th (median), 85th percentile and mean and walking distances for all 12 stations surveyed in 2013. In addition, the 2010 Papatoetoe and 2012 walkable catchment train station survey data is included for comparison. Mean (or average) and median are statistical terms that have a somewhat similar role in terms of understanding the central tendency of a set of statistical scores. While an average has traditionally been a popular measure of a mid-point in a sample, it has the disadvantage of being affected by any single value being too high or too low compared to the rest of the sample. This is why a median is sometimes taken as a better measure of a mid point.

The results show that the 50th (median) and 85th percentile walking distances for the 12 stations are quite different. The survey results show significant variation for median walking distance to each station. Papakura has the largest median walking distance of just under 971m, followed by Panmure with 917m. The responses from people walking to the 12 train stations have been collated and mapped to identify walkable catchment maps (see Appendix 5). The maps shows the 400-metre, 800-metre, 50th (median) and 85th percentile walking isochrones distances and where the respondents left before arriving at the train station.

Newmarket and Ellerslie stations had the lowest median walking distances with 569m and 446m respectively – well within the traditional 800m catchment distance. It should be noted that both Newmarket and Ellerslie are significant destination stations. There is some limited international evidence of reduced propensity to walk at the work destination of a public transport trip compared to the residential origin which could potentially be a factor at play in the shorter average walking distance at stations such as Newmarket and to a lesser extent Ellerslie (Washington Metropolitan Area Transit Authority 2006). Any future similar surveys could include a question about trip purpose in order to test whether this factor is significant in the Auckland context.

Overall, eight of the 12 stations recorded median walking distances within an 800m catchment, with four exceeding this distance. In addition, 85th percentile of all responses show that 15 per cent of all respondents were walking more than 1000 metres to get to a train station, with 15 per cent of respondents at Ōtāhuhu and Onehunga train station walking more than 2200 metres.
Table 7: Median (50th) and 85th percentile and mean walking distances to train stations

<table>
<thead>
<tr>
<th>Train Station</th>
<th>Mean</th>
<th>Median</th>
<th>85th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellerslie Station</td>
<td>720m</td>
<td>569m</td>
<td>1318m</td>
</tr>
<tr>
<td>Glen Eden Station</td>
<td>1035m</td>
<td>722m</td>
<td>1637m</td>
</tr>
<tr>
<td>Henderson Station</td>
<td>861m</td>
<td>756m</td>
<td>1531m</td>
</tr>
<tr>
<td>Manurewa Station</td>
<td>1259m</td>
<td>905m</td>
<td>1813m</td>
</tr>
<tr>
<td>Meadowbank Station</td>
<td>706m</td>
<td>552m</td>
<td>1074m</td>
</tr>
<tr>
<td>Newmarket Station</td>
<td>879m</td>
<td>446m</td>
<td>1903m</td>
</tr>
<tr>
<td>Onehunga Station</td>
<td>1308m</td>
<td>880m</td>
<td>2771m</td>
</tr>
<tr>
<td>Ōtāhuhu Station</td>
<td>1262m</td>
<td>791m</td>
<td>2258m</td>
</tr>
<tr>
<td>Panmure Station</td>
<td>1014m</td>
<td>917m</td>
<td>1369m</td>
</tr>
<tr>
<td>Papakura Station</td>
<td>1297m</td>
<td>971m</td>
<td>1465m</td>
</tr>
<tr>
<td>Pukekohe Station</td>
<td>1325m</td>
<td>800m</td>
<td>1468m</td>
</tr>
<tr>
<td>Sturges Station</td>
<td>1161m</td>
<td>640m</td>
<td>1171m</td>
</tr>
<tr>
<td>Papatoe (2010)</td>
<td>1072m</td>
<td>1200m</td>
<td>2180m</td>
</tr>
<tr>
<td>New Lynn(2012)</td>
<td>1347m</td>
<td>1125m</td>
<td>2116m</td>
</tr>
<tr>
<td>Glen Innes(2012)</td>
<td>1015m</td>
<td>943m</td>
<td>1526m</td>
</tr>
<tr>
<td>Mt Albert(2012)</td>
<td>952m</td>
<td>826m</td>
<td>1617m</td>
</tr>
</tbody>
</table>

This section provides a general comparison of the 12 train stations. Detailed results of the individual stations are presented in Appendix 3.

Table 8 shows the distance walked by survey respondents. For all 12 stations, most of the respondents walked between 400 – 1200 metres. It also shows that Newmarket had the highest proportion of respondents (46%) walking between 0-400m; Ōtāhuhu had the highest percentage of respondents walking 400-800m (45%), and Panmure the highest percentage of respondents walking(36%) 400-800m to get the station.
Table 8: Percentage Distance walked to get to 12 rail stations

<table>
<thead>
<tr>
<th>Station</th>
<th>0-400m</th>
<th>400-800m</th>
<th>800-1200m</th>
<th>1200-1800m</th>
<th>1800-2000m</th>
<th>2000-5000m</th>
<th>&gt;5000m</th>
<th>%</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellerslie</td>
<td>39%</td>
<td>26%</td>
<td>16%</td>
<td>14%</td>
<td>4%</td>
<td>2%</td>
<td>0%</td>
<td>100</td>
<td>166</td>
</tr>
<tr>
<td>Glen Eden</td>
<td>26%</td>
<td>27%</td>
<td>17%</td>
<td>18%</td>
<td>3%</td>
<td>6%</td>
<td>3%</td>
<td>100</td>
<td>165</td>
</tr>
<tr>
<td>Henderson</td>
<td>33%</td>
<td>20%</td>
<td>23%</td>
<td>15%</td>
<td>3%</td>
<td>6%</td>
<td>0%</td>
<td>100</td>
<td>79</td>
</tr>
<tr>
<td>Manurewa</td>
<td>14%</td>
<td>30%</td>
<td>28%</td>
<td>14%</td>
<td>5%</td>
<td>7%</td>
<td>2%</td>
<td>100</td>
<td>96</td>
</tr>
<tr>
<td>Meadowbank</td>
<td>33%</td>
<td>31%</td>
<td>26%</td>
<td>8%</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>Newmarket</td>
<td>46%</td>
<td>25%</td>
<td>7%</td>
<td>6%</td>
<td>3%</td>
<td>13%</td>
<td>1%</td>
<td>100</td>
<td>194</td>
</tr>
<tr>
<td>Onehunga</td>
<td>18%</td>
<td>30%</td>
<td>12%</td>
<td>11%</td>
<td>1%</td>
<td>26%</td>
<td>1%</td>
<td>100</td>
<td>106</td>
</tr>
<tr>
<td>Ōtāhuhu</td>
<td>6%</td>
<td>45%</td>
<td>14%</td>
<td>16%</td>
<td>3%</td>
<td>16%</td>
<td>0%</td>
<td>100</td>
<td>88</td>
</tr>
<tr>
<td>Panmure</td>
<td>9%</td>
<td>32%</td>
<td>36%</td>
<td>17%</td>
<td>2%</td>
<td>3%</td>
<td>1%</td>
<td>100</td>
<td>92</td>
</tr>
<tr>
<td>Papakura</td>
<td>14%</td>
<td>29%</td>
<td>26%</td>
<td>19%</td>
<td>2%</td>
<td>6%</td>
<td>4%</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Pukekohe</td>
<td>23%</td>
<td>43%</td>
<td>9%</td>
<td>14%</td>
<td>2%</td>
<td>2%</td>
<td>7%</td>
<td>100</td>
<td>44</td>
</tr>
<tr>
<td>Sturges Road</td>
<td>14%</td>
<td>54%</td>
<td>18%</td>
<td>4%</td>
<td>1%</td>
<td>6%</td>
<td>4%</td>
<td>100</td>
<td>136</td>
</tr>
</tbody>
</table>

Base: n= 1249

Table 9 shows the cumulative percentage of walking trips by distance. Cumulative percentage is another way of expressing frequency distribution. It calculates the percentage of the cumulative frequency within each interval, much as relative frequency distribution calculates the percentage of frequency (Statistics Canada 2013). The distances shown in the table represent the point at each percentage threshold is exceeded. For example, at the Ellerslie Station, 10 per cent of all customers who walked came from within 200m.
Figures 19 and 20 show tables 8 and 9 in more detail, including distances where walking trips begin to increase or decrease. In particular, they show the share of walking trips that is sustained within certain levels of distance away from the train station. Curves that are closest to the left of the charts show stations that play a more local role, with smaller geographical catchments. Conversely, curves that are positioned further to the right of the charts show stations that have geographically larger catchments with a higher share of walking trips that is sustained by non-local demand. Differences between these curves may also reflect local variations in the role of the station where some places serve both a local and wider spatial role. For these two graphs graph, longer and straighter lines represent a higher percentage trips being around a particular distance. Lines with an arc curve indicate a more gradual increase for walking distances.\(^6\)

In figure 19, three of the stations have a spike in trips between 400 and 800m before increasing more gradually. Henderson station is the exception, with a slow increase up until 3km followed by a steep increase.

---

\(^5\) Due to the small sample size at the Pukekohe Station, no distance could be calculated.

\(^6\) At several stations a small number of percentage respondents (mainly between 1-2\%) walked further than 5km to the station. It seems unlikely that someone would walk more than 5km to a train station. However, the walking data was reviewed and no errors were found.
Figure 19: Cumulative % Distance curve for Western Line stations, Onehunga and Panmure Stations

Figure 20 shows a range of walking patterns to seven Southern Line stations. At Ellerslie Station, for example, the graph line climbs steeply around 400m and continues until approximately 2km. At the Meadowbank Station, there is jump in respondents walking just after 800m. The other stations (except Newmarket) have more gradual distance curves.

Newmarket (figure 20) and Henderson (figure 19) are two dominant stations in terms of walking to the station. The graph lines for both stations are significantly further to the right than the other stations. In particular, it is notable that at least 50 per cent of customers who walked travelled from relative large catchment areas (3.4 km for Henderson and 2.4km for Newmarket).

Each station’s distance from the Auckland CBD also recorded (see appendix) 9). This was to establish if any patterns exist in regards to how far a station is from the city centre compared with its walking catchments. With the exception of Newmarket Stations (located approximately 3.8 km from the city with a larger catchment size), there is no clear pattern in terms of how far a station a station is from the city and the size of its walking catchments.

---

7 Onehunga Station is on the Onehunga line, while Panmure Station is on the Eastern line. Including the two stations on the same graph is not intended to provide specific comparisons with Western line Stations.

8 50% was chosen based on what was observed in the data. Furthermore, 50% is a useful measure of compactness around stations.
3.4 Busway survey results

A total of 2205 responses were collected during the survey. Full details of the responses are in table 3. Table 9 below shows the number of survey responses by mode of arrival.

Table 10: Mode of travel to bus station

<table>
<thead>
<tr>
<th>Bus Station</th>
<th>Car</th>
<th>Walk</th>
<th>Bus</th>
<th>Cycle</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>358</td>
<td>42</td>
<td>223</td>
<td>4</td>
<td>627</td>
</tr>
<tr>
<td>Constellation</td>
<td>186</td>
<td>92</td>
<td>55</td>
<td>1</td>
<td>334</td>
</tr>
<tr>
<td>Sunnynook</td>
<td>181</td>
<td>170</td>
<td>10</td>
<td>3</td>
<td>364</td>
</tr>
<tr>
<td>Smales Farm</td>
<td>119</td>
<td>243</td>
<td>200</td>
<td>7</td>
<td>569</td>
</tr>
<tr>
<td>Akoranga</td>
<td>15</td>
<td>281</td>
<td>10</td>
<td>5</td>
<td>311</td>
</tr>
</tbody>
</table>

Base: n=2205
Table 9 and Figure 21 show the mode of travel used to get to the five busway stations. Some significant findings of the busway surveys show that:

- Akoranga had the highest proportion of respondents walking to the station (90%) followed by Sunnynook (47%) and Smales Farm (43%).
- Albany had the highest proportion of people in a car (57%) followed by Constellation (55%) and Sunnynook (50%).
- Albany had the highest proportion of respondents arriving by bus (36%) followed by Smales Farm (35%).

**Figure 21: Mode of travel for all trips to busway stations**

![Mode of travel for all trips to busway stations](image)

Base: n= 2205

### 3.5 Mode and distance travelled to busway stations

Figures 22 to 26 show the proportion of trips that were less than five kilometres to a busway station. The sample size is 983. Overall, for trips less than 2000m to three of the five stations, walking was the most popular mode of travel.

The results for Akoranga show that nearly all respondents (97%) walked to the bus station. Walking to the bus station was also the most popular mode of transport for respondents arriving at Constellation (65%), with the remaining respondents arriving mostly by car (5.6%). A relatively high proportion of respondents (66%) walked to Smales Farm Station, while 17.3 per cent bussed and 14.4 per cent drove. In contrast to these three stations, only a small number of respondents walked to Albany (13%) and Sunnynook (14%) stations.
Figure 22: Mode and distance travelled to Albany Station

Base: n=95

Figure 23: Mode and distance travelled to Akoranga

Base: n=241
Figure 24: Mode and distance travelled to Constellation Station

Base: n= 34

Figure 25: Mode and distance interval travelled to Smales Farm Station

Base: n= 277
3.6 Walking to the station

The information in this section is only based on the respondents who walked to a bus station. All other modes of transport to the stations have been excluded so the analysis only focuses on people walking to a bus station. The data includes walk distances for a whole 12 hour period capturing people both on their “inbound” trip and their “outbound” trip. 1500 survey respondents provided addresses that were able to be geocoded.

Table 10 shows the 50th (median) and 85th percentile walking distances for five stations surveyed in 2013. This is the first time walking distance data has been collected for bus stations, so there is no opportunity for direct comparisons to be made. The responses from people walking to the five bus station have been collated and mapped to identify walkable catchment maps (see Appendix 6). The maps show the 400-metre, 800-metre, 50th (median) and 85th percentile walking isochrones distances and where the respondents left before arriving at the train station.

The results show that the 50th (median) and 85th percentile walking distances for the five stations are quite different.

Smales Farm had the lowest median walking distance at 588 metres. That is, 50 per cent of the people who walked to Smales Farm station walked less than 588 metres, and the other 50 per cent walked more than 588 metres. Akoranga had a similar median walking distance of 590 metres.
In contrast, the median walking distances to Constellation and Sunnynook were 1199 and 1141 metres. Meanwhile, the median walking distance to Albany was 2727 metres. It should be noted that only 42 respondents walked to the Albany Station and 92 to the Constellation. The small sample size for these two stations limits the statistical significance of the respective average walking distances to the stations. It also suggests the Albany and to a lesser extent Constellation are outliers in terms of walking walk distance.

Overall, the 85th percentile of all responses show that 15 per cent of all respondents were walking more than 1200 metres to get to a station, with 15 per cent of respondents at Albany and Sunnynook bus stations walking more than 2100 metres.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Station Name</th>
<th>Travel Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>1</td>
<td>Albany</td>
<td>2499</td>
</tr>
<tr>
<td>2</td>
<td>Akoranga</td>
<td>764</td>
</tr>
<tr>
<td>3</td>
<td>Constellation</td>
<td>1000</td>
</tr>
<tr>
<td>4</td>
<td>Smales Farm</td>
<td>916</td>
</tr>
<tr>
<td>5</td>
<td>Sunnynook</td>
<td>1409</td>
</tr>
</tbody>
</table>

Table 11: Median and 85th percentile walking distances to five bus stations

3.7 Results for individual busway stations

The responses from people walking to the five busway stations have been collated and mapped to identify walkable catchment maps (see walkable station maps in Appendix 6). The sample size for this data is 655. This section presents a summary of findings for each station.

Table 12 shows the distance walked by respondents to the five stations. This table gives a basic indication of the range of distances people are walking to the station. Table 13 and Figures 27-32 describe these numbers in more detail.

<table>
<thead>
<tr>
<th>Station</th>
<th>0-400 m</th>
<th>400-800 m</th>
<th>800-1200 m</th>
<th>1200-1600 m</th>
<th>1600-2000 m</th>
<th>2000-5000 m</th>
<th>%</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>17%</td>
<td>17%</td>
<td>58%</td>
<td>100%</td>
<td>12</td>
</tr>
<tr>
<td>Akoranga</td>
<td>0%</td>
<td>83%</td>
<td>7%</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
<td>100%</td>
<td>234</td>
</tr>
<tr>
<td>Constellation</td>
<td>5%</td>
<td>32%</td>
<td>32%</td>
<td>27%</td>
<td>5%</td>
<td>0%</td>
<td>100%</td>
<td>22</td>
</tr>
<tr>
<td>Smales Farm</td>
<td>27%</td>
<td>39%</td>
<td>18%</td>
<td>2%</td>
<td>4%</td>
<td>10%</td>
<td>100%</td>
<td>184</td>
</tr>
<tr>
<td>Sunnynook</td>
<td>4%</td>
<td>13%</td>
<td>38%</td>
<td>24%</td>
<td>5%</td>
<td>17%</td>
<td>100%</td>
<td>203</td>
</tr>
</tbody>
</table>
Table 13: Cumulative Percentage of walking trips by distance

<table>
<thead>
<tr>
<th>Station</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akoranga</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>600m</td>
<td>1200m</td>
</tr>
<tr>
<td>Albany</td>
<td>1400m</td>
<td>1500m</td>
<td>1900m</td>
<td>2000m</td>
<td>2700m</td>
<td>3100m</td>
<td>3200m</td>
<td>3400m</td>
<td>3400m</td>
<td>3600m</td>
</tr>
<tr>
<td>Constellation</td>
<td>500m</td>
<td>700m</td>
<td>700m</td>
<td>900m</td>
<td>1000m</td>
<td>1100m</td>
<td>1300m</td>
<td>1400m</td>
<td>1400m</td>
<td>1800m</td>
</tr>
<tr>
<td>Smales Farm</td>
<td>NA</td>
<td>300m</td>
<td>NA</td>
<td>NA</td>
<td>600m</td>
<td>600m</td>
<td>1000m</td>
<td>1100m</td>
<td>2000m</td>
<td>4200m</td>
</tr>
<tr>
<td>Sunnynook</td>
<td>900m</td>
<td>1000m</td>
<td>1100m</td>
<td>1100m</td>
<td>1200m</td>
<td>1400m</td>
<td>1500m</td>
<td>2000m</td>
<td>2900m</td>
<td>4700m</td>
</tr>
</tbody>
</table>

Table 13 shows the cumulative percentage of walking trips by distance. Cumulative percentage is another way of expressing frequency distribution. It calculates the percentage of the cumulative frequency within each interval, much as relative frequency distribution calculates the percentage of frequency (Statistics Canada). The distances shown in the table represent the point at each percentage threshold is exceeded. For example, at the Constellation Station, 10 per cent of all customers who walked came from within 500m.

Figure 27: Distance walked to Albany Station

Base: n = 12

The majority (58%) of respondents walked further than 2000m to the Albany Station. The rest of the respondents mostly walked between 1200-1600m (17%) and 1200-1600m.

---

9 Due to a small sample size, there are data gaps for Akoranga Station.
10 Due to a small sample size, there are data gaps for Smales Farm Station.
(17%). It is important to note that the number of people who walked to the Albany Station was relatively small at just 42.

**Figure 28: Distance walked to Akoranga Station**

![Bar chart showing distance walked to Akoranga Station](chart)

**Base: n= 234**

Figure 27 shows that the majority of respondents walked between 400-800m to the Akoranga Station. Based on the map in Appendix 4, the majority of respondents appear to be travelling to this station from the AUT North Shore Campus on Akoranga Drive.

**Figure 29: Distance walked to Constellation Drive**

![Bar chart showing distance walked to Constellation Drive](chart)

**Base: n= 22**

Figure 28 shows that that over 60 per cent of people walked further than 800m to get to the Constellation Drive Station. Of the 92 people who walked, 32 per cent walked
between 1200-1600m and 28 per cent walked 800-1200m. Most of these people came from the west of the station.

**Figure 30: Distance walked to Smales Farm Station**

![Bar chart showing distances walked to Smales Farm Station]

**Base: n=184**

Figure 28 shows that 66 per cent of respondents walked from within an 800m catchment. In addition, 18 per cent of respondents walked between 800-1200m, with a noticeable cluster to the north and south-east of the Station.

For the Sunnynook Station, 38 per cent of respondents walked 800-1200m, followed by 22 per cent who walked 1200-1600m and 17 per cent who walked further than 2000m. At 800m, most respondents came from the east of the station. The median walk distance to Sunnynook Station was calculated as 1143m. Within this catchment, the most people came from west of the station, while significant numbers also came from the east and north.
Figure 32 shows the share of walking trips that is sustained within certain levels of distance away from the busway stations. Curves that are closest to the left of the charts show stations that play a more local role, with smaller geographical catchments. Conversely, curves that are positioned further to the right of the charts show stations that have geographically larger catchments with a higher share of walking trips that is sustained by non-local demand. Differences between these curves may also reflect local variations in the role of the station where some places serve both a local and wider spatial role.

The graph line for Albany is significantly further to the right than the other stations; (over 50 per cent walked further than 2700m) suggesting customers are walking from a larger catchment. It should be noted though, that only 12 of the 42 respondents who walked to Albany Station provided their address, which is significantly lower than for the other stations.

Longer and straighter graph lines represent a higher percentage trips being around a particular distance. This is evident for Akoranga where over 80 per cent of walking trips were less than 600m and Smales Farm where 60 per cent of trips were under 600m. Lines with more of a curve or arc indicate a more even distribution for walking distances, as shown by the line for Sunnynook Station.
Base: n= 655

Each station’s distance from the Auckland CBD also recorded (see appendix 9). This was to establish if any patterns exist in regards to how far a station is from the city centre compared with its walking catchments. It is interesting to note that that the two stations closest to the CBD (Akoranga and Smales Farm) have two of the smallest walking catchments. At both these stations, for example, 80 per cent of walking trips are sustained from within 1km. It should be noted that Akoranga is close to a University Campus and Smales Farm is surrounded by offices and a number of schools, which may explain these station’s smaller catchment sizes.
4.0 Summary and recommendations

The purpose of this research was to test for evidence if an 800-metre radius is representative of the walkable catchment area for 12 train stations and five bus stations in Auckland and compare the findings with those in the 2012 survey and the 2010 Papatoetoe Train Station Survey.

The results of the 12 train station surveys show that:

- Walking was the most common mode of arrival at nine of 12 stations. Ellerslie (73%) and Newmarket (69%) recorded the highest percentage of respondents walking to stations. Manurewa recorded the small percentage of respondents walking 41 per cent
- For trips under 2km, walking was the dominant mode of arrival at four stations: Glen Eden, Henderson, Ōtāhuhu and Newmarket.
- At four stations more than 50 per cent of respondents walked further than 800 metres to get to a train station;
- At eleven stations more than 15 per cent of respondents walked further than 1500 metres to get to a train station; and
- Newmarket Station returned the lowest median walking distance to a train station with 446 metres. Ellerslie Station recorded a slightly higher median walking distance with 569 metres. The highest median walking distances were recorded at Papakura with 971 metres followed by Panmure with 917 metres.

Despite the median walking distances to the Newmarket and Ellerslie train stations being close to the 800-metre radius distance, a significant number of respondents walked greater distances than 800 metres to get to the train station.

- Newmarket and Henderson are two dominant stations in terms of walking to the station. In particular, it is notable that at least 50 per cent of customers who walked travelled from relative large catchment areas (3.4 km for Henderson and 2.4km for Newmarket).

The results of the five bus station surveys show that:

- The median walking distance ranged from 588m at Akoranga to 2727m at Albany
- At five of the stations, 50 per cent of respondents walked further than 800m. The exception was the Akoranga Station, where over 80 per cent of respondents walked between 400-800m.
- Walking was the most significant mode of travel for trips less than 2000 metres at three stations, including Akoranga, Constellation and Smales Farm. In contrast, only a small number of respondents walked to the Albany (13%) and Sunnynook (14%) stations.
- Smales Farm had the lowest median walking distance at 588 metres. That is, 50 per cent of the people who walked to Smales Farm train station walked less than 588 metres, and the
other 50 per cent walked more than 588 metres. Akoranga had a similar median walking distance of 590 metres. In contrast, the median walking distances to Constellation and Sunnynook were 1199 and 1141 metres. Meanwhile, the median walking distance to Albany was 2727.

Overall, the results from the surveys show that an 800-metre radius is accurate for some stations, but underestimates the actual walking distances for others.

The 2013 rail and bus survey adds to the small amount of existing data. While the results to date are not conclusive in terms of an 800-metre walking distance being representative of a walkable catchment area for a train or busway station in Auckland, the findings from the surveys do show that those currently using these train and busway stations are in some cases prepared to walk further than 800 metres to get to a station.

Any additional survey data will be useful for developing a typology of walkable catchments for train stations in Auckland. This typology would essentially be used to classify and group the train stations based on a set of characteristics. An example of these characteristics may include the location, surrounding land use, topography, availability of parking and accessibility issues for each station.

Walkable catchments for centres are not fixed and should not be, as over time the centres will evolve and change. When this happens, there are opportunities for research similar to that described in this report to help inform and guide future policy approaches that determine these walkable catchments.

Based on these findings, it is recommended that:

- Further surveys be carried out to test for more evidence if an 800-metre radius is representative of the walkable catchment area of other train stations in Auckland; and
- The data collected in the surveys is used to develop a typology of walkable catchments for train stations in Auckland.
5.0 Acknowledgements

Thanks to Ray Steele and Anthony Blom from Auckland Transport for enabling the surveys to be undertaken at the train and busway stations respectively, and to Sandeep Gangar from GIS Department and Ming Peng from Transport Strategy Unit for assistance in the production of the walkable catchment maps. Lastly, thanks to Phil Chung, formerly of Auckland Council, for his work on this project.
6.0 References


