Bus Benefits, Barriers, and Behaviour: A look into perceptions of public transport in Waimakariri, and current travel behaviour and trends

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Abstract

Public transport is widely used globally, however in New Zealand, the usage is much lower than other countries. In this thesis, the topic of public transport for the purpose of commuting from the Waimakariri District into Christchurch City will be analyzed. The overarching research question for the project is "How can public transport in the Waimakariri District be improved for the benefit of residents commuting into Christchurch, and what trends exist within current commuting patterns". This large research question will be answered through two smaller research questions. The first smaller research question is "what are the existing benefits and barriers that the Waimakariri Community face in utilizing public transport for commuting into Christchurch City", and will be answered through a perceptions survey, and focus groups. The second research question will be "what are the existing trends and patterns in relation to where the Waimakariri Community commute using public transport", and will be answered through a travel patterns survey, and data analysis of MetroCard data. These two questions are beneficial for the Waimakariri District Council, who is the community partner for this project.

Keywords

Waimakariri, Public Transport, Travel Patterns, Transport Perceptions, Bus Routes

Abbreviations

Waimakariri District Council (WDC)

New Zealand Transport Agency Waka Kotahi (NZTA)

Environment Canterbury (ECan)

Christchurch City Council (CCC)

Central Business District (CBD)

Public Transport (PT)

Mass Rapid Transit (MRT)

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1 Introduction

Since the late 1800s, public transport has been a cheap way to get around Christchurch City. One of the first forms of public transport in the city was horse drawn trams that began in 1879, and this lasted around 25 years, before electric trams took over (Christchurch City Libraries, n.d.). After the 1920s, motor vehicles became serious competitors for trams, and by the 1950s many services in the Northwest suburbs began to shut (Christchurch City Libraries, n.d.). While motor vehicles are the dominant transport choice for New Zealanders, with 82% of travel time by car (Environmental Health Intelligence NZ, 2023), the bus is an alternative which can have more benefits than travelling by car. While there has been plenty of research globally on why people choose certain modes of transport, this research will deep dive in on this concept from a small-town commuting into a larger city perspective.

This research was developed in collaboration with the Waimakariri District Council, and the research aim is to determine "How can public transport in the Waimakariri District be improved for the benefit of residents commuting into Christchurch, and what trends exist within current commuting patterns". This will be answered by two sub-questions, using various research methods including surveys, focus groups, and secondary data analysis.

2 Literature Review

2.1 Definitions

Public transport can be defined as "any more of transport available for hire and reward. In practice it usually refers to land-based passenger transport and, in particular, bus and train services and variants thereof" (Preston, 2020., p.113). This definition shows that public transport can mean a variety of things, however the focus of this literature review is on land-based passenger services. This research exclusively covers buses, as the Waimakariri District does not have commuter rail. Public transport and bus are used interchangeably in this research. While other forms of public transport such as taxis do exist, it is uncommon for commuters to use these for commuting (StatsNZ., n.d.). The bus services in Waimakariri are provided by ECan, and the infrastructure such as bus shelters, and park and ride facilities are provided by the WDC (Waimakariri District Council, 2023).

2.2 Background

The Waimakariri District is North of Christchurch. The district consists of multiple towns with more than 1,000 people. Many of these settlements in the district are also projected to experience further growth, as shown in Table 1. This means that the district needs to prepare for further growth, which could put strain on the existing transport network.

Table 1: Waimakariri key areas population in 2018 vs projected population in 2028 (Mitchell, 2021, p.4).

	2018 Population	2028 Population (Projected)
Rangiora	7,370	8,930
Kaiapoi	4,740	5,740
Woodend/Pegasus	1,970	3,070

Oxford	800	970
Rural/rural residential & small settlements	8,620	10,640
Total	**23,500**	**29,350**

As shown in the table, all areas in Waimakariri are expected to have increases in population over the 10-year period, highlighting a need for improvements in the transport sector. At present, the vast majority of commuters travel by car, with 61% of travel for work being completed by private vehicle, 16.7% being completed by a company vehicle, and just 1% being completed by public bus (StatsNZ., n.d.). The reason this is a problem is more people living in an area means there would be more cars on the road, and more passengers on buses. Car dependency at these levels has significant drawbacks. Children who are exposed to car dependency at an early age get less exercise and are not exposed to alternative transport methods (Mackett, R., 2002, p.29). As well as this, car dependency is a contributing factor to congestion (Pokharel et. al., 2023, p.5). With increasing populations, car dependency is likely to increase, further exacerbating these problems within the district.

At present, the bus network in Waimakariri exclusively services Rangiora, Kaiapoi, Woodend/Pegasus, and Waikuku (Waimakariri District Council, 2023). As shown in Table 2, there are five main bus routes in Waimakariri. Each service has a different frequency and purpose, and Figure 1 shows these routes on a map.

Table 2: Bus routes in Waimakariri (Waimakariri District Council, 2023; Metro, n.d.-a; Metro, n.d.-b, Metro, n.d.-c)

Bus Service	Route	Frequency

1 Rangiora & Belfast to Cashmere	This service travels from Rangiora to Kaiapoi, Christchurch City, and onto Princess Margaret Hospital and Cashmere	Every half an hour
91 Rangiora to City Direct	This service travels from the Park & Ride facilities in Rangiora to the city	Every half an hour from Rangiora 6:30am - 8:00am and every half an hour from the city 3:40pm - 5:40pm. This service only runs on weekdays.
92 Kaiapoi to City Direct	This service travels from the Park & Ride facilities in Kaiapoi to the city.	Every half an hour from Kaiapoi 6:40am - 8:10am and every half an hour from the city 3:45pm-5:45pm. This service only runs on weekdays.
95 Pegasus & Waikuku to City	This service travels to and from Waikuku at peak times and from Pegasus at other times. This service travels to Kaiapoi, then onto the city	Every half an hour at peak times (6am – 8am and 2:30pm – 5:30pm), and hourly at all other times.
97 Rangiora to Pegasus	This service travels between Rangiora and Pegasus	Every hour.
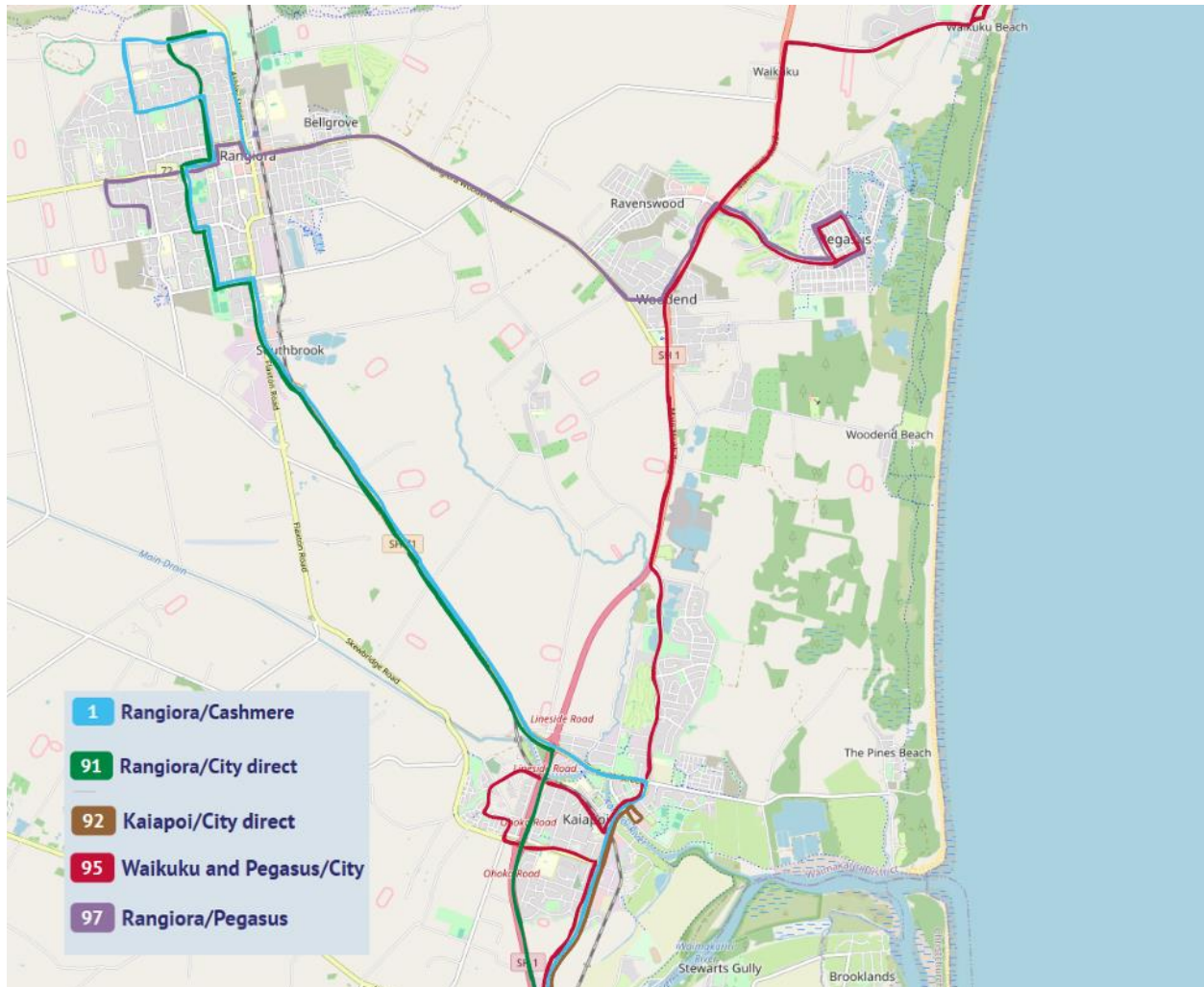
Figure 1: Map of Waimakariri bus routes (Metro, n.d.-d)

2.3 Key Factors in Choosing Public Transport

Given the current car dependency problems in the growing Waimakariri district, an investigation needs to be undertaken to understand why people choose the modes they do. Understanding the factors that influence transport decision making is crucial for effectively promoting a variety of mode choice. This section introduces six key factors that have been identified in a few pieces of literature.

When choosing a mode of transport, there are complex variables that factor into each individual's choice, as highlighted by Sigurdardottir et. al. (2014, p.23) regarding transport

freedom, as well as Popuri et. al. (2011, p.652) regarding stress-free, reliable journeys, and using public transport due to its perceived importance.

Existing research has identified a variety of key factors for public transport users. Cheyne & Imran (2010, pp.31, 80, 82) highlighted the importance of convenience, reliability, time efficiency, and cost efficiency. This example shows that if a bus service is far away from someone, never on time and expensive, someone is much less likely to be inclined to take the service. This aligns with other research, with Redman et. al., (2013, p.121) also finding that accessibility and comfort is crucial. Due to some commutes from Waimakariri being 40+ minutes, these two factors may be especially relevant in mode choice. By analysing how comfort impacts Waimakariri District residents, there could be improvements to public transport to make it more appealing.

This literature review explores six of these key factors, selected due to being representative of the needs of current and future public transport users. The selected factors include a variety of functional aspects, and user experience aspects. These key factors are price, safety, accessibility, frequency and efficiency in relation to bus stops, comfort, and environmental factors. The factors chosen are a combination of functional aspects (such as frequency and accessibility), and user experience aspects (such as comfort and safety). As well as this, these factors align with challenges and opportunities within the Waimakariri district, such as long commute times, and high car dependency. This literature review will provide insights into how this influences decision making elsewhere and identify gaps in the Waimakariri context.

2.3.1 Price

The pricing of public transport can be a very influential factor in the decision of whether or not to use it. Farebox recovery is the percentage of operating costs recovered through the bus fare (Kirschen et. al., 2022, p.6). In the US, the average farebox recovery is 32% (Kirschen et. al., 2022, p.6). In New Zealand, the expectation for farebox recovery is 30%,

with this expectation increasing to 42% by 2026-2027, however Christchurch is significantly below this at 13.9% (NZ Herald, 2024).

In August 2024, the Queensland Government in Australia began a six-month trial on their Translink network. The trial involved making a 50-cent flat rate on the network for all buses, trains, ferry, trams, and other on demand services. (Queensland Savers, 2024) The idea behind this was to ease congestion, while simultaneously providing cost of living relief. (Queensland Savers, 2024) According to the Queensland Government, after bringing in this trial, patronage almost completely returned to pre-COVID levels, reaching 98.5% of those levels. (Queensland Government, 2024) Overall, trips were up 11.1% across the network compared to the previous week, and the network had the busiest day on the train network in four years. (Queensland Government, 2024). This example shows that fare reductions are positive for public transport usage, however while the initial response seems promising, it is important to consider the potential for short term increases, and further analysis will need to be completed later in the trial.

Existing research on the price of public transport in Canterbury has only been conducted by ECan. Secondary data sourced from ECan showed a study that was used to determine the optimal fare for the bus in Christchurch. The result of this study showed the optimal fare is $2.81, and the acceptable range of prices is between $2.50 and $3.50. In 2023, the bus network introduced a trial of a flat fee of $2 to bus anywhere on the network, which proved to be highly successful, resulting in patronage increasing by 30% over one year and going back above pre-COVID levels. (Environment Canterbury, 2023) This shows that having a specific flat price below the acceptable range of prices is an excellent way to increase patronage. In 2025, the fares for public transport in Christchurch will be increasing after being reviewed. (Metro, 2024a) The cost for a standard fare will be increasing from $2 to $3, meaning the price is still within their acceptable fare range. While the fare review study conducted by ECan may be insightful, one limitation was the small number of respondents in Waimakariri and Selwyn. The study only had around 167 responses from Waimakariri residents despite having over 1653 responses total. This

means that while the price may be set correctly for city residents, the full implications of the pricing scheme may not be known for Waimakariri residents.

Existing research has shown that flat fare schemes are not always fair. While flat fares have the benefit of being simple to understand (Flink, 2019, p.14; Brown, 2018, p.766), some research suggests they can negatively impact users on lower incomes. Low-income households tend to take shorter trips, and fewer trips at peak hours, meaning on average, the price paid is more with a flat fare in comparison to a price per kilometre fee (Brown, 2018, p.772). This is relevant to the Waimakariri District, as the commute distance from Waimakariri to Christchurch is significantly longer than many of the commutes taken in the city. This means that per kilometre, Waimakariri residents are paying significantly less than their city counterparts. This indicates that the optimal price for Waimakariri residents to pay for travelling into the city, as this figure differs to that of city residents.

2.3.2 Safety

Safety on public transport is important for ensuring the wellbeing of passengers and drivers. The main safety concern for many people is any form of anti-social behaviour. Anti-social behaviour is someone acting "in a manner that caused or was likely to cause harassment, alarm or distress to one or more persons not of the same household" (Moore, 2011, p54). Based on this definition, potential types of anti-social behaviour could include behaviour such as being threatening or intimidating, assaulting someone, and vandalism. Minoritiy groups are more likely to experience anti-social behaviour on public transport (Cochran et. al., 2025), this can include women, members of the LGBTQ+ community, and other factors (Tilleman & Chowdhury, 2024, p.1). An example of this is a study that shows that women in Auckland are more likely to avoid public transport due to the fear of harassment (Tilleman & Chowdhury, 2024, p.3).

Public transport is often seen as safe during the daytime, with 1% believing it is not safe, however this figure significantly drops at nighttime, with 43% believing it is not safe (Mahmoud & Currie, 2010, p.6). Travelling on buses is also seen as safe, with only 4%

finding it not safe, but bus stops are seen as less safe, with 20% finding it unsafe (Mahamoud & Currie, 2010, p.6). This study shows that in general, the issue is more likely to occur at bus stops rather than on the bus, potentially due to there being other people on the bus who could help during an incident. While this study provides insights into the perceived safety of public transport aspects, this study targeted the demographic of people aged 18-25 so more research could be conducted looking at a wider demographic.

The Christchurch public transport network is considered relatively safe, and has around 1.9 safety incidents per 100,000 trips, including passengers and bus drivers (Environment Canterbury, 2025). This is below the target of 3 safety incidents per 100,000 trips (Environment Canterbury, 2025). In Christchurch, a security team has been placed on certain buses (Metro, 2024b). From this, The Press (2024) has reported that there are approximately 50 incidents per month on buses in Canterbury. Of these about 65% are intimidating behaviour, 15% are verbal assaults, and 5% are physical assaults (The Press, 2024).

Data collected by the Christchurch City Council shows that approximately 40% of Christchurch residents that use public transport believe it is safe for all users, however 35% of respondents disagreed. From this it also shows that approximately 68% of people feel safe waiting at bus stops (Christchurch City Council, n.d.), this is data specific to Christchurch however, and may not include Waimakariri. As the Waimakariri District Council is in charge of providing adequate infrastructure (Waimakariri District Council, 2023), it is important that Waimakariri specific data is collected to ensure bus stops are safe.

A key gap in the literature is Waimakariri specific information, as well as all age range data on safety. The surveys conducted by the Christchurch City Council do not prominently feature Waimakariri, and the needs of the community may be higher, especially with longer distances to travel. For this reason, more research needs to be conducted to determine how safety can improve in Waimakariri for bus users.

2.3.3 Accessibility

Accessibility to public transport is crucial for promoting social inclusion, and equal participation in the community, especially for people with disabilities. According to Community law (n.d.), access to transport is essential for members of the disability community, so they can participate equally in the community. This means they can get to work or other public places. This is governed by the anti-discrimination laws in the Human Rights Act 1993 (Community Law, n.d.). This means that bus companies must make "reasonable accommodations" so members of the disability community are able to access these services in a way that is equal to how someone without a disability can access it (Community Law, n.d.). This is reinforced by the requirements for urban buses set by NZTA. Some of the key requirements are that buses must have ramp that can be used, and it cannot have a gradient greater than 12.5% (New Zealand Transport Agency, 2024, p.16), buses must be able to kneel down no higher than 28cm from the ground (New Zealand Transport Agency, 2024, p.17), the priority seating area must be accessible for wheelchairs less than 70cm wide (New Zealand Transport Agency, 2024, p.24), the priority seating area must fit at least one wheelchair (New Zealand Transport Agency, 2024, p.22).

While these sources indicate that public transport in New Zealand is accessible, it is important to note that different communities have unique needs, and with long bus travels, ensuring the bus is accessible for everyone is crucial. Engaging further with the Waimakariri community could be beneficial for ensuring the needs of the disabled community are met.

2.3.4 Frequency and Efficiency in relation to Bus Stops

Placement of bus stops is a decision-making process that directly impacts whether someone will take a bus. A study by Fielbaum (2024), shows that bus stop positioning varies for long distance travellers and short distance travellers. The study found that travellers on longer journeys prefer stops spread further apart, whereas travellers on shorter journeys prefer stops to be closer (Fielbaum, 2024, p.13). This is because having frequent stops increases travel time, with long distances, this can add a significant

amount of time to a journey. This is particularly relevant to Waimakariri due to the long distance for travelling into the city.

Bus shelters at stops often increases ridership, particularly on rainy days (Miao, 2019, p.131), and two separate studies explored optimal bus stop spacing and determined the optimal distance between stops is around 500m. This is reinforced by NZTA guidelines which recommends 250-800m between stops (New Zealand Transport Agency, n.d.-a). Park and ride facilities also influence ridership, increasing ridership when placed correctly, with a study by Wallis et. al. (2014) that in some cases, park and ride facilities can reduce congestion for travellers going to a CBD (Wallis et. al., 2014, p.73). Conducting further Waimakariri based research can determine where more bus stops are required, and where there may be too many for the long-distance trips. Additionally, consulting on new park and ride facilities could increase ridership from areas with limited public transport.

According to Soza-Parra et. al. (2022), reliability can define as "the certainty travellers have regarding the level of service they will experience when travelling" (Soza-Parra et. al., 2022, p.621). This means that a bus service is reliable when the buses arrive to stops on time. Unreliable services can include late buses, and buses that do not show up at all. Reliable public transport also influences bus usage, since if the bus is consistently late to stops, commuters are less likely to use it. Another factor in reliability is ensuring bus bunching is minimized. Bus bunching is when two buses on the same route are travelling close to each other, usually due to the front bus being delayed (Rezazada et. al., 2024, p.767). When buses are bunched, the service is delayed. Introducing "turn up and go" services are also a way to increase usage. Turn up and go services have been implemented in Christchurch on some routes at some times, with buses coming every ten minutes, resulting in an average wait time of five minutes (Environment Canterbury, 2024).

Reliability in the current bus network is higher than expected, with 97% of buses starting their services on time (Environment Canterbury, 2025). However, this data does not account for any delays in services during the route, or bus bunching.

2.3.5 Comfort

Being uncomfortable, in terms of ride smoothness, temperature and seat availability significantly influences the decision to use public transport. In Waimakariri, bus rides into the city can be upwards of 30 minutes, and therefore extra provisions must be made it ensure comfort.

When buses are nearing capacity, passengers often must stand. This can be uncomfortable for several reasons, including the risk of injury from standing. According to Elvik, (2019), the risk of injury from falling in non-collision incidents on public transport is between 0.3 and 0.5 per million passenger kilometres (Elvik, 2019, p.135. This is very low, however, certain factors in Waimakariri may increase this. These factors are fatigue from standing for long durations, and the high speeds the buses can travel on the motorways. Combining these two factors could lead to uncomfortable journeys and increase the risk of potential injuries as well. It has not been researched in Christchurch how comfort impacts journeys and mode choice.

Temperature is another factor of comfort, especially for longer journeys. Existing research has shown that the optimal temperature of a bus in the Netherlands is 20.9°C (Velt & Daanen, 2017, p.75), and this is reflected within New Zealand bus requirements of an expected temperature of 20°C +/- 2°C. New Zealand Transport Agency, 2024, p.31).

While these may be the aims for comfort, sometimes buses are unable to meet these requirements. Older buses do not always have air conditioning, however many new buses in New Zealand have been fitted with air conditioning (Metro, n.d.-e). The buses in Christchurch have also been fitted with other comfort features, such as bike racks for multi-modal travel, and USBs next to the seats (Metro, n.d.-e). The newer buses are also electric (Metro, n.d.-f), which has been shown to improve overall public transport perceptions, since they are quieter and smoother (Borén et. al., 2016, p.260), however this study also noted some downsides to the electric buses, such as hard seats, and sudden braking (Borén et. al., 2016, p.260). Already, Metro has had some feedback around electric buses from Christchurch residents, with residents finding the ride smoother (Metro, n.d.-f).

Due to lack of data of how many people are on buses, it cannot be known for certain if buses are reaching standing room only. Because of this, it is essential that research is conducted to ensure buses are perceived as comfortable, and whether buses are getting full.

2.3.6 Environment

Another reason people choose public transport over private vehicles is because of the environmental benefits (Cheyne & Imran, 2010, p. 82). According to Metro (n.d.-e), land transport in Christchurch accounts for 36% of all greenhouse gas emissions (Metro, n.d.-e). Electric buses result in a smaller carbon footprint when the bus is on the road, with a study showing that in Indonesia, the use of electric buses can reduce co2 emissions by up to 96,332,825kg of co2 per year (Sunitiyoso et. al., 2022, p.12). Of course, with a smaller population and bus fleet size in Christchurch, the carbon emission reduction is smaller, estimated at 2,400,00kg of co2 per year in 2023, when compared to a fully diesel fleet (Metro, n.d.-f). Despite this, studies show that this can still influence perceptions of environmental friendliness (Borén et. Al., 2016, p.260).

The goal set by Environment Canterbury is a completely emission free bus fleet by 2035, using electric buses (Metro, n.d.-e). There are other environmental goals set by ECan, such as reducing stormwater contamination using copper free brake pads (Metro, n.d.-e). Electric buses do have some downsides though, specifically the higher weight compared to traditional diesel buses, resulting in more damage to roads (New Zealand Transport Agency, n.d.-b).

While all the literature on carbon footprint benefits and perceptions of electric buses is useful for forming a basic understanding of how electric buses can benefit communities, there is a significant limitation with this research. That limitation is that the research is not directly relevant to Waimakariri, or even Christchurch. Different communities have unique needs regarding transport, and the communities in those studies have differing views and

environmental footprints to Waimakariri. Therefore, there needs to be research conducted in Waimakariri on whether environmental factors significantly impact mode choice.

2.4 Transport Usage Patterns

Determining where people are travelling on public transport and with private transport can be difficult. Internationally, public transport has a tap on/tap off feature, for two purposes. One purpose is for trip distance calculating, for the purpose of charging the user a set amount. An example of this is the London Underground, which uses the distance between the tap on station and the tap off station to charge you a fee (Transport For London, n.d.). If a user fails to tap off, they are charged extra since the journey price cannot be calculated. Another example of this tap on tap off method is First Bus in the UK. This service is a similar bus service to Christchurch, but with the difference of it being tap on/tap off (First Bus. n.d.).

The Metro bus service in Christchurch is exclusively a tap on service since it has flat fee pricing (Metro, 2024a). This has some major drawbacks, despite it being more convenient for the user. The major drawback is the lack of journey tracking that is available for Metro and the districts that their buses operate in. Without there being tap off, it is difficult to get a sense of where people are travelling, and there is limited information available online about where people are travelling. However, there is data on where people commute in general. Using a service such as Waka Commuter, you can determine travel patterns from different census regions, and the modes used (Waka Commuter, n.d.). This kind of data can be analysed to help determine where buses should travel. If a method is discovered to find accurate public transport travel patterns, this service can be compared to those travel patterns to determine if existing public transport infrastructure is meeting the needs of its users.

2.5 Community Partner

This research has been developed in collaboration with the Waimakariri District Council. For the development of the research, the main point of contact was Peter Daly, who works for the council as a journey planner, and in their roading safety team. Before the planning

phase had begun and before a community partner was decided, the intention of the research was to look at the disadvantages of commuting using public transport from the satellite towns of Christchurch (Rangiora, Kaiapoi, Lincoln, and Rolleston). The plan was to use methods such as interviewing residents to determine why people prefer private vehicles over public transport for their daily commute, and what could make them more likely to take public transport. After discussing with Peter Daly from the Waimakariri District Council, it became clear that the focus would be on Rangiora and Kaiapoi, and rather than exclusively looking at disadvantages of public transport, it would be insightful to also look at the advantages of public transport and what is currently working well. During initial meetings, information on some of the Waimakariri District Councils goals, values, and interests was discovered, and one goal aligned with my research interests. This goal was improving sustainable transport for inter-town travel and commuting into the city. Due to the large scope, this was narrowed to public transport and commuting into the city. As well as this, a knowledge gap the Waimakariri District Council currently was determined. This knowledge gap is about where people are commuting using public transport. This was also a determining factor in deciding the research objectives.

2.6 Research Objectives

The overarching research question for this project is "How can public transport in the Waimakariri District be improved for the benefit of residents commuting into Christchurch, and what trends exist within current commuting patterns". To answer this, the overarching research question has been split into smaller research questions. The first is "What are the existing benefits and barriers that the Waimakariri Community face in utilizing public transport for commuting into Christchurch City". This will cover the gap in literature relating to the benefits and barriers of commuting on public transport from a small-town perspective. The second is "what are the existing trends and patterns in relation to where the Waimakariri Community commute using public transport". This will cover the gap in literature relating to where people are travelling on public transport.

3 Methodology

The goal of this research was to learn where people are travelling, and how people perceive public transport in Waimakariri. A mixed-methods approach was used, with a combination of digital surveys, focus groups, and secondary data analysis being utilized throughout the research process.

The two research questions required different methods, and the research was conducted independently from each other. This allowed focused exploration of each aspect, despite both questions being vital for answering the overarching research question. A survey was used to research where Waimakariri residents travel, alongside MetroCard data analysis. A different survey and two focus groups were used to research how Waimakariri residents perceive public transport.

The development of both surveys was informed by secondary data, such as bus stop utilization, and surveys found within literature. The results of the perceptions survey were also used to develop the focus group discussion. This was to ensure the research would stay on topic and be relevant to the Waimakariri community. The research was approved by the Human Research Ethics Committee, and the research was conducted between October 2024 and January 2025.

3.1 Travel Patterns Survey

Developing a survey was the first step in answering "what are the existing trends and patterns in relation to where the Waimakariri Community commute using public transport". Qualtrics was the software used to create the survey. Having a high response rate is crucial for the research, and therefore a significant amount of time was spent trialling different survey options, to determine which would be the most appropriate for the research.

3.1.1 Survey Design

The first section of the survey collected general information about the participants, and where they are travelling. This included age, if they had done the survey before, the survey code, and the bus line they are travelling on.

The second section required more trial and error and involved three different attempts.

The first attempt involved using a map of Christchurch and splitting it into sections, as seen in Figure 2. For this version, the user would enter which zone they were travelling to. This was not a suitable option, since the bus network is large. The map would need to be split into more subsections, or the size of the map would have to be small to include places such as Selwyn and Lyttleton. Accessibility was also an issue with this attempt, since some participants may have low vision, use screen readers, or are unable to read maps.
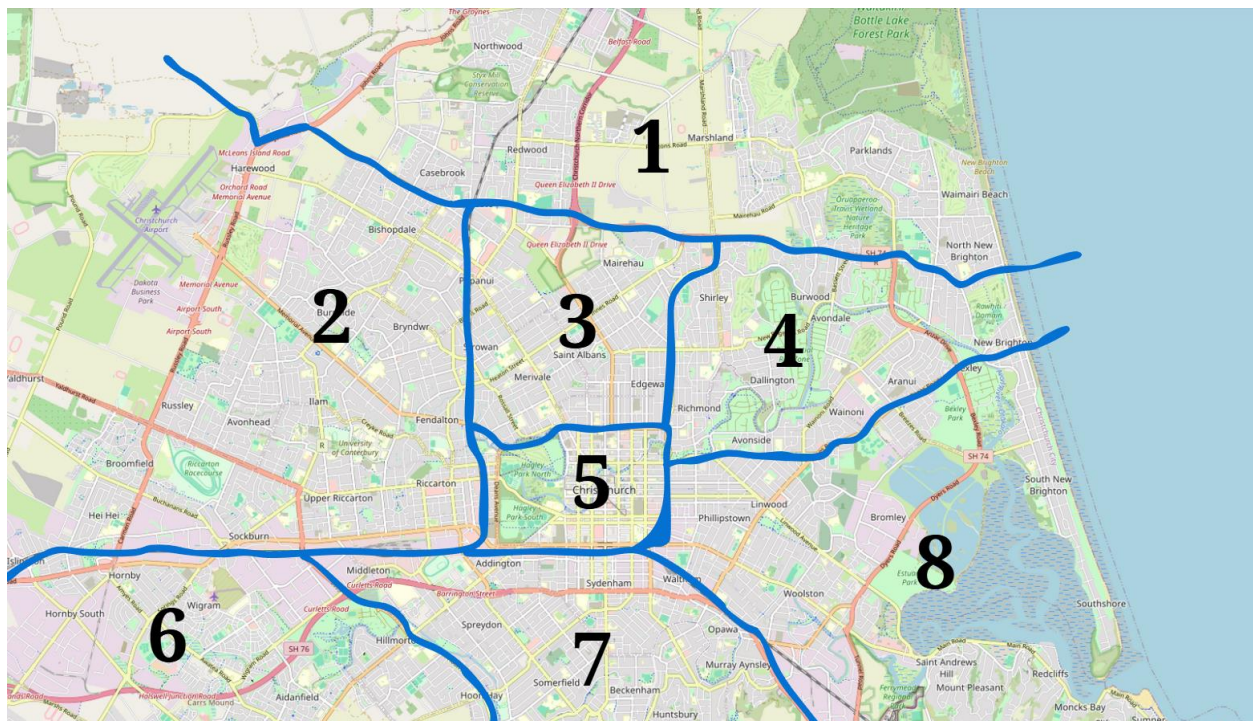

Figure 2: Attempt One: Splitting a map into eight arbitrary zones

The second attempt involved using a predetermined list of locations. This attempt was immediately problematic for two reasons. The first reason is that there are no official

boundaries to suburbs in Christchurch (FYI, 2018). This is problematic since it becomes vague for participants. The second reason is that there are approximately 83 suburbs in Christchurch (Geographic, n.d.). This is problematic since it would have to be a very long list, which may be hard to read and find the correct suburb. This attempt may result in participants clicking off the survey, rather than completing it.

The third and final attempt involved creating three separate sections using Qualtrics survey logic. The user would select which district they are travelling to (Waimakariri, Christchurch City, or Selwyn), and then would be provided more options. This creates a clear, distinct, well-known boundary, without causing confusion. If Waimakariri or Selwyn were selected, a predetermined list of towns would be provided for the participant to select from. This made the survey simple and consistent for people travelling to these locations. If the participant selected Christchurch City, they would be prompted to enter the suburb they are travelling to. This gave the participant the freedom to be as specific as they want. The key difference here is that this required manual data analysis, due to variations in how people entered their location. There was also an optional question for all participants. This question allowed people to share more details of the place they are travelling, increasing accuracy. The user only had to enter more details if they feel comfortable to do so. The survey then asked if the participant was travelling anywhere else, staying in the city, or going back to Waimakariri on the bus. This allowed the user to add more destinations if needed, and the previous questions would loop if they were.

3.1.2 Poster Design

The advertising poster was created using Canva. The intention was to create a captivating yet simple poster, that contained all the information potential participants would need. The final design included a teal background, similar to what Metro buses use. This allowed potential participants to connect that the survey was related to the bus network. The left side of the survey featured a graphic of a bus route map, further emphasising this is a bus survey before potential participants even begin to read it. The poster started with the question "Taking the bus today?", followed by the subheading "Help improve it while you

wait!". This was designed to help identify the correct set of participants and imply that the survey can be completed while they wait for the bus to arrive. The main text of the survey explained what the survey is, how to access the survey, and who to contact with any issues. Every survey was the same so that bus users could easily find it at any stop they may use. The code (bus stop number) was handwritten on each poster. The full final poster design can be viewed in Appendix A.

3.1.3 Distribution

The survey was distributed at Waimakariri bus shelters. Bus stop data analysis was used to justify this, since stops with bus shelters were the start location of approximately 72% of trips in Waimakariri in 2023. Bus shelters also keep surveys dry, meaning they would need replaced less frequently. There are 39 bus shelters in Waimakariri, however one was not being used during the survey period due to roadworks. A map of the bus shelters in Rangiora, Woodend/Pegasus/Waikuku, and Kaiapoi respectively can be seen in Figure 3, Figure 4, and Figure 5. Approximately once a week, the survey posters were checked for any damage or graffiti, and if necessary, were replaced. The survey took place between Monday 18 November 2024 and Wednesday 31 December 2024 and were immediately removed in following the conclusion of the survey period.
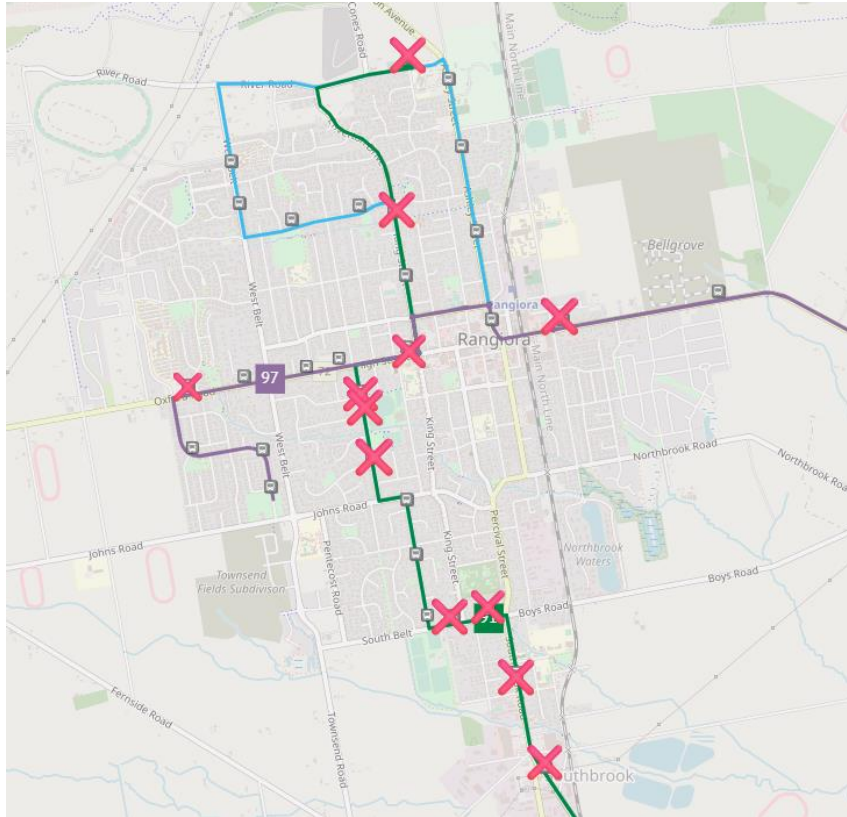
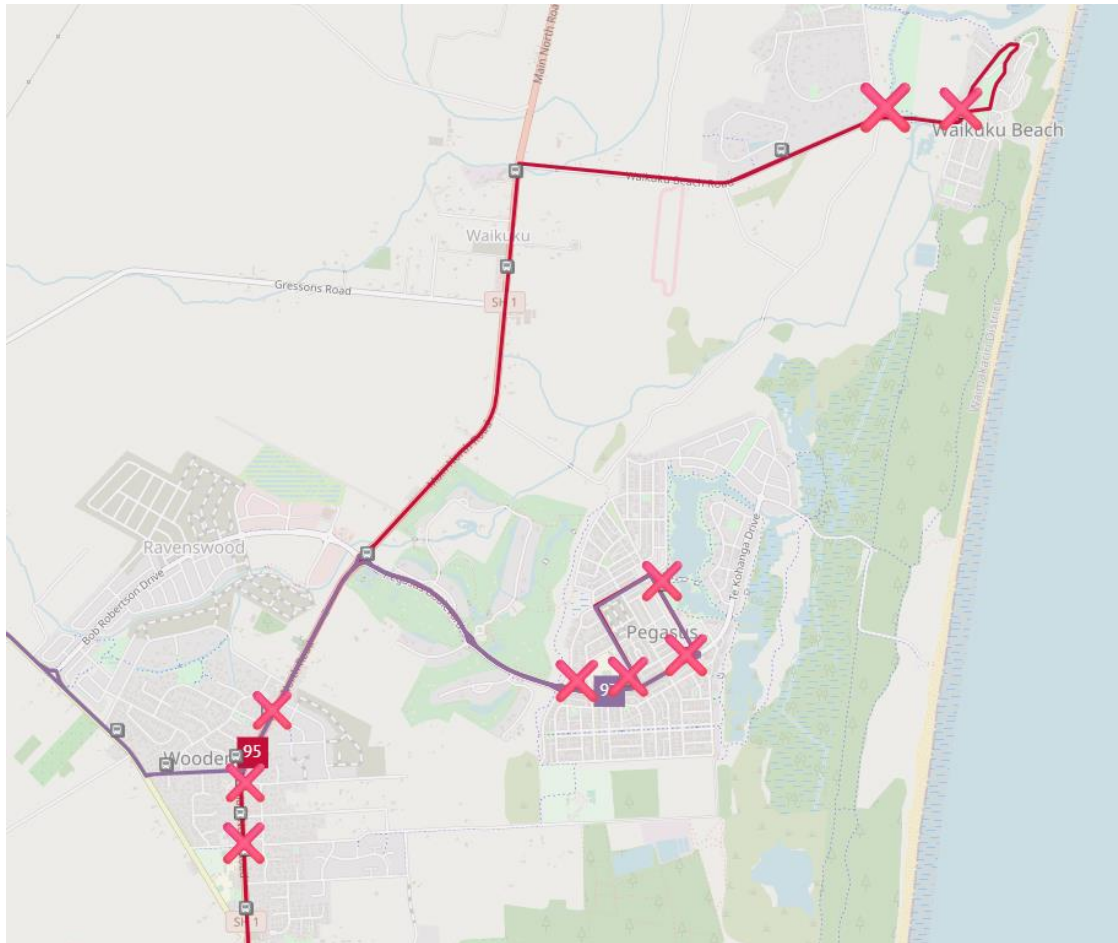Figure 3: Map of bus stops in Rangiora, indicated with an X

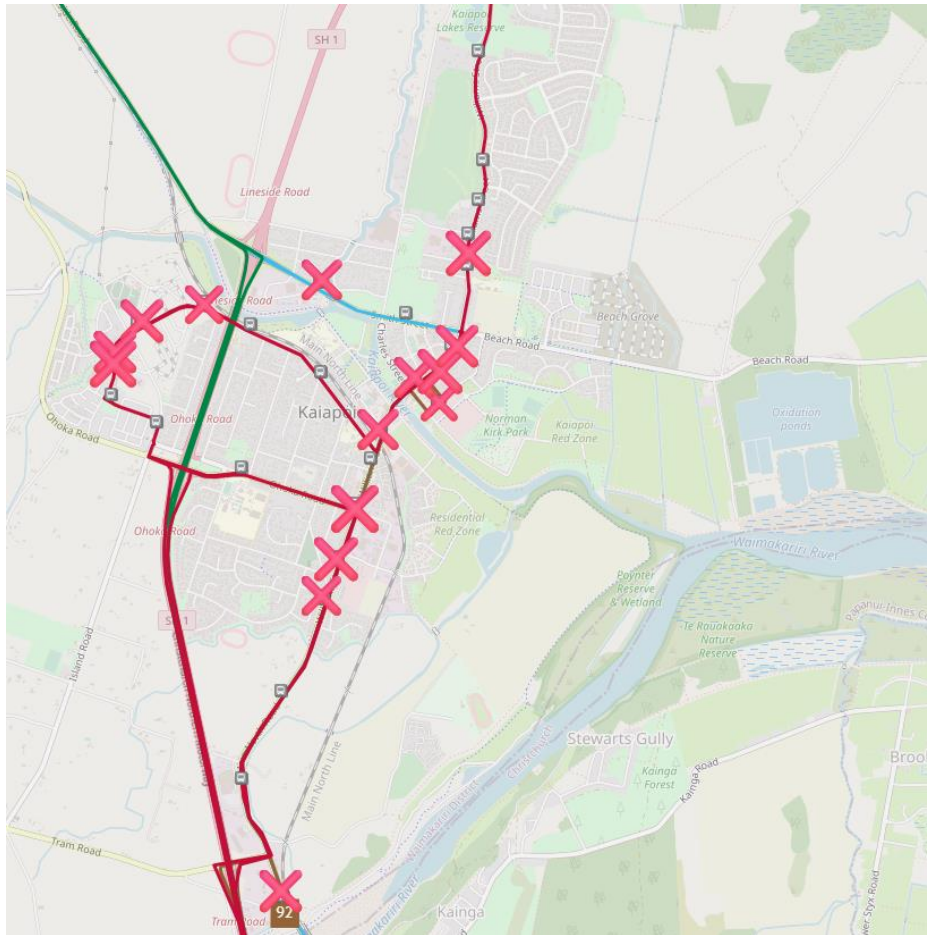Figure 4: Map of bus stops in Woodend, Pegasus and Waikuku, indicated with an X

Figure 5: Map of bus stops in Kaiapoi, indicated with an X

3.2 Perceptions Survey

Developing a survey was the first step in answering "what are the existing benefits and barriers that the Waimakariri Community face in utilizing public transport for commuting into Christchurch City". Qualtrics was the software used to create the survey. The design of the survey was based on a similar survey, which was previously conducted by Metro. Their survey was targeted at all Greater Christchurch bus users, rather than just Waimakariri. The survey by Metro had 167 Waimakariri responses, and by conducting further research with similar questions, this new survey should align with existing research and expand on what is already known. However, it is important to note that this survey is

different from the survey by Metro, and features more questions specifically aimed at Waimakariri residents, that may not apply to Greater Christchurch.

3.2.1 Survey Design

The first section of the survey collected demographic data. While Metro already collects some of this data on their bus users, collecting it in the survey allowed cross checking to be done, to ensure the survey results align with what is expected. The demographic data collected was age, frequency of bus usage, payment method, mode of transport to bus stops, and any disabilities the user may have.

The second section collected perception data. 22 questions were developed for this section, based on the categories from the literature review. Each question was on a sliding scale from one to five. There was also a "not applicable" button for every question, meaning participants did not have to answer a question if it was not relevant to their experiences. The full list of questions can be seen in Appendix B.

3.2.2 Distribution

The survey was distributed in three stages, in collaboration with the Waimakariri District Council. The first stage was sending the survey to Waimakariri residents that had opted into transport and roading projects on the Councils "Let's Talk" page. This was sent to 1489 residents, and the survey was opened by 157 of these residents (10.3%). The second stage was posting to local residents' pages on Facebook. The post was put on pages in Rangiora, Kaiapoi, Pegasus, Woodend, and Ravenswood. The final stage of distribution was distributing this post on the official Waimakariri District Council Facebook page. The survey was available to be completed from Monday 18 November 2024, to Wednesday 31 December 2024.

3.3 Focus Groups

Developing the focus groups was the second step in answering "what are the existing benefits and barriers that the Waimakariri Community face in utilizing public transport for commuting into Christchurch City". The design of the focus groups was based on the same

categories in the perceptions survey, and the purpose of the focus groups was to discuss these categories further, and more in depth with a smaller subset of participants.

3.3.1 Focus Group Design

Once the perceptions survey had been opened for a month, a full formal schedule was developed for the focus groups. Each focus group had the same schedule, which was based on the categories in the literature review/perceptions survey. After this, questions were developed for each category. This was done to allow full coverage of a wide range of topics. The full question list can be viewed in appendix C.

3.3.2 Participant Recruitment

Once the focus groups were designed, an email was sent to potential participants. The potential participants were identified by emailing everyone who had completed the perceptions survey and opted in to receiving information about the focus groups. The initial plan was to conduct four focus groups in early January 2025; two focus groups with bus users, and two focus groups with bus non-users. The justification for this is that by separating users and non-users, the participants would be able to relate to each other more, resulting in conversations flowing better. However, due to the focus groups being held at the University of Canterbury rather than Waimakariri due to unforeseen circumstances, there was less interest than anticipated. Two focus groups were held, and they were a mixture between users and non-users. The reason why two focus groups were held was to ensure each focus group had at least four participants. There were five and four participants in each focus group respectively. This is in line with existing research from Guest et. al. (2017, p.3), who states that focus groups can find 80% of trends with 2-3 focus groups (Guest et. al. 2017, p.3).

3.3.3 Conducting Focus Groups

Before the focus groups, the participants had to sign a consent form (Appendix D) and verbally agree to keep all discussions inside the room. This allowed participants to feel safe to share their experiences, without fear of their identities being revealed. Each focus

group was conducted in the evening on a weekday to allow maximum participation. Each focus group consisted of a brief introduction period, and two halves with a refreshment break in the middle. The full length of each focus group was approximately 1.5 hours. At the conclusion of each focus group, the participants received a $20 Pak n' Save voucher as a Koha. The focus groups were recorded and transcribed by another member of the University of Canterbury, and after the research was completed, the audio recording and transcript were destroyed.

3.4 Secondary Data

3.4.1 Bus Stop Data

The Waimakariri District Council provided bus stop data. This data contained a list of bus stops, and month by month data for passengers boarding the bus at each stop. This data was used to help determine which stops would feature posters, based on monthly users. The data showed that there was a clear trend between stops with bus shelters and high usage. Due to this trend, it was decided that bus shelters would have posters placed at them, and all other bus stops would be ignored.

3.4.2 Bus MetroCard Data

Ecan provided bus metro card data. This data was in a spreadsheet format, and featured rows of every transaction for that month. Each row had a bus card number, a stop number, a stop name, the coordinates of that stop, and how many passengers that card paid for. This data was used to create heatmaps of where passengers are travelling from Waimakariri.

3.4.2.1 Data Cleaning

A script was written to clean the data. This script did the following:
1) Go through each line in the MetroCard data spreadsheets, checking the bus stop number against a separate list of Waimakariri bus stops.

2) If the spreadsheet bus stop number is equal to any Waimakariri bus stops, take that row and add it to a new spreadsheet.

3) Save the spreadsheet

The result of this script was a spreadsheet of all trip starts in Waimakariri. After this, a new script was created, utilizing this new spreadsheet. This script did the following:

1) Go through each line in the MetroCard data spreadsheets, checking the user ID against the user ID's in the new Waimakariri Trips spreadsheet.

2) If the user ID is equal to any ID in the Waimakariri Trips spreadsheet, take that row and add it to a new spreadsheet. al.so add the details to a word document

3) Save the spreadsheet and word document

The result of this script was another new spreadsheet, of all trips by any user that went to Waimakariri. After this, another script was created utilizing this new spreadsheet. This script did the following:

1) Sort the data by user ID, time, and day to ensure all user data was together, and in chronological order.

2) Go through the data of each user ID and follow the following criteria:

    a. If a trip was the first trip of the day, go to the next trip

        i. If this trip is not on the same day ignore this trip, go to the next trip, and start from a.

        ii. If this trip is within 1.5 hours of the previous trip, go to the next trip and test criteria from i.

        iii. Otherwise, the trip must be on the same day and not within 1.5 hours of the previous trip, so add it to a heatmap, and add that trip to a word document

    b. Go to the next trip and start from i.

3) Save the heatmap and word document

The result of this script was a heatmap of destinations, and a word document with all the details and counts. The destination data is based on the following assumptions:

1) A user who travels somewhere will take the bus home

2) A user will be out for longer than 1.5 hours (a buffer period to disregard bus transfers)

3) A user will be commuting home within the same day

4) A users first location of the day is not a destination

4 Results

4.1 Travel Patterns Survey

4.1.1 SanKey Diagram

After the survey had closed and all submissions had been downloaded, a SanKey diagram was created to visualize the dataset. As seen in Figure 6, 84 submissions were valid and able to be used in further analysis. There were 49 invalid submissions, either due to not finishing the survey, or selecting the "Under 18" age option.
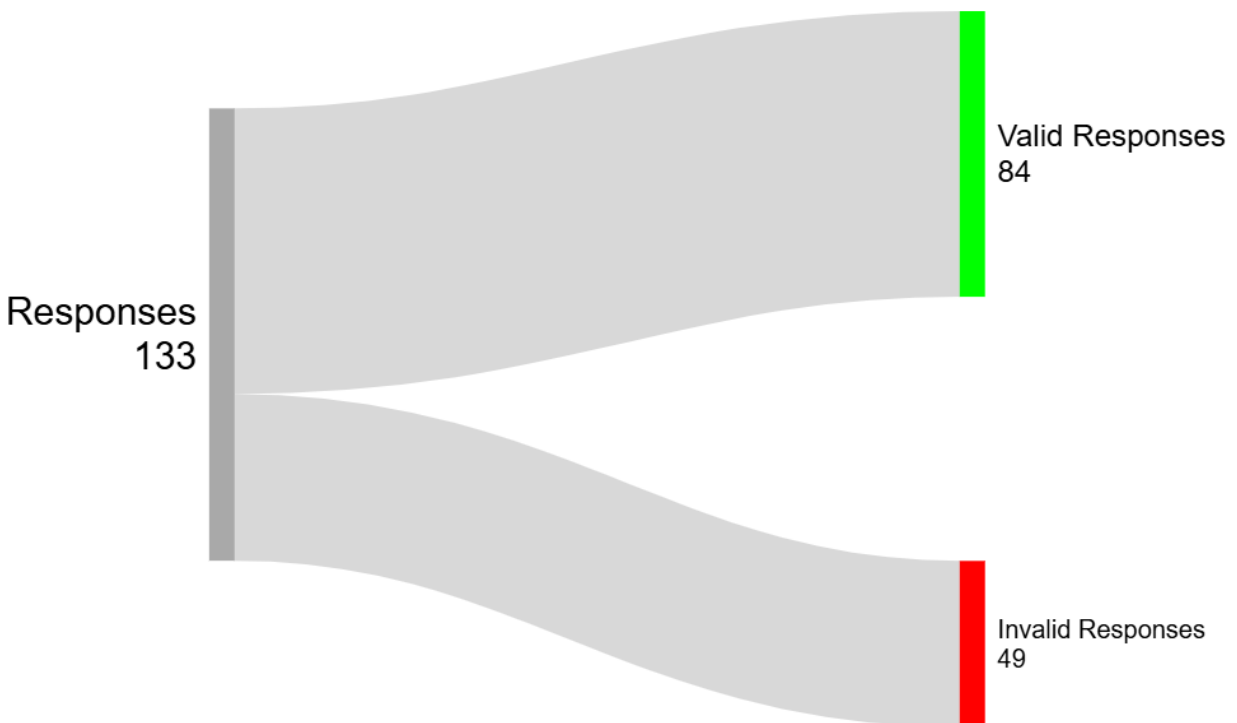
Figure 6: Sankey diagram of valid and invalid responses to the travel patterns survey

4.1.2 Most Popular Starting Stops

According to the survey, the most popular stops for riders to start their journeys were the Southern Park and Ride, the Town Hall, and Ashley Street. These stops are all in Rangiora, indicating a high response rate from that township. The full list of stops by response rate can be seen in Table 3. There were 19 stops mentioned. This is much lower than the total number of stops with posters, indicating a lower-than-expected response rate from many bus stops.

Table 3: Most popular bus stops

Location	Number of Visits
Rangiora Southern Park and Ride	11
Rangiora Town Hall	5
Rangiora Ashley Street	4
Woodend near School Rd	4
Kaiapoi near Mobil	4
Pegasus near Waireka St	3
Silverstream Park and Ride	3
Woodend near Parsonage Rd	2
Rangiora Southern Park and Ride	2
Rangiora South Belt	2
Kaiapoi near Cass St	2
Rangiora King St near Royal Tce	2
Rangiora White St near Parkhouse Dr	2
Pegasus near Whaktipu St	2
Unknown	2
Kaiapoi Police Station	1
Kaiapoi near Davie St	1
Kaiapoi near Courtenay Dr	1
Kaiapoi near Smith St	1
Pegasus near Pegasus Main St	1

4.1.3 Most Popular Bus Routes

The most popular bus line was the Rangiora to Cashmere route, followed by the Pegasus to City route. This is in line with expectations, as these are the two key routes taking passengers from Waimakariri, into the city throughout the entire day. Figure 7 shows the full results of the most popular bus routes.
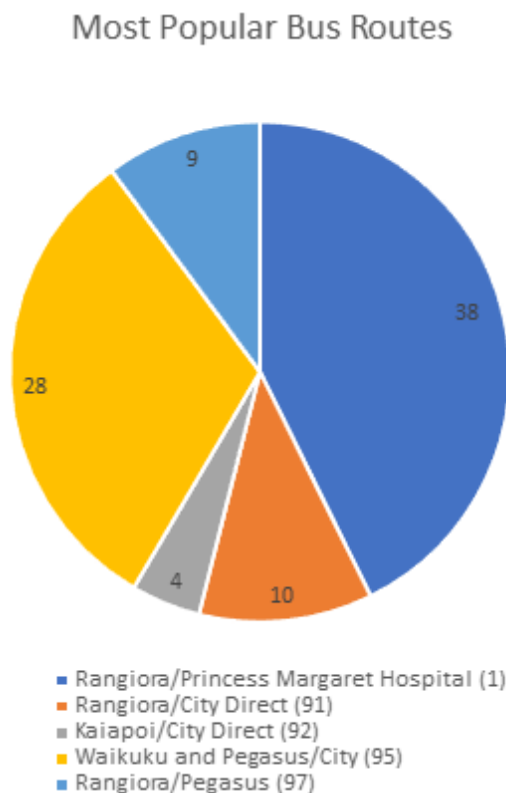

Figure 7: Most popular bus routes

4.1.4 Most Popular Destinations

The most popular trips were people travelling into the city. There were 62 responses travelling into the city, and nine responses travelling within Waimakariri. No responses were travelling to Selwyn. Note this includes responses that included more than one destination. In the city, the CBD was the most frequent response by far, with 33 responses.

This was followed by Northlands and Belfast. The full table of results can be found in Table 4. In Waimakariri, the most frequent response was Rangiora with five, followed by Kaiapoi and Woodend with two each. The full results can be seen in Figure 8.

Table 4: Most popular destinations

Location	Number of Visits
CBD	33
Northlands	6
Belfast	3
Bishopdale	3
Riccarton	3
Addington	2
Merivale	2
St Albans	2
Sydenham	2
Avonhead	1
Cashmere	1
Hornby	1
Ilam	1
Richmond	1
Shirley	1

Most Popular Destinations in Waimakariri

■ Rangiora ■ Pegasus ■ Woodend
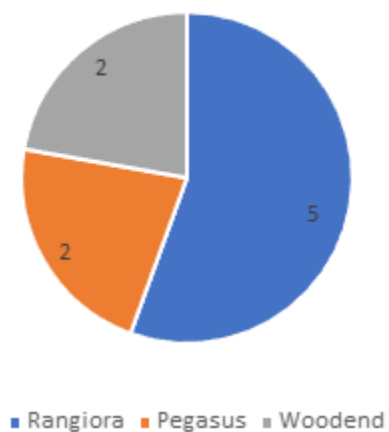
Figure 8: Most popular destinations in Waimakariri

4.2 Waimakariri Travel Patterns Based Off MetroCard Data

4.2.1 Most Popular Starting Stops in Waimakariri

The first heatmap was the Rangiora town map, as shown in Figure 9. This map shows that the most popular areas to start trips in Rangiora are the Ashley Street main stop, the park and ride facilities on White Street and South Belt, and the stops on the Northern part of West Belt.
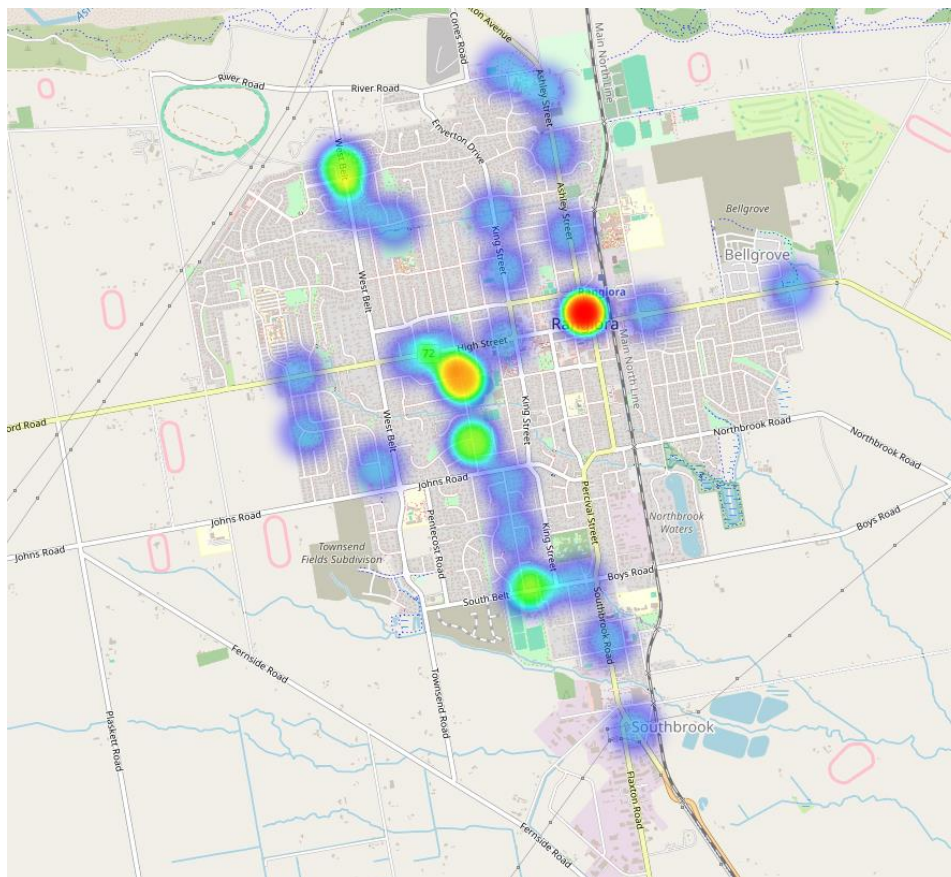

Figure 9: Heatmap of the most popular starting stops in Rangiora

The second heatmap was the Kaiapoi town map, as shown in Figure 10. This map shows that the most popular stops to start trips in Kaiapoi are the stops along Williams Street in the main township, as well as the stops near Silverstream. The large red part is very close to the main park and ride in the township, indicating significant usage of this stop.
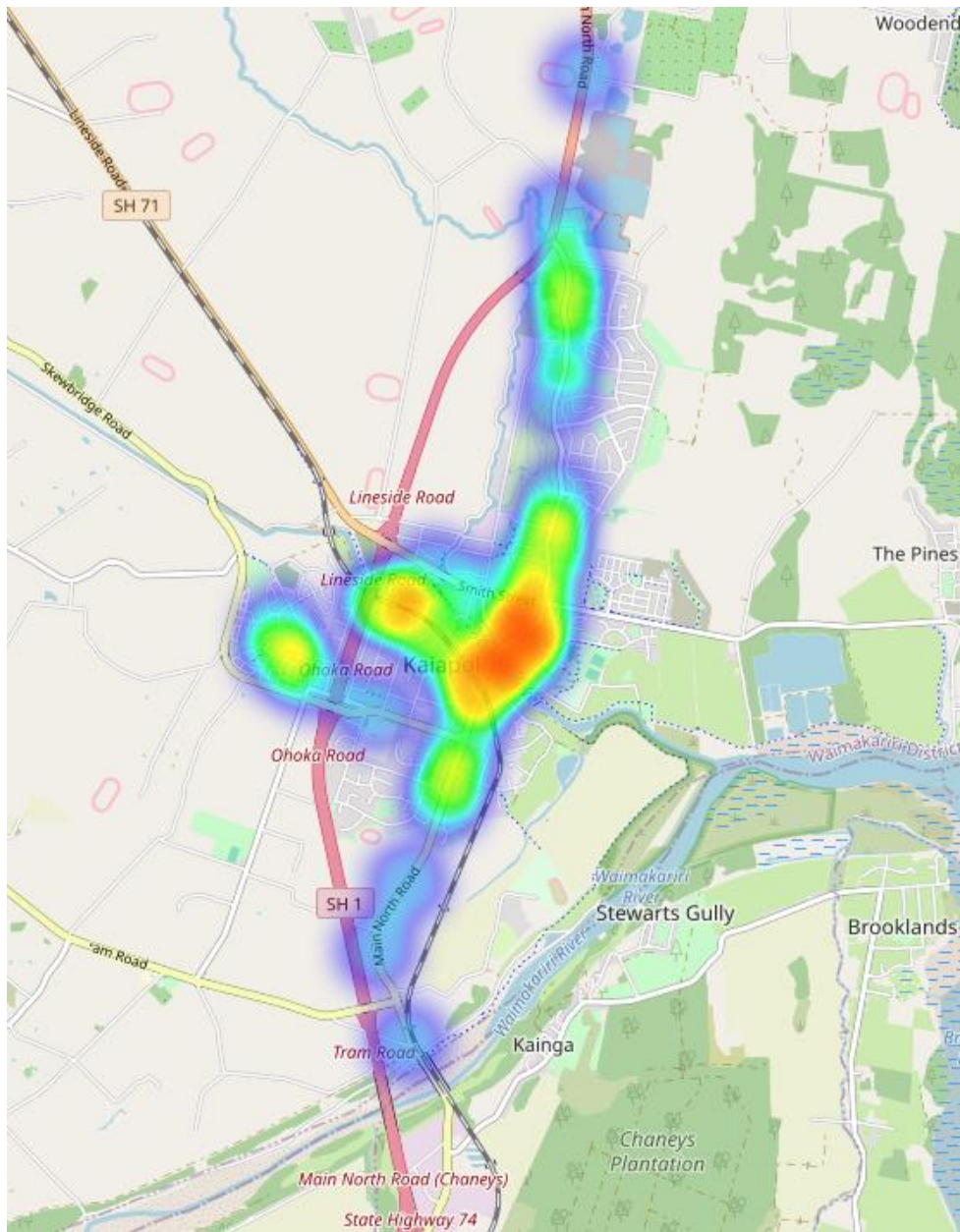
Figure 10: Heatmap of the most popular starting stops in Kaiapoi

The third heatmap was the Woodend, Pegasus, and Waikuku map, as shown in Figure 11. This map shows that the most popular stops to start trips in this area are the stops in Woodend.
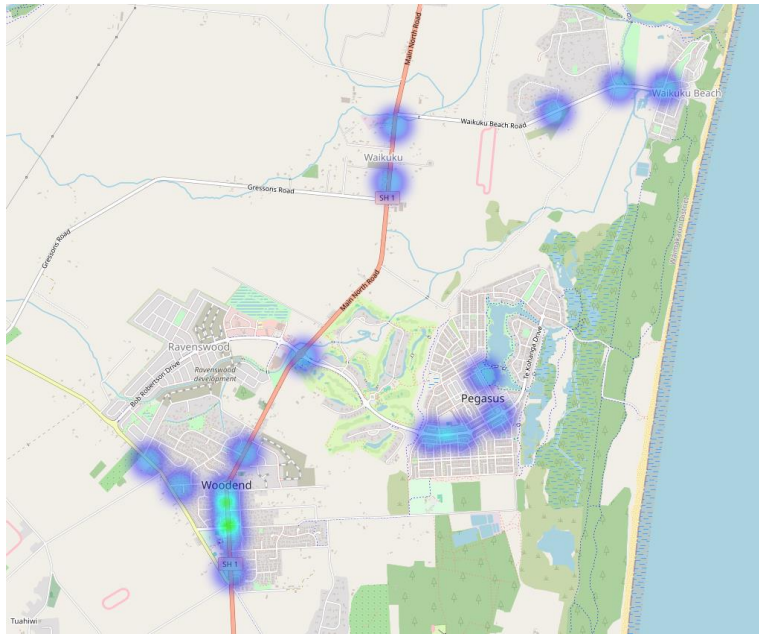
Figure 11: Heatmap of the most popular starting stops in Woodend, Pegasus and Waikuku

4.2.2 Most Popular Destinations

Using the full MetroCard data, a map was made of where people are travelling using the public transport network. The entire map can be seen in Figure 12, which gives an overview of the entire area, however the details and trends of the map can be seen clearer when separate sections are zoomed in on.
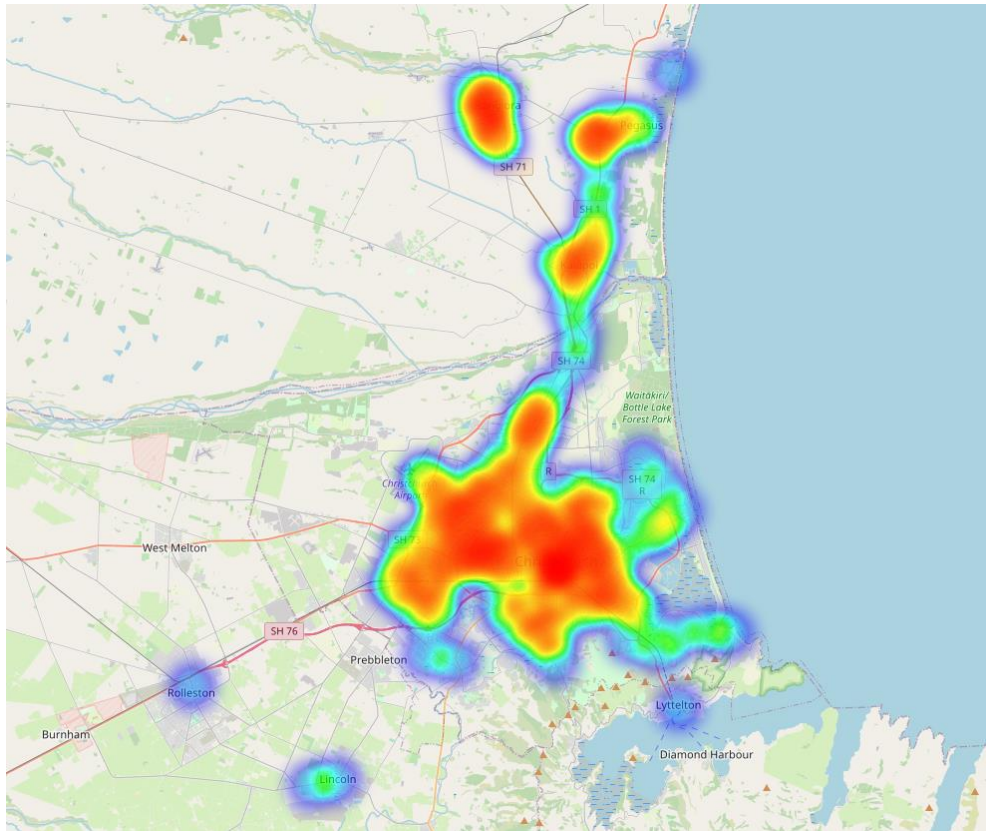
Figure 12: Heatmap overview of Waimakariri trip destinations

When looking closer at Rangiora in Figure 13, it shows that people are travelling to similar places as they are leaving. There are less arrivals than departures to Rangiora. One rationale for this is that the people travelling to Rangiora are travelling from Kaiapoi.

Figure 13: Heatmap of destinations in Rangiora

When looking closer at Kaiapoi in Figure 14, it shows that people are traveling primarily into the centre of Kaiapoi. There are also less arrivals than departures to Kaiapoi. One rationale for this is that the people travelling to Kaiapoi are travelling from Rangiora.
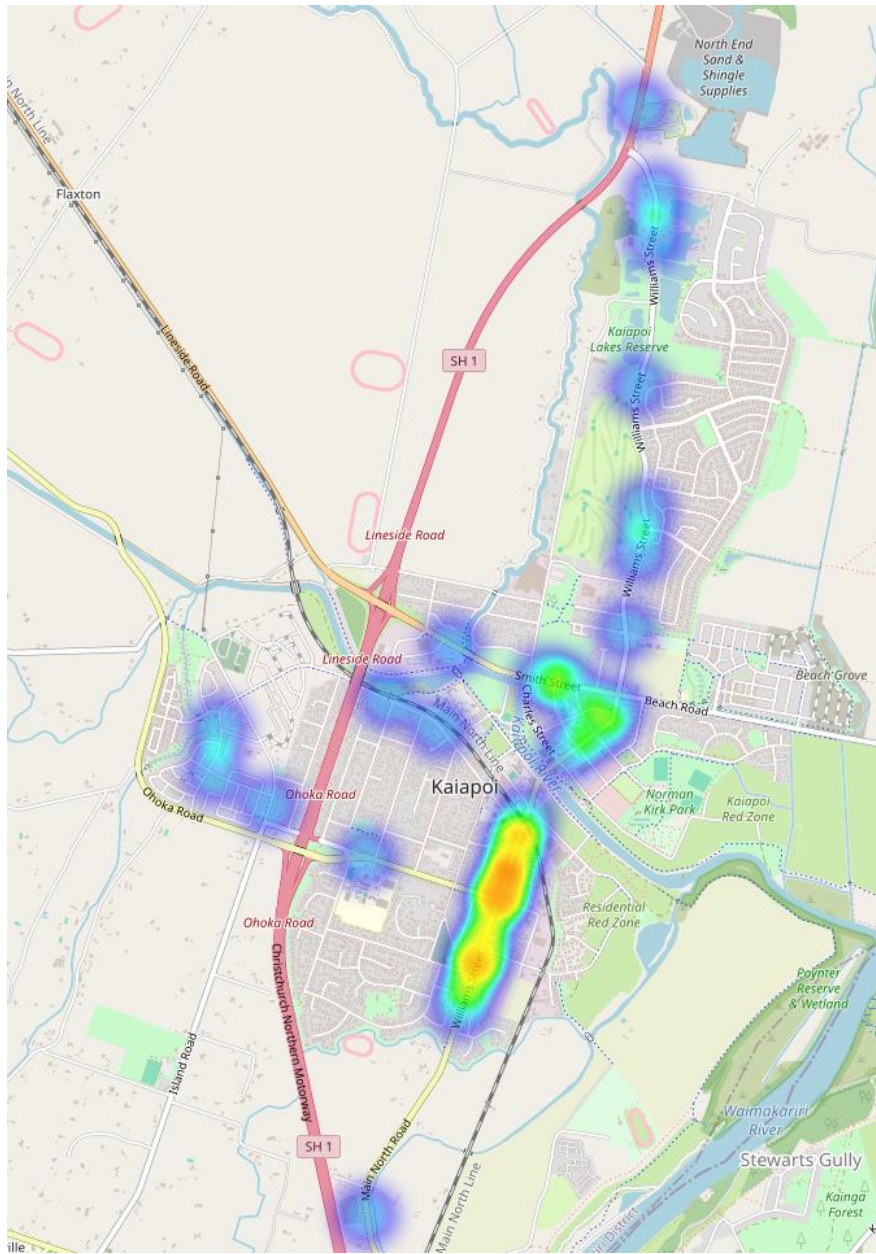
Figure 14: Heatmap of destinations in Kaiapoi

When looking closer at Woodend, Pegasus, and Waikuku in Figure 15, it shows that the main travel destination is still to Woodend, Pegasus, and Waikuku beach, but there is less of it. One rationale for this is that routes from both Rangiora and Kaiapoi go here, so people commuting come from both towns.
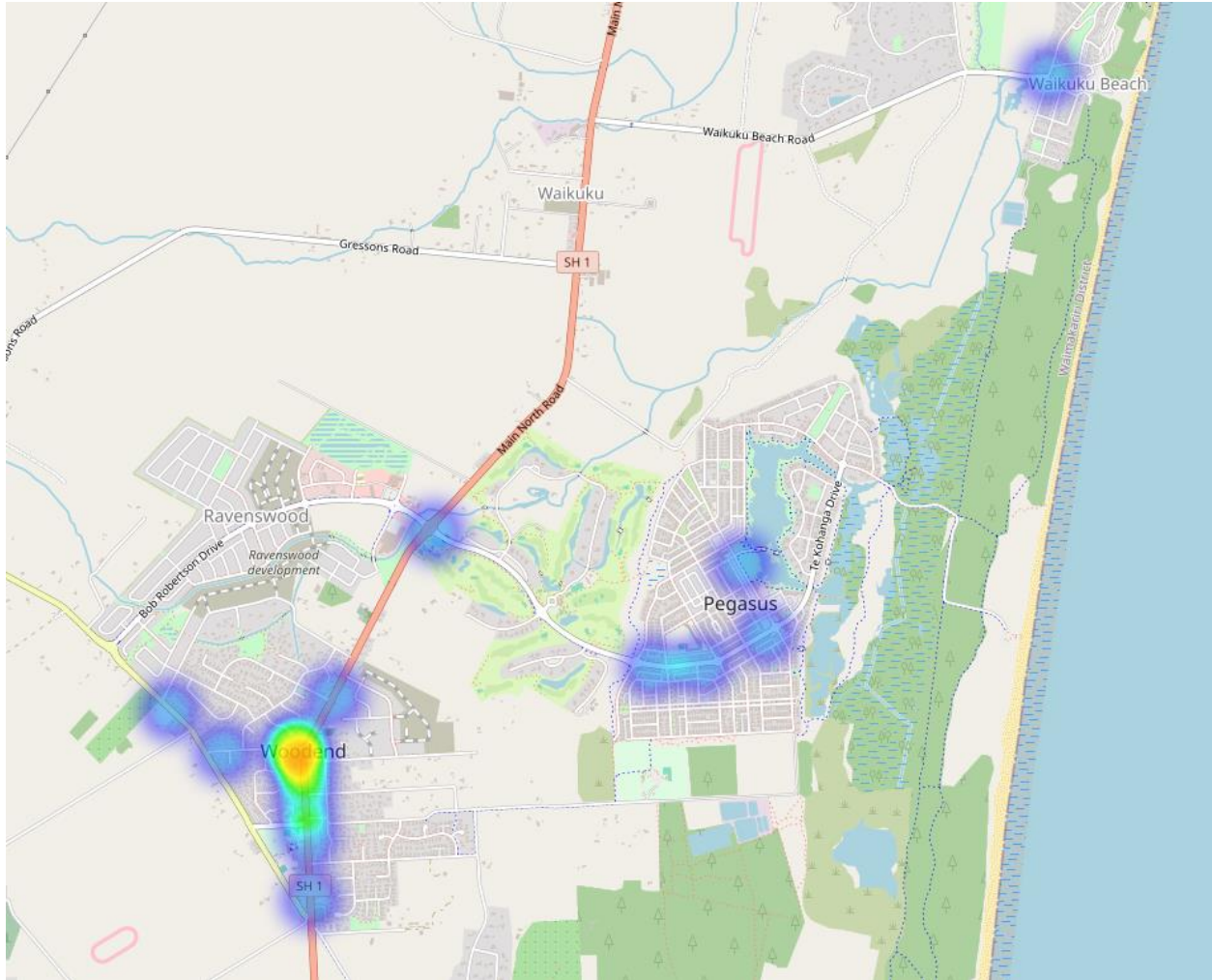
Figure 15: Heatmap of destinations in Rangiora Woodend, Pegasus and Waikuku

When looking closer at the Northern part of Christchurch in Figure 16, it shows that there are hotspots along the main corridor that the bus travels. This can also be seen closer in Figure 17 with hotspots all the way through Papanui and Merivale. The airport is another hot spot, as seen close in Figure 18.
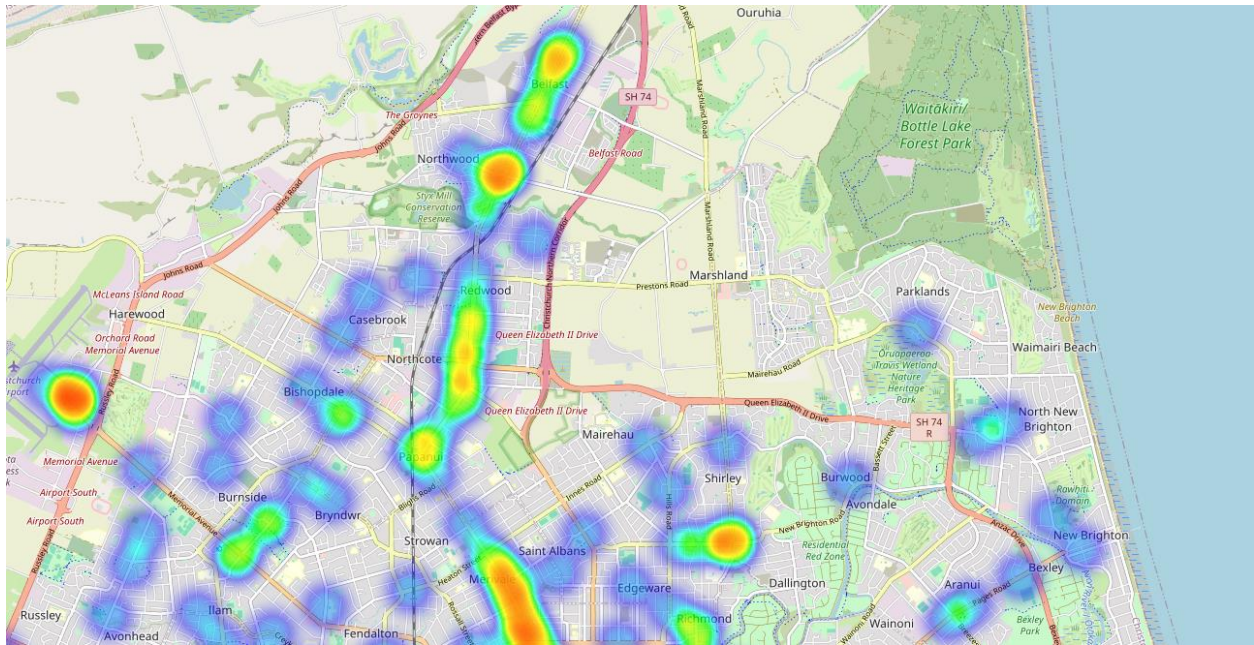
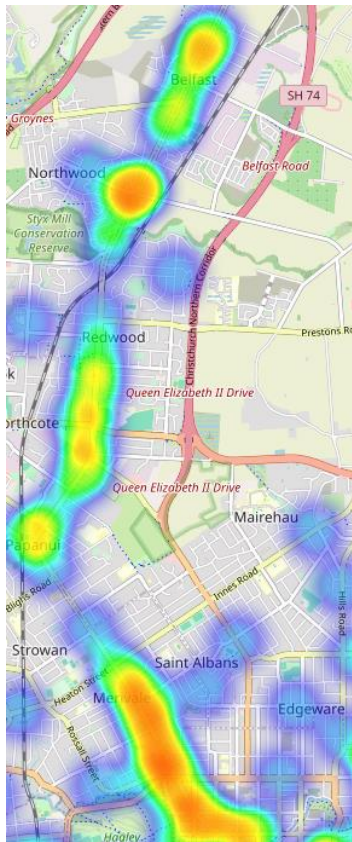Figure 1: Heatmap of destinations in Northern Christchurch.

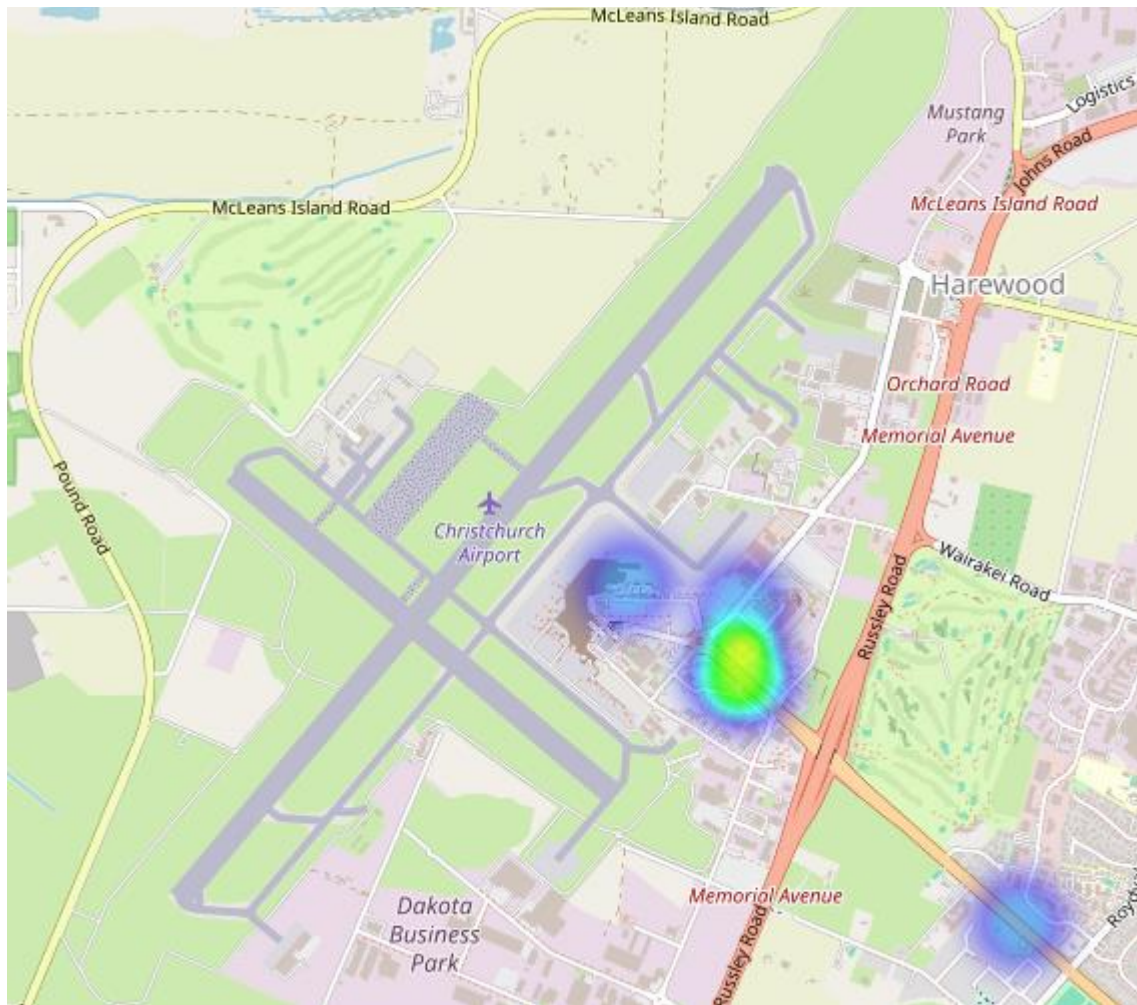Figure 1: Heatmap of destinations along the main public transport corridor

Figure 18: Heatmap of destinations at the airport

When looking closer at the Southern part of Christchurch in Figure 19, it shows that there are hotspots further down near Sydenham. This is shown closer in Figure 20. There is also a hotspot at Hornby and Riccarton as seen in Figure 21. due to the malls in Hornby and Riccarton, and the University of Canterbury.
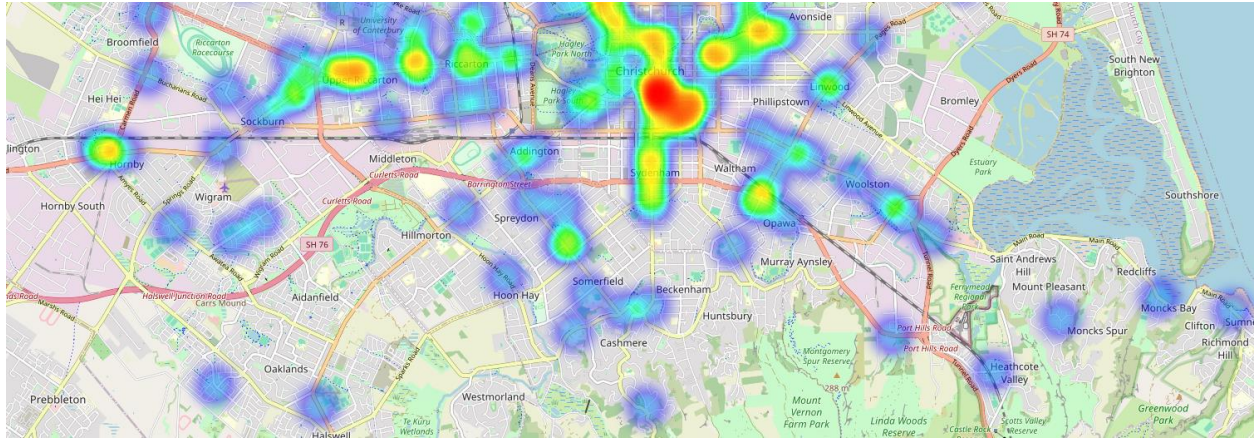
Figure 19: Heatmap of destinations in Southern Christchurch

Figure 20: Heatmap of destinations in Sydenham

Figure 21: Heatmap of destinations in Hornby and Riccarton areas

When looking at the Christchurch CBD in Figure 22, there is one main destination. This is the bus interchange. This is due to the direct buses and commuters utilizing these. Other popular CBD destinations include the hospital, and the stops on Manchester Street that are serviced by direct buses.
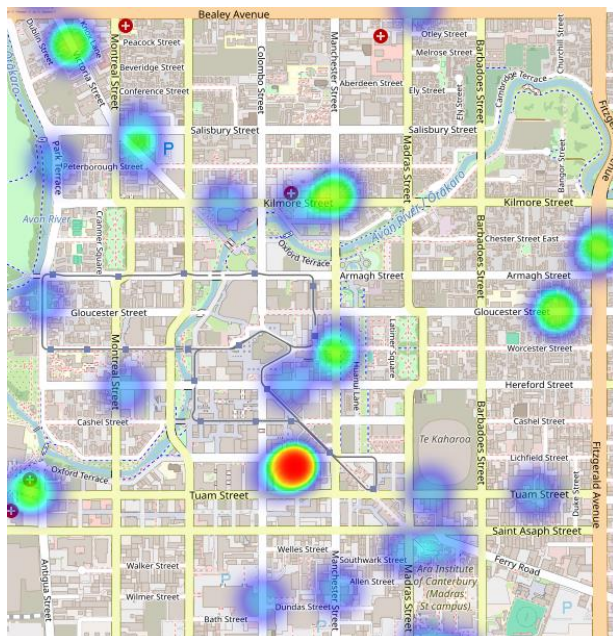
Figure 22: Heatmap of destinations in the CBD

4.4 Perceptions Survey Results

4.4.1 SanKey Diagram

After the survey had closed and all submissions had been downloaded, a SanKey diagram was created to visualize the dataset. As seen in Figure 23, 254 submissions were valid and able to be used in further analysis. There were 131 invalid submissions, either due to not finishing the survey, or selecting the "Under 18" age option.
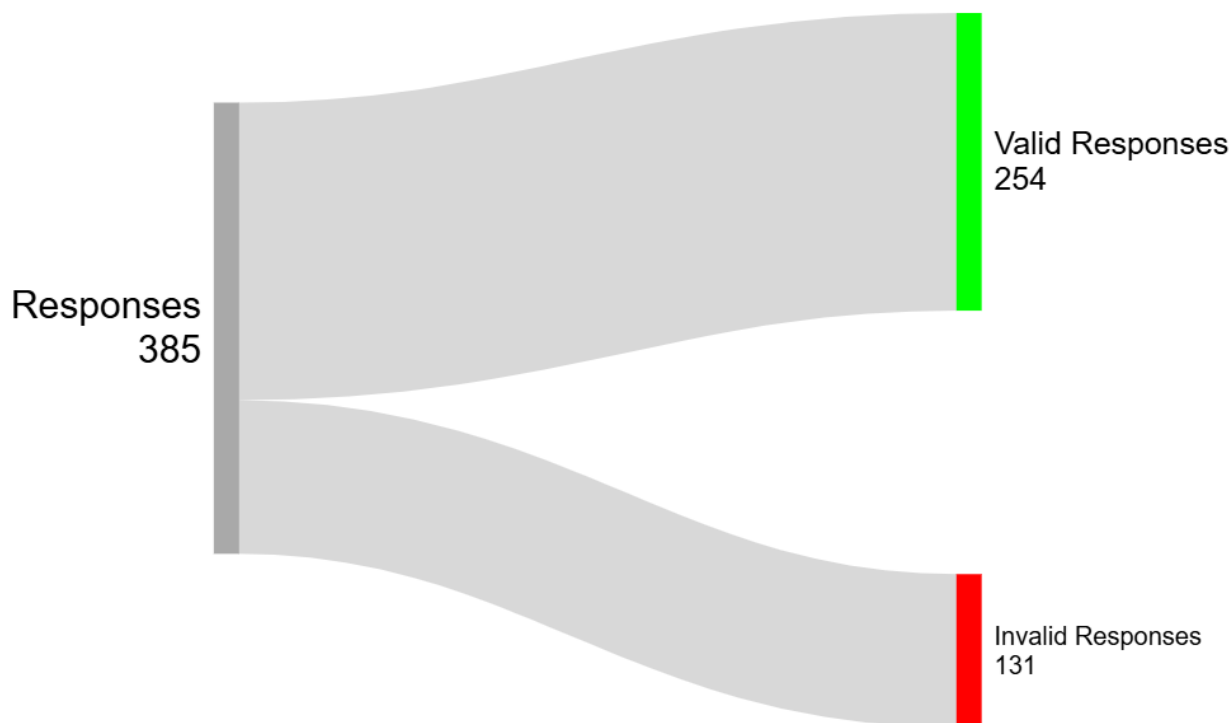

Figure 23: SanKey diagram of valid and invalid responses to the perceptions survey

4.4.2 Age

The age of survey participants can be seen in Table 5. The spread of the age of participants is even, indicating that the survey was distributed to a wide range of people.

Table 5: Ages of participants

Age Range	Number of Participants

18 - 24	26
25 - 34	35
35 - 44	35
45 - 54	46
55 - 64	51
65 - 74	36
75 - 84	24
85 or older	1

4.4.3 Gender

The gender of participants was also very even, as shown in Figure 24. There were 132 Female participants, 121 Male participants, and one participant who preferred not to say.
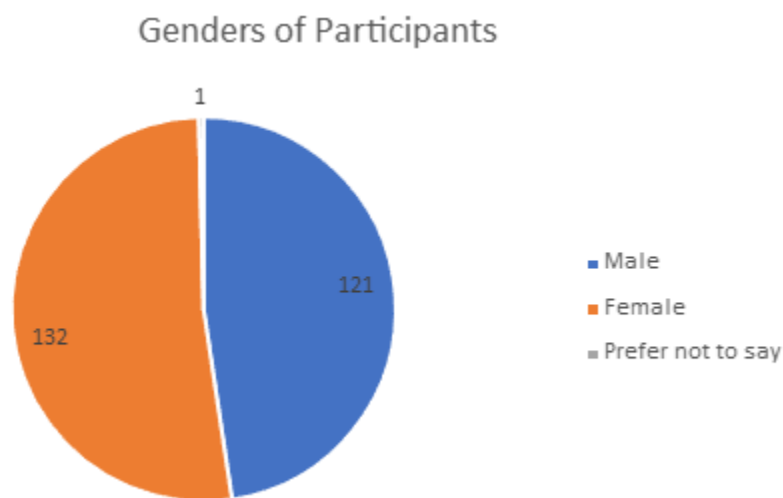

Figure 24: Genders of participants

4.4.4 Car access

Most participants own a car, as shown in Figure 25. 216 participants own their own car, 21 can access a car but don't own one, and 17 participants do not own cars. There was no notable trend of who cannot access a car.

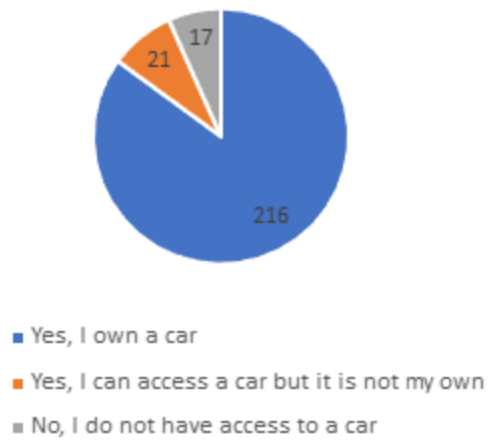Car Access in Waimakariri

Figure 25: Car Access in Waimakariri

4.4.5 Frequency

The survey had more public transport users respond than non-users. As shown in Figure 26, there are 82 frequent users, 23 regular users, 68 occasional users, 72 non-users who may consider using public transport, and 8 non-users who would not consider using public transport.
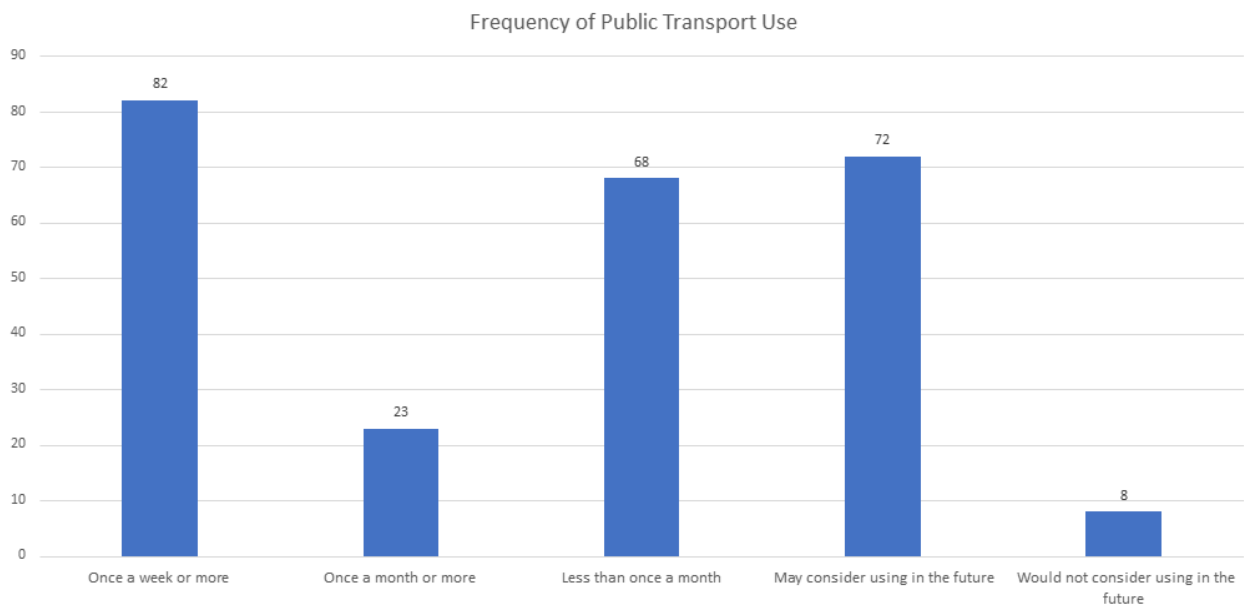
Figure 26: Frequency of public transport use

4.4.6 Access

As seen in Figure 27, most responses to accessing bus stops said they access them by walking, with 140 selecting this option. 71 take the car, five take a bike, and 35 selected other, indicating they may not use public transport.

Figure 27: Mode of transport to bus stop

4.4.7 Payment

Most responses also use a MetroCard to pay for the bus. As seen in Figure 28, this was selected by 134 participants, followed by Gold Card with 49 responses, cash with 19 responses, and community services card with 7 responses.
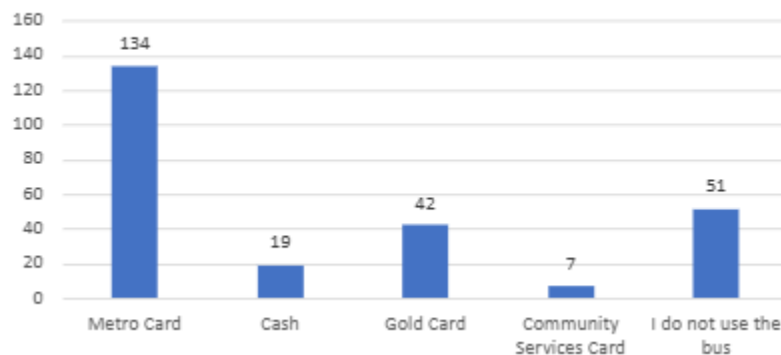
Figure 28: Payment method

4.4.8 Disability

Figure 29 shows that most responses were from people who identify as not disabled, with 222 responses selecting that option. 32 respons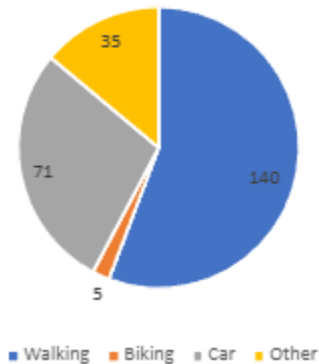es identified as disabled. The most common disabilities were visual and hearing impairment, mobility issues, and arthritis. Many of the participants with disabilities use the bus, albeit on a less frequent basis.
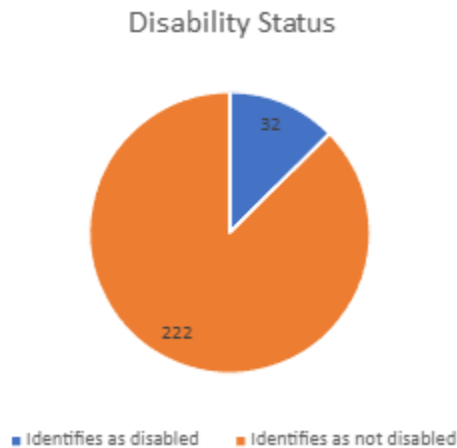
Figure 29: Disability status

4.4.9 Overall perceptions

The full perception results can be seen in Figure 30. The highest rated factor was "I understand how to use public transport" with an average rating of 4.3, followed by "Public transport is good for the environment" with an average rating of 4.0. The lowest rated factor was "Public transport is expensive" with an average rating of 2.2, followed by "Public transport is more convenient than driving". This indicates general positivity for public transport; however, it is agreed that it is not convenient from a Waimakariri perspective.
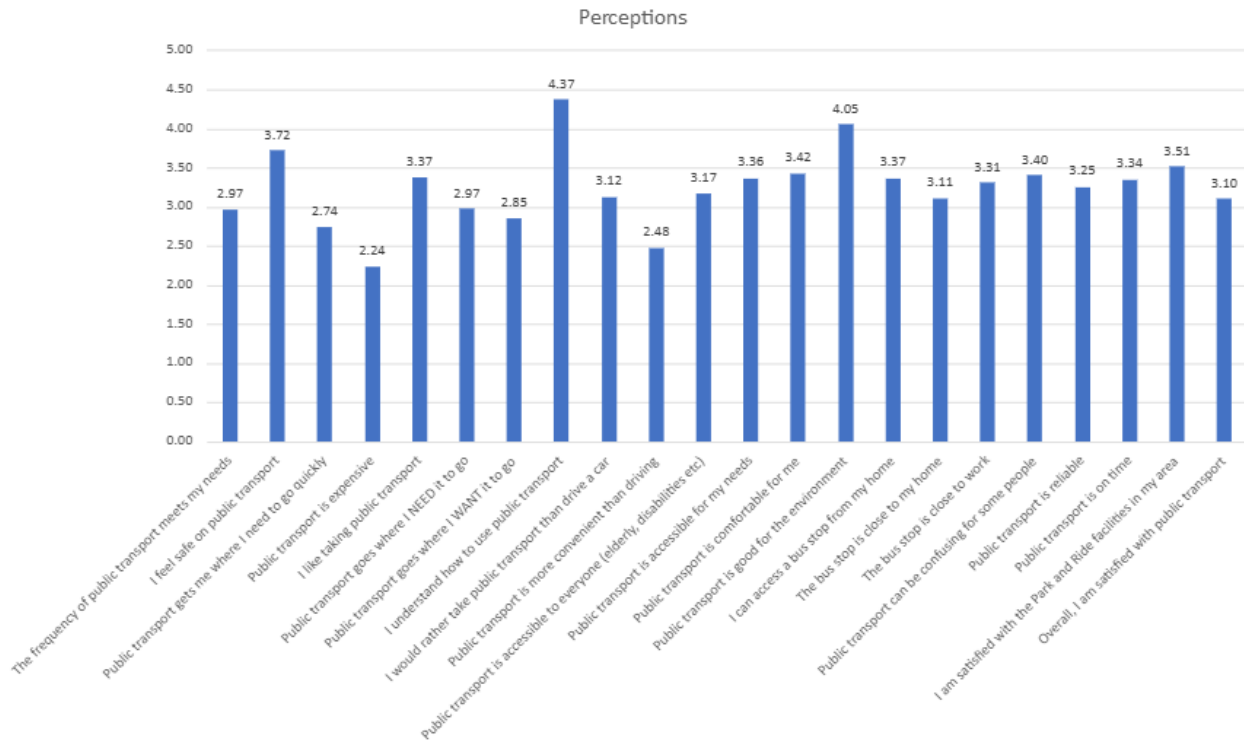
Figure 30: Overall rating of each perception

4.4.10 Perceptions by users and non-users

There was significant variation in perceptions results between frequency groups. When comparing the two most frequent user types (weekly, and more than once a month) against the two non-user groups, it is clear that how public transport is perceived is different for these two groups. Figure 31 shows the comparison in the average rating for these two groups, and it can clearly be seen that users rate public transport much higher than the non-users. In every single positive factor, the users rated the factor higher than the non-users, and in every single negative factor, the non-users rated the factor higher than the users. One key example of this is safety, in which users rated public transport safety 3.9/5, compared to 3.0/5 for non-users.
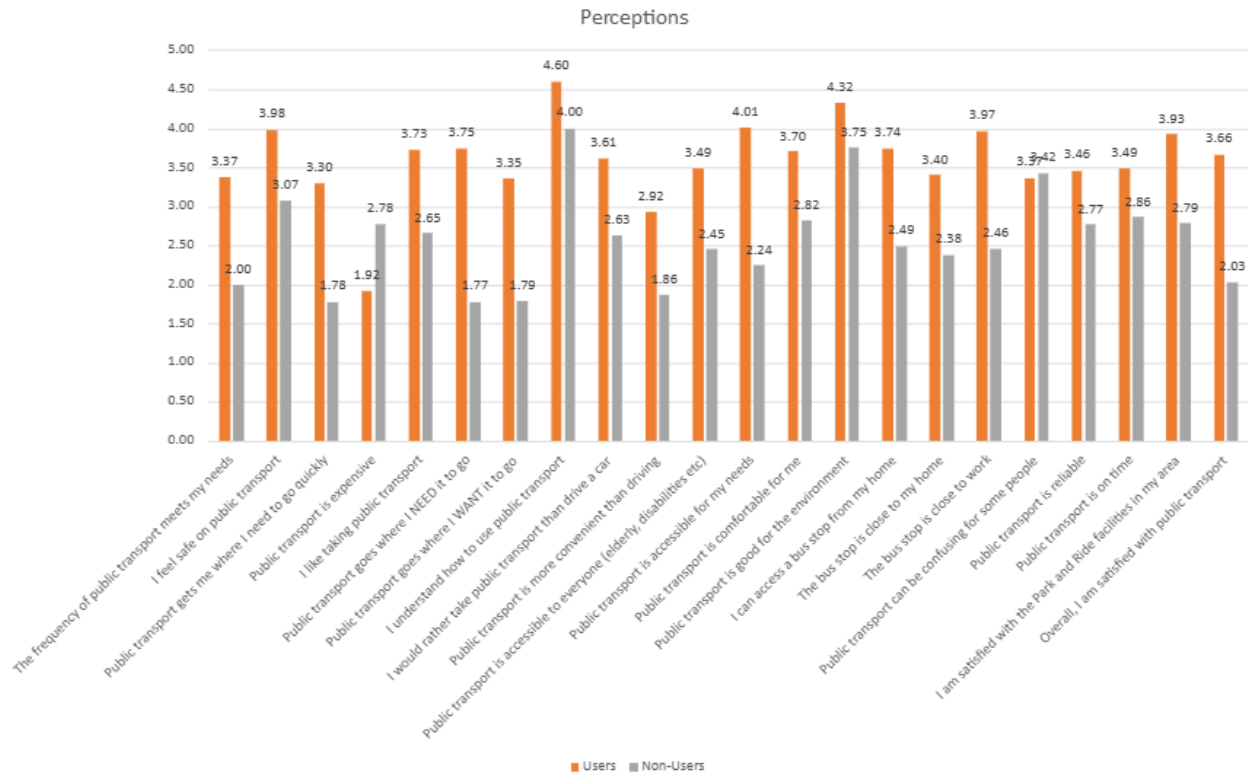
Figure 31: Transport perceptions users vs non-users

4.4.11 Perceptions by gender

There was limited variation in perceptions results between gender groups. When comparing male and female respondents, all factors except for five were separated by less than 0.3 for each gender. The most relevant factors for this are feeling safe and preferring to take public transport over the car. Women are less likely to feel safe on public transport, and men are more likely to prefer driving a car. Figure 32 shows the comparison between genders.
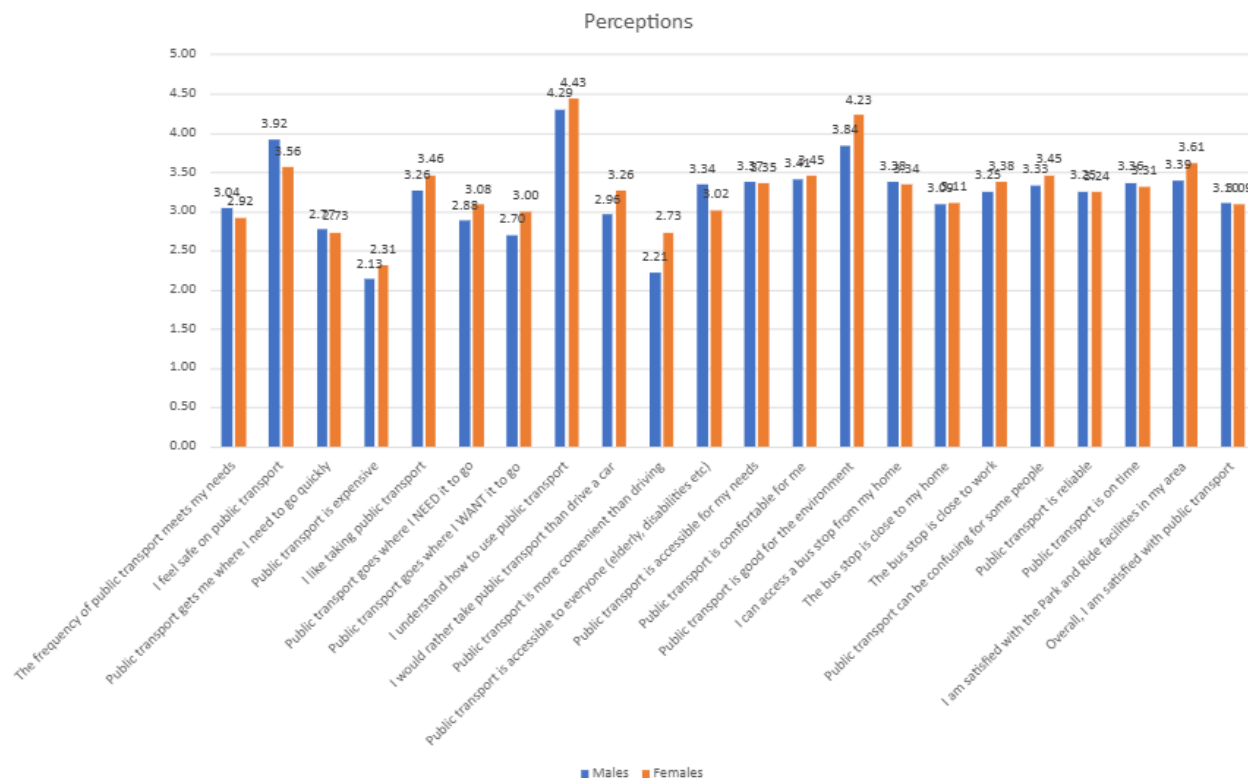
Figure 32: Transport perceptions males vs females

4.5 Focus Group Results

The focus group discussion was broken up into sections, with loose questions being used as a guide. For most of the discussion, the participants were allowed to veer slightly off topic, as this would provide further points to note down, and strengthen the conversations.

4.5.1 Price

When asked about the current price of public transport, the participants were overall in agreement that the current price is very cheap. There was discussion around changing the pricing scheme back to zone based, in which many participants believed that would be fair. The participants however did feel that the current price is acceptable for travel within Waimakariri but would be open to price increases.

Researcher: At present, there has been discussion of the price of public transport in Christchurch facing pricing increases. How do you feel about the current cost?

"A 50% increase won't worry me"

"It's too good to be true at the moment, I can't even turn my car on for $2"

"Think about the distance, Rangiora to the city. In terms of value for money."

"The old system [zoning] makes sense."

"It makes sense to have user pay for the distance"

When asked about subsidies for over 65s, community services card holders and under 25s, they agreed that these subsidies are important and should remain.

"The bus service is there for a reason. It should stay affordable"

"I'm not in any of those categories but I know for some it does make a difference"

4.5.2 Safety

When discussing the bus and negative experiences, there was limited real world experience to go off. This is due to most participants not having many close calls with incidents. However, it was noted that safety is a bigger issue at bus stops than on the bus itself.

"Sometimes it can be uncomfortable at the interchange and at Riccarton"

"Every now and then I go to the bus interchange, and young people can be intimidating"

"I won't get out at Riccarton – too close to the mall"

It was also agreed upon, without prior discussion that it is more of a social issue rather than a public transport issue and cannot be controlled by bus companies or the councils public transport team.

4.5.3 Accessibility

Bus accessibility was briefly discussed, and no significant issues were found. The users agreed that the bus drivers are helpful, and more so when you regularly commute with the same driver.

"The buses are good when they kneel, but sometimes they are a bit far from the kerb"

"The drivers are good helpful people"

"I have seen people in oversized wheelchairs who can't get on. The buses are built to a standard, but some wheelchairs don't meet those standards"

4.3.4 Frequency and Efficiency

The frequency was often enough for most participants. Recommendations were made for more services, particularly in the mornings. As well as this, the users of the direct services pointed out that often there is only standing room available on the bus. Some of the non-users did not know about the direct services and were finding out information about how to use them in the future. This indicates that the services are not promoted well, but yet still reach capacity. This shows there is a need for more.

"I would add more direct buses between 7:30am and 8:00am"

"More express and direct buses would help. People stop taking them when there is only standing room. At some peak times, the direct bus is full"

The participants also confirmed that the bus is usually on time, and there were no complaints.

"In all the times I've used the bus, there was only one time that the bus didn't come"

On the topic of peak time prioritization, there was a significant amount of confusion from participants, and some focus group members pointed out some of the bus drivers get confused too. This is due to the t2 lane on the motorway being on the right side, rather than the usual t2 lane position on the left side.

"The t2 lane does not work. Sometimes the bus driver doesn't know and holds up faster traffic in the non t2 lane"

"I thought the t2 lane was the left-hand side, not the right"

"It doesn't make sense since the driver is on the right-hand side, and the faster traffic has to go overtake on the wrong side. Elsewhere in the country such as Auckland they are all left hand"

4.3.5 Bus Stops

Discussing a lack of bus stops revealed Ravenswood is a key area with no buses currently. The participants also discussed the lack of Park and Rides in that area as well. Participants also felt there are too many bus stops in Kaiapoi, which slows the bus down.

"The bus does not go through Ravenswood at the moment"

"There needs to be a park and ride in Ravenswood"

"Kaiapoi has too many stops, some of them are short distances between each other, slowing down the bus"

The participants also floated new ideas, such as creating a linked route between Rangiora, Woodend, and Kaiapoi, similar to the orbiter. Some participants also mentioned the MyWay on demand service in Timaru, and how that could be implemented in the district.

"There should be a smaller bus doing a circle around Waimakariri, similar to the orbiter"

"Bringing a concept like MyWay in Timaru to Waimakariri would help people get to bus stops"

4.3.6 Comfort

The conversation regarding comfort showed that some people generally prefer public transport. Other participants noted that the new buses are nicer, but the seats are harder. There was also discussion around how cold buses used to be in winter, and how that is still

sometimes an issue, but less frequently. Additionally, some participants found bus drivers to drive harshly at times.

"Driving can be stressful sometimes. [Public Transport] I find it relaxing and calming"

"The buses with air conditioning are nice for long journeys"

"The seats are harder on the new electric buses"

"Seats could be more comfy"

"It used to be warmer outside in the frost than in the bus because heaters weren't working"

"There needs to be some more bus driver education, sometimes the driving is not very smooth"

4.3.7 Environment

A brief conversation about how much they consider the environmental factors revealed none of the participants significantly consider the environment when choosing a mode of transport.

"Only if I think about it"

"Zero"

5 Discussion

5.1 Leaving Waimakariri

The most popular departure locations were all in Rangiora. These were the Ashley St stop, the police station stop, and the park and ride facilities. In general, both the survey and the data analysis showed that park and ride facilities are some of the most popular places to start a ride. This shows there is a need for park and ride facilities, to accommodate commuters.

5.2 Existing Park and rides

Park and rides are more accessible than regular stops, and this would have been reflected in the perceptions survey. The results of the "can access a bus stop from my home", and "The bus stop is close to my home", was ratings of 3.4 and 3.1 overall. Non-users brought this average down, with ratings of 2.5 and 2.4 respectively, but many of these non-users may not know about the park and ride facilities. It was mentioned in the focus groups that the marketing for these services is not very good, and many people have not heard about them. This shows a need for improved marketing in Waimakariri, perhaps using social media.

By creating convenient park and ride facilities, more residents can commute using public transport. With Waimakariri continuing to grow, and the high car accessibility of rate of 93% according to the perceptions survey, park and rides are a great way to continue to grow the public transport network. However, the focus group participants expressed concerns with these services, expressing that some buses are standing room only. They also stated that former direct bus users now choose to drive to avoid standing on a bus. An investigation needs to be conducted on these routes, to determine which times need more services. More services could be provided by using bigger buses, adding another bus at the same time, or scheduling another service slightly earlier or later.

5.3 Future Park and rides

At present, the five park and rides are well used. However, the focus group participants highlighted the need for a new park and ride in the Ravenswood and Pegasus area. The nearest park and ride to this area is in Kaiapoi. The Waimakariri District Council already intends to build a new park and ride in this area, however it is not expected to be completed until around 2029 (Waimakariri District Council, 2024). There are multiple vacant sites in the Ravenswood and Pegasus area that could be used for the park and ride, if a location has not already been chosen. Figure 33 shows these two sites. These sites were chosen due to their proximity to the townships, making it convenient for drivers to

stop and take the bus. It is recommended that the council investigate potential sites for the park and ride, to ensure an adequate location is chosen.
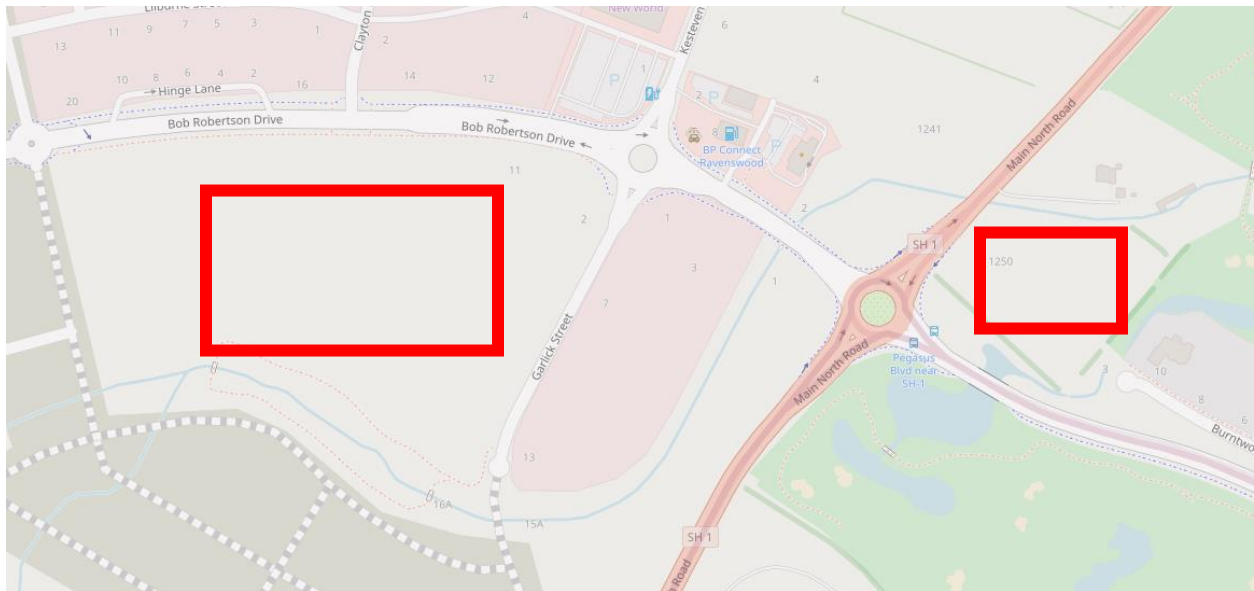
Figure 33: Red boxes indicate potential park and ride sites.

While waiting until 2029 is a significant wait, there is an opportunity to schedule this for around the same time the Belfast to Pegasus motorway is completed (New Zealand Transport Agency, n.d.-c). This would allow the bus to take a faster route, bypassing Woodend. Rather than having an entirely new route, this direct line could connect to the existing Kaiapoi to City direct line, as seen in Figure 34. The Waimakariri District Council should investigate the potential route for this upcoming direct line, as combining it with the existing Kaiapoi to City direct line would be cheaper, and have minimal impact on timing.

Figure 34: Potential route through Woodend (red), and potential route along Belfast to Pegasus Motorway (green) Note: Belfast to Pegasus Motorway route may differ to image above. (Map: Metro, n.d.-d)
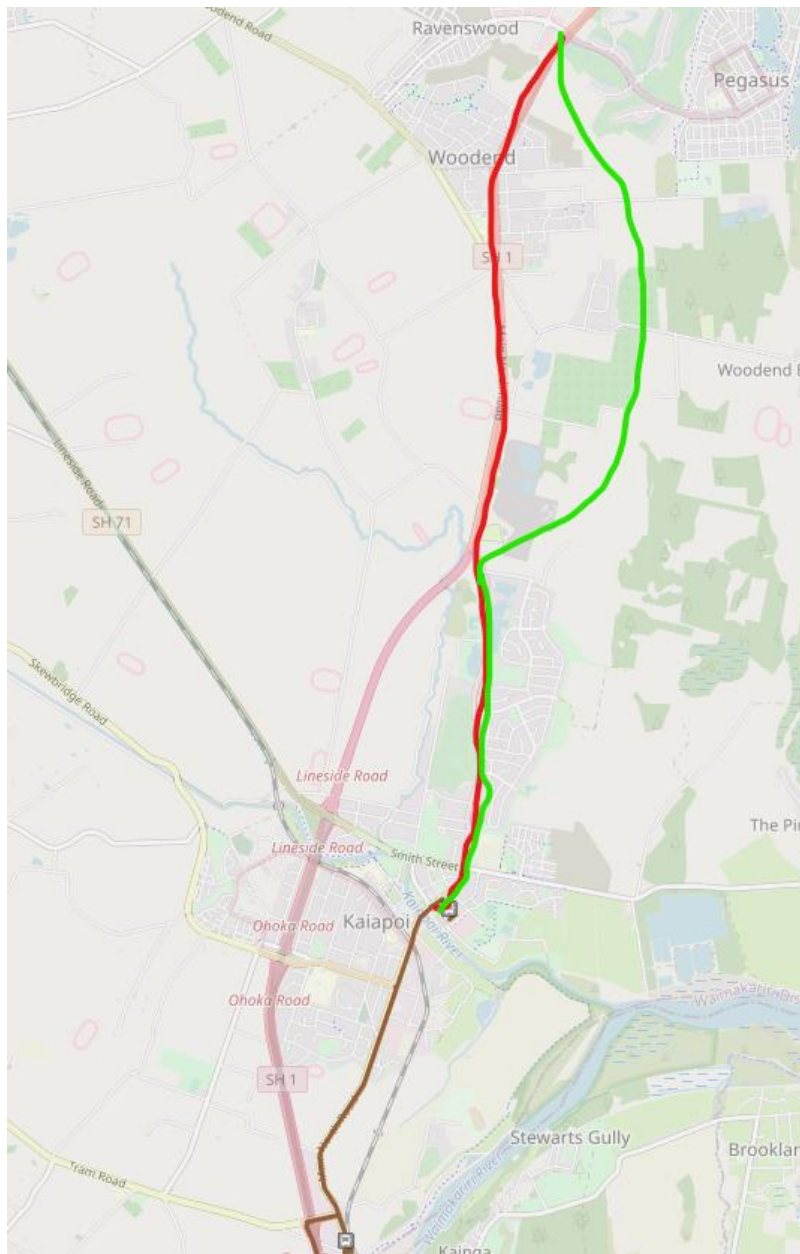
5.4 Changes to existing bus stops and routes

The focus group had an indepth discussion about bus stops, both locations lacking bus stops, and locations with too many. Ravenswood was a key area without bus stops, and the stop on the entry to Pegasus results in risk taking to cross SH1. A new route has been recommended for the 97 in Figure 35. This route is recommended rather than the 95, since the 95 can be accessed from the 97. If bus scheduling can be changed, it would allow commuters to transfer onto the 95 at the corner of SH1.
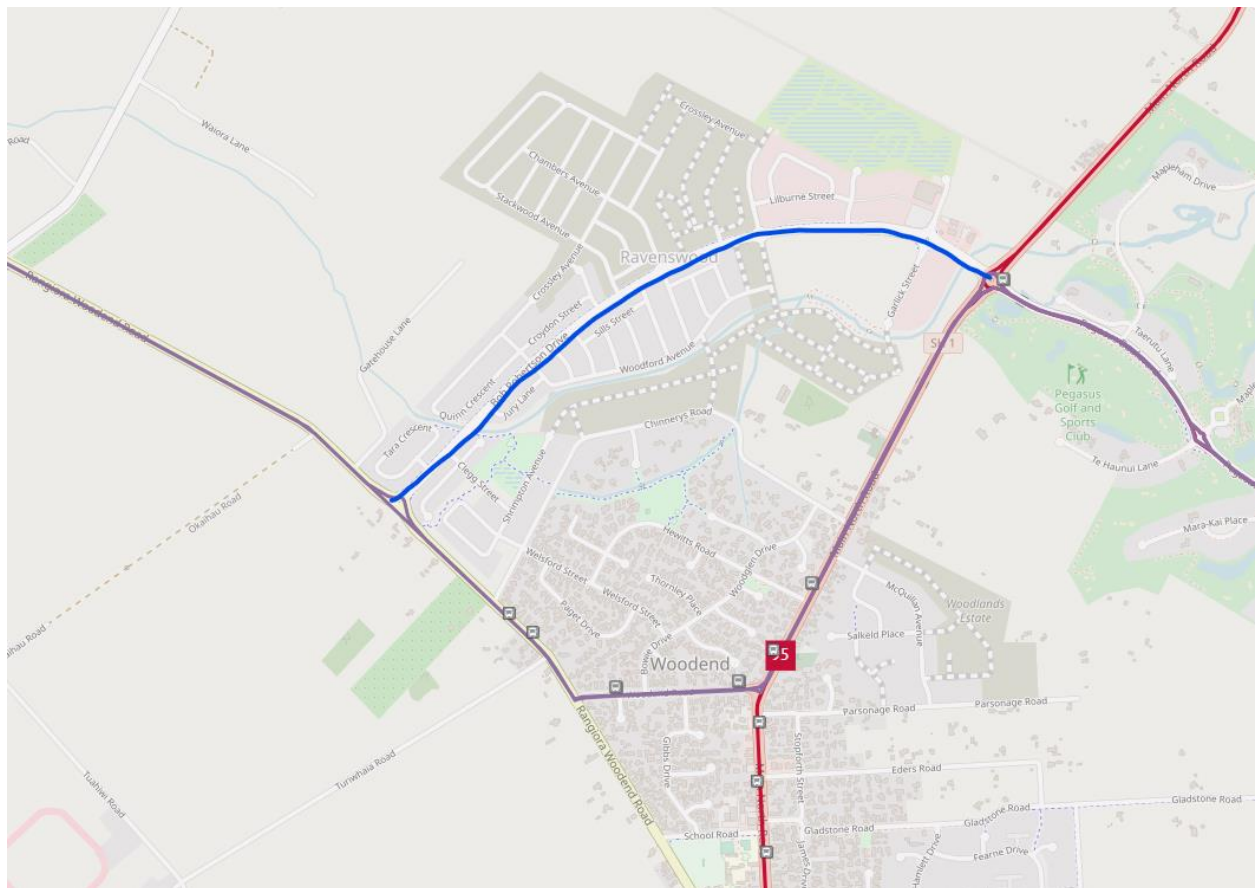
Figure 35: New recommended route for the 97 (Map: Metro, n.d.-d)

Due to the concerns of crossing SH1, Figure 36 shows a new recommended route for the 95, as well as a new bus stop. This map shows the bus route in red, and recommended stops are marked as an X.

Figure 36: New recommended route for the 95

The Waimakariri District Council should investigate immediately into these changes, due to the risk to people crossing SH1 trying to get into Ravenswood.

The focus group participants mentioned that Kaiapoi has too many bus stops. The literature has shown that this can slow down public transport and disincentivize longer travel. For this reason, it is recommended that the council look at stop distances, and ensure they are within the recommendations by NZTA (New Zealand Transport Agency, n.d.-a).

5.5 Arriving in Christchurch

The results of the survey and the data analysis showed clear trends of where people are travelling. The CBD was the most common destination, making up the majority journey

ends. This makes sense, since commuters likely make up the majority of Waimakariri public transport users, showcasing why extra emphasis needs to be put on morning buses into the city, and evening buses out of the city. Many users stated there is a bus stop close work, since the average rating for users was 4.0. Many of those users likely work in the CBD.

Another key trend was the popularity of travelling on the 1 through Belfast, Papanui and Merivale. While it initially may seem like this would be expected, it is significant for another reason. This route is where the proposed MRT goes (New Zealand Transport Agency, n.d.-d). The MRT route will begin at a new planned park and ride facility in Belfast, and then travel into the CBD. This will be a quicker, more efficient service, at a show up and go frequency. Waimakariri does not have show up and go frequency buses yet, so this could become a concern. Some users may end up travelling into Belfast to use the park and ride facility there, increasing traffic on the roads, and decreasing the number of Waimakariri bus users. For this reason, it should be investigated how the MRT development will impact Waimakariri users.

5.6 Changes to Pricing

Based off the perceptions survey, public transport is very cheap in Waimakariri. The rating for "Public Transport is expensive" got an average rating of 2.2, indicating it is not expensive for many users and non users. With many of the journeys staying within the district, there may be a need for a shift from flat fee pricing to a zoned approach. In the focus groups, many participants were in agreement that the price is very cheap, and that they would be happy to pay higher prices. By scaling prices, it would be possible to continue low-cost public transport within the district. This would however mean travel into the city from Waimakariri would cost more. This would help increase farebox recovery in line with government expectations (NZ Herald, 2024), and fund the public transport network further. While the literature agreed that the flat fare model is simple (Kirschen et. al., 2022), it is not always financially sustainable to continue this scheme. For this reason,

one recommendation is to conduct a similar study to the research done by ECan in 2021 but Waimakariri exclusive.

5.7 Safety

Safety and perceived safety are not always equivalent. Despite the literature showing there are 3 incidents for every 100,000 trips (Environment Canterbury, 2025), the network is not perceived as safe by many Waimakariri residents.

The respondents to the perceptions survey gave safety an average rating of 3.7. While this score itself is not low, and is actually somewhere in the middle, this rating varied by gender, with males rating it 4.0, and females rating it 3.0. Additionally, non-users perceived public transport to be less safe than current users, who gave average rating of 3.6 and 3.9 respectively. This further reinforces that there is a discrepancy between real world experiences (users), and assumptions made by others (non-users).

While it is understandable that some non-users, especially minorities find public transport less safe, there is an opportunity to change this perception. This could be done through advertising campaigns, and other improvements to public transport, such as increasing the security trial (Environment Canterbury, 2024). For this reason, it is recommended that more consideration is made to potential safety improvements on the network, and around bus stops.

5.8 Accessibility

Many of the perceptions survey respondents have mobility issues. The average rating for "public transport is accessible for everyone (elderly, disabilities etc), and "public transport is accessible for my needs" is 3.2 and 3.4 respectively. Non-users rated these lower, at 2.4 and 2.2 respectively. This indicates that many of the non-users are the ones impacted by non-accessible public transport. To improve accessibility for users with mobility issues, a new MyWay style service could be implemented. This was a popular idea within the focus groups.

5.9 Frequency and Efficiency

The frequency of public transport meeting participants needs was rated at 3.0. This was much lower for non-users however, at 2.0. This indicates that people may be avoiding using public transport due to low frequencies. Some routes are once an hour, which is a very low frequency. An investigation needs to be conducted into whether or not some routes can begin to have increased frequency. Some Waimakariri routes have not had the frequency adjusted in a long time despite continuous growth in the number of users of the public transport network, according to the bus stop secondary data.

The efficiency of the public transport network was also reviewed through "public transport is reliable" and "public transport is on time". These were both rated 3.3, which is satisfactory. By making sure the network is on time allows the network to create returning customers. An in-depth analysis of which routes are not on time should also be conducted, however focus group participants had very few experiences with delayed and missing buses on the network, further indicating high reliability for Waimakariri.

5.10 Inter-Town Travel

The survey and the secondary data analysis both showed that inter town travel in Waimakariri is common. Residents travel between Rangiora and Kaiapoi the most, however some residents also travel to Woodend, Pegasus and Waikuku. The need for a loop route similar to the orbiter was mentioned in the focus groups, highlighting a potential change to the public transport system. This service could connect to the main bus stops within Waimakariri, and be run with smaller buses, similar to those run by MyWay in Timaru. A proposed map can be seen in Figure 37. This map is based off focus group suggestions of a route connecting the three areas in Waimakariri. A potential downside to this could be a lack of interest from residents for this service. Before implementing a new service like this, consultation with the public can assist in determining whether or not a service is necessary.

Figure 37: A map showing a potential orbiter style bus route (map: Metro, n.d.-d)

A counter argument to this is that the public bus system already connects these three towns in all directions, meaning that a new route for this is not a high priority currently. This is a valid argument, since users can still get to each place using the current bus network in an equally efficient manner.

5.11 Comfort

The transport perceptions survey indicated that public transport is comfortable, with an average rating of 3.7. This aligned with the results of the focus group, with participants making comments such as the new buses have hard seats. This aligns with existing research, which showed that newer buses have harder seats, which passengers are enjoying less than the older buses which have more comfortable seating. As well as this, focus group participants also made comments about the air conditioning being nice in summer, and that there have been great improvements over the years. One participant reflected on how buses used to often be colder inside than outside in winter, and how this still occurs, but less frequently. This likely means that the buses are operating within a suitable temperature range. For this reason, the public transport network should continue to implement these new buses with the air conditioning, and continue to improve the temperature, ensuring it stays within the expected temperature range set by NZTA (New Zealand Transport Agency, 2024).

5.12 Environment

While the respondents of the transport perceptions survey rated "Public transport is good for the environment" as a 4.0 on average, the focus group responses were slightly different. The participants claimed they do not significantly focus on the environmental factors of public transport when choosing how they travel. This shows that while it was recognized that overall public transport is better for the environment than cars, it is not an influential factor for many residents in Waimakariri. This means that putting emphasis on the environmental benefits of public transport is unlikely to make more people use it. This varies from the literature, in which Swedish public transport users appreciated the environmental friendliness of public transport (Borén et. al., 2016). This indicates a cultural difference between Waimakariri and other places, highlighting a need to focus less on the environmental factors in Waimakariri.

6 Limitations

This research was not conducted, perfectly, and there are limitations that should be taken into consideration before using the findings of this research. As with many projects, there was a strict timeline. Even veering from this timeline slightly had negative implications for the overall project. For example, delays in the research process resulted in less time to complete the write up afterwards. There were also a few limitations within each aspect of the research that needs to be considered.

6.1 Transport Patterns Survey

The transport patterns survey had 133 responses. This was much lower than the expected number of responses. Despite the best attempt possible at displaying all required information on the poster, the community was not receptive to the survey. Additionally, some members of the Waimakariri community took down posters throughout the study period, resulting in poster downtime at certain locations. In total, there were 30 posters removed that had to be replaced. While the best effort possible was made to replace posters quickly, the average amount of time between checking poster locations was one week. This means that many of these posters may not have been available for over a week, and when posters are consistently missing, the missed opportunity for responses adds up. Additionally, a sizeable portion of the responses were invalid due to not completing the survey fully or selecting under 18 as their age. This meant their response had to be discarded before analysis due to ethics concerns.

6.2 MetroCard Data Analysis

The MetroCard data analysis was the main source of travel pattern data. This process was built upon inferences based on general travel behaviour as follows:

1) People who travel somewhere will take the bus home

2) People will be out for longer than 1.5 hours (the buffer period)

3) People will be commuting home within the same day

4) Peoples first location of the day is not a destination

While these assumptions may be correct, they result in a flawed dataset, which in no way can replace true tap on/tap off data. For this reason, the MetroCard data analysis itself may prove to be incorrect, and for that reason it is recommended that further studies are conducted after the implementation of tap on/tap off data collection.

6.3 Transport Perceptions Survey

Like the transport patterns survey, there was less interest in filling out the survey than expected. This resulted in a sample size of 385, but only 254 valid responses. While this was still larger than the data set used by Metro, it would have been beneficial to have more people filling out the survey. Distribution of the survey did go as planned, albeit sightly later than expected, so the cause of a less-than-ideal response rate is unknown. Future surveys could use incentives, especially due to the length of the survey. This could help increase the response rate, although having incentives was not possible for this survey due to budget constraints.

6.4 Transport Perceptions Focus Groups

The focus groups had multiple issues that resulted in underwhelming results. During the planning process, the intention was to have the focus groups in the Waimakariri District, either in Rangiora or Kaiapoi. However, due to unforeseen circumstances, it was no longer possible to host the focus groups in those areas. For this reason, the focus group location had to be moved to the University of Canterbury. This was the next best option, since it did not cost to host the focus groups there. However, this had a significant impact on how many people wanted to do the focus groups. Initially, there was provision for up to 27 participants across four focus groups, however the result was nine participants across two focus groups. This was a significant drop in interest compared to the anticipated interest in the focus groups. When interpreting the focus group results, the findings can be reinforced

with the perception data. Future focus groups can focus on having higher participation rates, since that would result in stronger results than those of this study.

7 Further Research

Building on from this research, future research may involve revisiting aspects of this study. Little is known about the prices Waimakariri residents are willing to pay for public transport, so further research could be conducted to determine this, using a survey similar to the one conducted by Environment Canterbury in 2021. This would allow equitable public transport pricing across the entire Metro network.

Another area that could be researched further is where people are travelling, particular after motu moves tap on/tap off is fully implemented. This would provide completely accurate data, rather than data based on a series of assumptions.

More research could be conducted on how MRT can influence commuters from outer towns, such as Rangiora, and if this will have an impact on traffic.

8 Conclusion

Waimakariri is a car dependent region, with very little public transport uptake at present. By deep diving into where people travel, and how people perceive public transport, recommendations can be made on how to reverse car dependency in Waimakariri, so residents can reap the benefits that come alongside public transport use.

Currently residents are primarily travelling into the CBD and along the proposed MRT route. For this reason, more direct buses are recommended, and support for the MRT plans is also recommended, due to the positive impact it could have for Waimakariri residents travelling into Christchurch, as well as for people from Christchurch travelling into Waimakariri.

The recommendations for the Waimakariri District Council, and other relevant Greater Christchurch authorities are:

1) Investigate ways to market direct services

2) Investigate which direct services require more capacity, and whether bigger buses, more buses at the same time, or more buses slightly later will suffice

3) Investigate potential Ravenswood and Pegasus Park and ride sites

4) Investigate routes for the Ravenswood/Pegasus direct, including the potential to use the Belfast to Pegasus bypass, and connecting to the Kaiapoi direct

5) Consider implementing a MyWay style on demand service within Rangiora to allow easier travel within the town to accommodate the aging population

6) Investigate further how MRT can work in conjunction with the current 1 route from Rangiora

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Appendix A:

Appendix B:

Question	Answer options
How old are you	Under 18
	18 – 24
	25 – 34

	35 – 44
	45 – 54
	55 – 64
	65 – 74
	75 – 84
	85 or older
What is your gender?	Male
	Female
	Another gender – please state
	Prefer not to say
Do you have access to a car	Yes, I own a car
	Yes, I can access a car but it is not my own
	No, I do not have access to a car
What type of public transport user are you?	Frequent (Once a week or more)
	Regular (Once a month or more)
	Occasional (Less than once a month)
	Non-user, may consider using in the future
	Non-user, would not consider using in the future
How do you access bus stops in Waimakariri	Walking
	Biking
	Car
	Scooter
	Other
How do you pay for the bus?	Metro Card
	Cash
	Gold Card

	Community Services Card I do not use the bus
Do you have a disability? If you are willing to share, please elaborate?	Yes No
How much do you agree with the following statements (Sliding scale for each from 1 to 5, with a not applicable box available)	The frequency of public transport meets my needs I feel safe on public transport Public transport gets me where I need to go quickly Public transport is expensive I like taking public transport Public transport goes where I NEED it to go Public transport goes where I WANT it to go I understand how to use public transport I would rather take public transport than drive a car Public transport is more convenient than driving Public transport is accessible to everyone (elderly, disabilities etc) Public transport is accessible for my needs Public transport is comfortable for me Public transport is good for the environment I can access a bus stop from my home The bus stop is close to my home

	The bus stop is close to work
	Public transporrt can be confusing for some people
	Public transport is reliable
	Public transport is on time
	I am satisfied with the Park and Ride facilities in my area
	Overall, I am satisfied with public transport

Appendix C:

Pricing:

1) How do you feel about the current cost of public transportation in comparison to other modes of transport?

2) How important to you is it that there are lower price options for students, seniors, and low-income individuals?

3) How much would you be willing to pay for public transport?

Safety and Accessibility:

1) How safe do you feel on public transport and at stops? Does anyone have any experiences where you felt unsafe on public transport?

2) Do you have any experiences or concerns regarding the accessibility of public transport for the disability community?

Frequency and Efficiency:

1) Is 30 minutes and hourly frequency enough? How does this impact your decision making when choosing a mode of transport?

2) Do you find public transport to be reliable for your needs?

3) How do you feel about the prioritization of public transport at peak times, through methods such as bus lanes, clearways and t2 lanes?

Bus Stops:

1) Are there any areas in Waimakariri that are underserved or overserved by public transport?

2) How do you find the current park and ride locations, and where would you build more?

3) How can park and ride facilities be improved?

4) Are there any locations you choose to drive rather than take public transport due to a lack of infrastructure?

5) How do you find intertown connectivity in the district?

Comfort:

1) How comfortable do you find public transport? Are there any aspects that need to be improved?

2) How do you find comfort on the newer electric buses vs the older diesel buses?

Environment:

1) How important is the environmental aspect of public transport in your decision making process?

Appendix D:

School of Earth and Environment | Te Kura Aronukurangi
Phone: +64 3 3692026
Email: ben.hendrie@pg.canterbury.ac.nz
[Date]
HREC Ref: *[Provided by HREC when study approved]*

Bus Benefits, Barriers, and Behaviour: A look into perceptions of public transport in Waimakariri, and current travel behaviour and trends.
Consent Form for Participants

Tick each statement that you agree with:

☐ I have been given a full explanation of this project and have had the opportunity to ask questions.

☐ I understand what is required of me if I agree to take part in the research.

☐ I understand that participation is voluntary and I may withdraw at any time without consequences. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain possible.

☐ I understand that any information or opinions I provide will be kept confidential to the researcher, and the supervisors of the research. I understand that any published or reported results will not identify me.

☐ I understand that a thesis is a public document and will be available through the UC Library.

☐ I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form. I understand the data will be destroyed after five years.

☐ I agree to being audio recorded, which may be converted into text using Artificial Intelligence (AI) by Microsoft Teams. I understand how this recording will be stored and used

☐ I give consent for quotes to be used from this focus group

☐ I understand that my quotes may be included in the research outputs

☐ I understand that I can contact the researcher Ben Hendrie using the email ben.hendrie@pg.canterbury.ac.nz or supervisor Lindsey Conrow using the email lindsey.conrow@canterbury.ac.nz for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Research Ethics Committee, Private Bag 4800, Christchurch, (email: human-ethics@canterbury.ac.nz).

☐ I would like a summary of the results of the project.

☐ By signing below, I agree to participate in this research project.

Name:_____ Signed:_____ Date:_____

Email address *(for report of findings, if applicable):*_____