GEOG402: Resilient Cities

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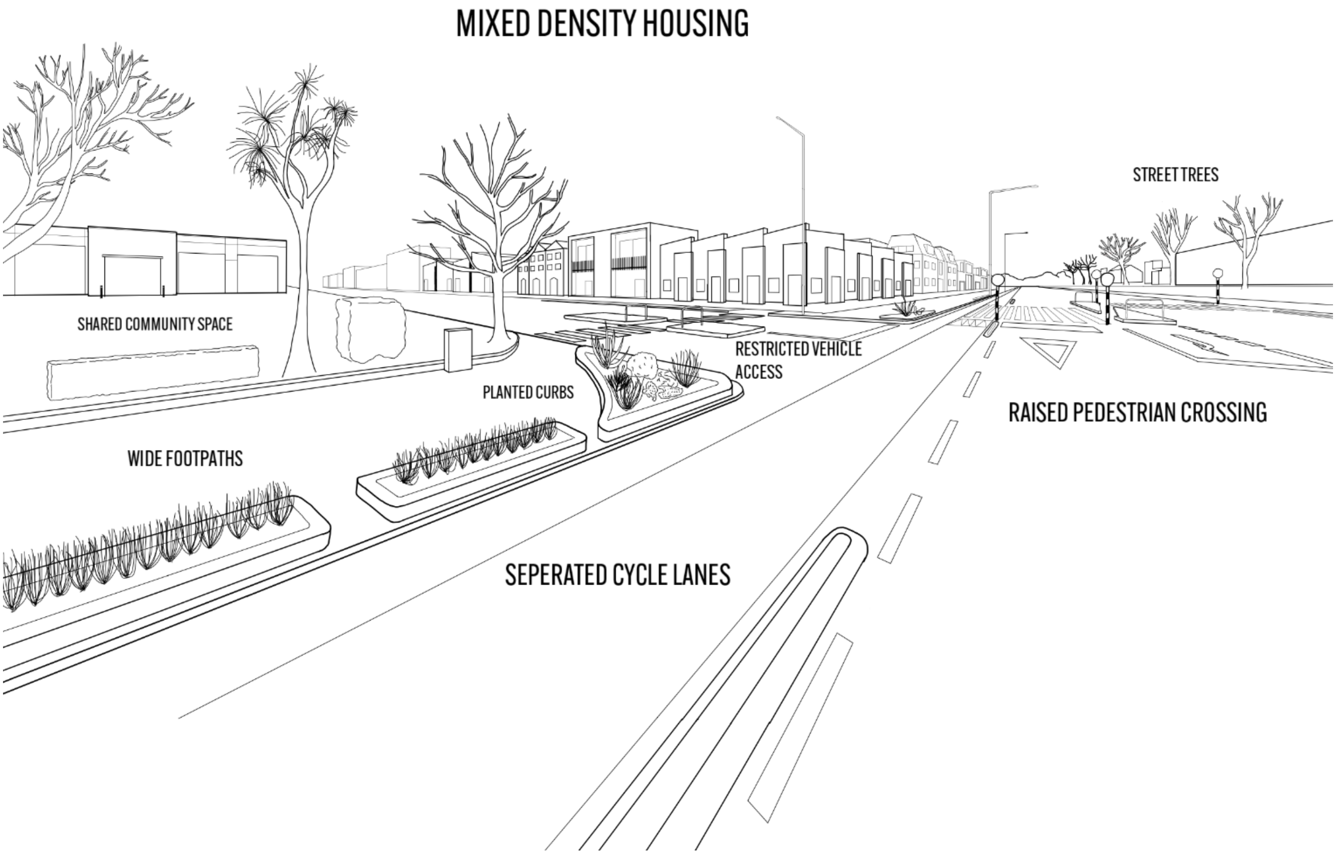

CREATING HEALTHIER STREETS

Making the case for embedding public health into the planning of Church Corners built environment ahead of Mass Rapid Transit and Plan Change 14

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ABSTRACT

Christchurch has ambitions of growing in a way that provides the best economic, social, cultural, and environmental outcomes for its people and places, for both present generations and those to come. To achieve this, Christchurch's urban form must adapt to its current needs. A high-density, transit-oriented development (TOD) urban form will be implemented, organising mixed-use intensification into urban cores along a transit corridor. To ensure the liveability and safety of these environments, there is a need to understand how the condition of the built environment influences life in urban areas. Under guidance from the recently adopted Greater Christchurch Spatial Plan (GCSP), our research explores what a transit-oriented future could look like around an existing suburban centre identified as a station on the planned Mass Rapid Transit (MRT) line. Using the Healthy Streets Framework, we assessed the current street environment around Church Corner, a commercial core surrounded by housing which is zoned for intensification under the proposed Housing and Business Choice Plan Change (PC14). Poor street quality disproportionately impacts pedestrian users, however small changes to urban design and strategic implementation of traffic calming measures could provide significant gains to urban quality. We identify areas that need improvement in Church Corner ahead of MRT implementation and suggest a plan of how the concept of superblocks could be implemented to foster a resilient transit-oriented environment, encouraging public and active transport uptake from residents in the area.

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INTRODUCTION

As global urban populations continue to grow, it is time to rethink how cities manage this growth to provide the best economic, social, cultural, and environmental outcomes for their people. A better understanding of what is going on at the street level could provide more holistic guidance on how to manage New Zealand's growth in a way that promotes health, sustainability, and resilience.

In Christchurch's current urban form, streets play a basic role of facilitating transport, mainly for privately-owned small vehicles. But using a strategic approach, they have the potential to become places where people move, meet, and connect, and do so with a strong sense of safety. To fully realise the objectives of shifting national policy direction, there is a need to understand how the current condition of the built environment influences life in urban areas. In Christchurch, there has been little to no data collected about the condition of streets for people outside of the city centre. This research aims to increase this understanding in a local setting, by providing an answer to the question:

What are the features of the current street environment around Church Corner, and what changes should be made to make the streets healthy places for everyone when the mass rapid transit line is installed?

The report is structured as follows: A background section defines the role of the Greater Christchurch Spatial Plan and the need for a new approach to urban growth in Christchurch. A thorough literature review explores how urban environments can be designed to shape healthy and safe communities who utilise public transport. Results from a comprehensive street assessment of Church Corner identify small changes that could provide benefits to the area and its residents. Finally, a plan for how incremental changes could be systematically implemented to create a shared priority network at Church Corner is discussed, conducive to sustainable and resilient city development.

BACKGROUND

Christchurch and Mass Rapid Transit

As the second largest major urban area in New Zealand, Greater Christchurch is predicted to see a 15 percent increase in population from 508,000 in 2018 to 653,000 in 2048 (Figure 1) (Canterbury Wellbeing Index, 2024). On top of this net population growth, rising sea levels and increased impacts from climate change have created the need to plan for managed retreat from risk zones (Greater Christchurch Partnership, 2023). To manage this, housing supply must increase by over 42,000 homes by 2048 (Mitchell, 2021). The current approach of greenfield subdivision results in fewer logistical challenges to land developers but has significant environmental effects such as encroachment on productive farmland and increased reliance on cars for transit (Greaves & Stopher, 2006). This unsustainable pattern of growth and the need for change has been recognised in recent policy documents.

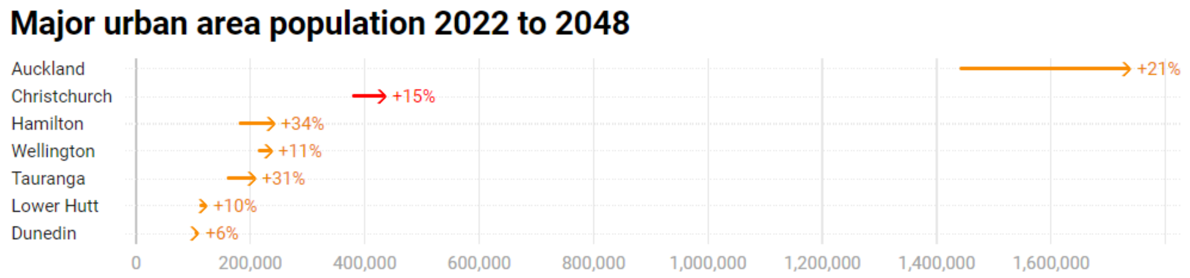


Figure 1: Projected population change in major urban areas across New Zealand (StatsNZ, 2022).

The urban development of Christchurch is guided by the Greater Christchurch Spatial Plan (GCSP), which was endorsed and adopted on the 16th of February 2024 by the Greater Christchurch Partnership Committee (GCPC) (Greater Christchurch Partnership, 2023). The GCSP is made up of a coalition of mana whenua, government agencies, and local government who inform the strategic direction of Greater Christchurch (Figure 2). A key role of the GCSP is to recharacterise urban growth in Christchurch from sprawling neighbourhoods of detached single-family homes to higher-density, mixed-use neighbourhoods. The Housing and Business Choice Plan Change 14 (PC14) gives effect to national direction for housing intensification set by the National Policy Statement on Urban Development (2020) (NPS-UD). PC14 is intended to allow for more growth in the city's existing footprint (Christchurch City Council, 2023).

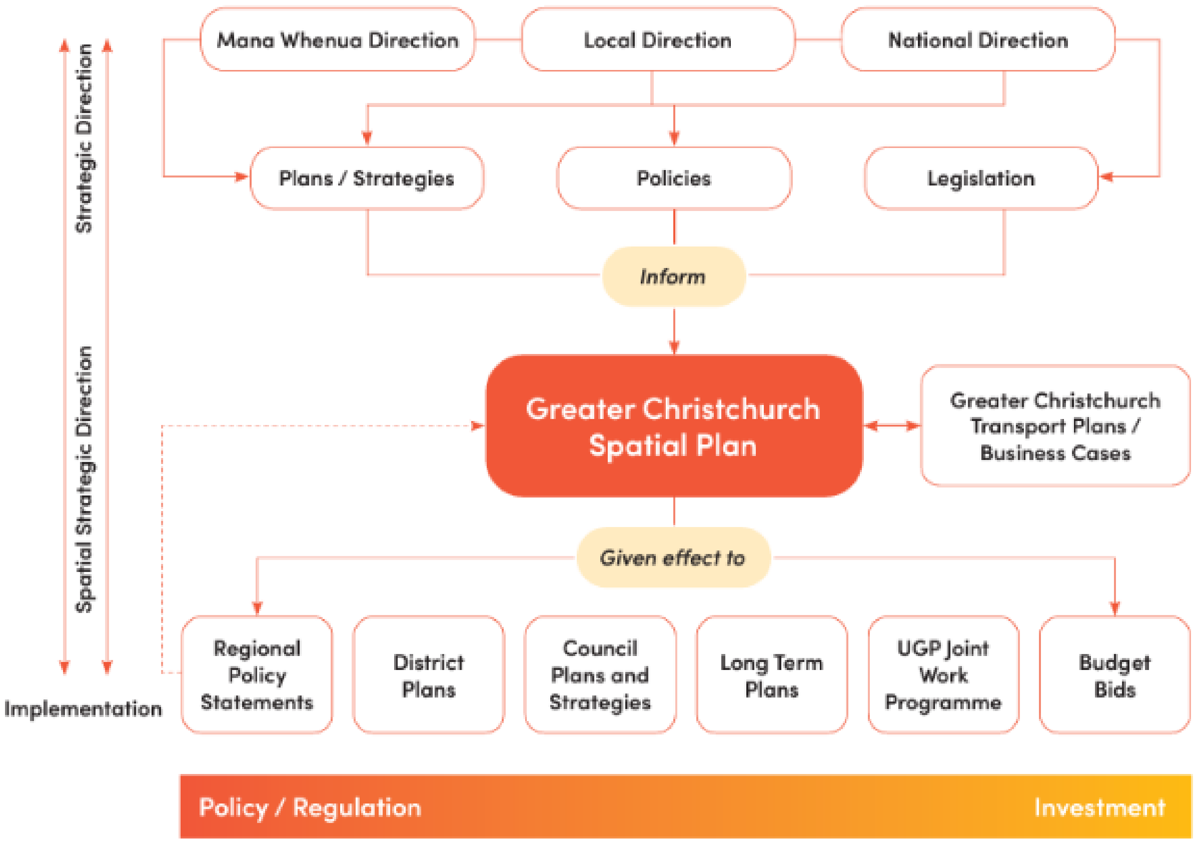


Figure 2: Planning context for the Greater Christchurch Spatial Plan (Greater Christchurch Partnership, 2023).

To delineate a corridor to focus on urban growth, the GCSP plans for the instalment of a single mass rapid transit line which will provide residents from outer suburbs a frequent, reliable, and fast service to and from the centre city. By 2028, it is expected that construction will be underway on a high-capacity service (rail or bus) operating between Papanui and Church Corner (WSP New Zealand Limited, 2021). A second phase plans to extend the service north into Belfast and Southwest towards Hornby (Figure 3). MRT will not only guide the city's urban development but will also help to achieve Christchurch's goal of reduced emissions from transport by 2051 (GCSP, 2023).

Greater Christchurch Spatial Strategy

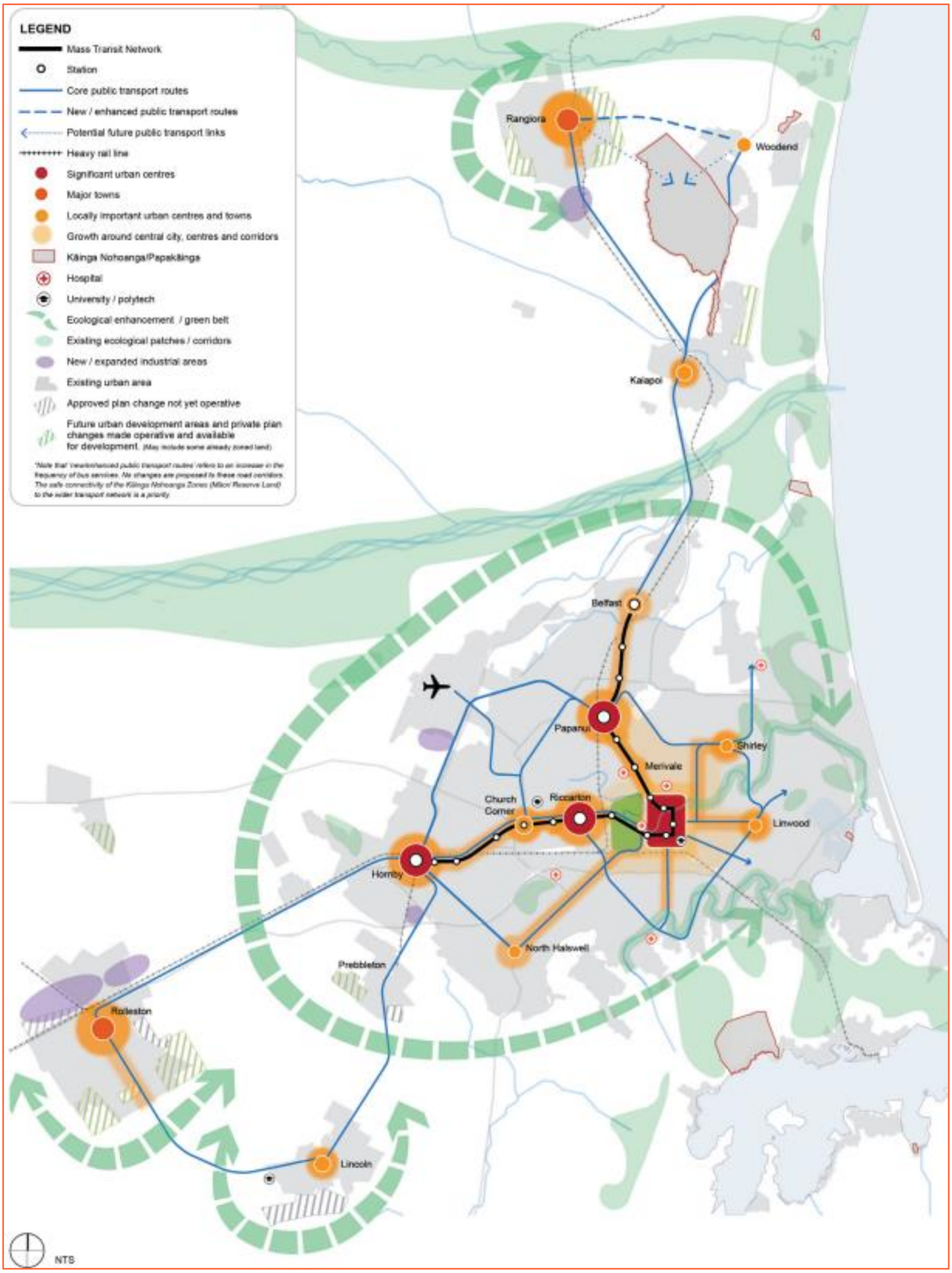


Figure 3: The spatial strategy as defined in the GCSP consultation document. This map indicates how growth could be managed with a population of 1 million residing in the Greater Christchurch Area (Greater Christchurch Partnership, 2023).

Church Corner

Church Corner (Figure 5) is a commercial centre positioned along the proposed MRT line, between Riccarton Mall and Hornby. Under PC14, Church Corner is identified as a 'Large Local Centre' for residential and commercial intensification (Christchurch City Council, 2023). It is located at the convergence of three major arterial routes - Riccarton Road, Main South Road, and Yaldhurst Road, with traffic volumes of over 10,000 vehicles passing through the area each day. Despite high through traffic, the land surrounding the centre is occupied by primarily low-density housing. Under the One Network Framework (ONF) recognised by Waka Kotahi/NZTA (Figure 4), most of the streets around Church Corner can be characterised as urban connectors or local streets (The Road Efficiency Group, 2021). Under the operative Christchurch District Plan, the residential area surrounding Church Corner is zoned for lower density, however, PC14 would permit the construction of six storey developments in these areas, significantly changing its urban form (Figure 5).

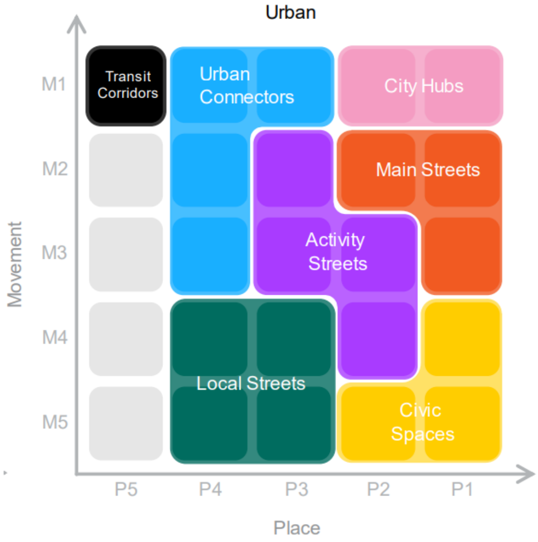


Figure 4: One Network Framework for classifying urban street types (The Road Efficiency Group, 2021).

Five schools are less than 1km walking distance from Church Corner, meaning the centre acts as a transit hub for many young people. Proximity to the University of Canterbury has led to a higher percentage of student aged population when compared to the rest of Christchurch (Figure 4). The student population also contributes to a lower average annual income within the community, with Upper Riccarton having an average of $19,700, significantly less than the $32,900 average across Christchurch City (Stats NZ, 2018).

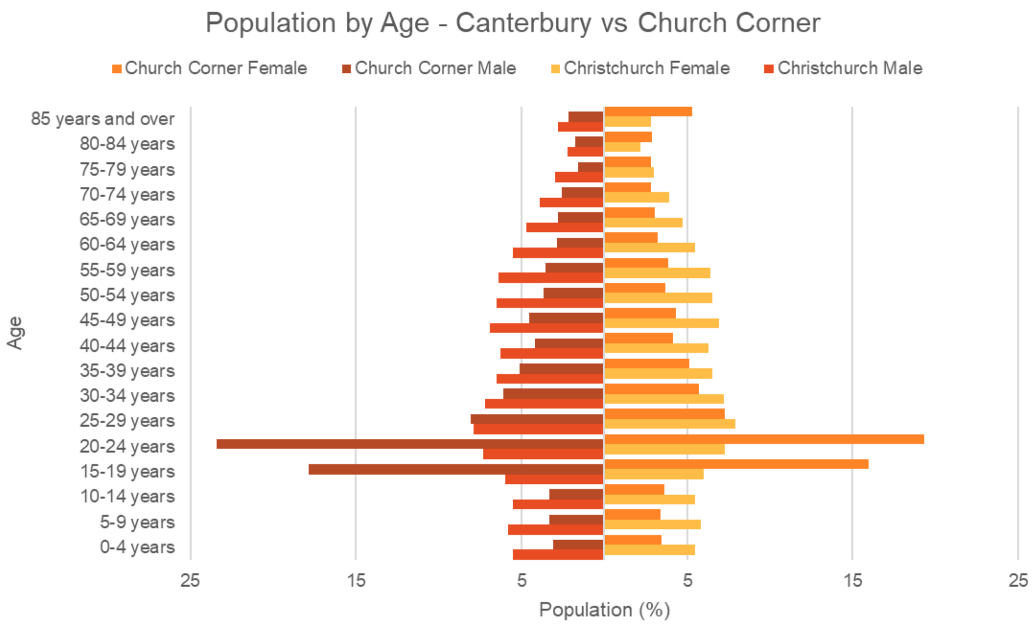
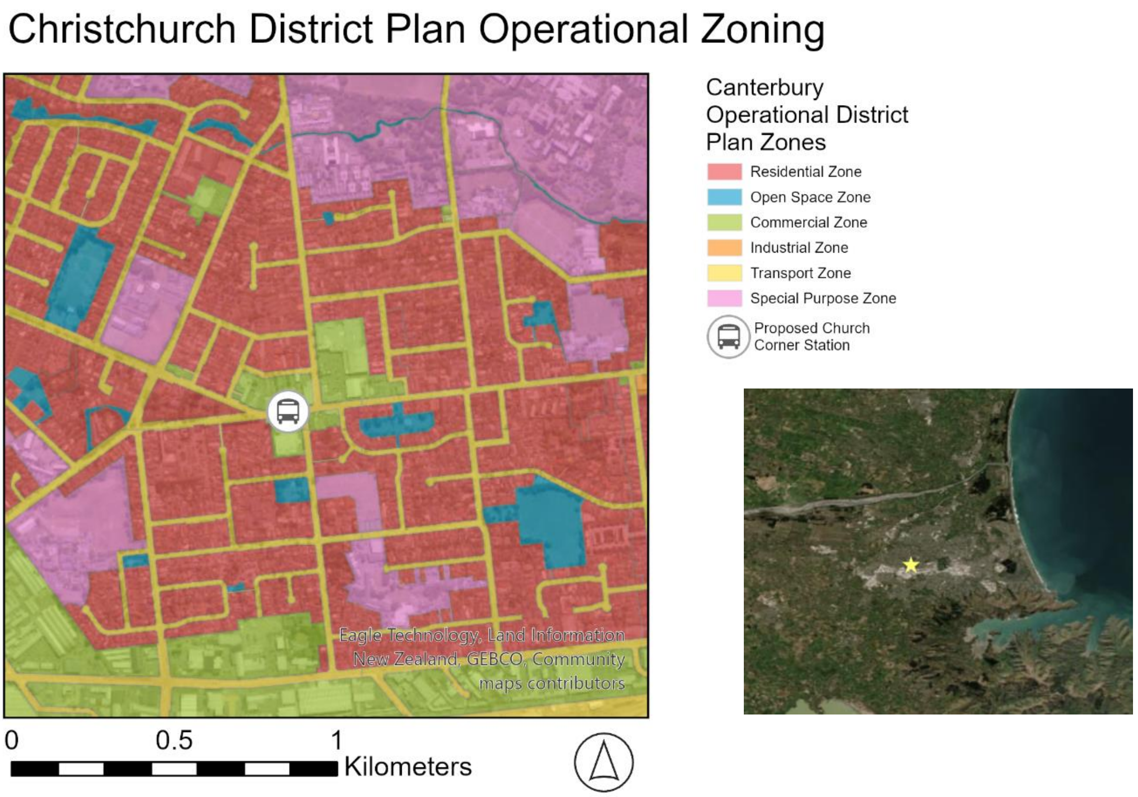


Figure 5: Population by age for the Church Corner Catchment compared to Canterbury population (StatsNZ, 2022).

Church Corner Catchment Zones



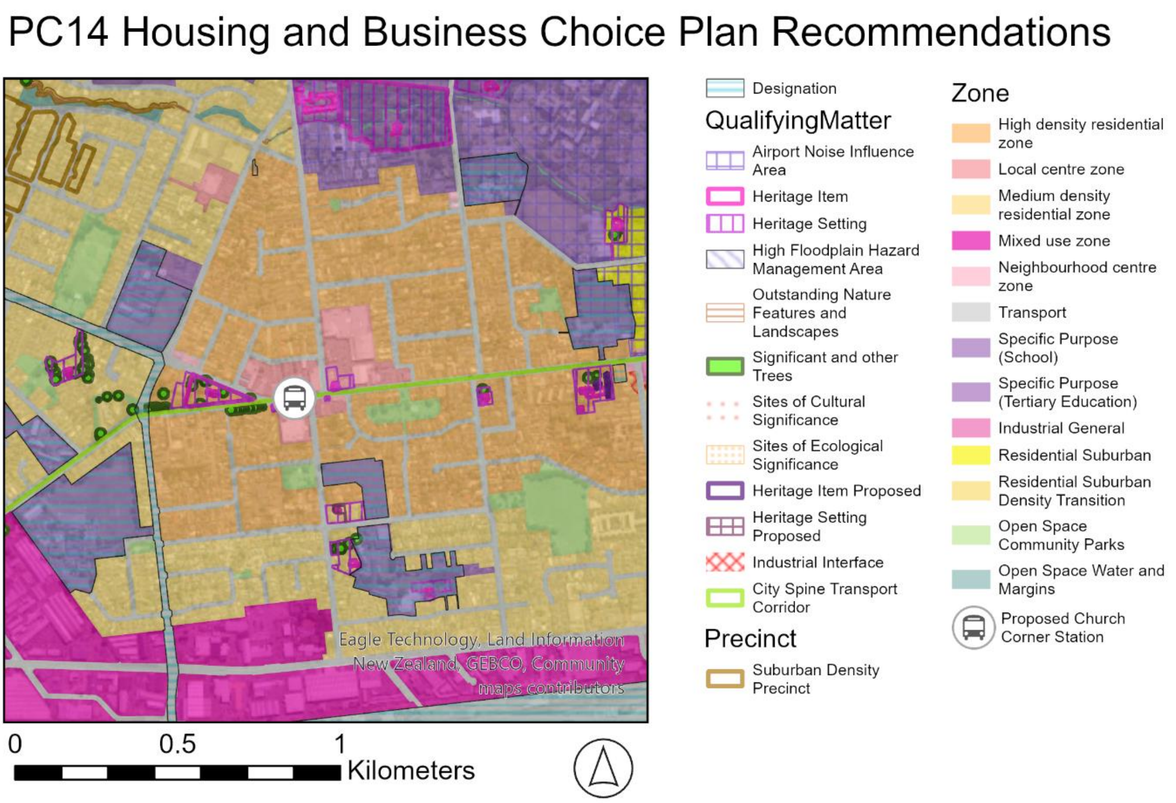


Figure 6: A Comparison of district plan zoning at Church Corner. The map above shows the operative zoning from the Christchurch District Plan, in which the surrounding blocks around the commercial centre are zoned for residential 1-2 storey homes. The map below indicates the recommendations from PC14, where the area in orange permits residential construction up to 14m without resource consent (Christchurch City Council, 2023a)

LITERATURE REVIEW

A strong understanding of the literature on creating healthy urban environments that encourage active and public transport is imperative to ensure Church Corner thrives as a larger local centre under the GCSP. This literature review explores the need to find a balance between pedestrian and vehicle movement, the infrastructure and amenities that are required for a well-functioning urban centre, the features that make an environment feel safe for its residents and visitors, and how these ideas can be integrated to encourage public transit uptake in a transit-oriented development.

Pedestrian Safety versus Traffic Flow: Striking a Balance

Recognising that high traffic speeds and volumes increase collision risk and severity (Job & Brodie, 2022), pedestrians display decreased willingness to use and spend time in car-centric street environments (Jacobsen et al., 2009). Literature has displayed an increase in urgency to ‘reclaim’ streets as public places (Lofland, 2017; Marshall et al., 2014), but this poses risks to motor vehicle accessibility and threatens the maintenance of economic vitality and functionality of pedestrian zones.

Hass-Klau (1993) found that traffic calming and pedestrianisation of urban areas increased foot traffic to retailers, though the stability of sales was more variable. Literature reported on the successes of implementation of 'pedestrian plazas'—public spaces that prohibit motor vehicle traffic (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017). These plazas saw improvements in pedestrian safety due to reduced collisions, increased foot traffic to commercial areas, and enhanced commercial success in nearby areas.

Even with increased foot traffic in commercial areas, freight transit vehicles carrying consumer goods, tradespeople materials, and waste collections still need to move goods to keep urban retailers stocked and provide essential services to residents. Verlinde et al. (2016) report that partial pedestrianisation restricts vehicle access forcing stakeholders to change their behaviour, impacting costs and service quality. However, well-managed time windows for deliveries along with strategically placed loading zones, can help mitigate the potential negative impacts on congestion and allows for a smoother integration of freight activities within pedestrianised areas.

Figure 7: Examples of Autonomous Vehicles from Aster Fab (2020, April 21).

The National Association for City Transport Officials (2019) suggest strategies to adapt urban freight delivery to fully pedestrianised street environments, aiming to stabilise commercial activity while ensuring safe and efficient operations. As vehicle access would be fully prohibited, a proposed method entails establishing consolidation facilities on the outskirts of pedestrianised urban areas, where multiple delivery services can resort and combine their goods. Packages bound for similar addresses can be efficiently delivered using electric bikes or small delivery Autonomous Vehicles, thus enhancing efficiency while minimising disruption to pedestrian zones (Figure 7). Pedestrians would preserve their sense of safety without the intrusion of motor vehicle traffic.

Provisioning Infrastructure for a Healthy Community

The planning of neighbourhoods and towns can impact the well-being of individuals and communities. To create a health promoting environment for its residents and visitors, a town should provide a certain level of service to maintain and improve its infrastructure, facilities, homes, and transport options.

Infrastructure in urban developments is comprised of interconnected systems of technology and utilities to provide services such as water, energy, and communications. It is essential for supporting urban living and the functionality of cities (Joynt, 2021). Access to infrastructure should be equitable for all residents to ensure a safe, healthy environment. Most people spend majority of their time at home, so utilities infrastructure should be accessible in all homes. Within a wider network, it is important there is a balance of infrastructure types, especially for transport, to allow for connectivity and ease of access (O'Sullivan et al., 2023).

As foundations for well-being, housing should be universal and cater to the needs of its occupants, ensuring stability for all, including the most vulnerable (Greater Christchurch Partnership, 2023; O'Sullivan et al., 2023). Existing housing typologies in Christchurch will not be able to meet the needs of the population in the future, indicating the need to develop more medium and high-density housing (Greater Christchurch Partnership, 2023). In 2018, 5.2 percent of private residential dwellings (78,900 dwellings) lacked access to at least one of six basic amenities in New Zealand (Viggers et al., 2018). Those living in these dwellings experience reductions in their mental and physical well-being. Warm, safe, and affordable housing is a fundamental human right in Aotearoa and should be prioritised in urban areas to improve population health (Joynt, 2021). New developments should be located with easy access to employment, transport, and social infrastructure to create connectivity for communities (Joynt, 2021).

Public facilities, including community hubs, libraries, and greenspaces, contribute to strong, healthy, and vibrant communities (Joynt, 2021). They provide a space for residents to socialise, learn, and participate in a diverse range of social, cultural, and recreational activities (Greater Christchurch Partnership, 2023). Social cohesion facilitated by these spaces contributes positively to individual and group health and well-being, safety, and resilience. A thriving community should meet the physical and sociocultural needs of its people (Kāinga Ora, 2022). It is important that the urban form is inclusive for all citizens, including the most vulnerable with complex needs (Joynt, 2021). Figure 8 shows the range of services that should be accessible through active transport modes to ensure a healthy community (Greater Christchurch Partnership, 2023). Encouraging active transport modes, such as walking and cycling, to essential services can benefit physical health and well-being. It is vital to ensure urban developments have a good balance of each service based on needs and everyone has equal access and opportunities for social, cultural, environmental, and economic interactions (Ministry of Health, 2022).

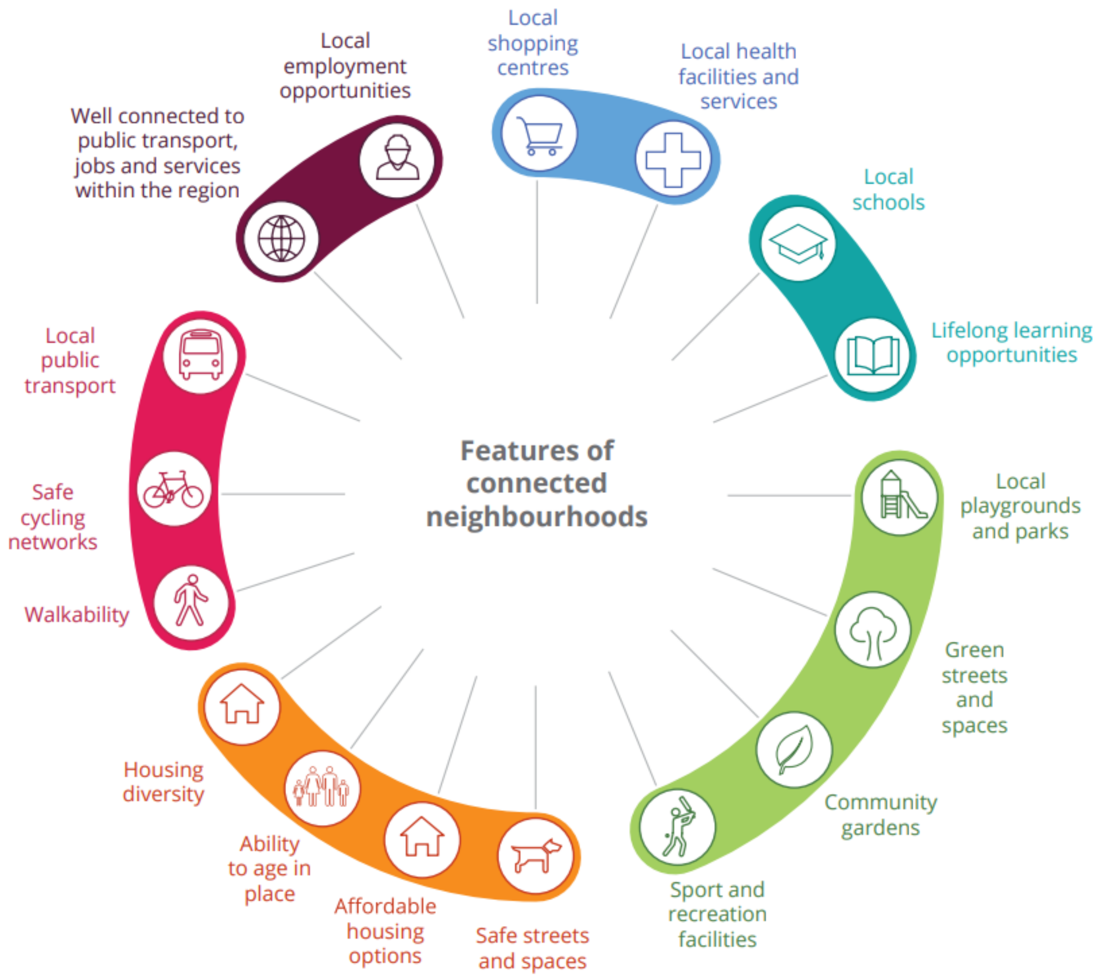


Figure 8: Features of thriving neighbourhoods as defined in the Greater Christchurch Plan as a part of opportunity 4: ‘Enable diverse, quality, and affordable housing in locations that support thriving neighbourhoods that provide for people’s day to day needs’ (Greater Christchurch Partnership, 2023).

Creating Safe Urban Spaces: Perceptions Versus Reality

An urban environment may efficiently provide amenities and reduce the actual danger of traffic to pedestrians, but without consideration of how its residents perceive their safety, its success can be compromised. Modelling by Manning et al. (2022) suggests that perceived crime in a location has a greater negative impact on life satisfaction than real crime, indicating the importance of creating environments where people feel comfortable and safe. When an environment is perceived as safe, transit uptake is encouraged and walkability increases, contributing to the health and well-being of its residents as well as the overall sustainability of the city (Traunmueller et al., 2016).

When measuring perceived safety in a neighbourhood, it is vital to consider how different demographics develop their perceptions of personal safety in relation to their environment. In a study of activity on public urban streets in Auburn, Alabama, Park & Garcia (2020) identified that younger female students typically express greater concerns about their safety in urban areas than their male peers, especially after dark. Results from the Canterbury Wellbeing Index Survey conducted between 2018 and 2020 suggest that age is also an important factor in determining safety perception, with Canterbury residents over 65 indicating lower perceived safety both on the street and in their homes (Canterbury Wellbeing, 2024). This study revealed that respondents with a lower income tended to have a more negative outlook on their safety than those on higher salaries.

For all demographic groups, lighting plays an important role in establishing a positive perception of safety. Despite some studies suggesting that well-lit environments do not decrease real crime rates on their own (Morrow et al., 2000; Steinbach et al., 2015), these studies focus on reported crime rather than perceived safety. Lighting has been suggested to help people perceive the area as safe, resulting in increased activity and therefore increased surveillance on the street (Kyttä et al., 2014).

In her book 'The Death and Life of Great American Cities', Jacobs (1961) discusses the principle of passive surveillance. The perception of safety in streets can be created actively, through security guards, or passively, through strategic design choices. A framework used often in urban design to guide these choices is Crime Prevention Through Environmental Design (CPTED). The Ministry of Justice (2005) provides official guidelines on how to implement CPTED into urban environments. The MoJ outlines 'seven qualities of well-designed, safer places', which are detailed in table 1. Principles from CPTED were adopted in the planning for the post-earthquake city in Christchurch, New Zealand (Ramsay, 2012).

Boundary setbacks and height controls that have shaped New Zealand's urban form can make it difficult to apply these principles in retrofitting scenarios, especially when residents have a previously developed perception of their safety in the area (Doeksen, 1997). However, safety strategies that encourage shared ownership can help to stop neighbourhood decay (Doeksen, 1997; Kyttä et al., 2014).

Table 1: qualities of well-designed, safer places, as defined by the New Zealand Ministry of Justice (20105)

Quality	Definition
Access	An area that promotes safe movement and connection, with well-defined entries and exits that do not compromise security.
Surveillance and sightlines	Places that are accessible to all, have clear lines of sight, and carefully designed lighting that provides maximum visibility.
Layout	The use of clear and logical design orientation that discourages crime and encourages imageability and wayfinding. These environments also enhance the perception of safety.
Activity mix	Follows Jane Jacob's (1961) principle of 'eyes on the street' by promoting a compatible mix of uses. A reduced risk of crime is created by increasing the use of the public realm.
Sense of ownership	Places that encourage their residents to care for their collective space. These areas promote territorial responsibility and community.
Quality environments	These environments are designed with thought given to how they will be managed and maintained over time, promoting safety in the present and future.
Physical protection	In places where it is necessary, active, well designed security features and elements are included.

From Streets to Spaces: Enhancing Urban Design

As active transport is intended to be the primary mode of travel used at the beginning and end sections of an MRT trip, it is essential that Church Corner's local built environment can adequately meet the demands of the increased future population. In transport literature, these sections are called the first/last mile (FLM) trip and are a significant factor that influences the success of an MRT network. This report investigates the relationship between pedestrians and the built environment within the first/last mile area of Church Corner to identify key factors of the that either promote or diminish accessibility to transportation. Church Corner is a “Larger Local Centre” under PC14 and is one of the core transport hubs in Christchurch’s proposed MRT network, making it a relevant case study (Christchurch City Council, 2014).

Alfaris et al. (2024) discuss how accessibility to transport is crucial to successfully addressing the FLM problem, with higher residential density, mixed land uses and built environment improvements identified as key factors contributing to high levels of accessibility. Both higher residential density and mixed land use factors are due to be addressed by PC14, projected to significantly improve transit efficiency compared to its current low-density environment.

Zellner et al. (2016) seconds these results, identifying trends in how the aforementioned factors interacted with one another. Their study finds where built environment improvements were implemented in lower density neighbourhoods, a greater proportional increase of transit ridership uptake was found in comparison to higher density neighbourhoods. However, higher density neighbourhoods are inherently restricted by car use policies due to the compact nature of the built environment, making existing transit use higher due to the inconvenience of car use and proximity to transit stations, regardless of the built environment’s condition. As well-being is a direct function of the built environment, its assessment and subsequent improvement is required to ensure Church Corner undergoes a successful transition to a higher density environment that adequately supports its increased pedestrian population (Sundling & Jakobsson, 2023).

Prioritised factors of the built environment vary depending on each populations needs. However, perceived safety is considered the most significant determinant of pedestrian well-being, closely followed by walkability (Sundling & Jakobsson, 2023). These factors are highly interconnected, with built environment improvements such as improved footpath surface quality, equitable crossings, pedestrian-only street connectivity, slower traffic speeds and lighting improvements having proven effective at addressing both factors, thus facilitating accessible pedestrian environments (Liu et al, 2023; Victoria Transport Policy Institute, 2019).

METHODOLOGY

Healthy Streets Framework

Healthy Streets originated in London as a systematic, evidence-based approach to develop an urban transport system to improve the mental and physical health of a city and increase active transport use through minimising negative transport impacts *(Plowden, 2019)*. These impacts have been transformed into evidence-based indicators, which are the foundations of the Healthy Street Approach shown in Figure 9. The Healthy Streets Assessment has been implemented in cities like London, Barcelona, and Hertfordshire, and has recently been introduced to New Zealand *(Healthy Streets, n.d.)*.

Figure 9: Healthy Streets Approach evidence-based indicators (Healthy Streets website)

Healthy Streets aims to enhance air quality, minimise congestion, and transform diverse communities into greener, healthier, and more attractive places to live, work, play, and do business (Palència, et al., 2020). It creates urban environments where all community members feel safe and welcome, encouraging people to spend time in these areas and promoting active transport. It creates inclusive environments and ensures easy access to everything within the catchment area, improving overall well-being (Healthy Streets, 2021). It adapts to the priorities and needs of different cities, assessing the entire street and determining the weakest area that impacts accessibility, safety, liveability, and connectivity, aiming to improve mental and physical well-being for all people in a community.

This holistic framework can be used at any stage of urban development and involves six evaluation steps: clarifying objectives, integrating evaluation into project planning, choosing measurement tools, designing how measures will suit the project, using evaluations to improve project delivery, and reporting findings (Healthy Streets, 2021). This cyclical process repeats itself until Healthy Streets' goals are achieved.

The research approach started with a meeting with a community partner, Chris Morahan from the Christchurch City Council (CCC). Together, the Healthy Streets Approach was decided upon to analyse the Church Corner area in Christchurch and determine the impact and improvements for the proposed MRT route. This assessment will provide CCC with data to further assess the urban form around Church Corner.

Study Area

Church Corner, in Upper Riccarton, Christchurch was chosen as the study area due to the proposed MRT transit station at its intersection. As shown in Figure 10, the assessment covered a 400 m and 800 m buffer zone of streets around the intersection. A 600 m walking catchment was recommended by CCC under PC14 (Christchurch City Council, n.d.). Streets west of Main South Road and lower Yaldhurst Road were excluded due to their residential zoning under PC14, despite being within the 800 m catchment. The chosen streets are all important for accessibility, safety, health, and connectivity once the MRT route is active.

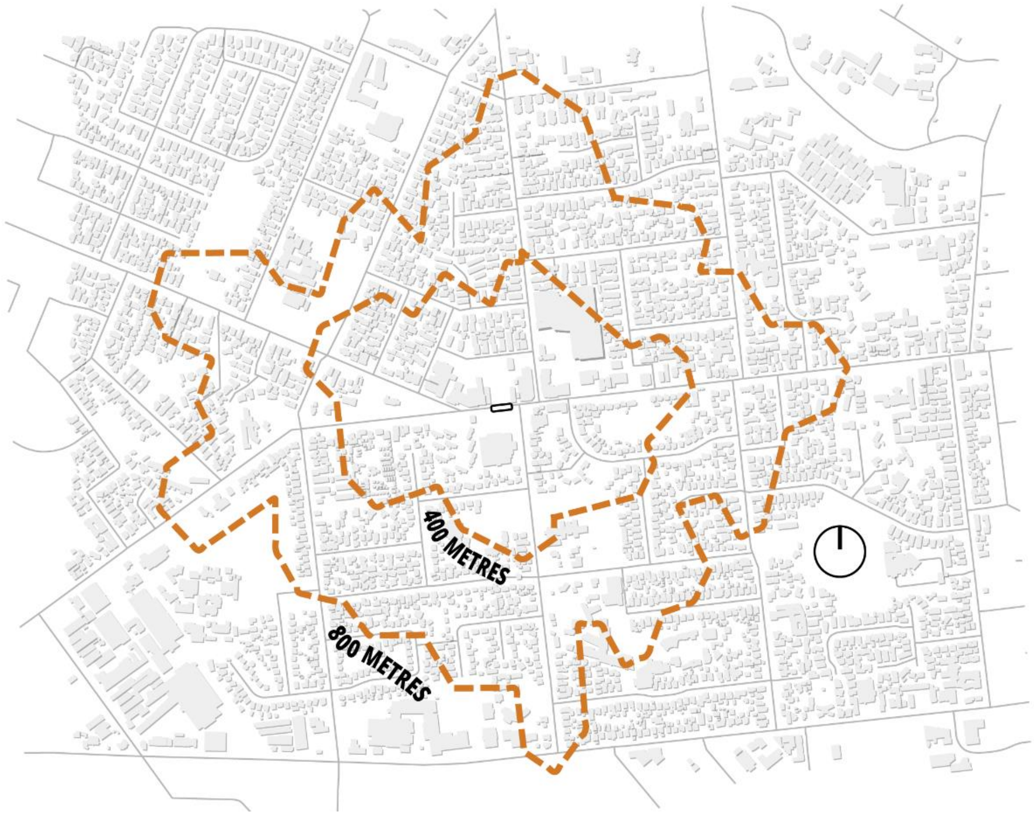


Figure 10: 400m and 800m walking distance isochrones from the proposed MRT station location in the Church Corner commercial core. The streets assessed under the Healthy Streets Framework were chosen based on these distances.

Data Collection

Primary Data Collection

To analyse the streets within the 800 m buffer around Church Corner, a Healthy Streets Survey was conducted on Tuesday, April 2nd, in the morning during peak school traffic. The survey began with all group members assessing Rountree Street together. This increased the data accuracy by ensuring consistent evaluation criteria for each metric. The group then split to assess streets separately during the day and returned at night to collect lighting data.

Healthy Streets provides free technical tools and resources for street designers and engineers use to assess streets (Healthy Streets, 2023). A survey was created in ArcGIS Survey 123, based on the New Zealand Healthy Streets Assessment with 19 metrics used to evaluate the evidence-based indicators (see Appendix B). When conducting the assessment each group member had an electronic survey form for each street and scored each metric a 0, 1, 2, or 3 based on the streets features. These were answered by walking the street, recording features, and taking pictures. Data from these surveys was collectively analysed to correct errors and mitigate uncertainties, ensuring accurate, uniform results. The scores given were entered into the Healthy Streets Design Check Excel tool where it generates a final Healthy Streets score out of 100 for each street by categorising each metric under the appropriate evidence-based indicators and weighting each indicator (Healthy Streets, 2023). ArcGIS maps were created from the final Healthy Streets data and scores to compare categories across the Church Corner area and investigate any irregularities.

Surveys were conducted during peak traffic times to assess congestion and gauge safety and wellbeing of community members. This also helped to visualise potential superblocks by observing traffic flow and identifying beneficial locations.

Secondary Data Collection

In the survey, traffic volume, speed, and vehicle mix data were obtained from CCC and NZTA databases as manual collection was likely to be inaccurate due to time constraints and lack of surveyors. Traffic speed was sourced from the CCC website, using the daily combined direction 85th percentile speed (Christchurch City Council, n.d.-a). Traffic volumes and mix of heavy vehicles per street were taken from the Mobile Road Index (Mobile Road, 2024).

However, the NZTA and CCC databases lacked some necessary information. For traffic speed, not all street speeds were included, so some speeds were estimated by comparing streets with similar layouts. For example, Hanrahan Street was scored based on Rountree Street's data due to their similar layouts and traffic calming measures.

RESULTS

Based on Figure 11, the Church Corner street environment does not effectively benefit public health. Healthy streets scores, except for one street, did not exceed an output of 50. Notably, arterial streets showed the lowest performance. Scores improved as distance from these arterial streets increased and residential use became more prominent.

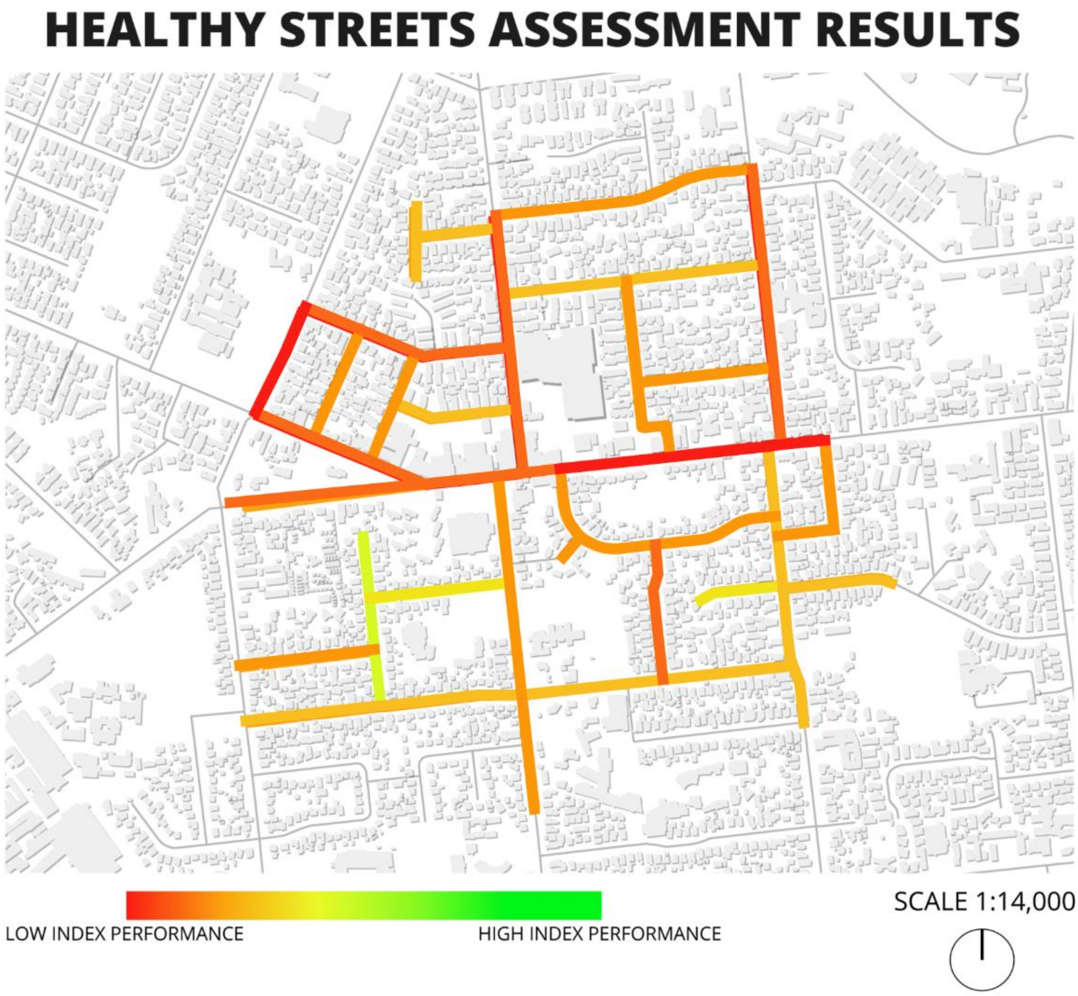
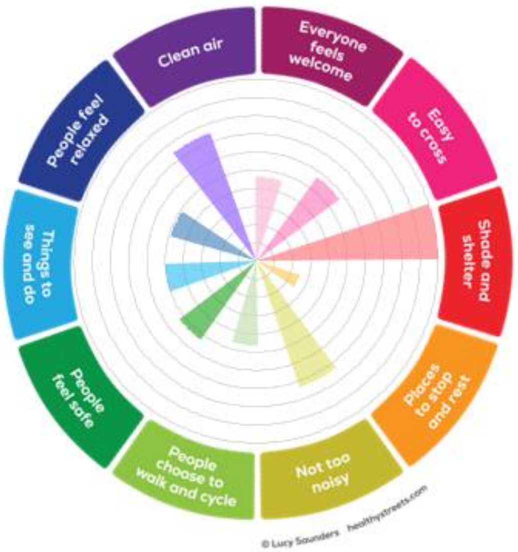


Figure 11: overall scores from the Healthy Streets Framework assessment of Church Corner streets.

Despite a trend of poor performing streets, one street achieved significantly better results. Ballantyne Avenue received a Healthy Streets score of 57, in comparison to the average score of 27 (Figure 12). Ballantyne Avenue benefits from its isolation from commuter traffic, with only two motor vehicle accessible roads, both of which are solely residential. The southern end of the street connects to the busier Suva Street, but access is granted solely for cyclists and pedestrians. Minimal traffic flow and restricted access contribute significantly to reduced noise levels, a heightened sense of safety, and decreased air pollution. Additionally, substantial tree canopy cover and sidewalk vegetation contribute to good shade and shelter, visual interest, and gives a sense of relaxation to street users. These features cultivate a welcoming environment, encouraging pedestrians to linger on the street and use it as a public space.

In contrast, Riccarton Road East was the poorest performing street with a Healthy Streets score of 7 (Figure 13). This section of the main Church Corner arterial route struggles with high traffic volumes stemming from commuters, heavy vehicles, public transit, and other private vehicle traffic. Despite the large carriageway width, there are no lanes dedicated to cyclists. Consequently, use of active transport is discouraged, perceptions of safety are low, and noise and air pollution are high. The wide carriageway also reduces reach for any existing tree canopy cover, removing the provision of shade and shelter. The lack of amenities such as seating, community-centric features like murals, and other elements that reflect local identity detracts from its appeal as a public space, discouraging pedestrians from lingering.

Ballantyne Ave



	Existing Layout Score
Healthy Streets Score	57
Everyone feels welcome	46
Easy to cross	57
Shade and shelter	100
Places to stop and rest	25
Not too noisy	73
People choose to walk and cycle	46
People feel safe	53
Things to see and do	50
People feel relaxed	49
Clean air	75

Figure 12: Assessment scores from Ballantyne Ave

Riccarton Road East

	Existing Layout Score
Healthy Streets Score	7
Everyone feels welcome	7
Easy to cross	5
Shade and shelter	0
Places to stop and rest	0
Not too noisy	20
People choose to walk and cycle	7
People feel safe	11
Things to see and do	0
People feel relaxed	7
Clean air	8

Figure 13: Assessment scores from Riccarton Road East

Car Centricity

Metrics that measured motor vehicle movement and infrastructure demonstrated a consistent pattern of street design prioritising car transit and accessibility. Metrics Traffic Speed and Volume of Traffic scored the poorest on streets primarily used for transit and through-traffic, those north of Riccarton Road, and on arterial routes. As the main arterial route, Riccarton Road traffic volumes are high, but congestion and poorly planned signal cycles lead to slightly slower traffic speeds (Figure 14). Streets with limited car accessibility correlated with decreased traffic speeds and volumes. Sequestered streets, where traffic is destination-oriented rather than transit-based, exhibited higher Traffic Speed and Volume of Traffic metrics scores.

Figure 13: Congestion at 8:20AM on a Friday morning

Streets with design elements that deprioritised car travel led to an increase in the street's overall Healthy Streets score. Existing traffic calming measures on Rountree Street and Hanrahan Street are a contributing factor of higher scores for the Traffic Speed metric to otherwise through-traffic streets. Both streets feature chicanes and narrow corner radii that tighten the path a motorised vehicle can take, forcing reduced speeds, and discouraging rat running.

In comparing scores for metrics Quality of the Carriageway Surface and Quality of the Footpath, infrastructure for motorised vehicles is visibly prioritised. Quality of the Footpath is scored broadly low. Comparatively, the Carriageway Surface metric performed well, with the highest scores on roads with high traffic volumes used for transit. As high traffic volume roads require maintenance, street surface investment is directed towards carriageway surface upkeep as it services motorised vehicle travel.

The Lighting metric scored consistently poor, as sufficient lighting fixtures at any point along the street lengths were absent or inconsistent. Exceptions to this trend were further examples of car-centric infrastructure, as lighting was designed solely for motor vehicle safety. Streets that scored higher were main routes with high traffic volumes and speeds, where the only sufficiently illuminated part of the street was the carriageway.

A Lack of Vulnerable Road User Infrastructure

Metrics that assessed vulnerable road user infrastructure demonstrated a consistent pattern of street design that deprioritised cyclist and pedestrian movement and accessibility. A lack of vulnerable road-user aimed infrastructure discourages their use of the streets, whether for transit or as a public place.

Metrics Space for Cycling, Cycle Parking, and Conflict Between Cyclists and Turning Vehicles scored poorly, highlighting the lack of sufficient cycling infrastructure in the study area. Sections of Suva Street and Middleton Road featured bi-directional cycle lanes which were physically separated from other traffic by a barrier. Existence of these lanes mitigated conflict by removing cyclists from the thoroughfare of car traffic. During school pick-up and drop-off hours, motor vehicles crowded Suva Street, leading to congestion and car doors opening into cycle lanes. This endangered cyclists due to the insufficient cycle lane width. Ilam Road and Hansons Lane each featured cycle lanes, but sections of these lanes were not separated, not wide enough, or did not span the entire assessed street length. Shared lane markings on Ballantyne Ave invited cyclists to the centre of the street but did not provide protection against mistakes from drivers.

Insufficient publicly available cycle parking in the Church Corner area discourages active transit to the commercial centre (Figure 15). In some cases, such as outside Woolworths Supermarket and the Bush Inn Shopping Centre there is private cycle parking provided (Figure 16). The lack of dedicated cycle parking around bus stops, especially on Riccarton Road, misses the opportunity to encourage first and last mile transit.

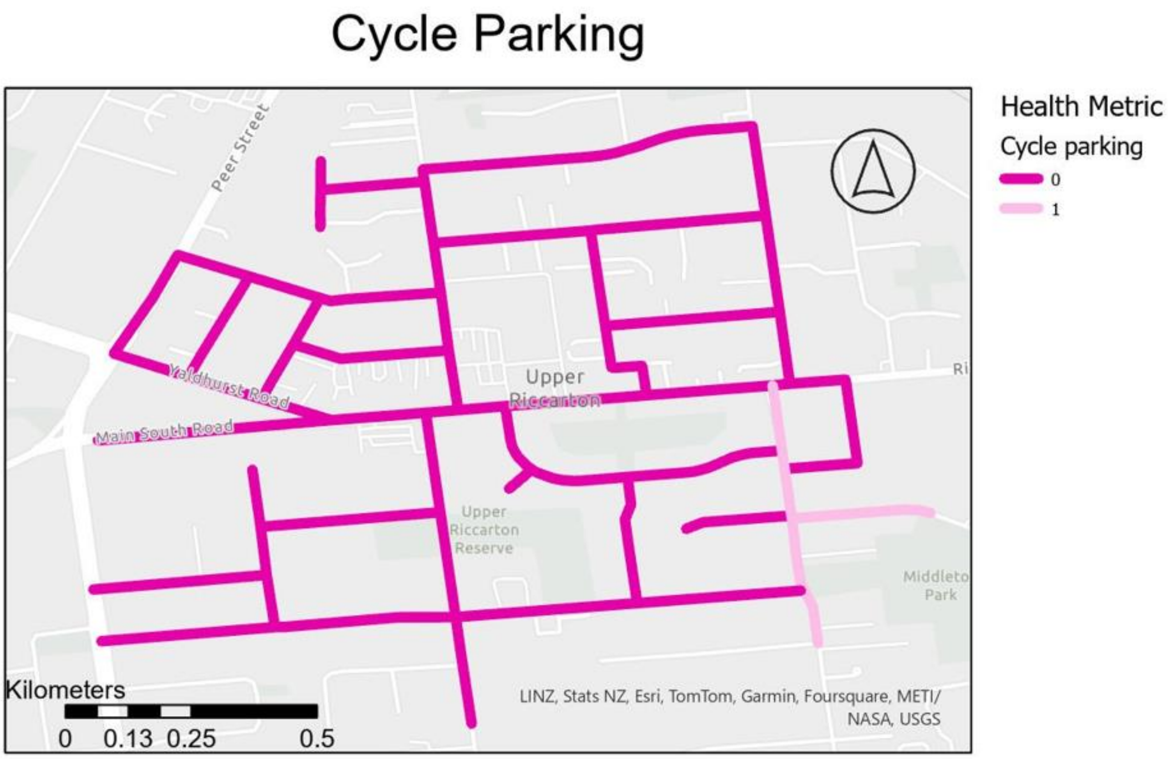


Figure 15: Scores for cycle parking on each street from the Healthy Streets Assessment.

Figure 16: Limited provision of cycle parking around the Church Corner Mall

Metrics Space for Walking, Quality of the Footpath, and Ease of Crossing at Intersections and Mid-block scored poorly, suggesting that street design does not prioritise pedestrian-focused infrastructure. All assessed streets had inadequately wide footpaths, and most had multiple major defects, leading to uneven surfaces that posed safety hazards. Poor accessibility deters footpath use, particularly for pedestrians who rely on mobility aids such as wheelchairs or walking sticks. Placement of roadside trees without intention and infrequent maintenance of self-seeded trees increases the risk of further defects, as root growth can disturb the concrete. The reduced accessibility resulting from insufficient footpath width is worsened by the addition of temporary obstacles, such as waste bins on pickup days, overgrown vegetation from private property, and rental electric scooters and bikes. Permanent obstacles narrowing footpath width included lamp posts and bus stops with inadequate setbacks. In instances where cyclists perceive the bike lanes provided, or their absence, as unsafe or inadequate, a sufficiently wide footpath could have provided an alternative.

Traffic calming measures which slow down drivers, contribute to heightened actual and perceived safety. The metric Turning Speeds at Side-Street Intersections performed well on most residential streets, reflecting how multiple streets had narrowed corner radii and a raised carriageway for crossing. Chicanes and speed bumps seen on Auburn Avenue, Suva Street (East) and Lochee Road led to reduced traffic speed. Conversely, the absence of traffic calming measures encouraged high traffic speeds. Side-street intersections branching off arterial routes to quieter streets commonly lacked infrastructure designed to mitigate speed. Intersections frequently did not provide cyclist waiting facilities, and when combined with wide corner radii, this encouraged conflict between cyclists and turning vehicles. Additionally, existing slip lanes on Middleton Road fail to encourage drivers to slow down when approaching intersections, reducing actual and perceived pedestrian safety.

Public Space Attributes Overlooked

Metrics that measured public space characteristics demonstrated a pattern of street design that did not foster social interaction, engagement in activities, or community involvement. The absence of placemaking features discourages locals from using the street as a public space and place to dwell, reducing it to just a route for transit.

Metrics Public Seating, Bus Stops, and Space for Walking performed poorly, demonstrating the lack of adequate places to stop and rest. By the grounds of St Peters Anglican Church, where places to stop and rest are provided (Figure 17), they require the pedestrian to traverse either Yaldhurst Road or Main South Road, arterial routes with an 85th percentile speed of 50 km/hour. The positioning of these benches leaves their users at risk if drivers on either road were to lose control. Seats available in Auburn Reserve were positioned where lighting did not reach after dark. Reductions in accessibility leave vulnerable demographics feeling uncomfortable when seated in obscured areas after dark. Where bus stops are present, their infrastructure often lacks appeal for waiting and use as a rest stop, as they commonly have insufficient seating and lack weather protection. This pattern was observed at bus stops primarily serving school-aged street users, for whom active transport is their only option for commuting. Seating at bus stops on Riccarton Road were not setback from the footpath, reducing space for walking, and increasing vulnerability to road collisions. The pattern of narrow footpaths throughout the assessed area also restricted pedestrians' ability to rest on the pathway without obstructing others, particularly those who rely on mobility aids. Insufficient provision of places to stop and rest for people of all accessibility needs discourages people from remaining on the street without a specific purpose.

Figure 17: Public seating provided at the intersection of Yaldhurst Road and Main South Road.

Metrics Sense of Place, Trees and Shelter, and Green Infrastructure measured presence of street attributes that offered things to see or do, and results showed an inconsistent pattern, with some areas scoring well and others poorly. This variability showed there was some support, though weak, for using the street as a public space. Elements supporting a sense of place were rare, with only three community pantries, all empty at the time of assessment, and additional examples including a mural, playgrounds, and commercial stores. Christchurch City, traditionally known as the 'Garden City' for its many public green spaces, reflected this characteristic in the Church Corner area. Among all individual indicators not relating to vehicle prioritisation, metrics assessing green space consistently scored the highest across each street (Figure 18, 19). The presence of vegetation was more pronounced on residential roads with low-density housing. Green infrastructure performance in commercial zones was poor. In commercial areas with limited tree planting, fixed awnings occasionally provided sufficient shelter, but shelter on arterial routes was limited due to their wider carriageways. Traffic calming infrastructure often created space for green infrastructure.

Figure 18: coverage of trees and shelter around Church Corner. Streets scoring 2 or 3 in this metric had tree coverage equal or greater than 50 percent over the carriageway.

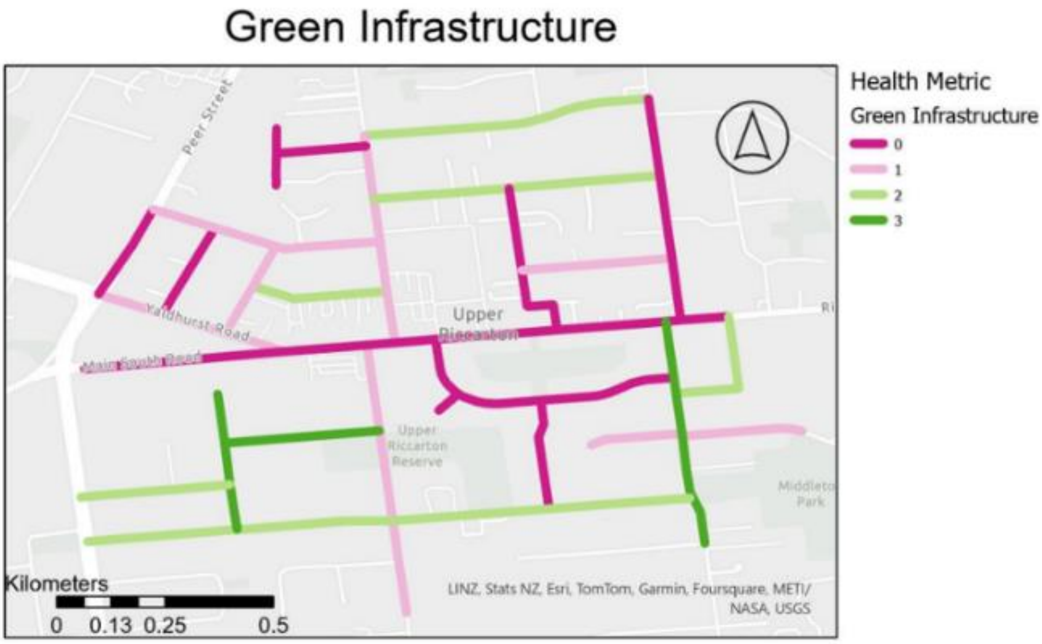


Figure 19: Green Infrastructure around Church Corner was mostly provided alongside traffic calming measures like chicanes and within corner radii. Cycle lanes also incorporated green infrastructure.

The presence of features promoting local community identity and opportunities to engage with the environment has led to higher healthy streets scores. By fostering a sense of belonging, inclusivity, and providing a welcoming atmosphere for residents, these elements contribute to improved public health outcomes.

Absence of Street Safety Characteristics

Metrics that assessed street characteristics influencing street users' perception of safety demonstrated a consistent pattern of street design that discouraged pedestrian use. Lower perceptions of safety leads to unwillingness of pedestrians to use the street and reduces its sense of being a public space.

Observed high volumes of traffic on most Church Corner streets can heighten feelings of insecurity among vulnerable street users, especially when traffic is traveling at high speeds and fails to provide adequate space for pedestrians or cyclists. Crossing mid-blocks or at intersections was also notably challenging for most streets, suggesting that pedestrians are less likely to feel safe crossing streets, especially in areas with heavy traffic volumes. Additionally, mid-block pedestrian refuge islands were not commonly found. The lack of clear separation between motor transit and cyclist road space further diminishes cyclists' sense of safety, a trend observed across most streets.

Sufficient lighting was consistently absent for pedestrians, which significantly affects their sense of safety and decreases their willingness to use the streets (Figure 20). Low visibility limits street use to daylight hours and discourages pedestrian last-mile transit. Even in commercial areas, the lighting fails to extend onto the streets. Pedestrian pathways through residential areas, such as those off Hansons Lane and through Auburn Reserve, are intended to provide pedestrian access separate from car routes. However, both paths suffer from poor lighting, and their single entry and exit points may leave users feeling unsafe. In the Church Corner area, carriageway lighting primarily caters to motorists, while a lack of low, warm lighting deprioritises pedestrian needs.

Figure 20: Tiora Place Is insufficiently illuminated, on the footpath or on carriageway.

A lack of a strong sense of place fails to attract people to stay. This absence of continuous active street use in the Church Corner area makes it seem like there are no "eyes on the street"; Without the presence of people in public spaces throughout the day, crime and anti-social behaviour are not deterred, reducing street users' sense of security.

DISCUSSION

Policy Recommendations

Results of the Healthy Streets assessment demonstrate that the current street environment surrounding Church Corner is designed for private vehicle use and does not promote the uptake of active transport. However, it is believed with strategic, staged implementation of adaptation options, a healthy space for all could be realised in preparation for the MRT line.
Addressing this environment will first involve incremental adaptations that are low or no regret. Smaller, short-term changes can be made to improve existing practices, programmes, and movements within the urban area to benefit all community members. Certain urgent actions within urban areas will create an initial high return, enhancing the streets for all people. Embedding the superblock model at Church Corner is a transformative adaptation which would involve long-term, strategic change. To ensure that the superblock model remains established and positively shapes the urban form, the practice of tactical urbanism will help to inform what changes are well received by the community.

Initial Changes with High Returns

Increasing bike parking around the commercial zones and near bus stops could increase the amount of people cycling daily to and from these zones. This will increase the ease of using public transport by decreasing travel time to get to the stations. Installing well-secured bike parking will ensure that potential cyclists feel safe leaving their bicycles at the station during the day (Dickinson & Östlund, 2019).

Improving the lighting around urban and commercial areas, and the streets, is a cheap and fast option to increase the safety of walking through the area at night. Streetlight design could contribute to the sense of place metric through including artistic designs, referencing local Christchurch history, and clear areas for waiting under lighting (Peña-García et al., 2015).

Removing overhanging trees obstructing footpaths is a low-cost, easy change resulting in high benefits of more footpath space for pedestrians. This is easily done through regular maintenance of private and public vegetation. When planting new trees another easy solution with long-term benefits is choosing tree species that have less surface root growth and overhang (Shi et al., 2023). This will mean in the future trees can still provide shade, but the required maintenance of the footpath is decreased. This would not achieve required widths of the footpaths, but it would increase walking space. Along these footpaths public seating could be increased to benefit the social aspect of streets with more areas to stop, rest, and converse with others, especially on common active transport routes, improving the connectivity of neighbourhoods. These features could increase the value of surrounding land parcels, creating more funding opportunities for street and urban improvements (Carmona et al., 2018).

Other changes on the street would include more parking restrictions and fees to increase funding around Church Corner streets and carparks for TOD. Traffic calming measures could also be used including speed bumps, raised tables, access restrictions, and chicanes to decrease traffic speed and volume (Mandic et al., 2023). When executed well, these are low-cost and easy traffic calming solutions. Traffic islands are another traffic calming method to make crossing roads easier, increasing the social interactions within a community. These should be introduced around the commercial centre of Church Corner. Street restrictions and access also decrease traffic volume and speed, which is achieved through superblocks.

Incremental Changes using Tactical Urbanism

Tactical Urbanism is a model for taking urban environmental action through cheap, short-term, community-based initiatives aimed at improving the pedestrian experience and neighbourhood liveability (Anderson, 2023). Using a variety of basic structures and materials such as planter boxes, street furniture, and paint, street space can be reclaimed from cars to provide positive pedestrian outcomes. Tactical urbanism can also be implemented with a higher level, more targeted approach to understand how the pedestrian may interact with permanent built environment improvements. This then informs the future development of the project through an interactive public consultation facilitated by tactical urbanism.

Waka Kotahi (n.d.) are utilising this model through their innovating streets and streets for people prs, facilitating the development of many tactical urbanism initiatives across New Zealand through temporary features such as cycleways, street crossings and traffic calming (Christchurch City Council, 2022). Following the first phase of the programme, positive pedestrian outcomes are observed with most projects reporting reduced vehicle speeds, increased walking and cycling, and more accessible pedestrian environments (Blewden et al., 2022). Notably, heavy vehicle volumes were reduced by 53% in Gore, a pop-up cycleway saw a 41% increase in active travel near Cambridge primary school, and car speeds were reduced by 22-26 km/h on subject streets in Richmond. As a result of positive public reception and a series of public consultations, Nelson City Council have now committed funding in their 2024-2034 long-term plan to make their street changes permanent, fulfilling the intention of this programme (Kortegast, 2022; Shape Nelson, 2024).

Blewden et al. (2022) conducted an evaluation of the innovating streets programme after its commencement and found greater support was shown when the public better understood the purpose of the built environment modification, it aligned with local environmental and cultural contexts, and the local community were engaged in the design process. In addition to the wide range of pedestrian benefits made possible with tactical urbanism, its legal interaction with statutory planning instruments has been identified as a key factor limiting the feasibility of fully community-led initiatives. In the planning field, tactical urbanism garners a variety of perspectives, with some viewing it as a necessary political demonstration of rights to the street (Vallance & Edwards, 2019), and others viewing it as vandalism, unsafe, and illegal due to its informal interaction with the street network (Spacing, 2013). The intentions and objectives are positive, however larger community-led initiatives can be challenging to manage from a council perspective as district plans do not currently recognise tactical urbanism, the need for resource consent may be triggered (Whangarei District Council, n.d). Working to address this barrier, Waka Kotahi successfully amended the Land Transport Rule: Traffic Control Devices, enabling roadway art for tactical urbanism purposes, highlighting the national drive towards tactical urbanism implementation (Ministry of Transport, 2020).

As New Zealand's urban landscape is due to undertake significant intensification, in turn, the supporting built environment must be considered with equal importance. The recent wide implementation and permanent built environment changes resulting from the streets for people programme legitimises tactical urbanism as an effective planning tool with high potential for regular use. Drawing from these findings, tactical urbanism is an effective method for undertaking a successful pedestrianised redevelopment of Church Corners built environment. At a larger scale, tactical urbanism can inform the development of the superblock model at Church Corner which forms the basis of our built environment recommendations.

Transformative Change: Superblocks

The superblock is an urban model for facilitating equitable pedestrian mobility by improving active transport accessibility in higher density neighbourhoods (Eggimann, 2022). Shown in Figure 21, a superblock is traditionally made up of a 3x3 grid where all interior streets become shared spaces that prioritise the pedestrian and significantly limit traffic accessibility, while arterial roads around the superblock perimeter are designated for moving traffic. This model aims to address the limitations of a car-centric transportation system by unlocking freedom of movement for its pedestrians, facilitating an integrated transport network. Private transportation is a highly effective tool in a cities' transport network when used appropriately, however, its dependence leads to traffic congestion, pollution, and negative health outcomes (Mueller et al., 2020).

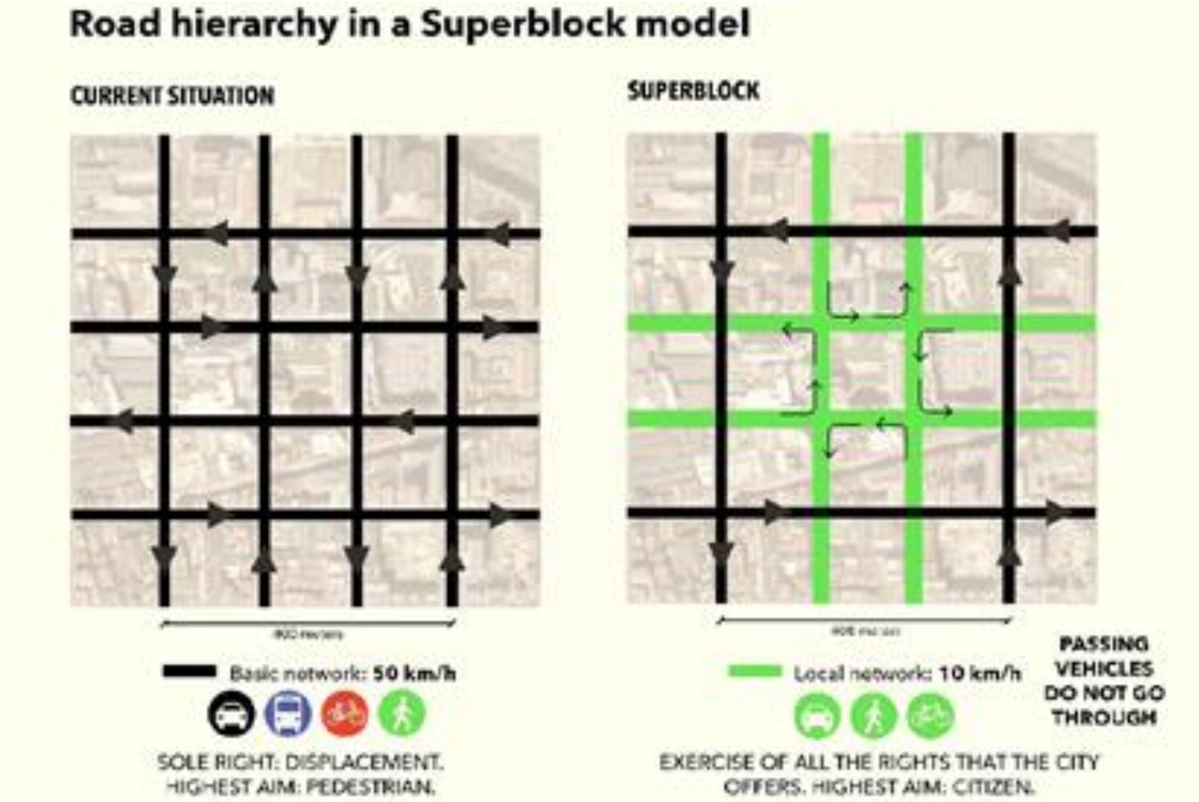


Figure 21: Road hierarchy in a Superblock model (Salvador Rueda, 2024).

As Christchurch moves towards a high-density future, its existing transport hierarchies must be redesigned to accommodate for its new population's contemporary needs. Due to Church Corner's strategic location as a future high-density local centre, and core hub in Christchurch's proposed MRT network, it is expected that an urban form guided by the superblock model would result in improved transport and health outcomes for its local population. The proposed MRT network is one of the primary reasons a superblock is considered at this location as it can service a larger proportion of the population's travel needs due to the improved accessibility and connectivity of the surrounding built environment. This will increase competitiveness with cars as travel times of transit decrease and private travel increases, further contributing to a transit-oriented modal share at Church Corner (WSP New Zealand Limited, 2021). An unchanged urban form would result in significant clashes between traffic and pedestrians, discouraging residents from moving into higher density housing as the major benefit of convenient travel is diminished.

Findings from research conducted in Christchurch by Kingham et al. (2020) can be used to demonstrate the local feasibility of superblocks through a tactical urbanism initiative that would represent a single street within the block. Taking advantage of a temporary road closure, a space for public recreation was created in the absence of traffic. This received positive local reception, with 89% of interviewed residents supporting the permanent closure of the street for through-traffic and 78% perceiving walking on the street to be more pleasant. Their findings can be used to represent how pedestrians interact in a fully connected superblock environment that combines multiple pedestrianised streets.

from Salvador Rueda's ideal superblock scenario shown in figure 21, our proposed superblock shown in figure 22 follows similar themes that have been adapted to suit Church Corner's unique street network (Te Pūtahi, 2024). Key features include pedestrianised interior streets that direct all cars to the superblock exterior with a unidirectional traffic network. This prevents rat-running and further discourages the use of cars in this area. Our proposed superblock is indicative of how an ideal superblock may be planned; however, it is understood that a phased implementation of superblock policies to match the scale of neighbourhood redevelopment is needed. Aligning with superblock themes, CCC's (2024) safer speeds programme reduces most neighbourhood streets to 30 km/h, shown in figure 23. This policy change demonstrates an effective first step in the preparation of the built environment for high density.

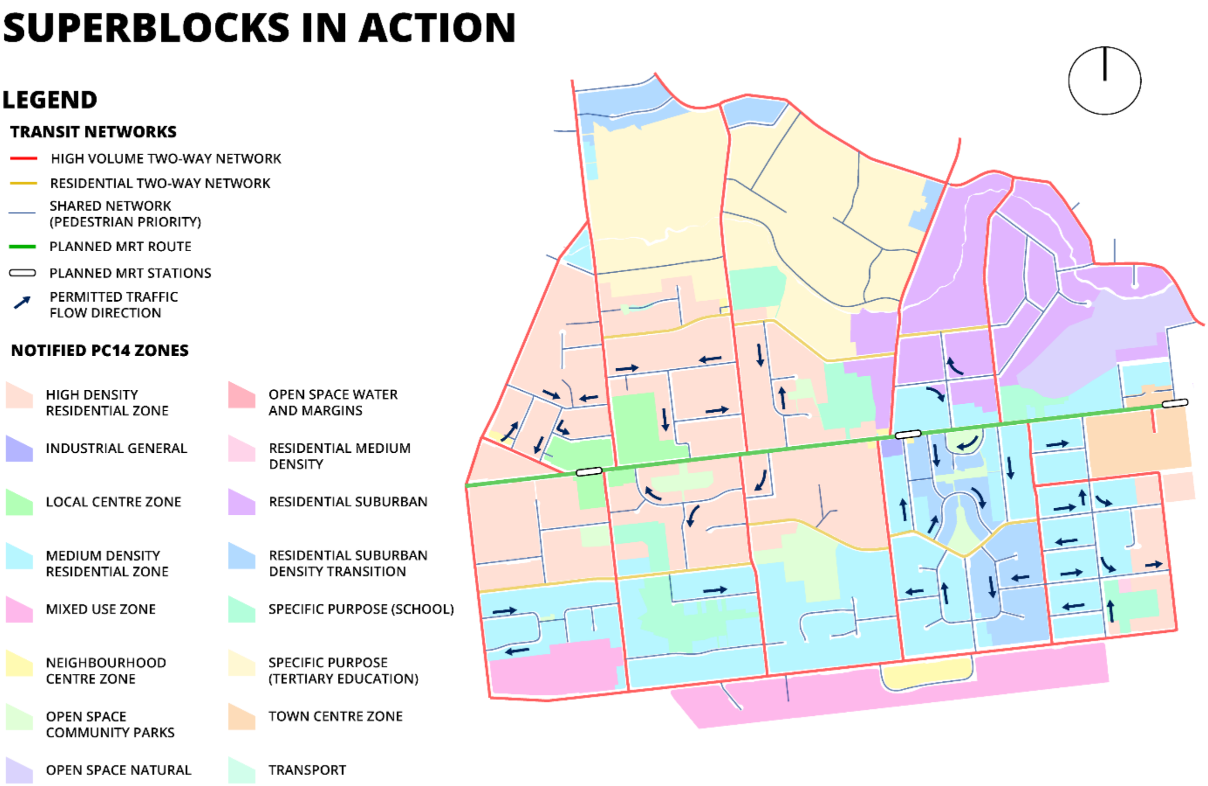


Figure 22: A model for superblocks developed for Church Corner and the surrounding areas zoned for housing intensification. This model was developed using the results from the Healthy Streets Assessment as well as prior knowledge of the area shared by the research group.

Figure 23: Church Corner streets to become 30km/h shown in orange.

Challenges and Limitations

Although the Healthy Streets Framework provided relevant data on Church Corner's street environment, some limitations were considered. The original framework was developed with London's streets in mind, and the framework used in this research is an adaptation of this for a New Zealand context (Von Wirth et al., 2018). Comparisons of collected Healthy Streets results in this study to studies elsewhere in the world can be subjective as a result.

Specific limitations were also encountered regarding the healthy streets assessment. Observational estimations were used where data quality or availability was limited. Since the CCC and NZTA data was collected in 2020 street layouts and activity has changed, affecting the traffic speeds, volumes, and mix of heavy vehicles per street. Additionally, many metrics required measurements to be based on the weakest point of the street. While this revealed issues that need to be addressed, it did not fairly represent any positive elements that existed on parts of the street. These limitations could be addressed through a framework that adapts the healthy streets criteria to better fit the context of its location.

This research did not include the direct study of street users in Church Corner. Before proceeding with any changes recommended in the report, proper discussion with the public should be facilitated. This could help diffuse the cultural resistance towards significant lifestyle changes observed by Salvador Rueda (Te Pūtahi, 2024), as the first iteration of the superblock was not initially well received by residents due to a lack of consultation (Nieuwenhuijsen et al., 2023).

Further Research

Further research on this study would be beneficial to ensure improvements to Church Corner are efficient and effective. Engagement with the residents of Church Corner and wider Christchurch is important to ensure suggested policy direction is beneficial for community needs. Facilitating community discussion ensures residents are both informed of project direction, and local perspectives can improve benefits of the project. Alongside this, a Public Life Street Assessment (Fitzpatrick, 2010), a method that focuses on human activity, would be useful to analyse how people interact with the street to determine the successes and higher priority issues. Quantifying the success of implemented changes could provide explicit evidence to encourage further funding. Examples of assessment could focus on the expected reduction in the number of insurance claims on vehicles from crashes, or reduced demands and costs facing the public health sector.

Setting regular Healthy Streets benchmark assessments would be incredibly beneficial to see if changes are being implemented, if they are improving the quality and features of the streets, and if further changes need to occur. Healthy Streets scores can be compared to previous assessments to determine whether scores have increased around Church Corner. Long-term impact studies will help to determine if the changes remain well-established and could be used to inform how the methods used at Church Corner could be translated to other station locations along the MRT route.

CONCLUSION

Currently failing to support healthy living for residents, the Church Corner street environment is ill-prepared for the projected population growth and its role as a proposed transit hub. However, considerately planned actions could facilitate a healthier street environment by placing priority on clean air, active transport, safety, and inclusivity.

As the Greater Christchurch Spatial Plan is implemented alongside the Housing and Business Choice Plan Change 14, any upgrades to the street environment must give consideration for the best economic, social, cultural, and environmental outcomes for Church Corners' people and places. The strategies outlined in this study suggest using community-led initiatives to reclaim streets for pedestrians through tactical urbanism. Short term success would be measured and inform application of the proposed superblocks to the wider Riccarton area. These plans hope to create a shared priority network that is inclusive and gives rise to a sustainable and resilient urban area.

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CRediT Author Statement

Lucy Dunshea: Software (Created method of data collection), Visualisation (Superblocks in Action), Writing – Original Draft (Introduction, Background, Creating Safe Urban Spaces: Perceptions Versus Reality). **Tomasz Heeney**: Writing – Original Draft (From Streets to Spaces: Enhancing Urban Design, Tactical Urbanism, Superblocks). **Charlotte Osborn**: Writing – Original Draft (Methodology, Provisioning Infrastructure for a Healthy Community, Policy Recommendations, Initial Changes with High Returns, Further Research). **Emma Rowling**: Writing – Original Draft (Results, Pedestrian Safety versus Traffic Flow: Striking a Balance, Conclusion). **All**: Conceptualisation, Validation, Investigation, Data Curation, Project Administration, Visualisation (Metric Graphs), Writing – Review & Editing.

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APPENDICES

Appendix A: Supporting Maps

The maps seen below were created using ArcGIS Pro. They display the Health Metric Score (from 0 to 3) for each of the 29 streets in the assessment. This was done for each of the 19 metrics used to evaluate the evidence-based indicators.

Mix of Vehicles

Traffic Speed

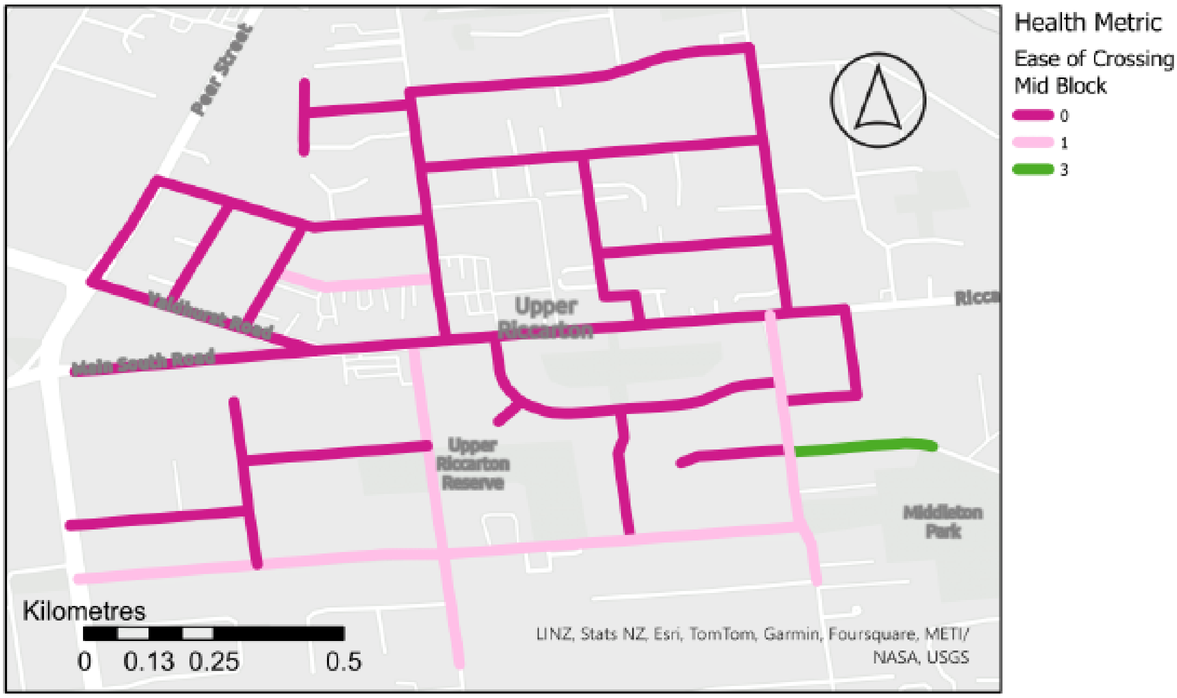
Volume of Traffic

Conflict Between Turning Vehicles

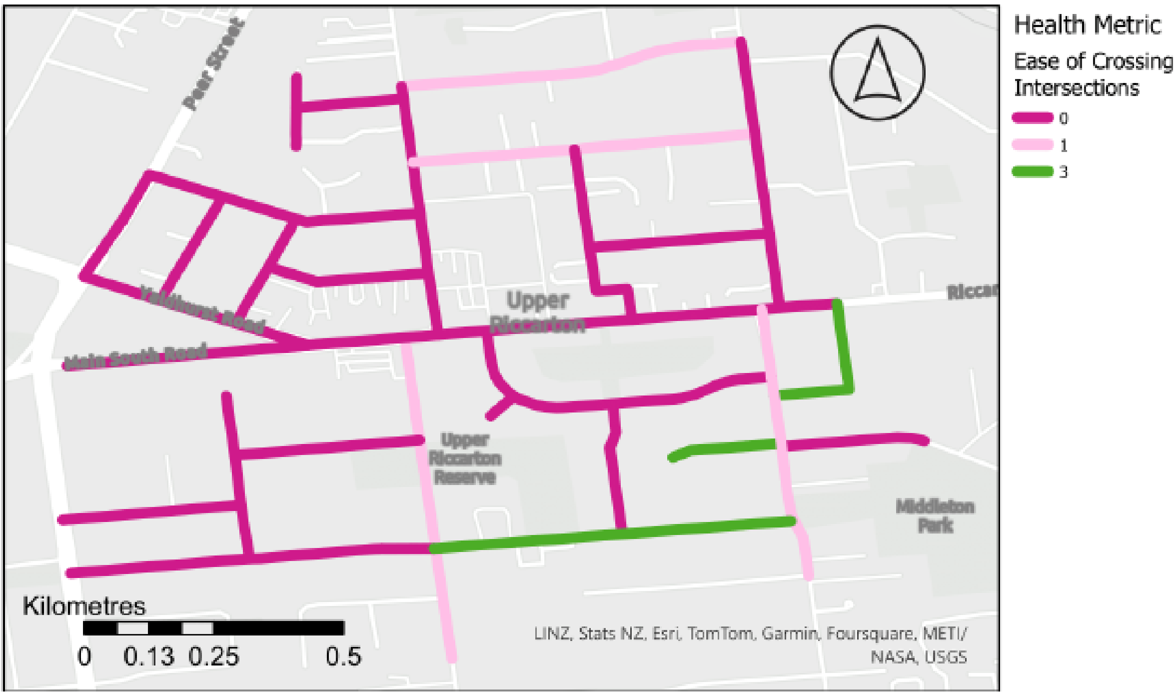
Bus Stops

Turning Speeds at Side-Street Intersections

Ease of Crossing Mid-Block



Ease of Crossing Intersections



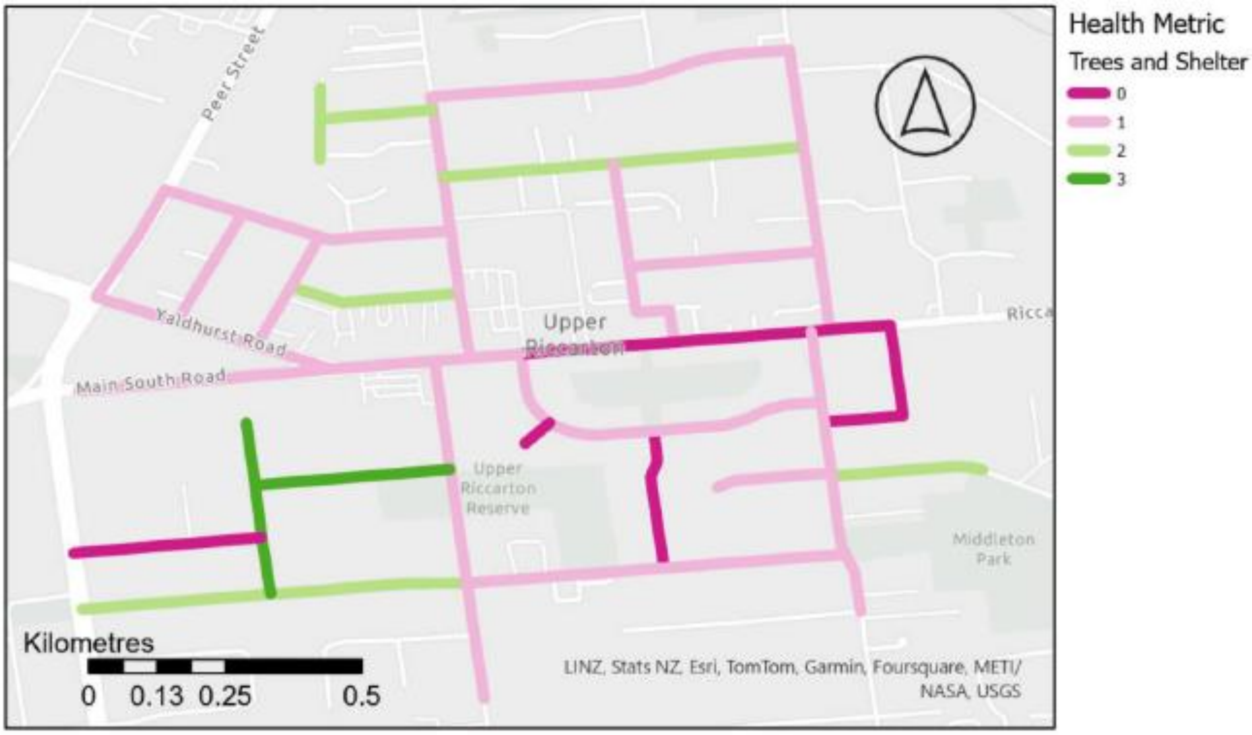
Reducing Through Traffic

Quality of the Carriageway Surface

Quality of the Footpath

Space for Walking

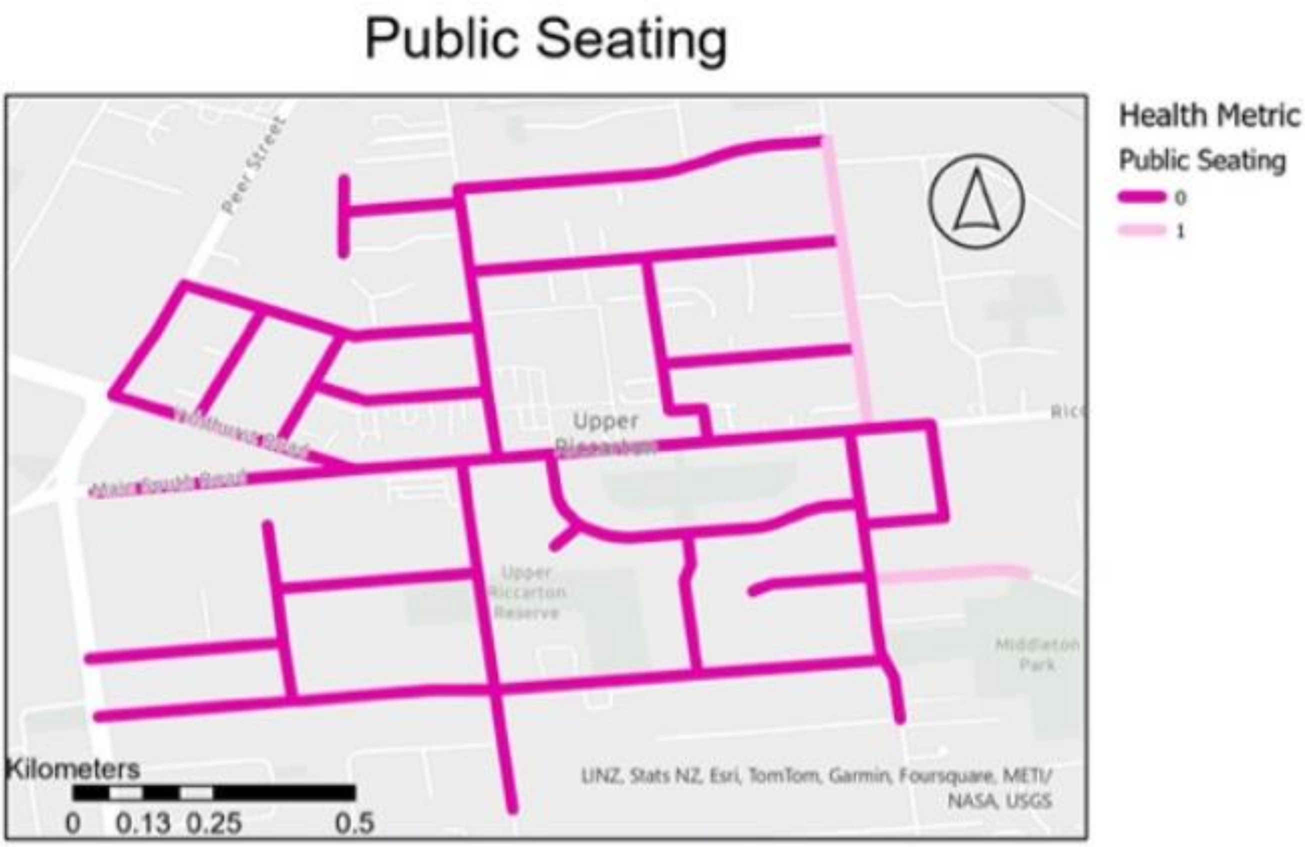
Trees and Shelter



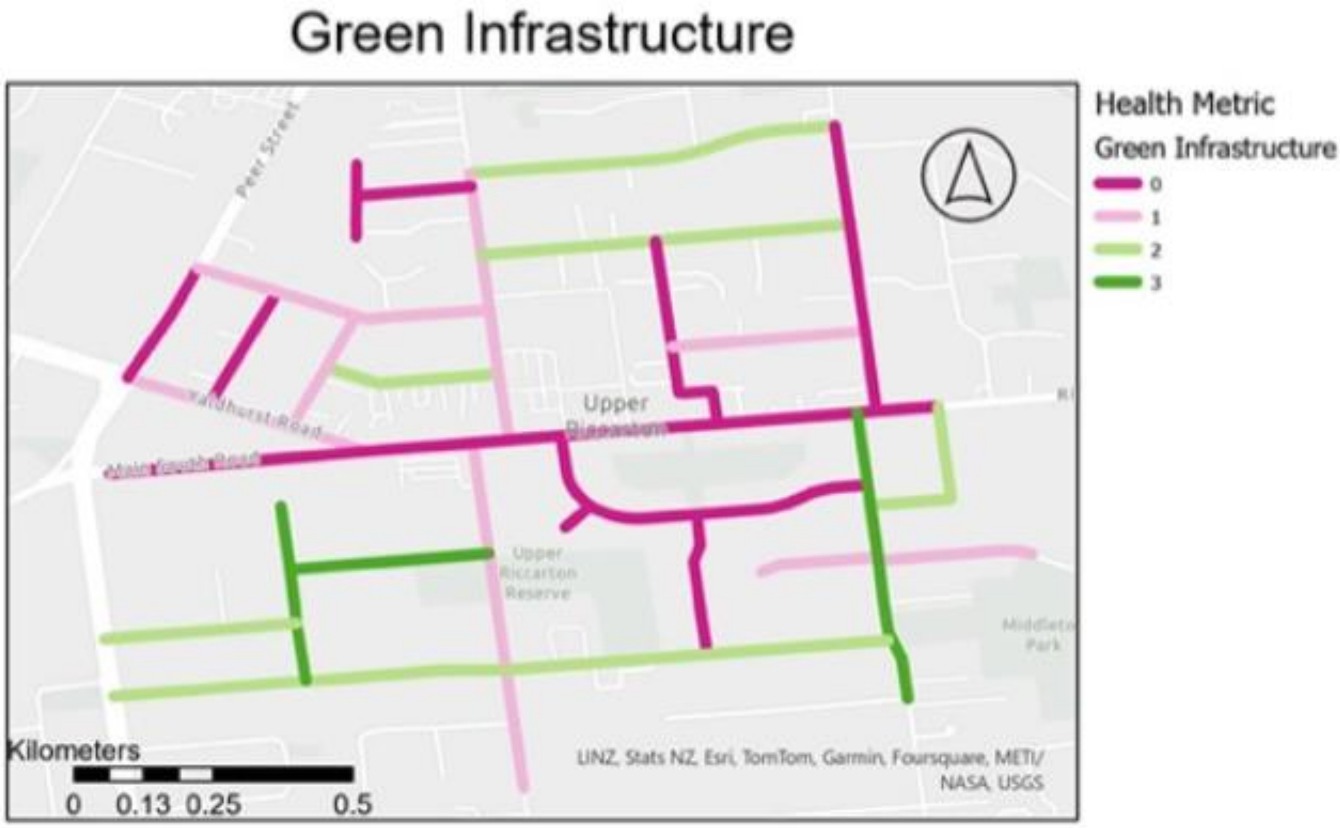
Space for Cycling

Lighting

Sense of Place


Public Seating
Health Metric
Public Seating
0
1
Peer Street
Upper
Upper Riccarton Reserve
Middleton Park
Kilometers
0 0.13 0.25 0.5
LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS


Cycle Parking
Health Metric
Cycle parking
0
1
Peer Street
Upper
Upper Riccarton Reserve
Kilometers
0 0.13 0.25 0.5
LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS


Green Infrastructure
Health Metric
Green Infrastructure
0
1
2
3
Peer Street
Upper
Upper
Riccarton
Reserve
Kilometers
0 0.13 0.25 0.5
LINZ, Stats NZ, Esri, TomTom, Garmin, Foursquare, METI/
NASA, USGS

Appendix B: Healthy Streets Assessment Metrics

The healthy Streets Design Check for New Zealand has explanations on the criteria used to score each metric in the Healthy Streets Assessment survey. These can be seen below.

Metrics		Score			
		3	2	1	0
1	**Traffic speed**	When motorised traffic is travelling at its fastest, the mean operating speed is below 30kph	When motorised traffic is travelling at its fastest, the mean operating speed is 30-39 kph	When motorised traffic is travelling at its fastest, the mean operating speed is 40-49 kph	When motorised traffic is travelling at its fastest, the mean operating speed is 50kph or more
2	**Volume of motorised traffic**	Vehicles per day is <1,000	Vehicles per day is between 1,000-3,000	Vehicles per day is between 3,000-10,000	Vehicles per day is >10,000
3	**Mix of vehicles**	The only heavy vehicles using the street are public service vehicles, public transport and vehicles servicing properties on the street	The proportion of heavy vehicles (excluding public transport) is less than 1% in the peak hour	The proportion of heavy vehicles (excluding public transport) is 1-3% of motorised traffic in the peak hour	The proportion of heavy vehicles (excluding public transport) is greater than 3% of motorised traffic in the peak hour
4	**Conflict between cycles and turning vehicles**	At the weakest non signal controlled intersection: Measures are in place to reduce the number **and** speed of turning movements by motor vehicles at intersections and driveway crossovers AND At the weakest signal controlled intersection all conflicting movements between cycles and turning motor vehicles have separated phases during the traffic signal cycle.	At the weakest non signal controlled intersection: Measures are in place to reduce the number **or** speed of turning movements by motor vehicles at intersections and driveway crossovers AND At the weakest signal controlled intersection cycle movements do not have separate phases during the traffic signal cycle but mitigation measures are in place like cyclist waiting facilities	At the weakest intersection: There are no restrictions on speed or number of turning movements by motor vehicles at intersections and other uncontrolled accesses but there is a space allocated to cycles like cycle lane marking	At the weakest intersection does not meet criteria in 1-3 i.e. At signal controlled intersections cycle movements do not have separate phases during the traffic signal cycle and there are no mitigation measures in place. At uncontrolled intersections there are no restrictions on speed or number of turning movements by motor vehicles and there is no space allocated to cycles

5	**Turning speeds at side-street intersections**	The weakest side-street intersection has a narrow, tight geometry such that a turning motorised vehicle must slow down below 20 kph and the carriageway is raised to the level of the footpath e.g. footpath continuation or raised pedestrian crossing with tactile indicators	The weakest side-street intersection has a narrow, tight geometry such that a turning motorised vehicle must slow down below 20 kph and instead of a raised carriageway at the intersection there are pram ramps which continue the pedestrian desire line	The weakest side-street intersection has only pram ramps at the intersection which continue the pedestrian desire line	The weakest side-street intersection does not meet criteria in 1-3 i.e. has no pram ramps or has pram ramps that do not continue the pedestrian desire line
6	**Ease of crossing mid block**	Presence of raised traffic signal controlled or raised zebra crossing AND peak hour mean operating speed on street is less than 30kph i.e. Metric 1 scores 3	Presence of traffic signal controlled or zebra crossing but not raised AND peak hour mean operating speed on street is less than 30kph i.e. Metric 1 scores 3 OR Presence of raised traffic signal controlled or raised zebra crossing AND peak hour mean operating speed on street is 30-49 kph i.e. Metric 1 scores 2 or 1	Non-priority crossing facilities such as a pedestrian refuge island AND peak hour mean operating speed on street is less than 30kph i.e. Metric 1 scores 3 OR Presence of a traffic signal controlled crossing AND peak hour mean operating speed on the street is above 50 kph i.e. Metric 1 scores 0	Does not full-fill the criteria to score, 1, 2 or 3 or there is no mid-block crossing facility
7	**Ease of crossing intersections**	Un-signalised (excluding roundabouts): A raised zebra crossing on all legs of the intersection AND no more than 1 lane in each direction Signalised: Raised intersection with crossing on every leg and maximum wait time is 20 seconds or less and maximum two lanes to cross on each arm.	Un-signalised (including roundabouts): The weakest arm of the intersection has a raised zebra crossing AND more than 1 lane in any direction. Signalised: Raised intersection with crossing on every leg and maximum wait time is 20 seconds or less OR a Barnes Dance with longer wait time (about 45 seconds)	Un-signalised (including roundabouts): The weakest arm of the intersection has step-free access to a pedestrian refuge island at least 2m wide AND peak average speed on street is less than 30kph i.e. Metric 1 scores 3 Signalised crossing facility on every leg and maximum wait time 45 seconds or less	Un-signalised (including roundabouts): Does not score 1-3 OR it would score 1-3 but one or more arms of the intersection are slip lanes OR it would score 1-3 but one or more arms of the intersection is not on the desire line (desire line = deviation less than 15 degrees)
8	**Quality of the footpath**	At the weakest point on the street there is an even, level, non-slip surface	At the weakest point on the street there is a non-slip surface without defects but it is not level	At the weakest point on the street there are defects but none more than 14mm level difference	At the weakest point there is at least one major defect (a level difference of 15mm or more)

9	**Space for walking**	At peak times for pedestrians and the narrowest point: There is 2.40m or more clear width for walking in quiet locations (flows of <60 pedestrians per minute) OR There is 3m clear width for walking in moderately busy locations (flows of 60-80 pedestrians per minute) OR There is more than 3m clear width for walking in busy locations (flows of >80 pedestrians per minute)	At peak times for pedestrians and the narrowest point: There is 2.00-2.39m clear width for walking in quiet locations (flows of <60 pedestrians per minute) OR There is 2.40-2.99m or more clear width for walking in moderately busy locations (flows of 60-80 pedestrians per minute) OR There is 3.00m clear width for walking in busy locations (flows of >80 pedestrians per minute)	At peak times for pedestrians and the narrowest point: There is 1.80-1.99m clear width for walking in quiet locations (flows of <60 pedestrians per minute) OR There is 2.00 – 2.39m clear width for walking in moderately busy locations (flows of 60-80 pedestrians per minute) OR There is 2.4-2.99m clear width for walking in busy locations (flows of >80 pedestrians per minute)	Regardless of the peak pedestrian flow, at the narrowest point there is less than 1.8m clear width for walking
10	**Quality of the carriageway surface**	At the weakest point on the street there is an even and smooth, skid resistant surface	At the weakest point on the street there are a few minor defects	At the weakest point on the street there are many minor defects	At the weakest point on the street there is at least one major defect (a level difference of 20mm or more)
11	**Space for cycling**	At the weakest point: If metric 1 scores 2, 1 or 0, cycles are physically separated from other traffic and the effective width of the path is at least 2.1m (1-way) or 3m (2-way) at the narrowest point If metric 1 scores 3, cycles mix with general traffic if peak hour flow is 200 vehicles or fewer	At the weakest point: If metric 1 scores 2, 1 or 0, cycles are physically separated from other traffic and the effective width of the path is 1.8 – 2.0m (1-way) or 2.5-2.9m (2-way) at the narrowest point If metric 1 scores 3, cycles mix with general traffic if peak hour flow is 200-500 vehicles.	At the weakest point: Cycles are separated from other traffic and the effective width of the path is 1.6m-1.7m (1-way) or 2.3 - 2.4m (2-way) effective width at its narrowest point. If metric 1 scores 3 cycles mix with general traffic if peak hour flow is more than 500 vehicles.	At the weakest point does not meet criteria in 1-3 OR There is no separated cycleway and metric 1 scores 2, 1 or 0.
12	**Lighting**	At the weakest point lighting has been specifically designed to prioritise comfort and safety of people walking and cycling, the light quality has been specifically selected for colour and glare	At the weakest point there is purpose designed lighting provided to ensure safety of people walking and cycling	At the weakest point lighting has been designed for motor vehicle safety. Walking areas meet AS/NZS 1158 as a consequence of the carriageway being illuminated	At the weakest point lighting does not meet criteria in 1-3 i.e. lighting of walking and/or cycling areas is absent or inconsistent (e.g. light is obstructed by planting) and does not meet AS/NZS 1158

13	**Sense of place**	Assessing the full length of the street there are at least three elements to support sense of place per 500m	Assessing the full length of the street there are two elements to support sense of place per 500m	Assessing the full length of the street there is one element to support sense of place per 500m	Assessing the full length of the street, there is 500m with no elements to support sense of place
14	**Public seating**	Assessing the full length of the street the longest distance between public seats on this street is less than 50m	Assessing the full length of the street the longest distance between public seats on this street is between 50m and 199m	Assessing the full length of the street the longest distance between public seats on this street is between 200m and 399m	Assessing the full length of the street the longest distance between public seats on this street is 400m or more
15	**Cycle parking**	Assessing the full length of the street the longest distance between available public cycle parking on this street is less than 50m, there is step free access	Assessing the full length of the street the longest distance between available public cycle parking on this street is between 50m and 199m and there is step free access OR the longest distance is less than 50m but there is no step-free access to the cycle parking	Assessing the full length of the street the longest distance between available public cycle parking on this street is between 200m and 399m and there is step free access OR the longest distance is between 50m and 199m and there is not step free access	Assessing the full length of the street the longest distance between available public cycle parking on this street is 400m or more and there is step free access OR the longest distance is between 200m and 399m and there is not step free access
16	**Trees and shelter**	Assessing the full length of the street, there are trees OR continuous canopy (e.g. fixed awnings, verandas) along the full length of both sides of the street	Assessing the full length of the street, there are trees OR continuous canopy (e.g. fixed awnings, verandas) along at least 50% of the full length of both sides of the street	Assessing the full length of the street, there are trees OR continuous canopy (e.g. fixed awnings, verandas) for less than 50% of the full length of both sides of the street	Assessing the full length of the street, there are no trees or places to shelter e.g. fixed awnings
17	**Green infrastructure**	Assessing the full length of the street, the stormwater is managed on the street including green infrastructure features on the full length of the street	Assessing the full length of the street, there are up to three green infrastructure features per 500m of the street (in addition to grass berms if they are present)	Assessing the full length of the street there are fewer than 3 green infrastructure features per 500m of the street (in addition to grass berms if they are present)	Assessing the full length of the street, there is no green infrastructure in the public realm for a stretch of at least 500m
18	**Reducing through traffic**	Assessing the whole street there is no through-movement for private motorised vehicles	Assessing the whole street through movement for private motorised vehicles is permitted but use of the side streets is indirect (i.e. to avoid rat running)	Assessing the whole street through movement for private motorised vehicles is permitted but there are on-street parking restrictions in place	Street does not meet criteria in 1-3 i.e. through movement for private motorised vehicles is permitted and there are no on-street parking restrictions
					Are there any bus services running on this street? Yes/No

19	**Bus stops**	At the weakest performing bus stop: There is sufficient waiting space based on peak patronage that is clear of the walking space; the bus stop has seating; rain and sun protection for 25% of peak customers (or at least 4 people); step free access and safe crossing of any cycleways to access the stop	At the weakest performing bus stop: There is sufficient waiting space based on average patronage that is clear of the walking space; the bus stop has seating; rain and sun protection for at least 4 people; step free access and safe crossing of any cycleways to access the stop	At the weakest performing bus stop: The bus stop has seating and rain and sun protection for at least 4 people	The weakest performing bus stop does not achieve criteria to score 1-3