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Lincoln Town Centre Streetscape Report

Lincoln Town Centre

Selwyn District Council

Quality Assurance Information

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Executive Summary

The scope of the Lincoln Town Centre Plan has recently been expanded from the previous Town Centre Plan to include Gerald Street from the Liffey River to Springs Road. The previous Town Centre Plan was based on the assumption that a bypass would be established south of the town centre and this would remove some traffic from Gerald Street. Based on current priorities the bypass is unlikely to ever proceed. This report revisits transport aspects of the previous Town Centre Plan and considers the expanded area.

Traffic flow

Gerald Street has a dual function, it provides the main arterial route through Lincoln and also access to destinations within the town centre. The current traffic volume on Gerald Street is approximately 6,000 vehicles per day, including approximately 5% heavy and medium commercial vehicles. Traffic surveys confirmed that Lincoln is an origin or destination for most travel in the vicinity and nearly all heavy vehicle trips are on the local network with few, if any, through trips occurring.

Traffic growth has been forecasted for the next 30 years and it was found that in 2041 the volumes on Gerald Street can be expected to vary between 11,100 and 13,000 vehicles per day along the corridor. This level of traffic flow can be accommodated within a two-lane two way road without the need to incorporate travel additional lanes. Traffic modelling showed that four intersections along Gerald Street will require upgrading to traffic signals, these are; James Street/Edward Street, West Belt Road, Vernon Drive and Ellesmere Junction Road /Springs Road.

Walking and Cycling

Gerald Street is an important walking connection through the town centre, as well as providing access to town centre activities (on both sides of the street) and bus services. The streetscape design therefore needs to cater for pedestrian movement along and across Gerald Street, including crossing side roads.

Gerald Street connects the eastern (Liffey River) and western (University) ends of the town centre, the existing and proposed cycle facilities in Lincoln and the wider Selwyn District. Currently on Gerald Street cyclists are generally required to share the lane with motor vehicles; the exception being on some road cycle lanes west of the core retail area. Given the arterial road function of Gerald Street a similar level of protection as the rest of the off road network is required to support an appropriate level of service for cycling. A continuous, segregated cycle facility is therefore proposed for Gerald Street to connect the eastern and western precincts of the town centre.

Parking

Parking in the Lincoln Town Centre is currently provided through a combination of on-street spaces and a number of privately-owned and Council managed off-street parking areas. Lincoln is one of the main urban centres of the Selwyn District and as the population grows and parking demand increases, management of the parking resource will become an increasingly important priority for Council. Efficient provision of parking is paramount to the ongoing growth and development of the Lincoln Town Centre.

A **parking survey** was undertaken on Thursday 26 March 2015 and a **Parking Management Plan** was developed to support the Lincoln Town Centre Plan, including assessing any impact of potential streetscape changes.

It is understood that the community, including the businesses in the town centre, are concerned that the current level of parking supply is insufficient. The parking survey showed that at peak times the occupancy in some Council owned off-street parking areas and in a private off-street car park (Lincoln Vale car park) was high, exceeding 80% occupancy during the peak 30-minute parking period (1pm-1.30pm). Also a total of five on-street parking areas also exceeded 80% occupancy and another two on-street parking areas reached 80% occupancy during the peak 30-minute period. However across the

entire day the survey showed that the overall the parking occupancy is below the 80% to 85% optimum occupancy range. Occupancies higher than 85% create difficulties for motorists searching for a car parking space.

The Parking Management Plan recommends a range of parking management methods that could be utilised including future parking supply, parking time restrictions, parking search routes, parking regulation (District Plan), reducing parking demand (mode shift and pricing) and improving user information. An Action Plan with short, medium and long term actions was developed to ensure parking is managed in a manner which supports a sustainable, prosperous, vibrant and easily accessible Town Centre.

Proposed design

The Town Centre consists of three precincts that generally align with proposed district plan zones, the Core Retail (East) Precinct, the Transitional Living Precinct and the Core Retail (West) Precinct. Cross sections have been developed for each precinct. These are the result of an option assessment process where the options were assessed against the design objectives. The cross sections and other aspects of design are informed by the Lincoln micro-simulation traffic model and a high level bicycle facility assessment. The key feature of the design is the inclusion of separated bicycle lanes on both sides of Gerald Street.

Four sets of design objectives have been developed for this project; overarching corridor objectives and specific objectives for each precinct. The objectives are summarised in **Table E1**.

The resulting cross sections are shown in **Figure E1** to **Figure E3** for each precinct. These cross sections are considered to meet both the precinct and corridor design objectives.

Figure E1 *Core Retail (East) Preferred Option*

Figure E2 *Transitional Living Preferred Option*

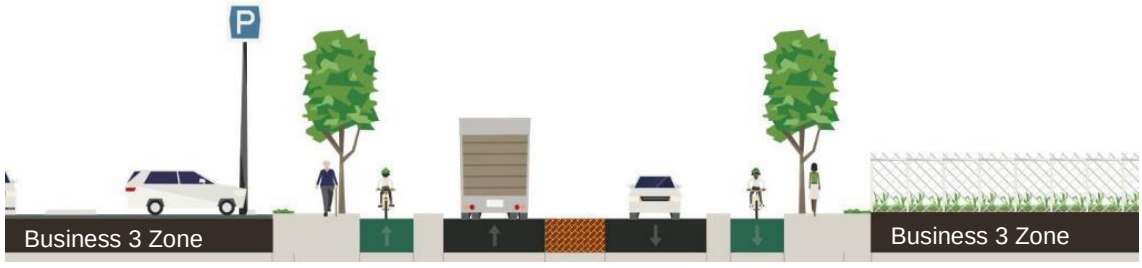


Figure E3 *Core Retail (West) Preferred Option*

Table E1
Design Objectives

Overarching Objectives
1) Cross section design recognises the movement, access and place functions of the corridor and provides appropriately for these functions.
2) The design recognises the difference between precincts, but ensures that the transitions between them are smooth.
3) Cycle infrastructure design recognises the important role that the corridor plays in connecting the surrounding cycle network, while also providing cycle access to town centre activities.
4) Pedestrian infrastructure that provides a connection through the town centre and creates an attractive environment where people want to spend time.
5) On street parking provision and potential restrictions are considered in the context of adjacent land uses and consolidated off-street parking facilities.
6) Street elements and materials are appropriate for a town centre environment acknowledging that these may differ between precincts, but overall remain coherent.
7) Speed environments in each precinct are appropriate to safely accommodate the demands on the road corridor.

Core Retail (East)	Transitional Living	Core Retail (West)
1) Creates a high quality public space where people want to spend time and retains the village atmosphere.	1) Creates a public space that complements the adjacent precincts while recognising the difference in land use between the precincts.	1) Creates a public space that compliments the adjacent street environments, but recognises the difference in land use.
2) Facilitates safe and user friendly pedestrian movements (along and across the street).	2) Facilitates safe and user friendly pedestrian movements (along and across the street).	2) Facilitates safe and user friendly pedestrian movements (along and across the street)
3) Facilitates safe and user friendly bicycle infrastructure that recognises the many cycle destinations within the precinct.	3) Facilitates safe and user friendly bicycle travel.	3) Facilitates safe and user friendly bicycle travel
4) Facilitates safe motor vehicle movements (along the street and whilst accessing parking and side streets).	4) Facilitates safe motor vehicle movements (along the street and whilst accessing adjacent activities, parking and side streets).	4) Facilitates safe motor vehicle movements (along the street and whilst accessing adjacent activities, parking and side streets)
5) Accommodates some on-street parking activities	5) Accommodates on-street parking activities.	5) Integrates with adjacent land uses (existing and proposed).
6) Integrates appropriately with adjacent land uses (existing and proposed).	6) Integrates with adjacent land uses (existing and proposed) and recognises their transitional nature.	6) Facilitates public transport access including bus stops.
7) Facilitates public transport access including bus stops.	7) Facilitates public transport access including bus stops.	

Contents

1. Introduction

1.1 Background

The scope of the Lincoln Town Centre Plan has recently been expanded from the previous Town Centre Plan to include Gerald Street from the Liffey River to Springs Road. The proposed district plan zoning for the expanded Lincoln Town Centre is shown in **Figure 1.1**.

Figure 1.1 *Lincoln Key Activity Centre (KAC) - Precinct Plan*

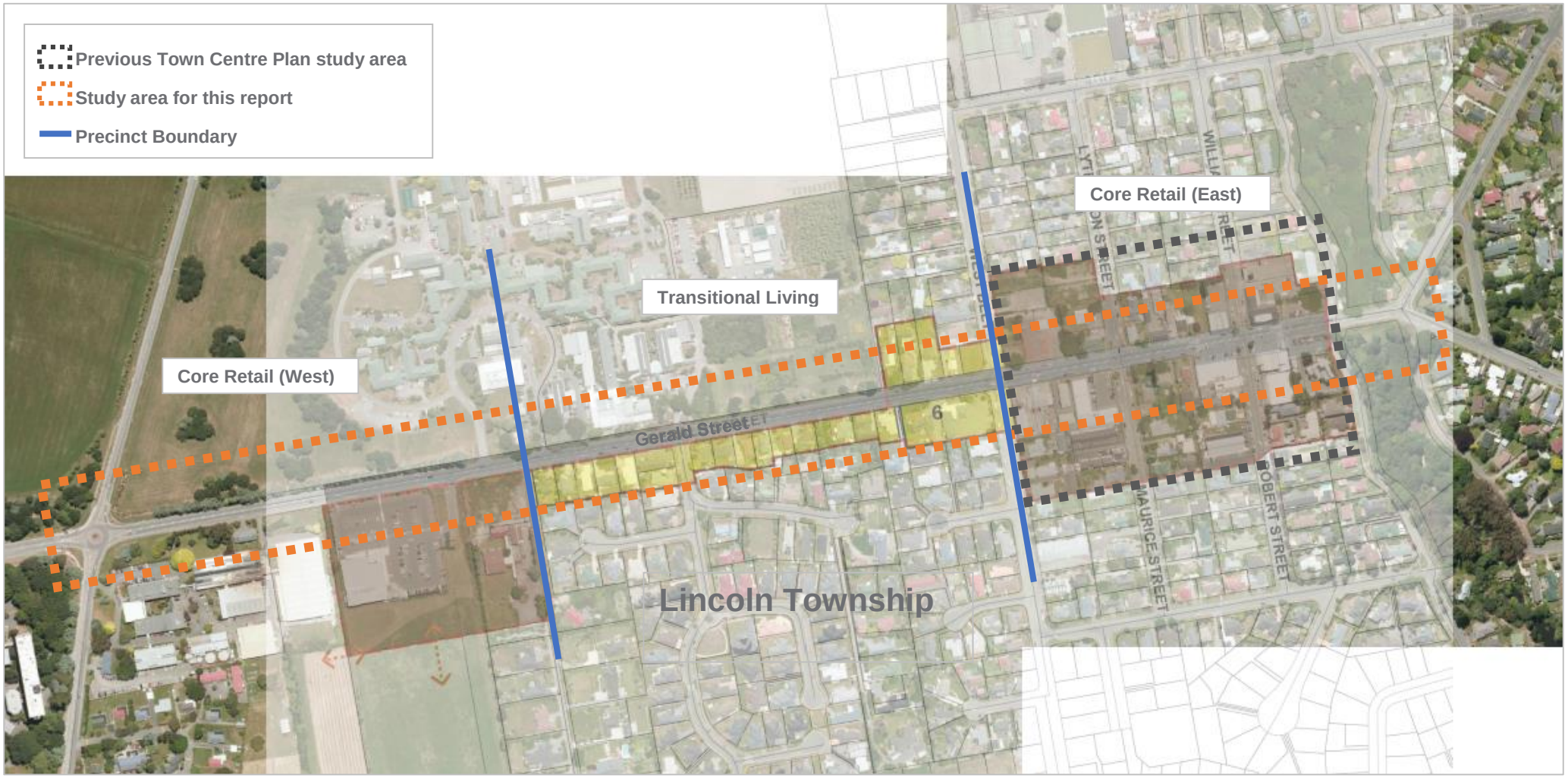
Gerald Street has a dual function providing the main arterial route through Lincoln and access to destinations within the town centre. Gerald Street is defined as an arterial in both the District Plan and the NZ Transport Agency's One Network Road Classification (ONRC). The previous Town Centre Plan was based on the assumption that a bypass would be established south of the town centre and this would remove some traffic from Gerald Street. Based on current priorities the bypass is unlikely to proceed. This report revisits transport aspects of the previous Town Centre Plan and considers the expanded area.

1.2 Scope of this report

This report considers three precincts in the Lincoln town centre. The precincts generally follow the proposed district plan zoning. However to ensure connectivity with the wider transport network the transport precincts extend outside of the Core Retail zones at either end of the study area as shown in **Figure 1.2**.

General cross sections have been developed for each precinct along with recommendations of how intersection forms and activities within the road corridor can be managed, for example the recessed angle parking in the Core Retail East precinct. The cross sections and other aspects of design are informed by the Lincoln S-Paramics micro-simulation model. The model has identified four key intersections within the study area that will need to be redeveloped over time to accommodate the growth within the district.

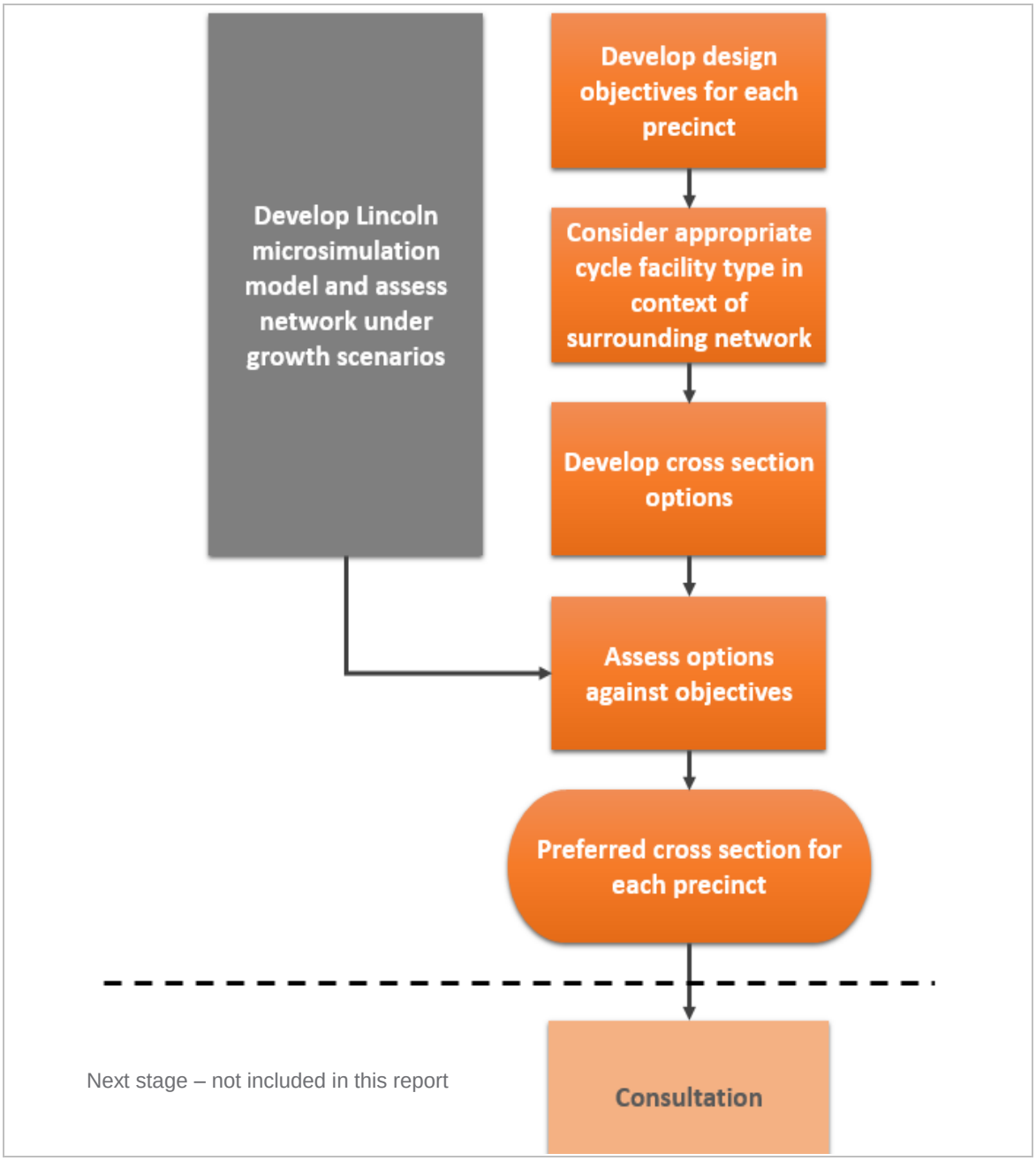
Figure 1.2 Study Area



1.3 Design Process

The design process is shown in **Figure 1.3**. Design objectives, cycle provision and the preferred cross sections were developed in collaboration with Council officers.

Figure 1.3 *Design Process*



1.4 Report Structure

This report is broken into sections for ease of understanding. The sections and their contents can be summarised as:

1) Introduction including background information to the project
2) The context of the surrounding transport environment
3) Street design elements for consideration in cross section design
4) Cycle facilities, consideration of what is appropriate within the study area
5) Design objectives for the corridor
6) Core Retail (East) sets out the proposed design for this precinct
7) Transitional Living sets out the proposed design for this precinct
8) Core Retail (West) sets out the proposed design for this precinct
9) Overall corridor summary considers all cross sections against the overarching design objectives

2. The Context

2.1 Introduction

The design of any cross section or intersection needs to be considered in the context of the transport network and adjacent land use. This section describes the transport network and adjacent land use as it relates to the study area. The context of the transport network and surrounding land use has been considered when developing the design objectives and cross sections.

2.2 The Transport Network

Road Classification

The study area includes Gerald Street only however the interface with connecting side streets is also considered. The road environment changes along the route with different levels of access required in each precinct. Gerald Street is classified as an 'arterial' in the District Plan and the One Network Road Classification (ONRC)[1], as shown in **Figure 2.1**. The ONRC aims to achieve a set of 'outcomes' in terms of the user experience (customer level of service). The customer level of service outcomes for arterials in the ONRC will need to be considered throughout the design process and have been accounted for in cross section design. Customer level of service (LOS) outcomes for arterial roads are defined as:

- **Safety:** "Variable road standards, lower speeds and extra care required on some roads/sections particularly depending on topography, access, density and use. Road user safety guidance provided at high risk locations. Some separation of road space for active road users in urban areas."
- **Resilience:** "Route is nearly always available except in major weather events or emergency event and where no other alternatives are likely to exist. Clearance of incidents affecting road users will have a high priority. Road users may be advised of issues and incidents"
- **Reliability:** "Generally road users experience consistent travel times with some exceptions in urban heavy peak, holidays, during major events or during moderate weather events."
- **Amenity:** "Good level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of both road users and land use. Urban arterials reflect urban fabric and contribute to local character. Some separation of road space for active road users for amenity outcomes in urban areas. Clean and secure"
- **Accessibility:** "Some land use access restrictions for road users, both urban and rural. Road user connection at junctions with national, arterial or collector roads, and some restrictions may apply in urban areas to promote arterials. Traffic on higher classified roads generally has priority over lower order roads. Numerous bus stops with high frequency services to key destinations and interchanges. Some separation of road space for active road users in urban areas to provide network access and journey continuity. Parking for all modes and facilities for mobility impaired at activity centres, and some shared spaces. Extra care required around activity centres due to mixed use, including goods vehicles. Provision of quality information relevant to arterial road user needs."

The ONRC customer LOS outcomes indicate that a town centre environment is not inconsistent with the arterial road classification and it is appropriate for the arterial to reflect the local character. However it is noted that the road should nearly always be available for traffic and therefore is not appropriate to be used as flexible space (e.g. for weekend markets). Furthermore the LOS outcomes suggest that separation between the traffic lanes and active modes is appropriate.

[1] The One Network Road Classification (ONRC) has been developed by the NZ Transport Agency. It involves categorising roads based on the functions they perform as part of an integrated national network. The classification will help local government and the NZ Transport Agency to plan, invest in, maintain and operate the road network in a more strategic, consistent and affordable way throughout the country.

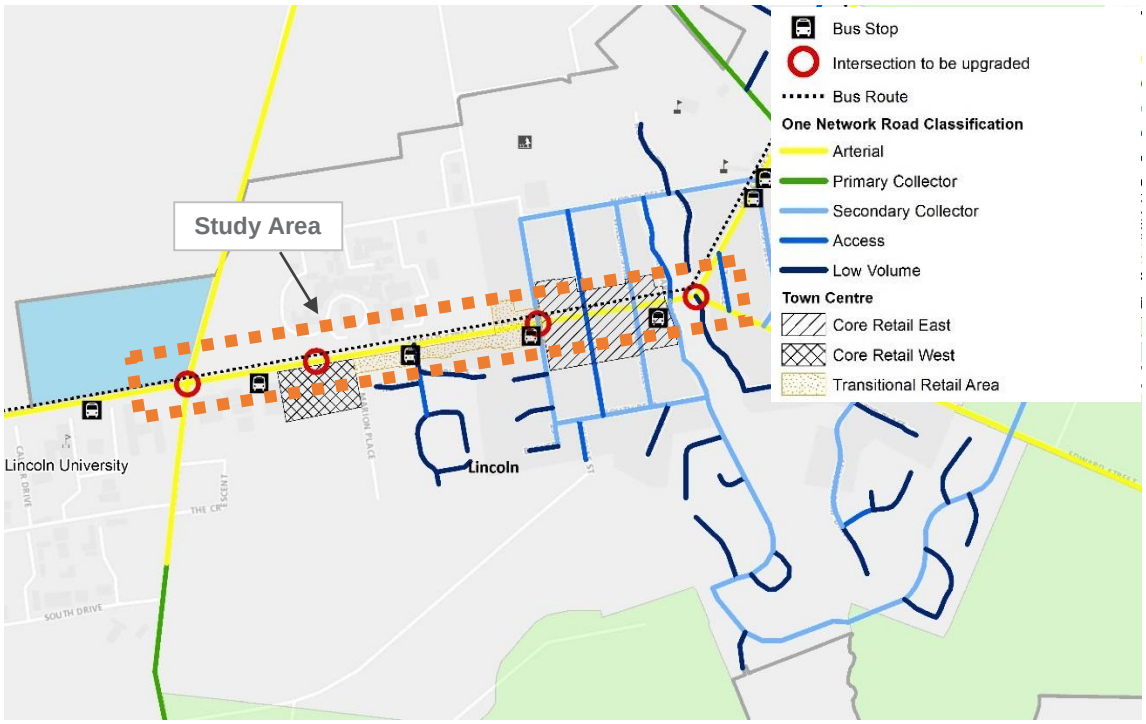


***Figure 2.1** One Network Road Classification (ONRC)*

Traffic Growth

The growth in residential areas and the town centre has been modelled in a micro-simulation model (S-Paramics) to understand the implications for the transport network. The micro-simulation model is explained in more detail in the '*Selwyn Traffic Model Information Sheet*' (2015), see **Appendix A**.

Paramics is a micro-simulation tool that simulates actual driver behaviour and interactions on a true to scale road network that can be visualised. As such the model can be used to assess the effects of changes to intersections, controlled pedestrian crossings and changes to on street parking.

The future model contains the 30 year growth as set out by the Long Term Plan. This includes approximately 3,300 households in the Outline Development Plan areas and also increased activity in the town centre and the transitional commercial area between the town centre and New World supermarket. The model was used to assess network capacity under the increased future traffic demands and determine the infrastructure required to cope with the increase in traffic.

This process has identified four intersections within the study area that require upgrading. The type of intersection control at could be appropriate at these intersections have been assumed as part of this project so as to inform the development of the street design. However these assumptions could be influenced by the potential future development of the proposed Lincoln Research Hub.

The intersections, their current form and the assumed future form are:

- James/Edward/Gerald currently priority controlled - upgrade to signals –
- West Belt/Gerald currently priority controlled - upgrade to signals –
- Vernon/Gerald currently priority controlled - upgrade to signals –
- Ellesmere Junction/Springs/Gerald currently a single lane roundabout - upgrade to signals –

The proposed upgrades to signalised intersections will assist with accommodating turning movements out of side streets and provide more safely for pedestrian and cyclist crossing movements. Having a series of traffic signal controlled intersections along Gerald Street allows for co-ordination of the intersections so that traffic flow and speed can be managed appropriately. It is noted that historically it was considered that the roundabout at the Ellesmere Junction/Springs/Gerald intersection could be enlarged from a single lane roundabout to a double lane roundabout when the need for further capacity was required. Double lane roundabouts do not provide good pedestrian crossing options and can be unsafe for cyclists. In order to facilitate good connection by all modes between the town centre and the university campus a signalised intersection is recommended.

The model also allows future flows on Gerald Street to be understood. The current traffic volume on Gerald Street is approximately 6,000 vehicles per day, including approximately 5% heavy medium commercial vehicles. The model includes the forecast growth in Lincoln over the next 30 years and forecast traffic flows on Gerald Street:

- 1,200 vehicles in the peak hour (approximately 12,000 vehicles per day) in the Core Retail (East) precinct
- 1,300 vehicles in the peak hour (approximately 13,000 vehicles per day) in the Transitional Living precinct
- 1,100 vehicles in the peak hour (approximately 11,000 vehicles per day) in the Core Retail (West) precinct

The flows listed above can all be accommodated within a two-lane two way road without the need to incorporate additional lanes, except as necessary at intersections. Upgrades to the intersections (including turning bays at intersections that will remain as priority controlled) are likely to require some space along Gerald Street.

The micro-simulation model also takes into account the location of proposed consolidated off-street parking to be accessed on side streets and how this will impact the operation of the associated intersections.

Within the Councils 30 year infrastructure strategy there is a proposal to extend Meijer Drive from North Belt Road through to Boundary Road. The prime purpose of the extension would be to provide access into the area north of the town centre for a future sports ground extension. This road extension would also potentially provide a direct connection to the town centre via William Street. This could result in a minor reduction in the traffic volumes on the western part of Gerald Street if the route was considered an attractive alternative to Springs Road. It is also likely that the intersection of William Street and Gerald Street would need to be upgraded. This proposal is currently considered a low priority for the Council and will not influence the development of cross sections for Gerald Street.

Travel movement patterns

An Origin-Destination (OD) survey was undertaken on the 21st and 22nd of May 2014 to understand travel movements into and out of the Lincoln township. The purpose of the survey was to measure the number of vehicles approaching Lincoln and then travelling through the wider township as opposed to Lincoln being the origin or destination of the trip. The OD survey was conducted between 4pm and 6pm on the 21st of May (evening peak) and between 7am and 9am on the 22nd of May (morning peak). The key arterials surveyed were:

- Springs Road to the north of town
- Springs Road to the south of town
- Birches Road to the north of the town
- Lincoln Taitapu Road
- Ellesmere Junction Road to the west to the University

The survey found that between 92% and 98% of trips towards Lincoln in the morning peak have a destination in Lincoln, i.e. only 2% to 8% of all inbound morning trips are through trips. During the evening peak a greater number of through trips were recorded, with 10% to 26% of trips travelling towards Lincoln being through trips. The morning peak rate is likely to be much lower than the evening peak due to the influence of the primary and secondary schools in Lincoln which service the local District. The highest proportion of through traffic was observed on the lower volume roads, specifically Springs Road south followed by Lincoln Taitapu Road and Ellesmere Junction Road.

Light and heavy vehicles were also recorded during the survey. No heavy vehicle through movements were observed in the morning peak. Only six heavy vehicle through movements were observed during the evening peak, four of which travelled along Gerald Street in either the westbound or eastbound direction. The OD survey confirms that Lincoln is an origin or destination for most travel in the vicinity and nearly all heavy vehicle trips are on the local network with few if any through trips occurring.

Traffic Speeds

Traffic speeds are observed to be significantly lower in the Core Retail (East) precinct than along the remainder of Gerald Street. This is due to the level of activity that currently exists in this precinct creating a lower speed environment including people crossing the road and cars parking/unparking. Speeds in other precincts are also likely to decrease over time as the levels of activity increase. The average speeds through the Core Retail (West) precinct and the Transitional Living precinct are anticipated to be in the order of 47-48 km/h once the anticipated growth is fully developed, as predicted by the micro-simulation model.

Retaining a low speed environment (30km/h) in the Core Retail (East) precinct is not anticipated to have any impact on capacity based on the micro-simulation model. A design that supports the low speed environment in this precinct would significantly increase safety and likely improve the number of crossing opportunities for pedestrians.

2.3 The Precincts

As described in Section 1 the study area has been divided into three precincts:

- Core Retail (East)
- Transitional Living
- Core Retail (West)

The precinct divisions reflect proposed zones in the District Plan. Due to the close relationship between transport and land use, the transport environment needs to be consistent with land use in each precinct. The precincts and related existing transport environments are discussed below.

Core Retail (East)

The Core Retail (East) Precinct generally covers the existing town centre area from the James/Edward intersection, across the Liffey River, to West Belt. Existing development is relatively small scale (1-2 levels) and has a village like feel. Generally buildings and outdoor dining front the street and there are high levels of pedestrian and on-street parking activity. The Lincoln Library is located at the western end of the precinct. There are well developed trees within the road corridor predominantly located at intersections. The Core Retail (East) precinct is shown in **Figure 2.2** and **Figure 2.3**.

Figure 2.2 *Core Retail (East) Precinct Looking West Along Library Frontage*

Figure 2.3 *Core Retail (East) Precinct Looking East From William Street*

Transitional Living

The Transitional Living Precinct predominantly contains residential activities with some small service businesses. On the north side of Gerald Street the majority of the land forms part of the Lincoln Research Hub, it is understood that the Research Hub will expand, careful consideration will need to be given to ensuring the design can safely accommodate the proposed development once plans have been developed[2]. A low hedge adjacent to a stormwater drainage ditch runs along the boundary between the hub and the road reserve. At the eastern end on the northern side there are also some residential and business activities. It is understood that in the short to medium term the existing buildings within this precinct are envisaged to remain, however their use may change from residential to business. Some off street parking is provided on the majority of sites within this precinct. There is a cycle lane and no on-street parking provided on the north side of Gerald Street, except at the eastern end of the precinct. The current Transitional Living Precinct is shown in **Figure 2.4** and **Figure 2.5**.

The intersection of Vernon Drive and Gerald Street is on the boundary of the Transitional Living and Core Retail (West) Precinct. Vernon Drive will become the main entrance to the Te Whariki subdivision.

[2] The proposed Lincoln Research Hub is an agricultural research and education facility being developed by a partnership of Lincoln University, DairyNZ and Crown Research Institutes (CRIs) AgResearch, Plant and Food Research, and Landcare Research.

Figure 2.4 *Transitional Living Precinct Looking West From Number 31 Gerald Street*

Figure 2.5 *Transitional Living Precinct Looking East at Eastern End (parking on both sides)*

Core Retail (West)

The Core Retail (West) precinct runs from Marion Place to Springs Road. The land in the south eastern quadrant of this precinct is proposed to be zoned core retail. Land on the north side of Gerald Street and in the south western quadrant of the precinct forms part of the Lincoln Research Hub. Similarly to the Transitional Living Precinct, care must be taken to ensure that any expansion of the Research Hub integrates with the design of the Town Centre. The existing cross section in this precinct includes on street cycle facilities and no on street parking.

Generally the business activities that are within this precinct provide on-site parking. Currently there is a supermarket and a service station located on the south side of Gerald Street, further retail developments are expected in the short to medium term. The businesses in this precinct will be abutted by medium density residential development. The current Core Retail (West) precinct is shown in **Figure 2.6** and **Figure 2.7**.

Figure 2.6 *Core Retail (West) Precinct Looking West From Edge of Transitional Living Precinct*

Figure 2.7 *Core Retail (West) precinct looking west along New World Frontage*

3. Street Design Elements

3.1 Overview

The streetscape is made up of elements that are contained within the legal road reserve and those adjacent to the road, such as the buildings and landscaping. These elements combined define a street's character. This work focuses on the elements within legal road reserve that reflect how the street is intended to function, acknowledging that the interface with adjoining land uses including property access, need to be considered in the streetscape design.

The existing road reserve along Gerald Street is generally 20 metres wide. This chapter discusses how the following streetscape elements influence the cross section development:

- Pedestrian movement
- Bicycle movement
- Bus movement
- Traffic lanes
- On-street parking
- Landscaping

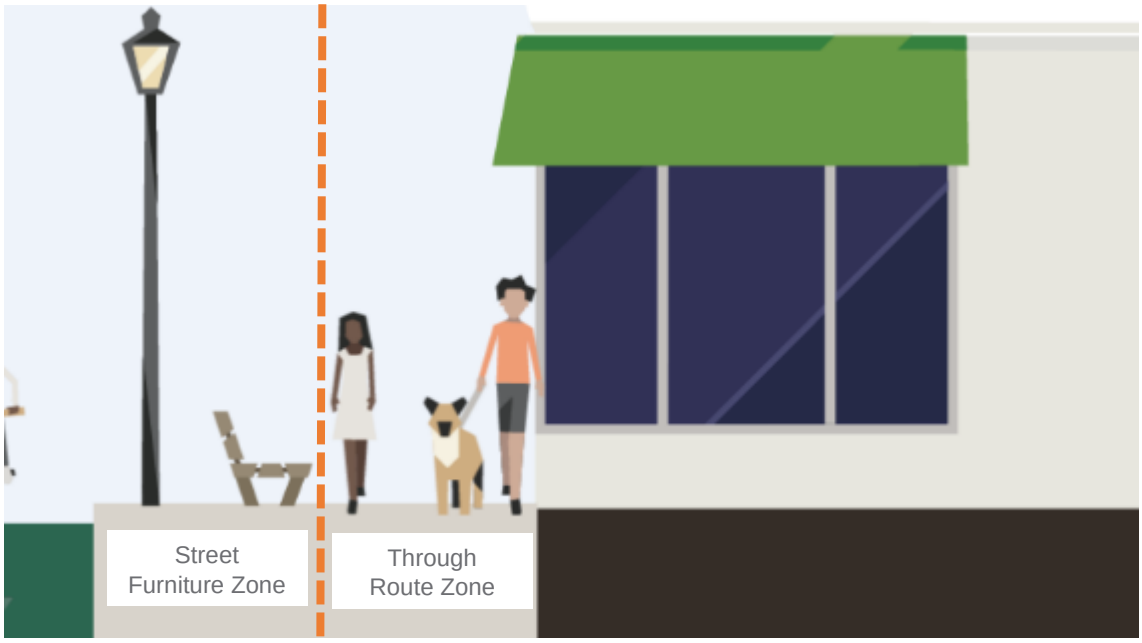
3.2 Pedestrian Movement

Gerald Street is an important walking connection through the town centre, as well as providing access to town centre activities (on both sides of the street) and bus services. The streetscape design therefore needs to cater for pedestrian movement along and across Gerald Street, including crossing side roads.

This section focuses on the footpath (movement of pedestrians) element of the streetscape, however it is acknowledged that an enjoyable walking experience is influenced by many factors (e.g. changes in footpath grade, footpath material, proximity to moving vehicles etc.). Factors such as surfacing and changes in grade should be considered in detailed design.

It is important to recognise that in town centre environments street furniture, including sandwich board signs, is more prominent than in residential areas and sufficient footpath width needs to be provided to ensure that a clear route is available for pedestrian movement. The concept of street furniture zones and through pedestrian route zones is introduced in **Figure 3.1**.

Figure 3.1
Footpath Layout



The Pedestrian Planning and Design Guide (NZTA, 2007) contains pedestrian levels of service (LOS) guidance for footpaths. The LOS can be described simply as the ease of ability to move through a system or network, with LOS A indicating free and unimpeded pedestrian movement and LOS F indicating delayed and interrupted movement, similar to that experienced when leaving a large event.

Pedestrian Planning and Design Guide Table 14.3 covers the maximum pedestrian volumes for different through route widths that would result in LOS B. These can be considered minimum widths that apply to typical pedestrian flow conditions. Generally wider street furniture zones are required in areas with high adjacent vehicle speeds and volumes, and wider through route zones are required in areas with higher pedestrian volumes or with a high number of pedestrians stopping on the footpath. A 'through route' is the footpath space where pedestrians normally choose to travel and should be kept clear of obstructions at all times. This clear space is particularly important for visually impaired people, a meandering clear space is not appropriate for this reason. The overall footpath width is a function of the land use, for example if there is outdoor dining anticipated a wider footpath would be desirable. On street parking can also be removed in order to accommodate localised footpath widening, either permanently or temporarily (e.g. a wooden deck/platform) see **Figure 3.2**.

Figure 3.2 *Parking removed from cross section to accommodate outdoor dining (Timaru)*

For Gerald Street it is considered that the minimum footpath widths and through routes are

- Core Retail (East) – 3m footpath, 1.8m through route
- Transitional Living – 1.5m footpath, 1.5m through route
- Core Retail (West) – 1.8m footpath, 1.8m through route

3.3 Bicycle Movement

There are four main ways to cater for cycling within the road reserve:

- Sharing the traffic lane with other traffic,
- On road cycle lanes,
- Physically separated cycle facilities, and
- Off road paths.

These are outlined below in more detail. Understanding cycle facility types is important as the cross section design often hinges on selecting the appropriate cycle treatment. This is particularly the case for the Lincoln Town Centre as discussed in Section 4.

Share the Traffic Lane with other traffic

This treatment creates a street environment where the cyclist shares the traffic lane with motor vehicles. This can either be when the cyclist and motor vehicles can travel side by side and therefore a lane width of 4.2m or greater is required, or when motor vehicles follow the cyclist in the traffic lane or make a proper overtake manoeuvre. The latter should only be considered appropriate when the following conditions apply:

- The traffic lane is no more than 3.0m wide,
- Traffic must operate at slow speeds (30km/h or less),
- The traffic volumes are low (below 2,000 vehicles/day),
- There are low servicing and access requirements for the adjacent land use, and

- The treatment is over short lengths, approximately one or two blocks, longer distances may evoke driver impatience as most cyclists will be travelling at speeds around 20 km/h.

It should be noted that even with the right conditions it may be off putting for inexperienced cyclists to share a 3.0m wide traffic lane, particularly if the lane is directly adjacent to a high turnover parking lane.

The important aspect of sharing the lane is that traffic lanes widths of between 3.0m and 4.2m should be avoided. These widths result in an unsafe arrangement where cyclists are 'squeezed' due to traffic overtaking within the same lane when there is insufficient width for this to occur safely. **Figure 3.3** shows an example of a high street environment with a traffic lane width between 3.0 and 4.0m width, it shows that the space between the travelling vehicles and the parked vehicles is limited for cyclists and creates a squeeze point.

Figure 3.3
Example of Unsafe Lane Width where cyclist is squeezed (thedailyblog.co.nz)

On Road Cycle Lanes

This treatment involves the provision of a separate lane for cyclists line-marked between the parking or kerb and general traffic lane; with no physical separation between the lanes. The cycle lane surface can be coloured green to highlight conflict points, for example across side street intersections. Cycle symbols are painted along the lane at regular intervals to legalise and reinforce its use. The cycle lane width is a function of the adjacent activity. For example the width needs to be at least 1.8m when there are parked cars adjacent to the cycle lane to allow for car doors opening. When there is no on street parking adjacent the cycle lane can be reduced to 1.6m where necessary. Cycle lanes provide cyclists with their own space in the carriageway however can still be too intimidating for inexperienced/less confident cyclists.

The provision of cycle lanes adds to the overall carriageway width and therefore can induce higher traffic speeds; this should be less of an issue in the town centre due to regular intersection spacing and high density traffic conditions.

Separated Bicycle Facility

A separated bicycle facility (SBF) is a facility that is physically separated from the general traffic lane and the footpath. The separation can be kerbs, vertical flexi-posts or landscape treatments such as planter boxes. An example of a one-directional SBF with kerb separators is shown in **Figure 3.4**. SBFs can also be bi-directional and provided on one side of the road.

Figure 3.4
Example of a Separated Cycle Facility (Ilam Road, Christchurch)

SBFs separate people on bicycles and motor vehicles to a greater degree than a cycle lane; however they require careful consideration where bicycles and motor vehicles interact, for example at intersections.

Another consideration is the interaction between pedestrians and cyclists at bus stops, pedestrian crossing facilities and between areas of high turnover parking and the footpath. Mitigation of these conflicts is a function of how much space is available; ideally passengers should not be able to walk directly off the bus, or step out of parked cars, into the separated cycle facility. **Figure 3.5** shows a bus stop with a shared path at the rear along a SBF route.

Figure 3.5 *Cyclist can use the bus stop if no bus or the shared path at rear of the shelter*

Off Road Paths

Off road paths can be cycle only paths or paths where cyclists and pedestrians share the path, known as a 'shared path'.

Shared paths are allowable under the Traffic Devices Rule 11.4 if the facility is signposted in accordance with the rule. Shared paths require careful consideration as the different speeds of pedestrians and cyclists can lead to inevitable conflicts. Some pedestrians, for example older pedestrians, feel insecure walking among faster cyclists. As the volumes of all users increase, conflicts between their needs can significantly affect the quality of provision for both pedestrians and cyclists. It has also been found that some cyclists will not divert from a roadway that provides a more direct route, so paths rarely completely replace the need for on-road provision. Conflicts can be mitigated to some extent by allowing cyclists to conveniently exit the path prior to intersections. However, the best tool to address conflict is to provide a shared path of a width that is sufficient for the expected usage (including consideration of future usage).

3.4 Traffic Lanes

Traffic lanes are the general lanes used by motor vehicles and in some situations also by cycles. The main variables of a traffic lane are its width and whether it is line marked. The width of a lane is generally related to its required capacity and function. Gerald Street is classified as an arterial road therefore the width of the lanes need to reflect this.

Other considerations when determining the width include the situation adjacent to the lane, for example, whether it is next to a cycle lane, parked cars or kerb. This is particularly important when considering how emergency services might travel through congested conditions, e.g. are the other vehicles able to move to the side allowing space for a fire truck to proceed. Speed is also a consideration in determining the lane width but to a lesser extent in a town centre environment due to the presence of other conditions that will support a low speed environment (side friction created by on-street parking, close intersection spacing etc.). Overall the selected lane widths should ensure a safe operating environment for all road users.

Generally wider lanes allow for the likely use by buses (be it on a defined bus route or potential to be a bus route in the future) and other large vehicles on a regular basis. Where a lane is located adjacent to a cycle lane (not an SBF) the traffic lane can be narrower and still cater for buses and large vehicles effectively.

For Gerald Street traffic lanes between 3.2m and 3.5m wide are considered appropriate.

3.5 On-Street Parking

Parking within the Lincoln Town Centre is made up of public and private off street parking and public on-street parking. There is also an area of on-street angle parking (Robert Street) that is on both public and private land, this type of shared arrangement is a useful solution to increase parking supply. It is noted that in the Core Retail (west) precinct and on the northern side of the transitional living precinct no on street parking is currently provided.

A **parking survey**[3] was undertaken in March 2015 to establish the current parking demand, both in term so of occupancy and duration of stay.

A **Parking Management Plan**[4] has been prepared to support the Town Centre Plan and includes recommendations for managing current parking supply and also the parking changes that may result from the street changes.

On street parking can either be parallel to the kerb or at an angle. Angle parking generally provides a greater number of parking spaces along a length of road, however requires more width than parallel parking. Angle parking can create issues for cyclists, if there is insufficient space provided between the parking and the traffic lane. It is understood that the existing angle parking on the south side of Gerald Street is to remain.

Figure 3.6
Example of street tree planting between parking bays (Papanui)

On-street parking includes spaces allocated to drop off and pick up (short term parking), loading zones, mobility parking, taxi stands and site specific activities. These types of spaces need to be catered for in the streetscape and are generally allocated when a street undergoes scheme design and can be related to the land use at that time.

On-street parking lanes can provide street landscaping opportunities by incorporating trees and landscaping between parking bays, as shown in **Figure 3.6**

[3] Lincoln Town Centre Parking Survey, Abley Transportation Consultants, May 2015
[4] Lincoln Town Centre Parking Management Plan , Abley Transportation Consultants, May 2015

3.6 Landscaping

Landscaping introduces visual amenity into the street environment. For this stage of the street design process is important to identify generally where trees could be located within the cross section. Detailed guidance on matters such as placement to ensure safe road user sightlines, address CPTED[5] principles (i.e. no hiding areas), consideration of underground services and overhead services and structures (e.g. canopies) should be developed during the detailed design stage.

Street trees can be planted within the car parking lane, either in tree pits as shown in **Figure 3.6** or in substantial kerb build outs as shown in **Figure 3.7**. Kerb build outs soften the road environment and reduce the carriageway width at regular intervals thereby helping to reduce vehicle speeds. Both methods reduce the overall car parking spaces, but provide an avenue effect due to the trees being closer to the traffic lane.

Figure 3.7
Example of Kerb Build Out between Parking Bays (Wanaka)

[5] Crime Prevention Through Environmental Design

4. Cycle Facilities on Gerald Street

4.1 Existing cycle environment

Gerald Street plays an important role in connecting the eastern (Liffey River) and western (University) ends of the town centre, the existing and proposed cycle facilities in Lincoln and the wider Selwyn District. A map showing the study area in the context of existing and proposed cycle facilities is shown in **Figure 4.1**.

Currently on Gerald Street cyclists are generally required to share the lane with motor vehicles; the exception being on road cycle lanes in the Core Retail (West) precinct and on the north side of the Transitional Living precinct. As there is a flush median, there is currently room for drivers to move around cyclists, if required.

The Selwyn District Council is in the process of expanding its cycle network including new links between Lincoln and Rolleston and Lincoln and Springston. There is also potential for a connection along Springs Road between the Lincoln to Rolleston cycleway and the University. The Little River Rail Trail that connects Lincoln to Christchurch and Little River largely exists, but will be further developed in future. The Selwyn cycle network generally consists of off-road paths on high speed roads which cater for less confident and younger cyclists. Given the arterial road function of Gerald Street a similar level of protection is required in order to provide a link that caters for these user types. The target users of the network are therefore considered to be the 'interested but concerned'[6]. Interested but concerned users enjoy cycling, or would like to cycle, however they are concerned about their safety and therefore very few people in this category regularly cycle. Providing facilities that are perceived as safe by this user type has the potential to significantly increase cyclists on the network as they are generally considered to comprise of approximately 60% of the population.

In summary a continuous, segregated cycle facility is sought on Gerald Street to connect the eastern and western precincts of the town centre.

4.2 Facility type assessment

The different types of cycle facility listed in Section 3 are considered in the context of Gerald Street in **Appendix B.** It is also noted that the study area does not continue far enough to link up with the remainder of the Selwyn cycle network. These links should ideally be implemented at the same time as the Gerald St facility.

Based on the assessment of options a separated/protected form of facility is preferred along Gerald Street, this is also consistent with the customer level of service outcomes in the ONRC.

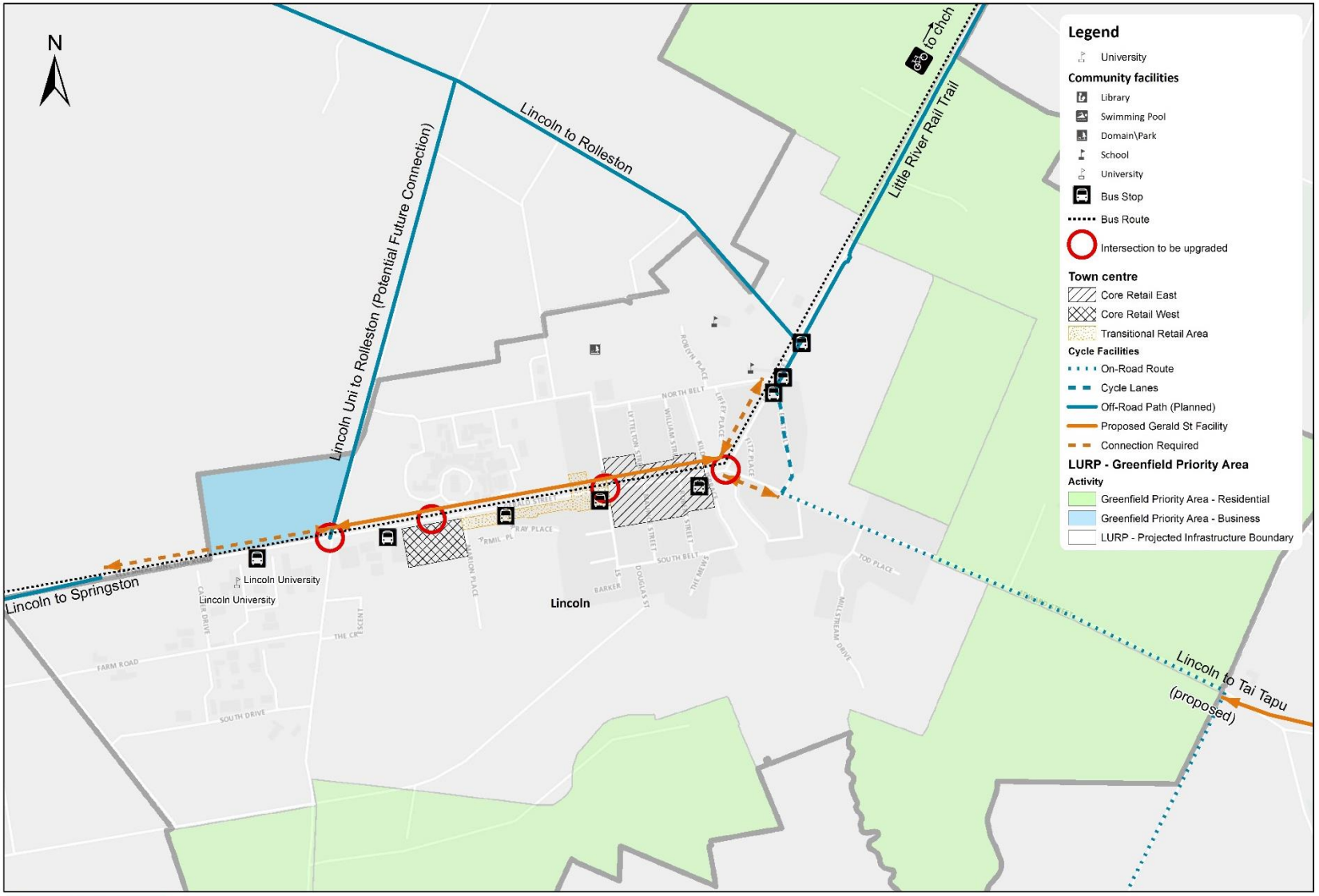
It is considered that a shared path is not appropriate for the Core Retail (East) precinct due to high levels of pedestrian activity and the space required on the footpath for sandwich boards and pedestrian linger nodes. Therefore the appropriate facility in this precinct is considered to be a separated bi-directional or one-directional facility. This is further considered in Section 6 in the cross section option assessments with consideration to how the cycle facilities in each precinct integrate to form a continuous link.

A shared path may be appropriate for the Core Retail (west) and Transitional living precincts, especially if it is provided on the northern side where there are fewer driveways. Separated bicycle facilities would also be appropriate, this is considered in the cross section design. It is noted that the Lincoln – Springston facility is provided on the southern side of Ellesmere Junction Road. The transition between this facility and the Gerald Street facility will need to be carefully designed. Furthermore it is noted that on street cycle

[6] Cycle user type classification by Roger Gellar

lanes are currently provided in the Core Retail (west) precinct. Removing these facilities and replacing them with a facility on the northern side of Gerald Street (away from retail destinations) may reduce the level of service for confident cyclists e.g. westbound cyclists may choose to stay on-road rather than cross and use the shared facility. This is also a consideration taken forward to cross section development.

Figure 4.1 Wider Cycle Network Connections



5. Design Objectives

Four sets of objectives have been developed. The first set (overarching objectives) applies to all precincts and covers aspects of design that need to be consistent/link throughout the town centre or need to be considered at a higher level. Separate more specific objectives are developed for each precinct.

5.1 Overarching Objectives

The overarching study area objectives are:

1) Cross section design recognises the movement, access and place functions of the corridor and provides appropriately for these functions.
2) The design recognises the difference between precincts, but ensures that the transitions between them are smooth.
3) Cycle infrastructure design recognises the important role that the corridor plays in connecting the surrounding cycle network (e.g. Rail Trail and University facilities), while also providing cycle access to town centre activities.
4) Pedestrian infrastructure that provides a connection through the town centre and creates an attractive environment where people want to spend time.
5) On street parking provision and potential restrictions are considered in the context of adjacent land uses and consolidated off-street parking facilities.
6) Street elements and materials are appropriate for a town centre environment acknowledging that these may differ between precincts, but overall remain coherent.
7) Speed environments in each precinct are appropriate to safely accommodate the demands on the road corridor.

6. Core Retail (East)

The Core Retail (East) precinct currently acts as the heart of the town centre. It includes the library, some public off street parking and a high density of small businesses. Generally, on street parking turnover is high in this area and traffic speeds are relatively low during business hours.

Current features of the Core Retail (East) precinct include (see **Figure 6.4**):

- Painted central median (2.4m wide)
- Parking on both sides, including some recessed angle parking on the south side, see **Figure 6.1**
- Established trees at intersections, see **Figure 6.2**
- Two existing zebra crossings, one outside the Famous Grouse Hotel and one near Hillyers Café
- 3.2m wide traffic lanes
- 2.2 – 4.0m wide footpaths (berms in some locations)
- Some existing cycle parking, see **Figure 6.3**
- One bus stop pair including shelter and seating at the eastern end of the precinct. There could be potential to also locate bus stops outside the library.

It is understood that previously the existing zebra crossings were provided on raised platforms. Raised platforms are useful for lowering traffic speeds and making pedestrian crossings more visible. The platforms have since been removed due to the associated vibrations felt by adjacent building occupants. The inclusion of raised platforms, in the Town Centre Plan is therefore not considered a viable option for Gerald Street, especially in the Core Retail (East) precinct.

***Figure 6.1** Parking in Core Retail (East) Precinct*

Figure 6.2 *Established Trees in Core Retail (East) Precinct*

Figure 6.3 *Cycle Parking in Core Retail (East) Precinct*

Figure 6.4 Core Retail (East) Features

6.1 Core Retail (East) Precinct Design Objectives

The Core Retail Precinct incorporates relatively small scale retail activities and is currently recognisable as the town centre. The design objectives for the Core Retail Precinct are to develop a streetscape that:

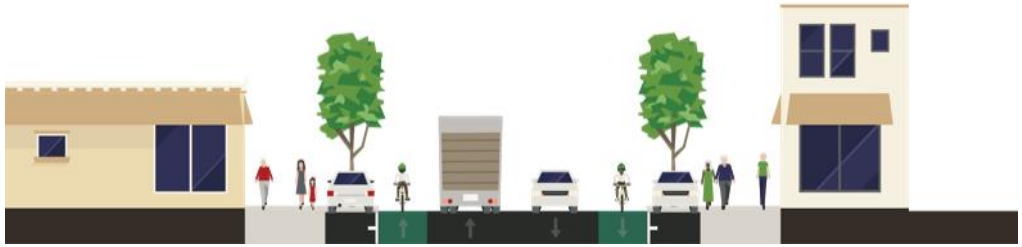
1) Creates a high quality public space where people want to spend time and retains the village atmosphere.
2) Facilitates safe and user friendly pedestrian movements (along and across the street).
3) Facilitates safe and user friendly bicycle infrastructure that recognises the many cycle destinations within the precinct.
4) Facilitates safe motor vehicle movements (along the street and whilst accessing parking and side streets).
5) Accommodates some on-street parking activities recognising that consolidated on-street parking will be developed in this precinct.
6) Integrates appropriately with adjacent land uses (existing and proposed).
7) Facilitates public transport access including bus stops.

6.2 Options

The cross section options developed for the Core Retail (East) precinct are shown in **Table 6.1**, including key strengths and weaknesses. The options are assessed against the design objectives in **Table 6.2**. Three options have been developed for the precinct, each option is distinctly different. It is noted that the cross section progressed to final design may be a variation of the preferred option, but should incorporate the same principles.

A shared path has not been considered for this precinct for the reasons explained in Section 4.

Table 6.1 *Core Retail (East) Cross Section Options*

Option Description	Indicative Cross Section
Option 1 – On-road cycle lanes (do minimum) Key features: 3m wide footpaths, 3.2m wide traffic lanes, no median, parking on both sides, unprotected cycle lanes. This option provides some space for cyclists however the facilities are not protected and therefore don't align with the outcome of the cycle facilities options assessment. Cycle lanes next to high turnover parking spaces can induce safety issues due to conflicts with car doors and parking/unparking vehicles. The advantage of this option is that parking can be accommodated on both sides of the street, i.e. no loss of parking from existing layout. Parking on both sides provides more flexible space for example removal of 1-2 bays to accommodate outdoor dining outside cafes and space for street trees. Parking on one side could also be removed to accommodate a median.	
Option 2 - One-Directional Separated Facilities Key features: 3m wide footpaths (narrower next to trees), 3.3-3.5m wide traffic lanes, no median, parking on one side, SBFs on both sides. This option provides for parking on one side only. On the side where no parking is provided street trees would need to be incorporated into the footpath, this would create localised footpath narrowing below the 3m minimum. Cycle facilities are protected and intuitively provided on both sides in the same direction as traffic (no contra-flow). The parking could be alternated between sides of the street however this would result in a lateral shift of the centreline which is not considered appropriate for this type of road (arterial). It would also result in less parking due to the transition between sides of the street.	
Option 3 - Bi-Directional Separated Facilities Key features: 3m wide footpaths (narrower next to trees), 3.3m wide traffic lanes, narrow 1.3m wide median, parking on one side, SBFs on one side (with contra-flow). This option provides for parking on one side only. On the side where no parking is provided street trees would need to be incorporated into the footpath, this would create localised footpath narrowing below the 3m minimum. The contra-flow nature of a bi-directional facility could create safety issues at intersections/driveways and will need to be managed carefully through design. Space for a narrow median allows flexibility and better accommodates continuous traffic flow, e.g. past stopped buses and parking vehicles as is appropriate for an arterial road.	

6.3 Option Assessment

Each of the options is assessed against the design objectives listed in Section 6.1, see **Table 6.2**. The assessment is qualitative and considers the extent to which the option achieves the objective.

Table 6.2 Option Assessment – Core Retail (East)

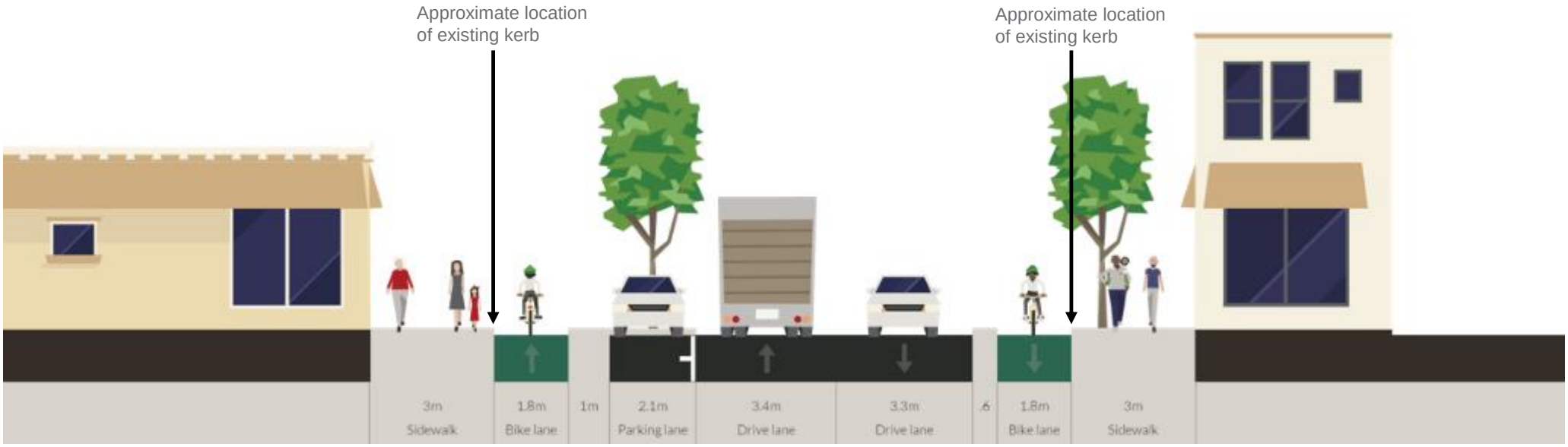
Objectives		Option			
		1 Do-Minimum	2 One-Directional SBFs	3 Bi-Directional SBF	Comments
1	Amenity	✓	✓✓	✓✓	Cycle lanes result in wide feeling carriageway not synonymous with low speeds etc.
2	Pedestrian provision	✓✓	✓	✓	Provision of trees in footpath creates localised narrowing.
3	Cycle provision	-	✓✓✓	✓✓	Bi-directional SBF could create an element of confusion. Providing on-road cycle lanes not consistent with overall cycle facility assessment.
4	Vehicle movement	✓	✓✓	✓	Median in Option 3 provides flexibility to allow more continuous flow. Contra-flow on SBF could create conflicts at intersections/driveways.
5	Parking	✓✓	✓	✓	Recessed angle parking can be retained in all options.
6	Integration with Land use	✓✓	✓	✓	Parking on both sides allows flexibility to incorporate local widening of footpath.
7	Public Transport	✓✓	✓	✓	All lane widths are sufficient to accommodate buses. Separated facilities adjacent to the footpath can be routed behind bus stop. Parking lanes on both sides provide more space for traditional bus stop arrangements.

✓✓✓ Exceeds the Objective
✓✓ Meets the Objective well
✓ Meets Objective
- Does not meet objective

Option 2 (as highlighted in grey) is the preferred option when considered against the design objectives. It is however noted that all options score relatively similarly, however Option 1 does not provide the preferred level of protection for cyclists. The location of street trees in Option 2 will need to be carefully considered in terms of where it is appropriate for footpath narrowing to occur.

Figure 6.5 shows the general layout of the preferred cross section and the current kerb location. For this section of Gerald Street the kerb generally aligns with the proposed cross section so it is anticipated that no new kerb will be required. Between Kildare Terrace and Lyttelton/Maurice Street the street lights are located on the north side of the street just behind the kerb and there are no overhead power lines. Between Maurice Street and West Belt Road, just behind the kerb, there are power poles on both sides of the road with overhead power lines and street light fittings on the power poles on the south side of the street. The location of underground services will need to be considered in detailed design. No land purchase is required to implement the cross section.

Figure 6.5 Core Retail (East) Preferred Cross Section



Cycle facilities

It is recommended that parking is retained on the southern side of Gerald Street. This provides space for greater protection of cyclists alongside the recessed angle parking. The preferred cross section includes a wider (1.0m) buffer between the SBF and parallel parking to ensure cyclists are protected from opening car doors and provides space for people to stand while getting in and out of their parked vehicles.

The design of the cycle facility adjacent to the recessed angle parking will need to be carefully considered. Protection between both vehicles reversing out of spaces and the traffic lanes should be provided. **Figure 6.6** shows an example of a low profile speed hump used on the Beach Road cycleway in Auckland to provide protection at commercial driveways whilst still allowing vehicle access. A similar treatment, possibly constructed from a different material, could be used on both sides of the SBF behind angle parking as shown in **Figure 6.7**.

It should be noted that the 1.8m width of the cycle facilities is a minimum and does not allow for overtaking within the facility. Some overtaking opportunities may be able to be incorporated during scheme and detail design.

Figure 6.6
Possible Protection Adjacent to Angle Parking (Auckland)

Figure 6.7
Indicative Cross Section at Angle Parking including low profile speed bumps

Landscaping/Street Trees/Street Furniture

There is potential to plant trees on each side of the street. On the south side they would be located in kerb buildouts that create parking bays between them. On the north side they would need to be located in the footpath whilst still maintaining a clear through route for pedestrians. The location of underground services would need to be established in order to confirm street tree locations.

Where street trees are provided in line with parking, seating and other features such as cycle parking could also be provided in the kerb buildout, see **Figure 6.8**.

Figure 6.8 *Street Trees in Kerb Extensions with Seating (Rangiora)*

Bus Stops

In order to accommodate bus stops within the proposed cross section cyclists need to travel behind bus shelters on a shared path for a short section. Alternatively bus stops could be provided in the form of bus boarders, where buses stop in the traffic lane. At the location of the existing bus stops the road reserve is wider than further along Gerald Street. This provides an opportunity to increase the width of the cross section at this point and better accommodate the sharing of the footpath. Some landscaping adjacent to the existing off-street car parks may need to be removed in order to provide sufficient space. A possible cross section at the bus stops is shown in **Figure 6.9**.

Figure 6.9 *Indicative Cross Section at Bus Stops adjacent to Liffey River*

If a bus stop was located outside the library providing a standalone shelter would be difficult due to insufficient space however it may be possible to utilise the existing veranda overhang. . Pedestrian activity outside the library is likely to be high and therefore a wider shared path would be necessary to accommodate cyclists safely.

Pedestrian Crossing Facilities

There are currently two pedestrian crossing facilities within the Core Retail (East) precinct, see **Figure 6.10**. It is recommended that these crossings are retained. Zebra crossings are appropriate in this environment where pedestrian volumes are relatively high and the traffic speed environment is low, despite this being an arterial road.

The upgrade of the West Belt/Gerald intersection to signals will also provide another priority crossing location for pedestrians. An additional mid-block crossing facility on the block between Maurice Street and West Belt is also recommended, see **Figure 6.10**. The provision of a crossing in this location would provide crossing opportunities every 80 to 100m throughout the Core Retail (East) precinct. It is recommended that in the first instance the new mid-block crossing is provided as kerb extensions only, i.e. no priority given to pedestrians over vehicles. Over time the need to incorporate a zebra crossing may arise however in the interests of protecting the arterial function of the corridor it is not recommended that this is implemented in the first instance. It is anticipated that the spacing of zebra crossings and signals throughout the remainder of the precinct and the low speed environment of the precinct will assist with increasing crossing opportunities at this location.

It should be noted that the existing layout, incorporating a flush median, assists with pedestrians crossing the road along the length of the precinct. The proposed cross section cannot accommodate a median and therefore may make it more difficult for pedestrians to find suitable gaps in the traffic away from priority facilities. It is anticipated that the new signalised intersections will assist with providing gaps and also providing additional priority crossing locations. However, it should be acknowledged that this potential inconvenience for able bodied pedestrians will exist.

It is recommended that the design of all mid-block crossing facilities gives priority to pedestrians over cyclists. This could be supported by creating a raised platform within the cycle facility.

Figure 6.10 *Core Retail (East) Pedestrian Crossings*

Intersections

The intersections at either end of the Core Retail (East) precinct have been identified for upgrade to signals, the design of these intersections will need to be considered outside of this study as a greater level of detail is required. Priority intersections within the precinct will become more important as off street parking is further established. It is understood that platforms are not an appropriate treatment for these intersections however a rough paved surface could be used to encourage drivers to take additional caution, see example in **Figure 6.11**.

Figure 6.11 *Tactile Surface at Intersection (Auckland)*

Parking

Currently in this precinct there are minimal parking restrictions in place (allocation of some disability spaces only). If this cross section design is implemented the availability of on-street parking will be reduced and remaining spaces will be more highly demanded. This is addressed in the **Parking Management Plan**[7] along with recommendations for managing current parking supply and also the parking changes that may result from the street changes.

It is important that appropriate time restrictions are applied to on street parking to ensure that this convenient parking is available to the highest priority users. Consolidated off street parking will be available to take any over flow, especially where visitors are parking for longer periods of time. There is potential to create additional angle parking precincts within the side streets to increase the overall parking supply in close proximity to the Town Centre. Parking management strategies are useful tools to understand which users should be prioritised where and these are usually developed in conjunction with the relevant stakeholders (e.g. businesses and land owners).

Currently an informal 'Park N Ride' arrangement operates in the vicinity of Market Square and the existing bus stop on the north side of Gerald Street, adjacent to the Famous Grouse. There may be opportunities to expand the arrangements, in a different location, so it captures a larger number of passengers, for example in conjunction with the proposed Lincoln Research Hub.

[7] Lincoln Town Centre Parking Management Plan , Abley Transportation Consultants, May 2015

7. Transitional Living

The Transitional Living Precinct accommodates relatively small scale activities. These are predominantly expected to be service activities such as dentists and lawyers. Currently the majority of activities within the Transitional Living Precinct are residential, however this is anticipated to change over the life of the Plan.

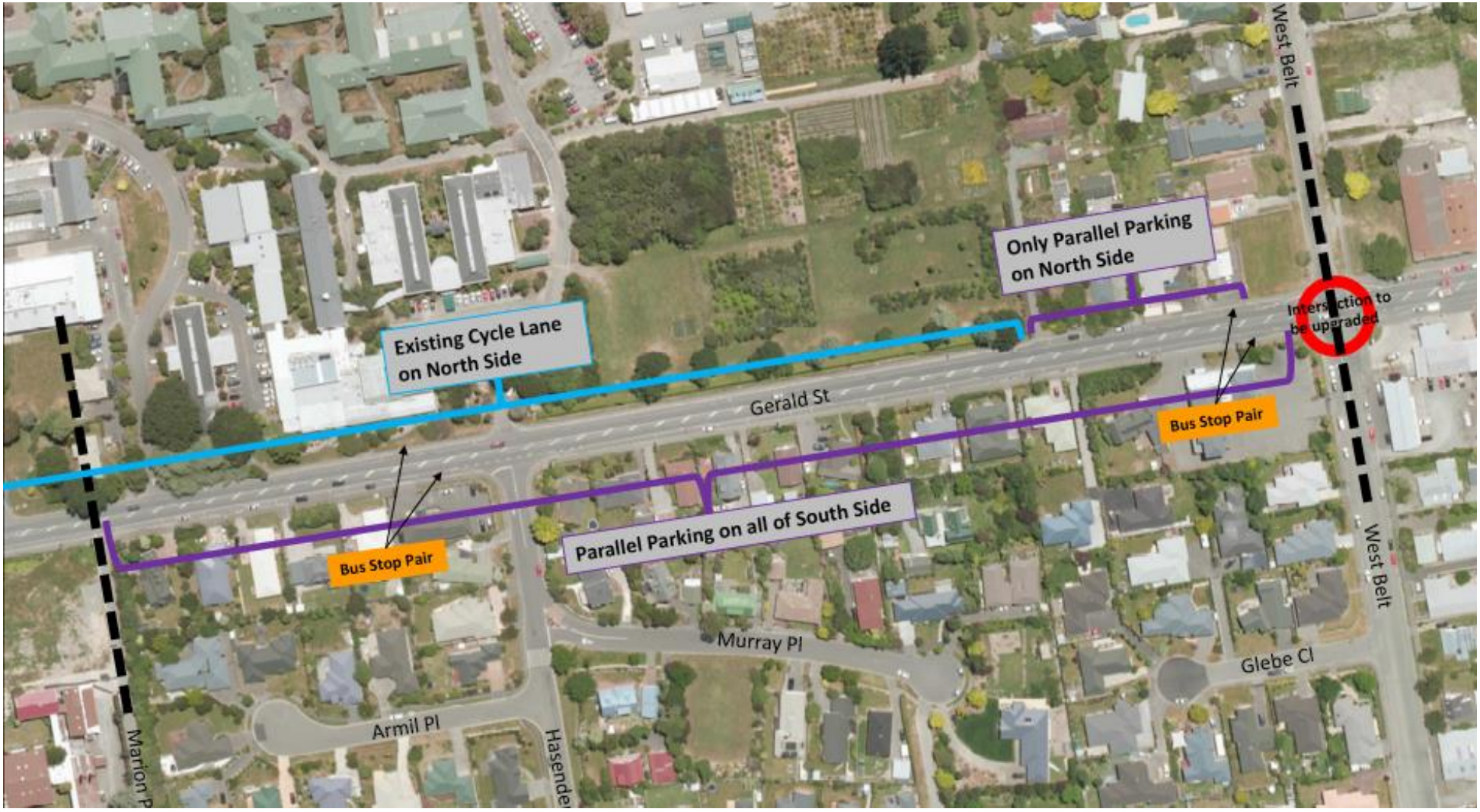
The current cross section within the Transitional Living Precinct includes one traffic lane in each direction and a painted median down the centre of the road, see **Figure 7.1**. Parking is provided on the south side only, however at the easternmost end parking is provided on both sides for a short length.

A cycle lane is provided along the northern side where no parking is provided. Currently there are two pairs of bus stops within the precinct, one adjacent to West Belt and one adjacent to Murray Place. No pedestrian crossing facilities are currently provided.

It is understood that during preliminary discussions with the Research Hub the possibility of providing a footpath within their land has been tabled. The cross section options developed do not include any additional land outside the road reserve, however the availability of this land would reduce space constraints within the cross section.

Figure 7.1
Transitional Living Precinct Looking West

Figure 7.2 Transitional Living Features



7.1 Transitional Living Precinct Design Objectives

The design objectives of the Transitional Living Precinct are to develop a streetscape that:

1) Creates a public space that complements the adjacent precincts while recognising the difference in land use between the precincts.
2) Facilitates safe and user friendly pedestrian movements (along and across the street).
3) Facilitates safe and user friendly bicycle travel.
4) Facilitates safe motor vehicle movements (along the street and whilst accessing adjacent activities, parking and side streets).
5) Accommodates on-street parking activities.
6) Integrates with adjacent existing and proposed land uses (e.g. the Research Hub and its proposed expansion) and recognises their transitional nature.
7) Facilitates public transport access including bus stops.

7.2 Options

The cross section options developed for the Transitional Living precinct are shown in **Table 7.1**, including the key strengths and weaknesses. The options are assessed against the design objectives in **Table 7.2**. Three options have been developed for the precinct. It is noted that the cross section progressed to final design may be a variation of the preferred option, but should incorporate the same principles.

Table 7.1 *Transitional Living Cross Section Options*

Option Description	Indicative Cross Section
Option 1 - One-Directional Separated Facilities Key features: 1.5-2m wide footpaths, 3.3-3.5m wide traffic lanes, no median, parking on one side, one-directional SBFs on both sides, grass berm/landscaping on one side. This option provides for parking on one side only. On the side where no parking is provided street trees would need to be incorporated into the footpath, the footpath could meander around the trees. Cycle facilities are protected and intuitively provided on both sides in the same direction as traffic (no contra-flow). Narrower footpaths are appropriate for this precinct due to the nature of the anticipated activities generating less pedestrian demand.	
Option 2 - Bi-Directional Separated Facilities Key features: 1.5-1.8m wide footpaths, 3.2 -3.5m wide traffic lanes, narrow 1.4m wide median, parking on one side, SBFs on one side (with contra-flow). This option provides for parking on one side only. On the side where no parking is provided street trees would need to be incorporated into the footpath. The contra-flow nature of a bi-directional facility could create safety issues at intersections/driveways and will need to be managed carefully through design. Space for a narrow median allows flexibility and better accommodates continuous traffic flow, e.g. past stopped buses and parking vehicles as is appropriate for an arterial road. At some locations this cross section may be able to accommodate pedestrian refuges.	
Option 3 – Shared Path Key features: 1.8m wide footpath on south side, berm on south side, 3.0m wide shared path on north side, 2.3m wide median, parking on one side, paved shoulder between shared path and traffic lane, 3.5m wide lanes, cycle lane on south side for use by experienced cyclists. This option provides for parking on one side only, this is consignant with the current layout. This layout could not accommodate street trees on the north side without utilising some of the Research Hub's land. However it is understood that this may be an option. A larger flush median could be accommodated in this option which would assist with travel time reliability along the corridor and providing informal crossing locations for able bodied pedestrians.	

7.3 Option Assessment

Each of the options is assessed against the design objectives listed in Section 7.1, see **Table 7.2**. The assessment is qualitative and considers the extent to which the option achieves the objective.

Table 7.2 Option Assessment

Objectives		Option 1 One-Directional SBFs	Option 2 Bi-Directional SBF	Option 3 Shared Path	Comments
1	Amenity	✓✓	✓✓	✓	Wider median and buffer in Option 3 creates wide carriageway not synonymous with low speeds etc. No space for trees on both sides in Option 3.
2	Pedestrian provision	✓	✓✓	✓	No median in Option 1 means more difficulties crossing for able bodied pedestrians. Conflicts with cyclists on shared path.
3	Cycle provision	✓✓✓	✓	✓	Bi-directional SBF could create an element of confusion. Providing on-road cycle lanes not consistent with overall cycle facility assessment. Experienced cyclists unlikely to use shared path.
4	Vehicle movement	✓	✓	✓✓✓	Median provides flexibility to allow more continuous traffic flow. Contra-flow on SBF could create conflicts at intersections/driveways.
5	Parking	✓✓	✓✓	✓✓	Parking on one side in all options.
6	Integration with Land use	✓✓✓	✓	✓	Bi-directional cycle facility and shared path on opposite side of road from most activities (except the Research Hub)
7	Public Transport	✓	✓✓	✓✓	All lane widths are sufficient to accommodate buses. Separated facilities adjacent to the footpath can be routed behind bus stop. Median allows stopped buses to be better accommodated.

✓✓✓Exceeds the Objective
✓✓ Meets the Objective well
✓ = Meets Objective
- Does not meet objective

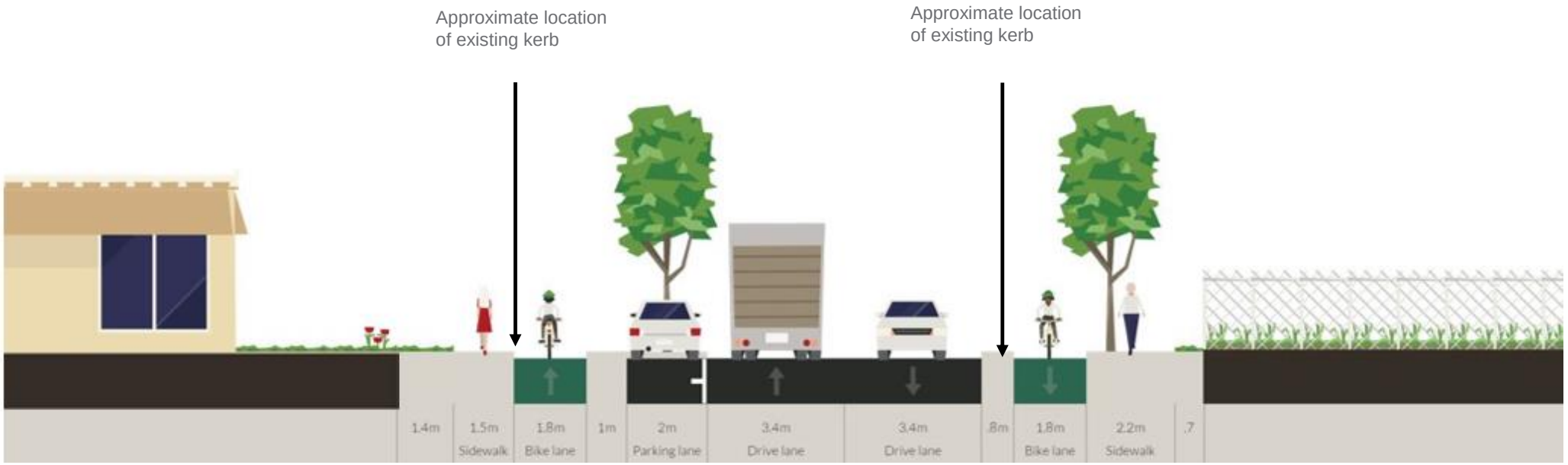
Option 1 (as highlighted in grey) is the preferred option when considered against the design objectives. It is however noted that all options score relatively similarly. The provision of a shared path could degrade the level of service for pedestrians and cyclists, therefore separated facilities are preferred. Option 1 will integrate well with the preferred cross section in the Core Retail (East) precinct and will provide a continuous cycle experience.

A larger representation of the preferred cross section and the current kerb location is provided in **Figure 7.3**. For this section of Gerald Street the southern kerb generally aligns with the proposed cross section however the majority of this kerb is old dish channel and will require replacement to accommodate the cycleway. On the north side of the street there is a hedge that is located on road reserve for the majority of the length of this precinct. This means that the existing kerb and flat channel is located approximately 4-5 m from the boundary. Both the hedge and the kerb would need to be removed to replicate the cross section in **Figure 7.3**. However there are possibilities to alter the design to retain the existing kerb on the northern side:

- Work with the Research Hub to accommodate a footpath on their land.
- Remove on street parking on the southern side of Gerald Street through this section.
- Provide a wide shared path on the northern side of Gerald Street that accommodates eastbound cyclists and pedestrians.
- Consider alternatives for the type of separation between the footpath and cycleway if no vertical separation is possible (would still require removal of hedge but kerb could be retained.

It is understood that initial discussions regarding the possibility of working with the Research Hub to provide better walking and cycling facilities along their site frontage have occurred. Utilising the Lincoln Research Hub land would allow all components of the preferred cross section to be retained. Between West Belt Road and Vernon Drive there are power poles, with street light fittings, on the south side of the road, just behind the kerb. The location of underground services will need to be considered in detailed design. No land purchase is required to implement the cross section, however an arrangement regarding the use of the Research Hub land may be required if the intent is to retain the existing kerb on the northern side.

Figure 7.3 *Transitional Living Preferred Cross Section*



Cycle facilities

There are many driveways along the southern side of Gerald Street in the Transitional Living Precinct. It is important that the design of the cycle facility on this side provides sufficient visibility from the driveways, especially as they transition to commercial uses and therefore accommodate higher numbers of trips. Working with property owners to ensure fences and landscaping do not obscure a clear view of the cycleway would be beneficial. Furthermore, the driveways will create many breaks in the buffer adjacent to the cycleway. This is not considered an issue due to the additional width provided by the parking lane. Green paint markings across driveways (especially commercial properties) to highlight the presence of the cycleway should be considered in scheme/detailed design. It should be noted that the 1.8m width of the cycle facilities is a minimum and does not allow for overtaking within the facility. Some overtaking opportunities may be able to be incorporated during scheme and detail design.

Landscaping/Street Trees/Street Furniture

It is unlikely that there will be a high demand for outdoor dining and on street cycle parking in this precinct. However seating will be necessary to provide resting places along the corridor. Some space for berms is available and street trees can also be accommodated. Over time as properties transition to commercial uses 'sandwich board' signs on the footpath may need to be managed.

Bus Stops

At bus stops cyclists should be provided for on a shared path to allow space for the bus to stop without impeding traffic flow. Buses to Lincoln run every 5-30minutes therefore allowing buses to pull out of the traffic on this arterial road is considered appropriate. The provision of bus shelters against the kerb provides greater footpath space in constrained areas, see **Figure 7.4**.

Figure 7.4 *Bus Shelters against the kerb (Hornby)*

Pedestrian Crossing Facilities

There are currently no pedestrian crossing facilities provided within this precinct. The removal of the flush median will also make informal crossings more difficult than the current scenario. The proposed traffic signals at West Belt will provide a formal crossing at the eastern end of the precinct. Because parking and the majority of activities likely to attract pedestrians are provided on the southern side, it is unlikely that crossing demand will be high. In addition to the West Belt signals, signals are proposed at Vernon Drive (Core Retail (West) precinct). At a minimum, two mid-block crossing locations should be provided in the

Transitional Living precinct, see **Figure 7.5**. It is envisaged that these facilities would be provided in the form of kerb extensions only. Crossing facilities will also provide an opportunity for cyclists to exit/enter the separated facilities. The proposed crossing locations represent approximately 170m spacing between crossings, this is considered appropriate due to the low crossing demand anticipated. The crossing locations should be considered in conjunction with any Research Hub development plans to ensure that they align with anticipated pedestrian desire lines.

Figure 7.5
Pedestrian Crossing Locations

Intersections

Apart from Marion Place (very minor) and West Belt (to be signalised), only one intersection is located within the Transitional Living precinct at Murray Place. This is a low volume T-intersection. It is important that gaps in the cycle way separation on the North Side are provided at the intersection to allow cyclists to leave/join the cycleway at Murray Place.

Parking

The existing one side of parking is proposed to remain in the preferred cross section. The incorporation of street trees and pedestrian crossings into the design will reduce the parking provision from what is existing. While these properties remain residential this is unlikely to cause any issues however over time as they transition to commercial uses some higher parking demands may be generated. When locating street trees the proximity of alternative parking (e.g. on large private sites or on Murray Place) should be considered where possible. The expansion of the Research Hub may also induce additional all day parking, this may need to be managed through parking restrictions.

8. Core Retail (West)

The Core Retail (West) precinct incorporates general retail activities including some larger format activities, such as the New World Supermarket. Generally activities within this precinct tend to provide on-site parking for visitors and some staff. It is understood that over time the residential zone adjacent to this precinct could be developed into medium density housing.

No parking is provided on Gerald Street within the Core Retail (West) precinct. Currently, on-road cycle lanes are provided on both sides and a flush median runs along the centre of the road, see **Figure 8.1**. The existing kerb on the southern side is dish channel, however on the northern side the kerb is newer. A bus stop pair is located outside the supermarket.

Two intersections within the precinct are proposed to be upgraded as the township grows:

- Vernon Drive/Gerald Street (currently a priority intersection to be upgraded to a single lane roundabout)
- Springs Road/Gerald Street (currently a single lane roundabout to be upgraded to signals)

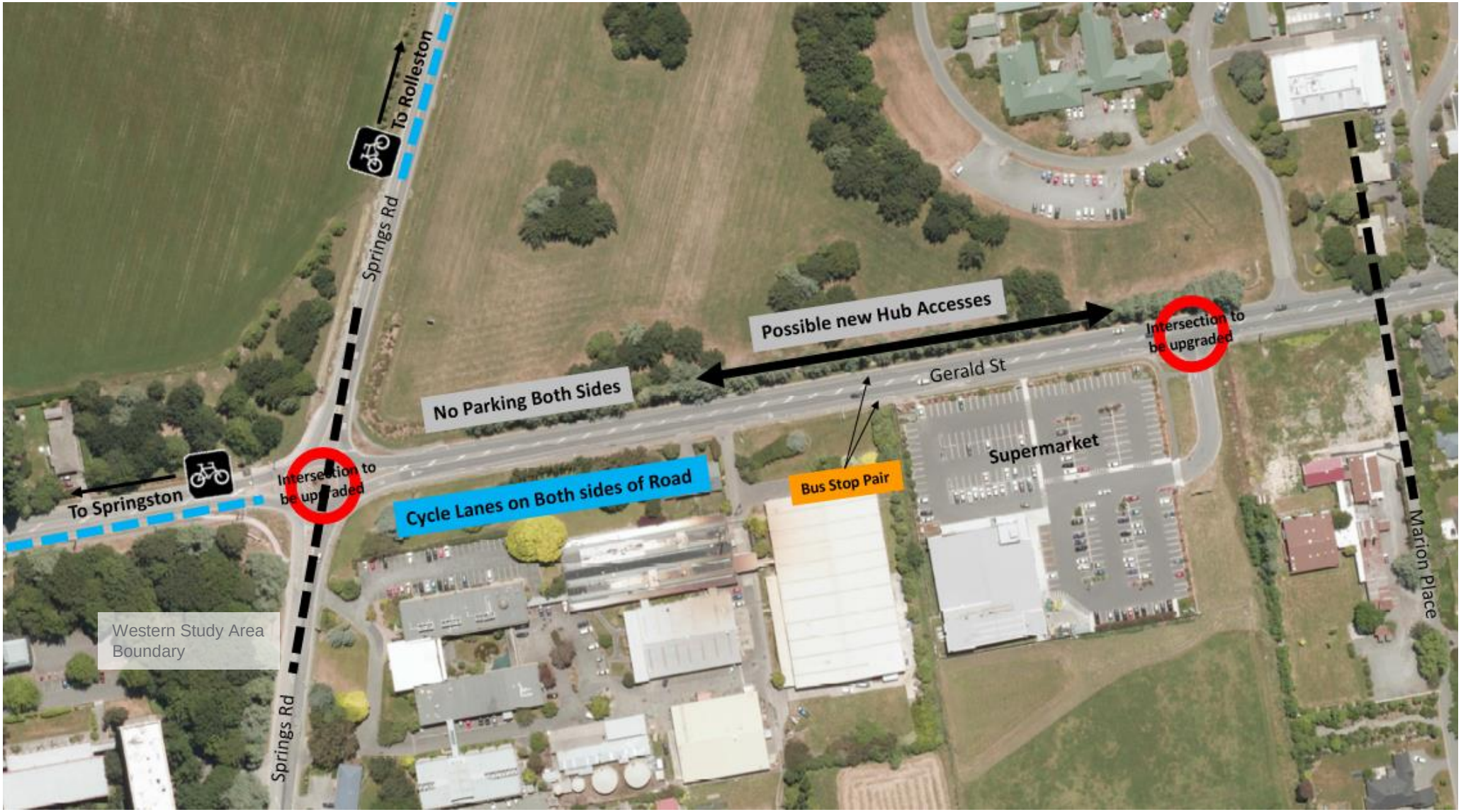
It is understood that land surrounding the Springs/Gerald intersection is owned by Council. This offers an opportunity to provide a very high quality intersection design that provides the necessary space and separation for all users. Intersection design is the next phase of the project. It is anticipated that the signalisation of this intersection will assist with linking the University to the town centre especially for cyclists and pedestrians.

Figure 8.1 *Core Retail (West) Typical Cross Section*

Land along the northern side, and part of the southern side, of this precinct forms part of the proposed Lincoln Research Hub. It is understood that there are plans to further develop this land, this may result in additional accesses being established along the northern side.

Constraints and features of the Core Retail (West) precinct are shown in **Figure 8.2**.

Figure 8.2 Core Retail (West) Constraints and Features



8.1 Core Retail (West) Precinct Design Objectives

The design objectives for developing a streetscape for the Retail Precinct are:

1) Creates a public space that compliments the adjacent street environments but recognises the difference in land use.
2) Facilitates safe and user friendly pedestrian movements (along and across the street)
3) Facilitates safe and user friendly bicycle travel
4) Facilitates safe motor vehicle movements (along the street and whilst accessing adjacent activities, parking and side streets)
5) Integrates with adjacent land uses (existing and proposed).
6) Facilitates public transport access including bus stops.

8.2 Options

The cross section options developed for the Core Retail (West) precinct are shown in **Table 8.1**, including the key strengths and weaknesses. The options are assessed against the design objectives in **Table 8.2**. Three options have been developed for the precinct. It is noted that the cross section progressed to final design may be a variation of the preferred option, but should incorporate the same principles.

Table 8.1 *Core Retail (West) Cross Section Options*

Option Description	Indicative Cross Section
Option 1 - One-Directional Separated Facilities Key features: 1.5-2m wide footpaths, 3.4m wide traffic lanes, 2.2m wide median, no parking, one-directional SBFs on both sides, grass berm/landscaping on both sides. Street trees would need to be incorporated into the footpath, dependent on underground service location. The footpath could meander around the trees or incorporate localised narrowing. Cycle facilities are protected and intuitively provided on both sides in the same direction as traffic (no contra-flow). Narrower footpaths are appropriate for this precinct due to the nature of the anticipated activities generating less pedestrian demand. This cross section is able to accommodate pedestrian refuges	
Option 2 - Bi-Directional Separated Facilities Key features: 1.5-2m wide footpaths, 3.2 -3.5m wide traffic lanes, 3m wide median, no parking, SBFs on one side (with contra-flow). Street trees would need to be incorporated into the footpath. The contra-flow nature of a bi-directional facility could create safety issues at existing and new accesses to the **Research** Hub and will need to be managed carefully through design. Space for a median allows flexibility and better accommodates continuous traffic flow, e.g. past stopped buses and parking vehicles as is appropriate for an arterial road. Provision of bus stops outside of traffic flow would be difficult in this cross section. This cross section is able to accommodate pedestrian refuges	
Option 3 – Shared Path Key features: 1.5 - 2m wide footpath on south side, berm on south side, 3.0m wide shared path on north side, 3m wide median, paved shoulder between shared path and traffic lane, 3.5m wide lanes, cycle lane on south side for use by experienced cyclists, space for street trees on north side (requires kerb to be shifted). A larger flush median could be accommodated in this option which would assist with travel time reliability along the corridor, bus stop provision and providing informal crossing locations for able bodied pedestrians. The median could be narrowed in this cross section and a greater amount of space for trees and landscaping provided on the southern side.	

8.3 Option Assessment

Each of the options is assessed against the design objectives listed in Section 8.1, see **Table 8.2**. The assessment is qualitative and considers the extent to which the option achieves the objective.

Table 8.2 Core Retail (West) Option Assessment

Objectives		Option 1 One-Directional SBFs	Option 2 Bi-Directional SBF	Option 3 Shared Path	Comments
1	Amenity	✓	✓	✓✓	Wider median in all cross sections creates wide carriageway not synonymous with low speeds etc. Provision of space for trees on north side allows opportunities to incorporate additional street furniture.
2	Pedestrian provision	✓✓	✓✓	✓	Medians in all options provide informal crossing opportunities and allow space for pedestrian refuges. Conflicts with cyclists on shared path in Option 3.
3	Cycle provision	✓✓✓	✓	✓	Bi-directional SBF could create an element of confusion. Providing on-road cycle lanes not consistent with overall cycle facility assessment. Experienced cyclists unlikely to use shared path.
4	Vehicle movement	✓✓✓	✓✓	✓✓✓	Median provides flexibility to allow more continuous flow. Contra-flow on SBF could create conflicts at intersections/driveways.
5	Integration with Land use	✓✓	✓	✓	Bi-directional cycle facility and shared path on opposite side of road from most activities (except Research Hub)
6	Public Transport	✓✓	✓	✓	All lane widths are sufficient to accommodate buses. Separated facilities adjacent to the footpath can be routed behind bus stop. The provision of bus stops out of traffic flow would be difficult in Options 2 and 3.

✓✓✓Exceeds the Objective
✓✓ Meets the Objective well
✓ = Meets Objective
- Does not meet objective

Option 1 (as highlighted in grey) is the preferred option when considered against the design objectives. Unlike the other precincts the difference between option 1 and other alternatives is much larger for the Core Retail (West) precinct. The provision of a shared path could degrade the level of service for pedestrians and cyclists, therefore separated facilities are preferred. Option 1 will integrate well with the preferred cross section in the Transitional Living precinct and will provide a continuous cycle experience.

A larger representation of the preferred cross section and the current kerb location is provided in **Figure 8.3** . For this section of Gerald Street the southern kerb generally aligns with the proposed cross section however the majority of this kerb is old dish channel that will require replacement to accommodate the cycleway. On the north side of the street there is a row of large trees that is partially located on road reserve for the majority of the length of this precinct. There is also an open drain on the north side and the existing kerb and flat channel is located approximately 5.6 m from the boundary. The drain would require piping and the kerb relocated to replicate the proposed cross section. However there are possibilities to alter the design to retain the existing kerb on the northern side:

- Work with the Research Hub to accommodate a footpath on their land.
- Remove on street parking on the southern side of Gerald Street through this section.
- Provide a wide shared path on the northern side of Gerald Street that accommodates eastbound cyclists and pedestrians.
- Consider alternatives for the type of separation between the footpath and cycleway if no vertical separation is possible (would still require removal of the row of trees but the kerb could be retained.

As for the transitional living precinct, it is understood that initial discussions regarding the possibility of working with the Research Hub to provide better walking and cycling facilities along their site frontage have occurred. Utilising the Lincoln Research Hub land would allow all components of the preferred cross section to be retained. Between Vernon Drive and Springs Road there are street light poles on the south side of the road, just behind the kerb. There are no overhead power lines in this section of Gerald Street. The location of underground services will need to be considered in detailed design. No land purchase is required to implement the cross section, however an arrangement regarding the use of the Research Hub land may be required if the intent is to retain the existing kerb on the northern side.

Figure 8.3 *Core Retail (West) Preferred Cross Section*

Cycle facilities

There are very few driveways along Gerald Street in the Core Retail (West) precinct. It is important that as the Research Hub develops the design of any new accesses (especially those that accommodate high traffic volumes) provides sufficient visibility along the cycleway. Green paint markings across driveways to highlight the presence of the cycleway should be considered in scheme/detailed design. Due to the low number of accesses within this precinct it is important that breaks are provided in the separation to ensure that cyclists can enter/leave the facility as necessary.

It should be noted that the 1.8m width of the cycle facilities is a minimum and does not allow for overtaking within the facility. Some overtaking opportunities may be able to be incorporated during scheme and detail design.

Landscaping/Street Trees/Street Furniture

It is unlikely that there will be a high demand for outdoor dining and on street cycle parking in this precinct. However seating will be necessary to provide resting places along the corridor. Some space for berms is available and street trees can also be accommodated on both sides. Given the larger format commercial properties in this precinct it is unlikely that 'sandwich board' signs will create an issue however due to the narrower footpath widths this may need to be managed over time.

Bus Stops

At bus stops cyclists should be provided for on a shared path to allow space for the bus to stop without impeding traffic flow. Buses to Lincoln run every 5-30minutes therefore allowing buses to pull out of the traffic on this arterial road is considered appropriate. The provision of bus shelters against the kerb or at the edge of private properties (e.g. on Hub land) would provide greater footpath space in constrained areas.

Pedestrian Crossing Facilities

There are currently no formal pedestrian crossing facilities provided within this precinct. The retention of the flush median provides for informal crossings however it should be noted that pedestrians must cross both the cycle facilities and the road separately. The proposed intersection upgrades will provide formal crossings near/at each end of the precinct. Because the majority of activities likely to attract pedestrians are provided on the southern side, it is unlikely that crossing demand will be high however there may be some people travelling between the Research Hub and commercial activities and other parts of the hub. At a minimum, two mid-block crossing locations should be provided in the Core Retail (West) precinct, see **Figure 8.4**. It is envisaged that these facilities would be provided in the form of kerb extensions only. Crossing facilities will also provide an opportunity for cyclists to exit/enter the separated facilities. The proposed crossing locations represent approximately 100m spacing between crossings. The crossing locations should be considered in conjunction with any Research Hub development plans to ensure that they align with anticipated pedestrian desire lines. It is recommended that pedestrians are given priority over cyclists at the mid-block crossings, this could be achieved by constructing a platform across the cycle facilities.

Figure 8.4
Pedestrian Crossing Locations

Intersections

Only the intersections to be upgraded are included in this precinct. At the Springs/Gerald intersection care needs to be taken to ensure that the cycle facilities in the Core Retail (West) precinct connect with the proposed/newly constructed paths to Rolleston and Springston. This may be able to be accommodate through a diagonal phase at the traffic signals. Cycle signal trials are expected to take place in Christchurch in the near future, the outcomes of these trials may be useful in the signal design of the Springs/Gerald intersection.

Parking

No parking is currently provided on Gerald Street in this precinct, this is not proposed to change.

9. Overall Corridor Summary

The preferred cross section for each precinct is shown in **Figure 9.1** to **Figure 9.3**. The overall corridor is considered against the corridor objectives in **Table 9.1**.

The overall design links the eastern and western ends corridor in an integrated manner and addresses both the movement and place functions of the street. A corridor overview plan is shown in **Figure 9.4**.

It should be noted that because the provision of separated cycle facilities is in its infancy in New Zealand there are very few examples to draw from to demonstrate how Gerald Street may look and feel once completed. There are many separated facilities proposed as part of the Christchurch Major Cycleway Network, learnings and examples will be able to be taken from these as they are implemented. These learnings will be timely for application in Lincoln.

Overall it is considered that the design objectives can be met by the proposed cross sections.

Following consultation the scheme designs should be developed further to allow firmer cost estimates to be established and ensure that suitable intersection designs can be accommodated. It should be noted that no topographical survey has been undertaken along Gerald Street therefore the exact location of existing kerbs relative to the preferred cross sections has not been verified.

Figure 9.1 *Core Retail (East) Preferred Option - Corridor*

Figure 9.2 *Transitional Living Preferred Option - Corridor*

Figure 9.3 *Core Retail (West) preferred option*

Table 9.1
Consideration of Preferred Cross Sections against Corridor Objectives

Objective	Assessment
1) Cross section design recognises the movement, access and place functions of the corridor and provides appropriately for these functions.	The balance between providing for continuous movement along the corridor and access to adjacent activities has been considered in all precincts. If some of the proposed walking and cycling provision can be provided for in the Research Hub land in the Transitional Living precinct a median may also be able to be accommodated within the cross section. This would provide more flexibility in terms of allowing vehicles to access parking and adjacent properties without significantly impeding traffic flow.
2) The design recognises the difference between precincts but ensures that the transitions between them are smooth.	Landscaping and materials throughout the precincts are able to be applied consistently. This will ensure that the town centre feels continuous. The need to upgrade intersections at some of the key transition points also provides an opportunity to create a smooth transition.
3) Cycle infrastructure design recognises the important role that the corridor plays in connecting the surrounding cycle network while also providing cycle access to town centre activities.	The preferred cross sections for all precincts include consistent cycle facilities, this ensures that the through route is continuous.
4) Pedestrian infrastructure that provides a connection through the town centre and creates an attractive environment where people want to spend time.	Continuous pedestrian infrastructure on both sides of the street is proposed. Recommendations for crossing locations and types are also made. Rest points along the length of the town centre will be an important component of making the centre walkable.
5) On street parking provision and potential restrictions are considered in the context of adjacent land uses and consolidated off-street parking facilities.	Where on street parking is provided it is recommended to be on the southern side of Gerald Street. This is due to the location of activities that may require this parking and assists with cycle safety in the Core Retail (east) precinct. A parking management strategy is recommended to inform any necessary time restrictions.
6) Street elements and materials are appropriate for a town centre environment acknowledging that these may differ between precincts but overall remain coherent.	It is envisaged that the design of street furniture and materials used will be consistent throughout the town centre.
7) Speed environments in each precinct are appropriate to safely accommodate the demands on the road corridor.	The speed environment in the Core Retail (East) will be low due to high turnover of parking and spacing of signals and the zebra crossings. The provision of separated cycle facilities assists with reinforcing an urban speed environment, on road cycle lanes can create a very wide feeling corridor. Not providing a median in the eastern precincts will also assist with creating a lower speed environment.

Figure 9.4 Overview Plan

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Appendix A

Selwyn Traffic Model Information Sheet

SELWYN TRAFFIC MODEL INFORMATION SHEET

Prepared for: Selwyn District Council

Job Number: 4494-00

Issue Date: 20 May 2015

Prepared by: Jared White, Senior Transportation Engineer

A1 INTRODUCTION

The Selwyn District Council (SDC) has commissioned Abley Transportation Consultants (Abley) to prepare this short note to provide a summary of the inputs to the two sParamics Microsimulation (Paramics) models of Rolleston and Lincoln and how the models have been used to support traffic planning in the District.

Paramics is widely used throughout New Zealand and across the globe to provide a visual assessment of intersections, road corridors or entire road networks. It is known as a microsimulation tool because it simulates actual driver behaviour and interactions on a true to scale road network. Drivers in this virtual network have to find gaps in opposing traffic streams on their journey from A to B in the model and will come across queues at pinch points and intersections, much like a typical journey in real life such as driving from home to work.

A2 MODEL INPUTS

The geographical area that represents each model is shown in **Figure A.1** and the model includes all roads within the areas that are highlighted.

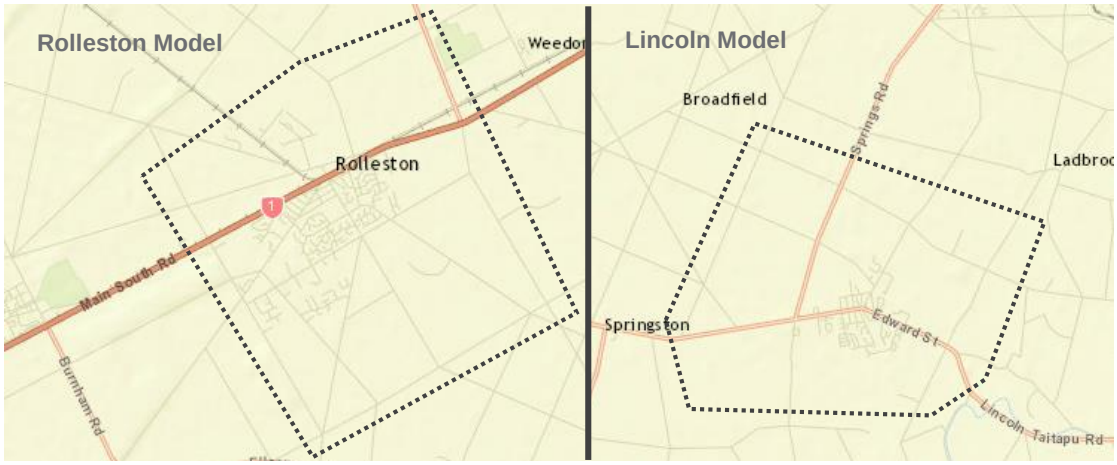


Figure A.1
Paramics Model Extents

All of the existing households and jobs within the areas in **Figure A.1** are grouped based on Stats NZ meshblock boundaries and these areas, known as zones, form the origin or destination of vehicle trips in the model. The number of trips to and from each zone depends on the amount and type of activity and are

informed by industry standard rates. Each model was validated to observed traffic counts so that the model's closely replicate turning movements at intersections and traffic flows on major roads.

After validating the base models the future models were created by including expected growth in household, commercial and industrial activities. The vehicle generation rates calibrated in the validation process are applied to the growth areas creating a future traffic demand. In each of the future models any committed infrastructure was included such as the improvements along the State Highway as part of the Christchurch Southern Motorway projects. New roads in the residential areas are based on the proposed road networks in the ODP areas.

For Rolleston the future growth included the following as advised by Council:

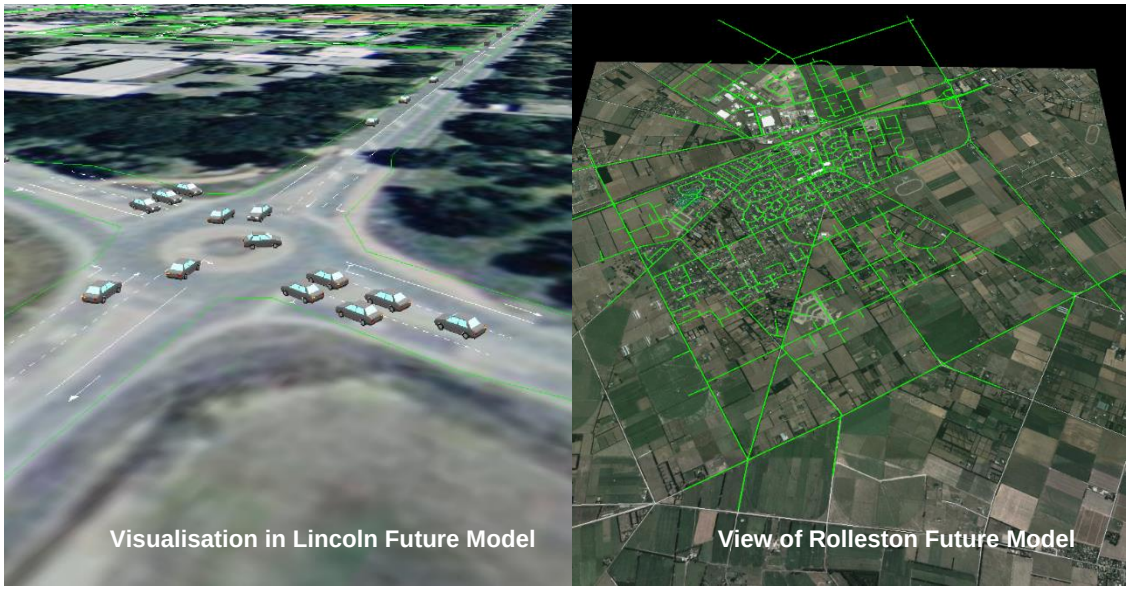
- Household growth in the ODP areas set out by the District Plan (Approx. 5625 HHs);
- Approximately 72,000m^2 GFA in the Town Centre informed by the Rolleston Town Centre Master Plan;
- Industrial land near IZONE included:
  - Completion of all IZONE stages;
  - 32Ha in Cockburn Block (Priority Business Area under the LURP);
  - 122Ha in Carters Block (Priority Business Area under the LURP).

For Lincoln the future growth included the following as advised by Council:

- Household growth in the ODP areas set out by the District Plan (Approx. 4100 HHs);
- Increased activity in the town centre and transitional commercial area between the town centre and New World supermarket;
- Commercial development in Business 2B/Living Z land south of the University;
- Increased activity at the University and Agriculture Research Centres.

Some visual outputs of the future models are shown in **Figure A,2** including the Springs Road / Gerald Street roundabout upgraded to signals and an aerial view of the Rolleston future model

Figure A,2
Paramics Model Examples



A3 MODEL USES

The models have been used to help shape the future transport infrastructure of Rolleston and Lincoln.

Rolleston

The Rolleston model was initially used to assess the effects of growth in the Town and support the Town Centre Master Plan. Since then further growth in the industrial activity off Hoskyns Road was included as a requirement of the LURP and the road network checked for issues with capacity at intersections. The modelling identified various intersection upgrades and timing that were required to meet demand, including but not limited to:

- Traffic signals at the Rolleston Drive / Masefield Drive intersection;
- Traffic signals at the Rolleston Drive / Tennyson Street intersection
- Traffic signals at the Tennyson Street / Lowes Road intersection;
- Upgrading the Masefield Drive / Lowes Road roundabout to two circulating lanes.

The model has also played a key role in calculating the transport component of Development Contributions. The model identifies all traffic using an infrastructure project and isolates the traffic related to growth only so any recoverable costs to the Council can be inferred.

Lincoln

The Lincoln model has also been used to assess the effects of growth in the Lincoln Township. The model was used to assess network capacity under the increased future traffic demands and determine the infrastructure required to cope with the increase in traffic. All of the infrastructure requirements were required on Gerald Street including:

- Traffic signals at the Gerald Street / Springs Road intersection;
- Traffic signals at the Gerald Street / West Belt intersection;
- Traffic signals at the Gerald Street / James Street / Edward Street intersection;

The model has provided information such as future traffic volumes in key roads to guide the development of the Town Centre Master Plan. In a similar fashion to Rolleston the Lincoln model has played a key role in calculating the transport component of Development Contributions. The development contributions are linked to the 30 year LTP and as such the household growth in the Lincoln model was reduced to approximately 3300 households in line with Council growth projections. The model identifies all traffic using an infrastructure project and isolates the traffic related to growth only so any recoverable costs to the Council can be inferred.

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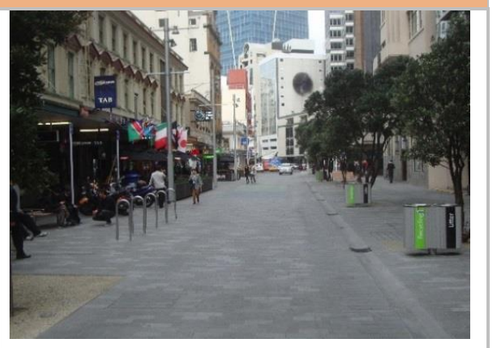
Appendix B
Bicycle Facility Options Assessment

Table B1 Cycle Facility Options Assessment

Facility Type	Core Retail (West)		Transitional Living		Core Retail (East)		Conclusion	Example and Key Design Considerations
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages		
Narrow kerbside Lane (~3m) – Cyclists take the lane	Low Cost Minimal space requirement	Inconsistent with 50km/h speed environment and arterial function Intimidating for less confident users given buses, service vehicles and traffic volumes Less protection than provided by existing cycle lanes in this precinct	Low Cost Minimal space requirement	Inconsistent with 50km/h speed environment or arterial function Intimidating for less confident users given high traffic volumes	Supports low speed environment Low Cost Less confusing for pedestrians and people accessing activities from on-street parking Minimal space requirement	Very intimidating for less confident users given buses and service vehicles and traffic volumes.	Not considered appropriate for Gerald St, traffic volumes are too high. Inconsistent with arterial function.	
Wide (4.2m+) kerbside lane – Cyclists share the lane	Low Cost Minimal space requirement	Very intimidating for less confident users given buses, service vehicles and traffic volumes Conducive to higher speeds than appropriate for a town centre environment Less protection than provided by existing cycle lanes in this precinct	Low Cost Minimal space requirement	Very intimidating for less confident users given buses, service vehicles and traffic volumes Conducive to higher speeds than appropriate for a town centre environment	Low Cost Less confusing for pedestrians and people accessing activities from on-street parking Minimal space requirement	Very intimidating for less confident users given buses, service vehicles and traffic volumes Does not support low speed environment	Not considered appropriate for Gerald St, traffic volumes too high and does not offer same level of protection as wider Selwyn network.	

Facility Type	Core Retail (West)		Transitional Living		Core Retail (East)		Conclusion	Example and Key Design Considerations
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages		
Shared Space	Would assist with integrating activities on opposite sides of Gerald St May assist with breaking up long corridor feel of Town Centre. Generally incorporates high quality design elements suitable for town centre environment.	Inconsistent with minimal access requirement to adjacent land uses and 50km/h speed environment Inconsistent with arterial function High Cost	May assist with breaking up long corridor feel of Town Centre. Generally incorporates high quality design elements suitable for town centre environment	Inconsistent with adjacent built environment (i.e. buildings set back from boundaries) and 50km/h speed environment Inconsistent with arterial function High Cost	Supports low speed environment – but would need to be slower than 30km/h. Consistent with outdoor dining and pedestrian linger nodes	Inconsistent with arterial function Traffic volumes too high to support true shared space environment High cost	Not considered appropriate for Gerald St due to arterial function and built environment in transitional living and core retail (west) precincts.	
On Road Cycle Lanes	Low Cost Included on existing roadway in this precinct therefore minimal space requirement Allocates space for more confident cyclists	Would not offer same level of protection as wider Selwyn Network Would not be comfortable for less confident cyclists given anticipated heavy vehicle volumes	Low Cost Minimal space requirement Allocates space for more confident cyclists	Would not offer same level of protection as wider Selwyn Network Would not be comfortable for less confident cyclists given anticipated heavy vehicle volumes	Low Cost Minimal space requirement	Would not offer same level of protection as wider Selwyn Network Would not be comfortable given anticipated heavy vehicle volumes Not desirable in environment with high on street parking turnover and high risk of being hit by car doors	Not considered appropriate for primary Gerald St facility as would not provide for less confident users on an arterial road.	

Facility Type	Core Retail (West)		Transitional Living		Core Retail (East)		Conclusion	Example and Key Design Considerations
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages		
Shared Path	Consistent with Lincoln-Springston and Lincoln-Rolleston facilities Provides separation from busy traffic	Can create conflicts with pedestrians, especially vision impaired pedestrians Inconvenient for experienced cyclists who prefer unimpeded routes due to higher levels of pedestrian activity in town centre	Consistent with Lincoln-Springston and Lincoln-Rolleston facilities Provides separation from busy traffic	Can create conflicts with pedestrians, especially vision impaired pedestrians Inconvenient for experienced cyclists who prefer unimpeded routes due to higher levels of pedestrian activity in town centre	May allow parking to be retained on both sides of street	Speed differential between cyclists and pedestrians inappropriate for town centre environment with sandwich boards, high pedestrian volumes and outdoor dining	Not considered appropriate for Core Retail Precinct (East). Will be considered for Transitional Living and Core Retail (West) Precincts.	 **Design Considerations:** Many driveways on south side of road could create conflicts in Transitional Living Precinct. Consider locating on North side or large separation from property boundaries.
Separated One-Directional Facilities	Provides protection appropriate for less confident users Provision on both sides of road is intuitive and easier to manage at intersections Lower likelihood of pedestrian/cyclist conflict than shared path	Largest space requirement of all facilities	Provides protection appropriate for less confident users. Provision on both sides of road is intuitive and easier to manage at intersections	Largest space requirement of all facilities - may require removal of parking on one side of Street	Provides protection appropriate for less confident users. Provision on both sides of road is intuitive and easier to manage at intersections Provides separate space from pedestrians in busy areas	Largest space requirement of all facilities - would require removal of parking on at least one side of street	Will be considered for use but space requirement may cause difficulties, especially in Core Retail (East) Precinct.	 **Design Considerations:** Careful design of bus stop required to provide sufficient space for boarding/ alighting passengers. Requires clear definition of pedestrian crossing locations due to separators to ensure sufficient opportunities are created. This will also depend on separator style.

Facility Type	Core Retail (West)		Transitional Living		Core Retail (East)		Conclusion	Example and Key Design Considerations
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages		
Separated Bi-Directional Facility	Provides protection appropriate for less confident users Provides space separate from pedestrians Lower likelihood of pedestrian/cyclist conflict than shared path	Drivers at intersections and driveways and crossing pedestrians may not be expecting cyclists approaching from both directions	Provides protection appropriate for less confident users. Provides space separate from pedestrians	May require removal of parking on one side of Street Drivers at intersections and driveways and crossing pedestrians may not be expecting cyclists approaching from both directions	Provides protection appropriate for less confident users. Provides separate space from pedestrians in busy areas	Would require removal of parking on one side of street. Large space requirement but less than one-directional SBFs Drivers at intersections and driveways and crossing pedestrians may not be expecting cyclists approaching from both directions	Will be considered for use.	 **Design Considerations:** Many driveways on south side of road could create conflicts in Transitional Living Precinct. Consider locating on north side or large separation from property boundaries. Intersection design also needs to address any issues around cyclists approaching from both directions on same side of road. Careful design of bus stop required to provide sufficient space for boarding/ alighting passengers. Requires clear definition of pedestrian crossing locations due to separators to ensure sufficient opportunities are created. This will also depend on separator style.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