Bellgrove, Rangiora

Stage 1 Integrated Transport Assessment

Bellgrove Rangiora Ltd

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Contents

Appendices

Appendix C

Crash Analysis

Appendix D

Traffic Modelling Report by Abley

Appendix E

Road 2 / Kippenberger Avenue Operational Intersection

Appendix F

Road Design Attributes

Appendix G

Austroads Guide to Road Design Part 4

Appendix H

Christchurch City Council Infrastructure Design Standard Part 8

Appendix I

WDC Approval of Non-compliance

Figures

Tables

1 Introduction

1.1 Background

Bellgrove Rangiora Ltd (BRL) commissioned Aurecon Ltd to prepare an Integrated Transport Assessment (ITA) to support the subdivision and resource consents for Stage 1 of the proposed Bellgrove residential development. The land parcel under consideration is located in the north-east section of Rangiora as shown in Figure 1-1 below.

This report provides an assessment of the transportation effects of the proposal. It has been prepared broadly in accordance with the guidance specified in the Integrated Transport Assessment Guidelines published by Waka Kotahi NZ Transport Agency (Waka Kotahi).

Figure 1-1: Regional Location

This ITA considers the transport related impacts of Bellgrove Stage 1 (20.9ha of land) of the development only, as shown in Figure 1-2 below. It is anticipated that future stages of the development will be subject to a separate application in the future.

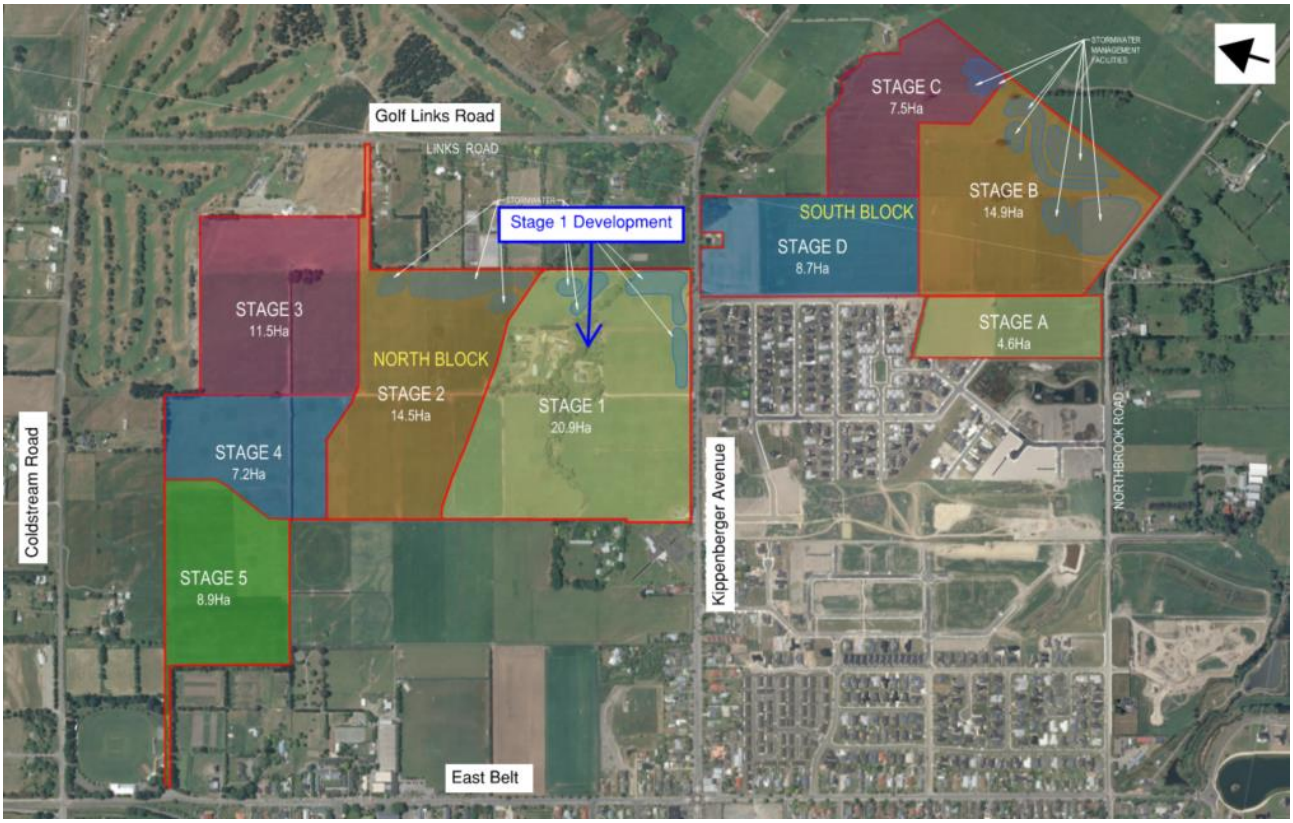


Figure 1-2: Locality Plan

Stage 1 of BRL's intended Bellgrove development is centred on the historic 'Belgrove Homestead' and will include general and medium density residential development yielding approximately 200 lots/dwellings, provision for a commercial area, retention of the heritage homestead for residential use, and associated roading, stormwater management and reserve networks.

1.2 Report Structure

The report is divided into the following sections:

- Section 2 – Existing Transport Environment
- Section 3 – Future and Recent Transport Network Changes
- Section 4 – Proposed Development
- Section 5 – Traffic Generation
- Section 6 – Assessment of Effects
- Section 7 – Construction Management
- Section 8 – District Plan; and
- Section 9 – Conclusions and Recommendations.

2 Existing Transport Environment

2.1 Site and Regional Context

The Stage 1 site is primarily used as pastureland for dairy farming. The site is located to the north-east of Rangiora's existing urban area, with the Town Centre located approximately 1.2km to the west. The site is approximately 5km from Woodend (via Rangiora Woodend Road), 12km from Kaiapoi (via SH71), and approximately 28km from Christchurch City Centre (via SH1 and SH74) as shown in Figure 2-1.

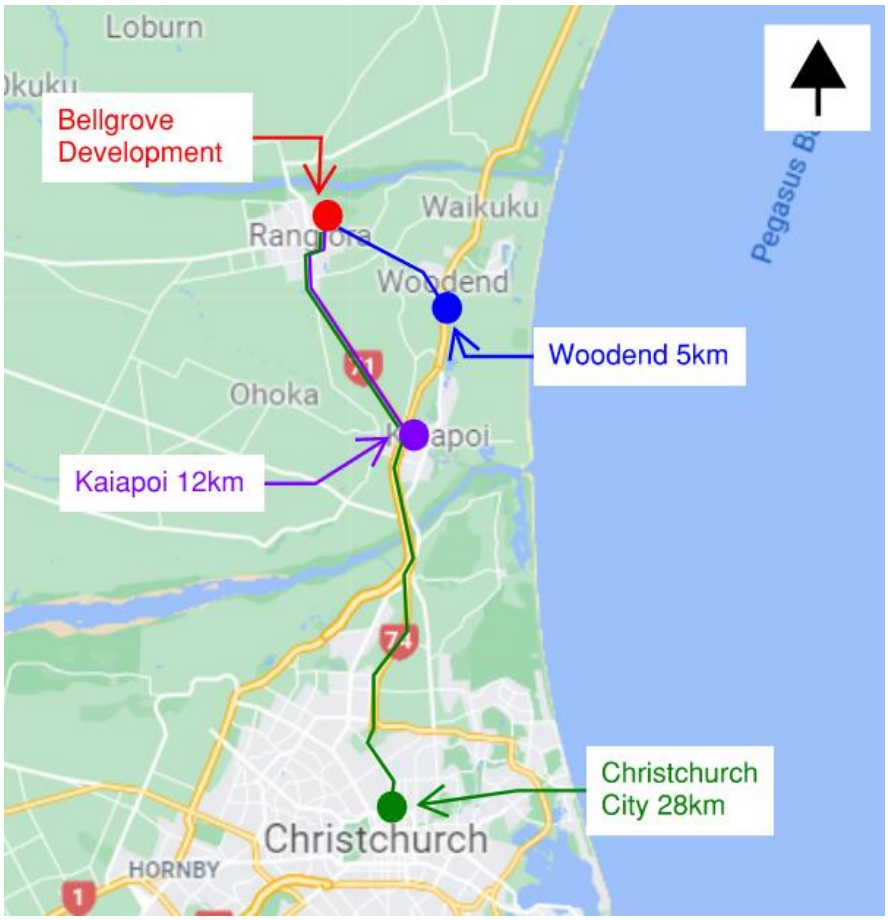


Figure 2-1: Distance from Major Towns

2.2 Zoning

The site is zoned Rural in the operative Waimakariri District Plan (WDP) as shown in Figure 2-2 below, denoted with no shading and “RU” in the key.

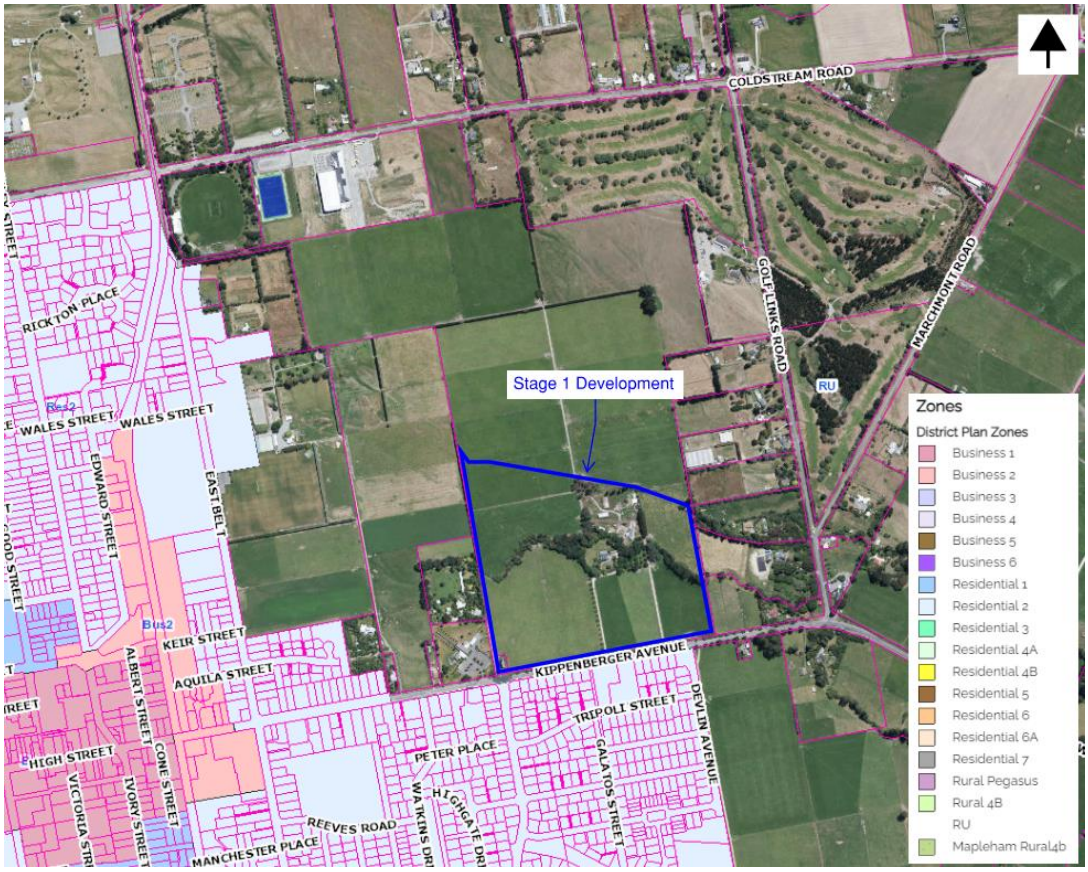


Figure 2-2: WDP Site Zoning

In addition, Waimakariri District Council (WDC) notified the proposed Waimakariri District Plan (pWDP) 18 September 2021, which identifies the site in the Rural Lifestyle Zone and within the North-East Rangiora Development Area Extent (shown in Figure 2-3 below). Provisions proposed in the pWDP enable the transition from the underlying Rural Lifestyle Zone to residential development within the North-East Rangiora Development Area if and when required to address a shortage of land available in existing residential zoned areas.

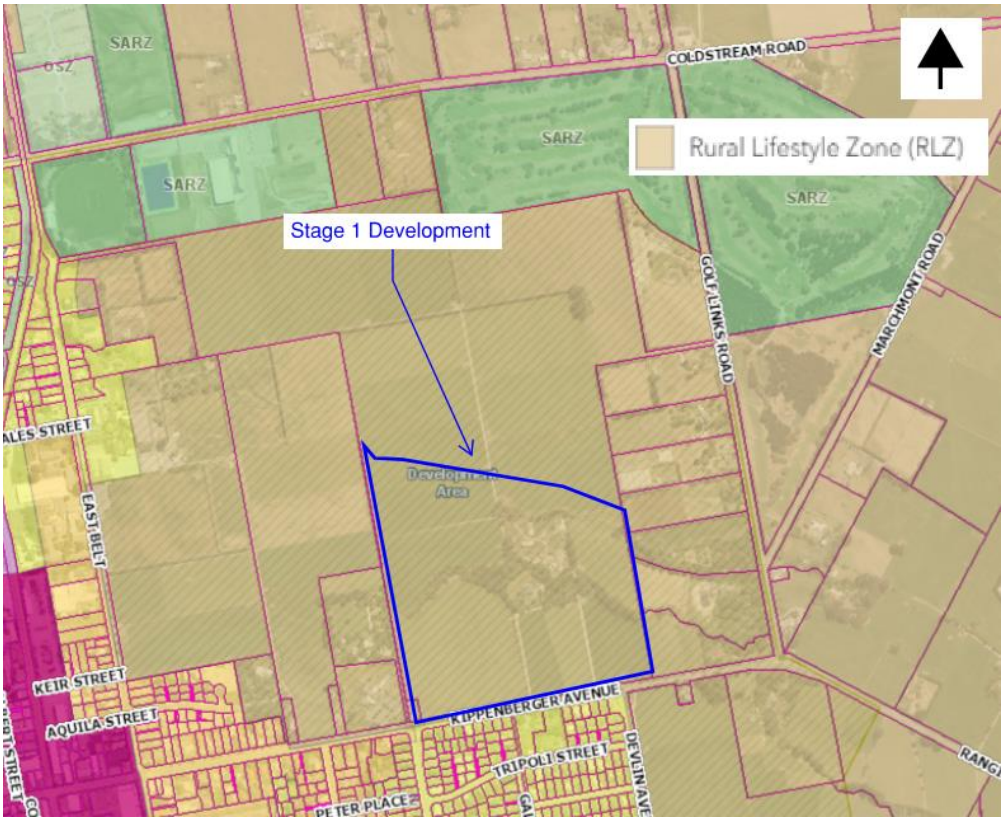


Figure 2-3: pWDP Site Zoning

2.3 Surrounding Road Network

2.3.1 Surrounding Roads

The surrounding road network with the associated existing speed limits can be seen in Figure 2-4 below.

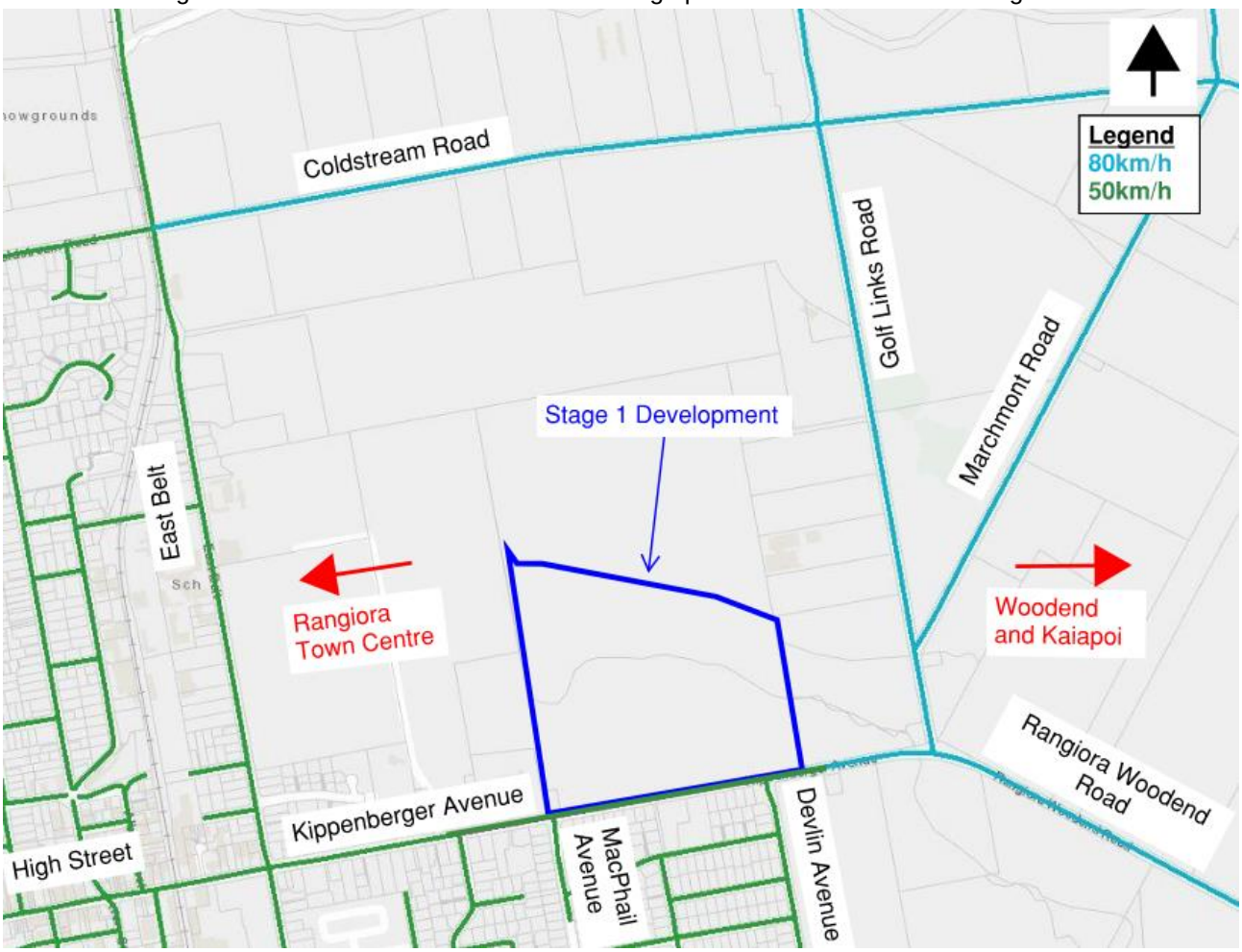


Figure 2-4: Surrounding Road Network

Kippenberger Avenue, Rangiora Woodend Road, Golf Links Road, Coldstream Road, East Belt, MacPhail Avenue, Devlin Avenue, Marchmont Road and High Street are described in further detail below. It is understood that the One Network Framework (ONF) is in the process of replacing the One Network Road Classification (ONRC). Whilst this information has not been made public yet, as of 31 January 2022, the preliminary road classifications based on the ONF have been noted (based on the ONF made available to the team by WDC).

Kippenberger Avenue

Kippenberger Avenue is classified as an Arterial Road in the WDP and pWDP, as a Primary Collector in the Waka Kotahi ONRC, and as an Urban Connector under the ONF. It should be noted that the traffic volumes on Kippenberger Avenue fit within the traffic volume range of an Arterial Road under the ONRC (refer to Section 2.5.1 for traffic volumes). Kippenberger Avenue provides a through route into and out of the district and is also serviced by buses. It runs in a broadly east to west direction past the proposed site, westward towards Rangiora Town Centre and eastward towards Woodend.

Kippenberger Avenue is formed and sealed, and provides a typical two-lane, two-way carriageway with a grass verge on the north and kerb and channel on the south from Devlin Avenue westward as shown in Figure 2-5. Kippenberger Avenue is marked with a painted centreline with no raised retroreflective pavement markers (RRPMs). It is also marked with edge lines with two 3.5m wide traffic lanes and sealed shoulders. There are no stopping lines on the south side of Kippenberger Avenue. There is a shared user path which transitions to a footpath 140m east of Devlin Avenue on the south side of Kippenberger Avenue with on-road

cycle lanes on both sides of the road. There is street lighting and no-stopping lines on the south side of Kippenberger Avenue with street trees on both sides of the road with overhead utility services located on the north side.

The posted speed limit on Kippenberger Avenue is 50km/h up to approximately 150m west of the intersection of Golf Links Road / Rangiora Woodend Road, where it changes to 80km/h.

Figure 2-5: Kippenberger Avenue Cross Section (looking westward from MacPhail Avenue intersection)

Rangiora Woodend Road

Rangiora Woodend Road is identified as an Arterial Road in the WDP and pWDP, as a Primary Collector in the ONRC, and as a Rural Connector under the ONF. It connects to Kippenberger Avenue at the intersection of Kippenberger Avenue / Golf Links Road and provides a through route into and out of the District. It runs in a broadly south-east to north-west direction past the proposed site, westward towards Rangiora Town Centre and eastward towards Woodend.

Rangiora Woodend Road is formed and sealed to a width of approximately 6.6m with grass verges on both sides and a shared path on the southwest side of the road. It is marked with painted centrelines and edge lines along its entirety and has RRPM's on centre line. There is no street lighting on Rangiora Woodend Road and overhead utility services are located on the northeast side of the road.

The posted speed limit of Rangiora Woodend Road between its intersections of Kippenberger Avenue / Golf Links Road and Okaihau Road is 80km/h. Southward from this point, Rangiora Woodend Road is posted at 50km/h.

Golf Links Road

Golf Links Road is classified as a Local Road in the WDP, a Collector Road in the pWDP, as a Primary Collector according to the ONRC, and as a Rural Connector under the ONF. It runs broadly north to south and intersects with Kippenberger Avenue / Rangiora Woodend Road at its southern end and Coldstream Road at its northern end and lies to the east of the proposed development. Golf Links Road approaches to Kippenberger Avenue and Coldstream Road are GIVE WAY controlled.

Golf Links Road is formed and sealed to a width of approximately 6m with grass berms and has a centreline marking between its intersections of Kippenberger Avenue / Rangiora Woodend Road and Coldstream Road; beyond which is not marked as shown in Figure 2-6. There are no RRPMs on this road. Overhead utility services are located on the east side of the road between its intersections of Kippenberger Avenue / Rangiora Woodend Road and Marchmont Road. From Marchmont Road northwards, overhead utility services are located on the west side of the road. No footpaths or cycle lanes are provided.

The posted speed limit on Golf Links Road is 80km/h.

Figure 2-6: Golf Links Road Cross Section (looking southward from Coldstream Road intersection)

Coldstream Road

Coldstream Road is classified as a Local Road in the WDP; a Collector Road in the pWDP; as a Primary Collector according to the ONRC; and under the ONF as a Rural Road east of Golf Links Road, a Peri-urban Road between Golf Links Road and East Belt, and as an Urban Connector west of East Belt. It runs broadly east to west north of the proposed development and intersects with Golf Links Road to the east and East Belt to the west.

Coldstream Road is formed and sealed to a width of approximately 6.5m with kerb and channel on the south side and has a painted centreline road marking, but no RRPMs as shown in Figure 2-7. Overhead utility services are located on the north side of Coldstream Road. There is a shared user path on the south side of Coldstream Road between the Waimakariri Hockey Turf and 200m east of the Coldstream Road / East Belt intersection, after which it is an on-road uni-directional cycleway on the north side of Coldstream Road.

The posted speed limit on Coldstream Road is 50km/h between its intersection with Ashley Street and the Waimakariri Hockey Turf and 80km/h eastward.

Figure 2-7: Coldstream Road Cross Section (looking westward from Rangiora Park Lawn Cemetery)

East Belt

East Belt is classified as a Local Road north of the High Street / Kippenberger Avenue intersection and as an Urban Collector Road south of the High Street / Kippenberger Avenue intersection in the WDP; as a Collector Road in the pWDP; as a Secondary Collector in the ONRC; and under the ONF as an Activity Street between its intersections of High Street / Kippenberger Avenue and Wales Street, and an Urban Connector elsewhere. It runs broadly north to south, west of the proposed development and intersects with Coldstream Road to the north and Kippenberger Avenue / High Street to the south.

East Belt is formed and sealed to a width of approximately 12.5m with kerb and channel and parking on both sides of the road between its intersection with Northbrook Road / Cotter Lane and approximately 280m north of its intersection with Wales Street as shown in Figure 2-8. There are painted centreline and edge line markings but no RRPMs. From Wales Street northwards, East Belt is formed and sealed to a width of approximately 6m with grass verges on both sides of the road where there are no centrelines, edge lines or RRPMs. Near the proposed development there is a footpath and uni-directional cycleway on East Belt between Kippenberger Avenue and Wales Street. Overhead utility services are located on the west side of the road.

The posted speed limit on East Belt is 50km/h.

Figure 2-8: East Belt Cross Section (looking northward from Rangiora High School)

MacPhail Avenue

MacPhail Avenue has an undefined road classification in the WDP (being established after the WDP came into effect), is classified as a Collector Road in the pWDP, as an Access Road according to the ONRC, and a Local Street under the ONF. It runs broadly north to south and intersects with Kippenberger Avenue to the south of the development.

MacPhail Avenue is formed and sealed to a width of approximately 12m with kerb and channel and parking on both sides of the road between its intersections with Kippenberger Avenue and Northbrook Road and no centreline markings, edge line markings or RRPMs. There are footpaths on both sides of the road along its entirety but no cycle lanes as shown in Figure 2-9.

The posted speed limit on MacPhail Avenue is 50 km//h.

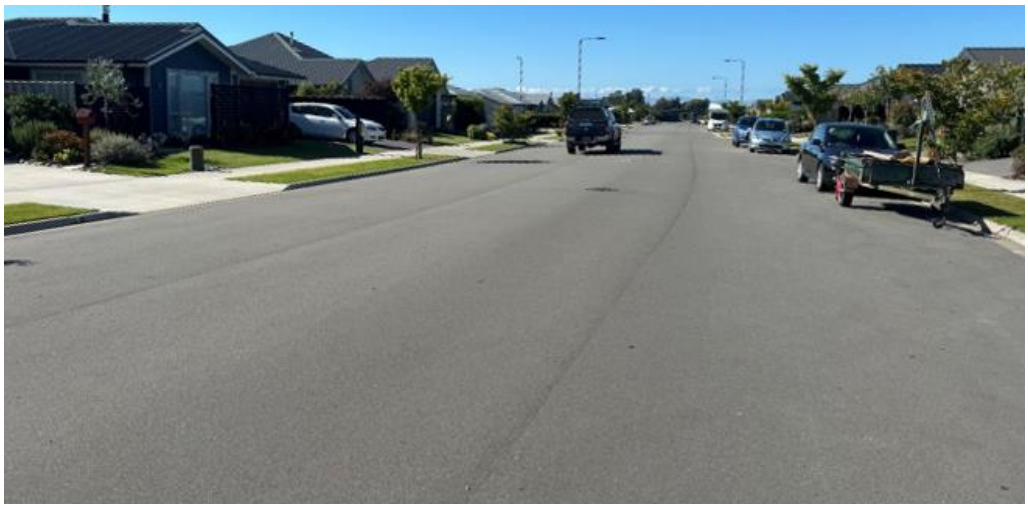


Figure 2-9: MacPhail Avenue Cross Section (looking southwards from Kippenberger Avenue intersection)

Devlin Avenue

Devlin Avenue has an undefined road classification in the WDP, is classified as an Arterial Road in the pWDP, as an Access Road according to the ONRC, and a Local Street under the ONF. It runs broadly north to south and intersects with Kippenberger Avenue to the south of the development.

Devlin Avenue is formed and sealed to a width of approximately 9.5m with a kerb and channel and parking on both side of the road. There are no centreline markings, edge line markings or RRPMs. There is a footpath on the western side of the road and no cycle lanes as shown in Figure 2-10.

The posted speed limit on Devlin Avenue is 50km/h.

Figure 2-10: Devlin Avenue cross section (looking northward towards Kippenberger Avenue intersection)

Marchmont Road

Marchmont Road is classified as a Local Road in the WDP and pWDP, as an Access Road according to the ONRC, and as a Rural Road under the ONF. It runs broadly south-west to north-east and intersects with Gold Links Road and Coldstream Road to the east and north east of the proposed development.

Marchmont Road is formed and sealed to a width of approximately 5.2m with grass berms and no centreline or edge line markings. There are no footpaths or cycle lanes on this road.

The posted speed limit on Marchmont Road is 80km/h.

High Street

High Street is classified as an Arterial Road between its intersection of Kippenberger Avenue / East Belt and Ashley Street / Ivory Street according to the WDP and an Arterial Road in the pWDP and a Primary Collector in the ONRC. From the Ashley Street / Ivory Street intersection westward it is classified as a Strategic Road in the WDP and an Arterial Road in the ONRC. Under the ONF, High Street is classified as an Activity Street between its intersections of Kippenberger Avenue / East Belt Ashley Street / Ivory Street and as a Main Street west of the Ashley Street / Ivory Street intersection. It provides a primary traffic route into, through and out of the district and is used by bus services. It runs broadly in an east to west direction, westward towards Oxford and eastward towards Woodend.

High Street is formed and sealed, and provides a typical two-lane, two-way carriageway as shown in Figure 2-11. It is marked with a painted centreline and edge lines but no RRPMs. Its road width varies to accommodate medians along parts of the road. Each lane measures approximately 3.5m in width. On-road cycle lanes and footpaths are provided on both sides of High Street. Apart from a few designated parking bays, High Street has no stopping lines on both sides of the road between its intersections with Kippenberger Avenue / East Belt and Ashley Street. Street lighting is located on both sides of the road.

High Street forms several priority intersections along its length, with the closest to the site being the roundabout controlled intersection of Kippenberger Avenue / East Belt. The posted speed limit on High Street is 50km/h.

Figure 2-11: High Street Cross Section (looking eastward from Albert Street intersection)

2.4 Surrounding Intersections

The surrounding intersections can be seen in Figure 2-12.

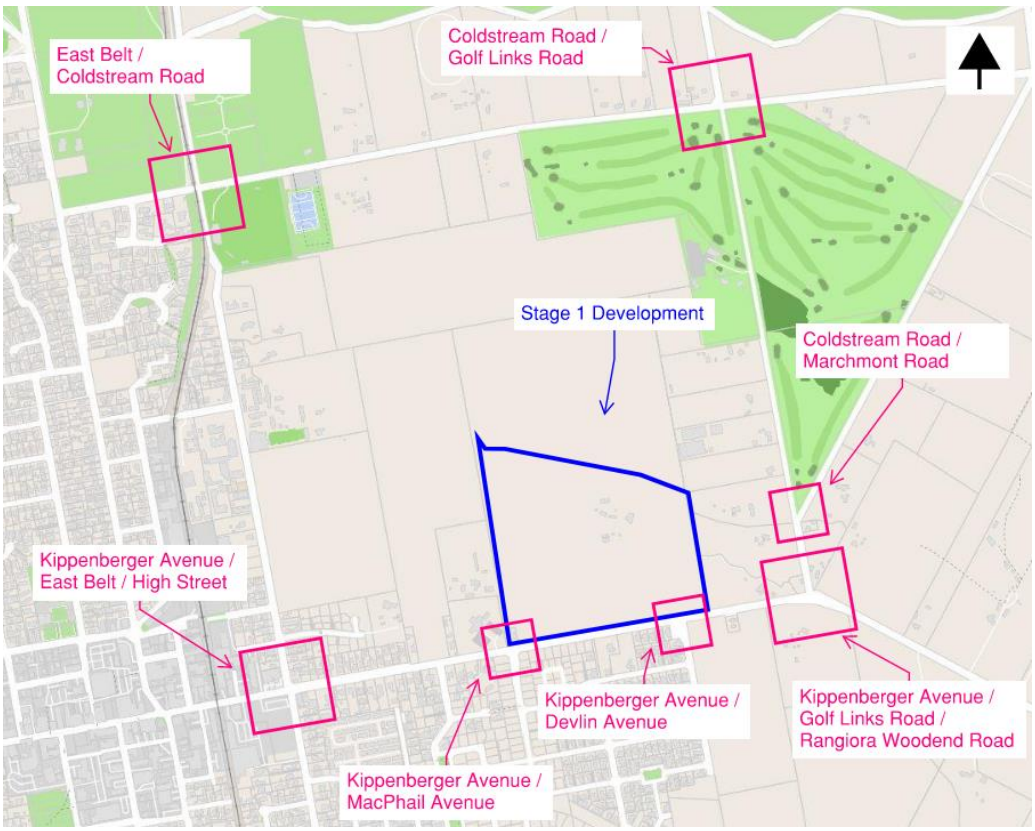


Figure 2-12: Surrounding Intersections

All of the intersections identified in the above figure are described in further detail below.

2.4.1 Kippenberger Avenue / East Belt / High Street

The intersection of Kippenberger Avenue / East Belt / High Street forms a four-way intersection as shown in Figure 2-13. The intersection is a roundabout with central splitter islands for pedestrian refuge on each approach. Kerb and channel are provided on the four corners of the intersection. The intersection has streetlights on High street and Kippenberger Avenue. There is currently a uni-directional on carriageway cycle lane on East Belt between Kippenberger Avenue and Wales Street.

Figure 2-13: Kippenberger Avenue / East Belt / High Street Intersection (Courtesy: Canterbury Maps, 2021)

2.4.2 Kippenberger Avenue / Golf Links Road / Rangiora Woodend Road

The intersection of Kippenberger Avenue / Golf Links Road / Rangiora Woodend Road forms a three-way T-intersection as shown in Figure 2-14. Golf Links Road to Kippenberger Avenue is GIVE WAY controlled. Kerb and channel is not provided at this intersection. The intersection has no street lighting but has a shared use path along the south side along Kippenberger Avenue to Rangiora Woodend Road. The intersection has a right-turn bay facility for vehicles turning right from Rangiora Woodend Road to Golf Links Road. There are guardrails located opposite Golf Links Road at transition between Rangiora Woodend Road and Kippenberger Avenue. Off Golf Links Road, there is an existing private vehicle access for 518 Rangiora Woodend Road. There are also chevron warning signs indicating the bend and change in direction of the road.

Figure 2-14: Kippenberger Avenue / Golf Links Road / Rangiora Woodend Road Intersection (Courtesy: Canterbury Maps, 2021)

2.4.3 Kippenberger Avenue / Devlin Avenue

The intersection of Kippenberger Avenue / Devlin Avenue forms a T-intersection as shown in Figure 2-15. The intersection is GIVE WAY controlled with priority given to Kippenberger Avenue and has no central splitter island. Kerb and channel is provided on the south side of Kippenberger Avenue. The intersection has street lighting on Devlin Avenue with a footpath along the south side of Kippenberger Avenue and on-road cycle lanes on both sides of Kippenberger Avenue. The intersection does not have right turn bay facilities for vehicles turning right from Kippenberger Avenue to Devlin Avenue and it has a wide sealed shoulder that accommodates a bus stop. From Figure 2-15, an existing livestock underpass is evident at 52 Kippenberger Avenue.

Figure 2-15: Kippenberger Avenue / Devlin Avenue Intersection (Courtesy: Canterbury Maps, 2021)

2.4.4 Kippenberger Avenue / MacPhail Avenue

The intersection of Kippenberger Avenue / MacPhail Avenue forms a T-intersection as shown in Figure 2-16. The intersection is STOP controlled with priority given to Kippenberger Avenue and has central splitter islands. Kerb and channel is provided at this intersection with streetlights provided on each side of MacPhail Avenue. There is no cycle provision but there is a courtesy pedestrian crossing on MacPhail Avenue. It should be noted that the kerb cutdowns for this crossing do not align. The intersection does not have right turn bay facilities for vehicles turning right from Kippenberger Avenue to MacPhail Avenue; however, it has a wide sealed shoulder allowing vehicles travelling straight on Kippenberger Avenue to pass a vehicle waiting to turn right onto MacPhail Avenue.

Figure 2-16: Kippenberger Avenue / MacPhail Avenue Intersection (Courtesy: Canterbury Maps, 2021)

2.4.5 Coldstream Road / Golf Links Road

The intersection of Coldstream Road and Golf Links Road forms a four-way intersection as shown in Figure 2-17. The intersection is STOP controlled with priority given to Coldstream Road and has no central splitter islands. Kerb and channel are not provided at this intersection. The intersection has no street lighting and there are no pedestrian or cycle facilities. The intersection does not have right turn bay facilities for vehicles turning right from Coldstream Road to Golf Links Road.

Figure 2-17: Coldstream Road / Golf Links Road Intersection (Courtesy: Canterbury Maps, 2021)

2.4.6 East Belt / Coldstream Road

The intersection of Coldstream Road and East Belt forms a four-way T-intersection as shown in Figure 2-18. The intersection is STOP controlled northbound and GIVE WAY controlled southbound, with priority given to Coldstream Road and has no central splitter islands. Kerb and channel are provided on the southern side of Coldstream Road. The intersection has no street lighting; however, there is a footpath along the south side of Coldstream Road. The intersection does not have right turn bay facilities for vehicles turning right to access East Belt.

The intersection of East Belt / Coldstream Road is directly adjacent to ALCAM Railway Level Crossing 2279: Coldstream Road Rangiora. It is a non-compliant distance of 0m from the level crossing with signage and flashing lights as the only control measures. There is a pedestrian level crossing (ALCAM Level Crossing 2280: Coldstream Road Ped Down Rangiora) delineated by tactile pavers on the south side of Coldstream Road. There is no physical separation noted for the two crossings.

Figure 2-18: East Belt / Coldstream Road Intersection (Courtesy: Canterbury Maps, 2021)

2.4.7 Golf Links Road / Marchmont Road

The intersection of Golf Links and Marchmont Road forms a three-way T-intersection as shown in Figure 2-19. The intersection is GIVE WAY controlled with priority given to Golf Links Road. Marchmont Road has a very shallow approach to Golf Links Road and has no central splitter islands. Kerb and channel is not provided at this intersection. The intersection has no street lighting and there are no pedestrian or cycle facilities. The intersection does not have right turn bay facilities for vehicles turning right from Golf Links Road to Marchmont Road. There is also a private vehicle access for 16 Golf Links Road at close proximity to the intersection.

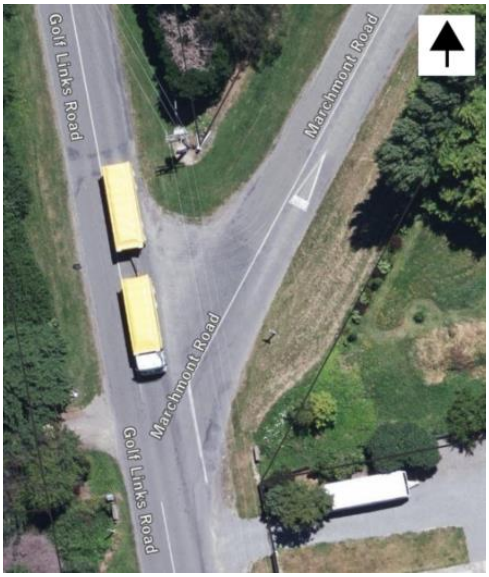


Figure 2-19: Golf Links Road / Marchmont Road Intersection (Courtesy: Canterbury Maps, 2021)

2.4.8 Coldstream Road / Marchmont Road

The intersection of Coldstream Road and Marchmont Road forms a three-way T-intersection as shown in Figure 2-20. The intersection is STOP controlled with priority given to Coldstream Road. The Marchmont Road approach has no central splitter islands. Kerb and channel are not provided at this intersection. The intersection has no street lighting and there are no pedestrian or cycle facilities. The intersection does not have right turn bay facilities for vehicles turning right from Marchmont Road to Coldstream Road. There are two vehicle accesses which join at the head of the T. One provides access to the river, the other to a private property.

Figure 2-20: Coldstream Road / Marchmont Road Intersection (Courtesy: Canterbury Maps, 2021)

2.5 Traffic Data

2.5.1 Traffic Counts

Traffic count data provided by WDC is summarised in Table 2-1 below. The detailed count data is provided in Appendix A.

Table 2-1: Traffic Volumes on Adjacent Streets

	5 Day ADT	7 Day ADT	Weekday AM Peak	Weekday PM Peak	Weekend Peak
Site 0361A, Kippenberger Avenue 170m west of Golf Links Road between 13/10/2020 and 20/10/2020					
Both directions	6307	6115	468	604	615
Site 0361B, Kippenberger Avenue 150m west of Watkins Place between 17/08/2019 and 24/08/2019					
Both directions	6860	6570	523	657	636
Site 0270A, Golf Links Road 600m south of Coldstream Road between 19/05/2021 and 26/05/2021					
Both directions	1169	1172	84	138	133
Site 0142A, Coldstream Road 550m east of Marchmont Road between 19/05/2021 and 26/05/2021					
Both directions	511	500	38	53	56
Site 0142B, Coldstream Road 400m west of Golf Links Road between 19/05/2021 and 26/05/2021					
Both directions	1602	1586	119	183	173
Site 0204C, East Belt 100m north of Keir Street between 17/08/2019 and 24/08/2019					
Both directions	2255	1933	383	281	132
Site 0204E, East Belt 250m north of Wales Street between 24/07/2019 and 31/07/2019					
Both directions	1134	1015	195	155	95
Site 0204D, East Belt 150m south of Kippenberger Avenue between 17/08/2019 and 24/08/2019					
Both directions	4049	3770	376	424	335
Site 0545G, Rangiora Woodened Road 400m east of Golf Links Road between 19/05/2021 and 26/05/2021					
Both directions	7493	7270	558	776	681
Site 0303A, High Street 100m west of East Belt between 27/08/2019 and 03/09/2019					
Both directions	9953	9576	774	971	923
Site 0414A, Marchmont Road 600m north of Golf Links Road between 26/06/2018 and 11/07/2018					
Both directions	143	139	14	18	17

The ONRC recommends the following ADT ranges based on the road classification:

- Access: < 1000vpd
- Secondary Collector: 1000 – 3000vpd
- Primary Collector: 3000 – 5000vpd
- Arterial: 5000 – 15000vpd
- Regional: 15000 – 25000vpd; and

- National: > 25000vpd

Based on the data in Table 2-1, the traffic volumes currently accommodated on the roads surrounding the site are acceptable and within the bounds of the road classifications under the ONRC except for Kippenberger Avenue. Kippenberger Avenue is currently averaging close to 7000 vpd and therefore fits within the traffic volume range of an Arterial Road as stipulated by the ONRC.

2.5.2 Turning Volumes

Traffic volumes and turning movements were only provided by WDC for the Kippenberger Avenue / Golf Links Road / Rangiora Woodend Road intersection. Turn counts show most vehicle trips occur towards the west, towards the Rangiora township. The 2016 traffic count for the Kippenberger Avenue / Golf Links Road / Rangiora Woodend Road intersection is provided in Appendix B for reference.

2.6 Crash History

Crash data has been sourced from the Waka Kotahi Crash Analysis System (CAS) database for all crashes in the last ten years (2011-2020) plus any crashes reported to date in 2021. It is important to note that the recorded crashes only include those reported to the New Zealand Police; therefore, other minor unreported events may be excluded from the database.

The data shows a total of 45 reported crashes in the immediate vicinity of the Stage 1 development in the ten-year period between 2011 – 2021. A description report and collision diagram, showing the location and type of crashes, is provided in Appendix C. The area shown in Figure 2-21 demonstrates the extent of the study area considered.

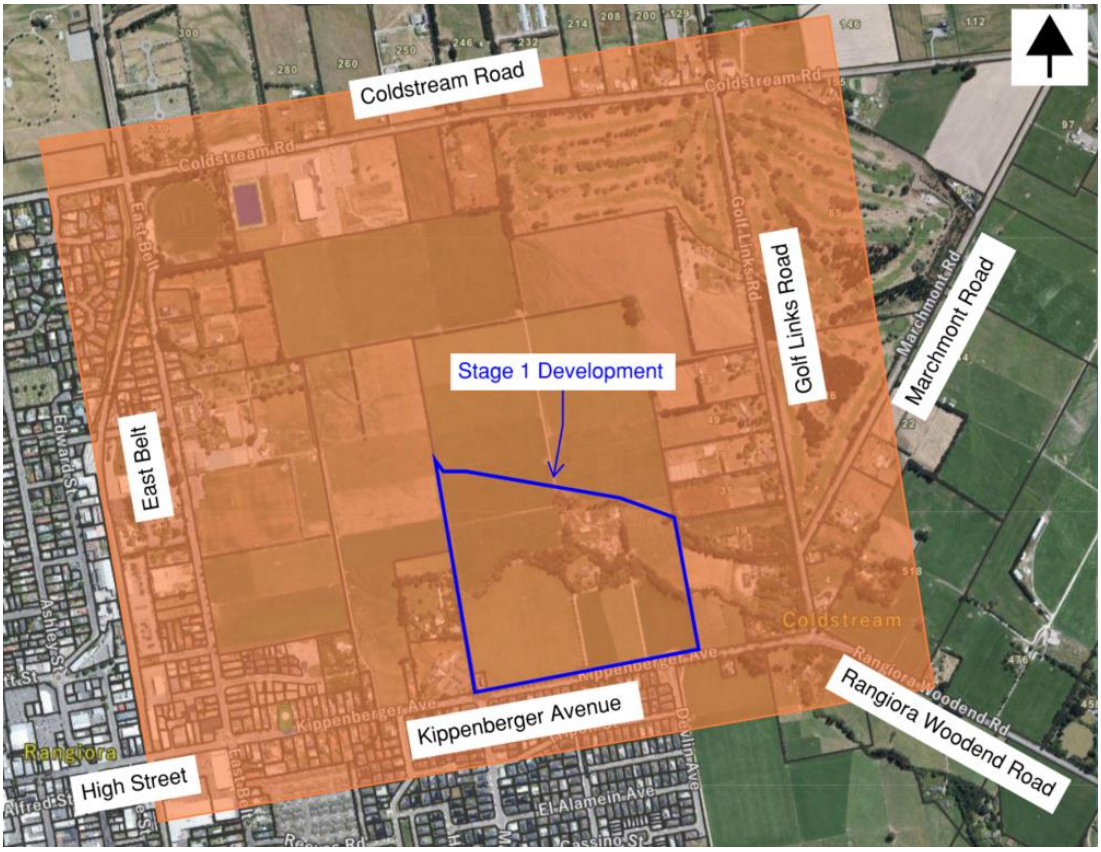


Figure 2-21: Extent of CAS Assessment

Of the 45 crashes, there was a total of zero fatal crashes, three serious injury crashes (6.67%), 13 minor injury crashes (28.89%) and 29 non-injury crashes (64.44%). The recorded crashes for the time period under consideration are detailed in Table 2-2 and Table 2-3 below.

Table 2-2: Crash Data Between 2011 and 2015 (CAS)

Crash Severity					Subtotal
Year	Fatal	Serious	Minor	Non-injury	
2011	0	0	1	5	**6**
2012	0	1	0	3	**4**
2013	0	0	3	6	**9**
2014	0	0	4	1	**5**
2015	0	1	2	2	**5**
Subtotal	**0**	**2**	**10**	**17**	**29**

Table 2-3: Crash Data Between 2016 and 2021 (CAS)

Crash Severity					Subtotal
Year	Fatal	Serious	Minor	Non-injury	
2016	0	0	1	3	**4**
2017	0	0	0	3	**3**
2018	0	0	0	3	**3**
2019	0	0	0	0	**0**
2020	0	1	2	2	**5**
2021	0	0	0	1	**1**
Subtotal	**0**	**1**	**3**	**12**	**16**

It is noted that the total number of crashes have decreased in the last five-year period (2016 – 2021) when compared to the previous five-year period (2011 – 2015). There has also been a decrease in both serious and minor crashed in the last five-year period.

Of the crashes noted, two involved cyclists. The details of the incidents are provided below:

- On 25 January 2018, a cyclist entered the Kippenberger Avenue / East Belt / High Street roundabout intending to turn right onto Kippenberger Avenue. A car on East Belt intending to travel straight ahead failed to see the cyclist and a non-injury collision occurred.
- On 23 March 2020, a cyclist entered the Kippenberger Avenue / East Belt / High Street roundabout intending to head south on East Belt. A car was driving west on Kippenberger Avenue intending to travel straight through, who paused at the roundabout and then proceeded. The car did not see the cyclist and collided at the middle of the intersection resulting in a serious collision. The cyclist suffered a broken collarbone and broken ribs.

Both crashes noted above occurred at the Kippenberger Avenue / East Belt / High Street roundabout and occurred due to driver inattention. The occurrence of this crash type may indicate the need for additional supporting infrastructure at the roundabout to improve the safety for cyclists (in alignment with WDC's Operational Road Safety Action Plan 2019-2020 which has a vision for a safe road system increasingly free of death and serious injury). For further detail refer to Section 6.3 of this report.

2.7 Public Transport

2.7.1 Bus Routes

Bus services in the Rangiora township are provided by Metro. The only bus route which operates adjacent to the proposed development is the Number-97 service along Kippenberger Avenue. The Number-97 operates between Rangiora and Pegasus every 40-minutes. The Number-1 (previously known as the Blue Line) also operates within the Rangiora township, travelling between Rangiora and the Christchurch suburb of Cashmere. Figure 2-22 depicts the existing bus routes near the proposed development as of September 2021.

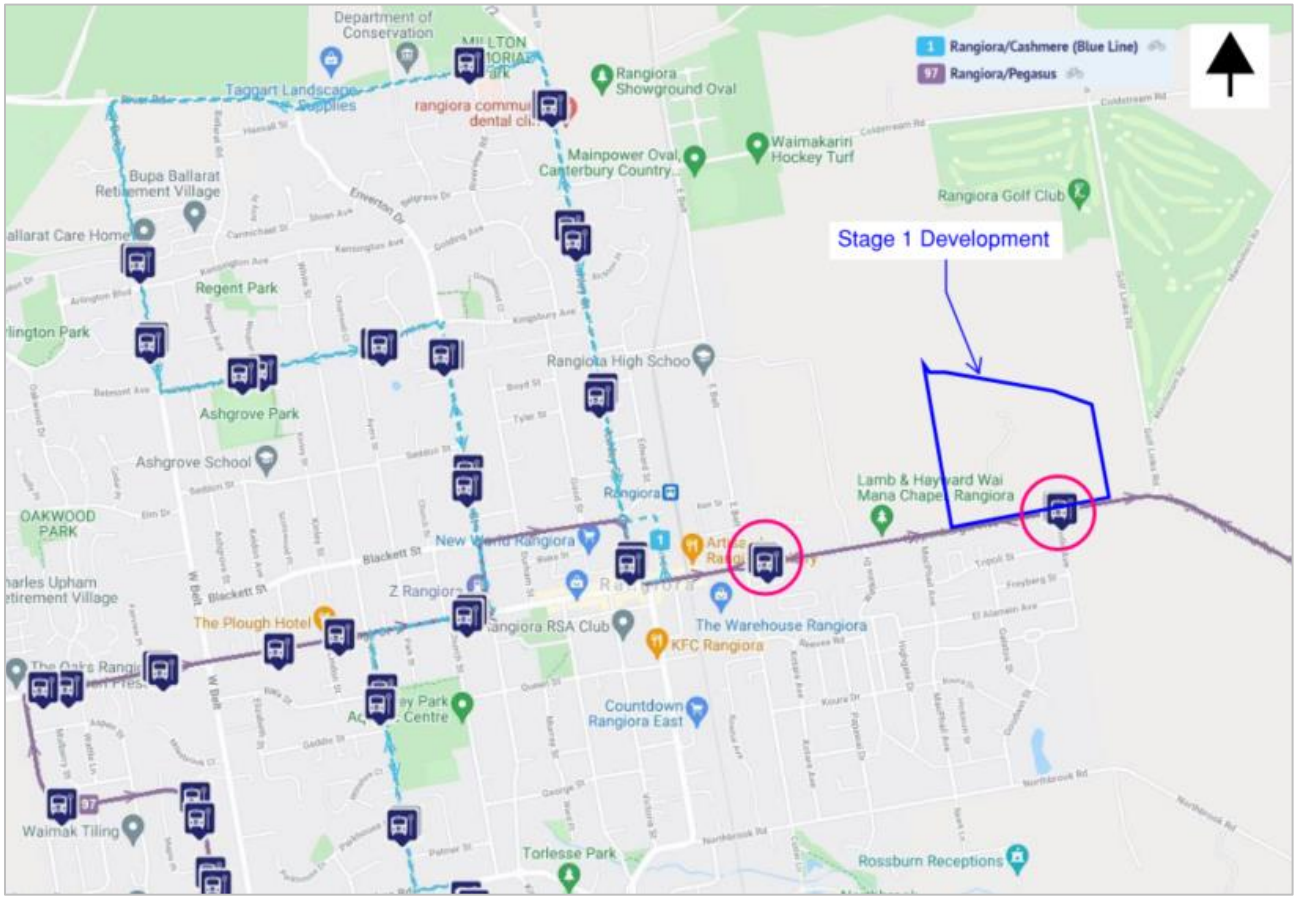


Figure 2-22: Public Bus Service Routes

It should be noted that the Number-1 bus route continues south towards Christchurch City. There are two pairs of bus stops in close proximity to the proposed development on Kippenberger Avenue directly opposite Devlin Avenue and near the Kippenberger Avenue / East Belt / High Street intersection, circled in pink in Figure 2-22.

In addition to regular public Metro bus services, school bus services are provided by Metro in the Greater Christchurch network to some schools. Metro school bus services are provided by a variety of different operators under contract to the Ministry of Education who designate the bus routes. Transport service providers use their discretion to decide where the safest stopping points are along the designated route. Some stops in the Waimakariri District are used by school buses only. The school routes are shown in Figure 2-23.

Figure 2-23: School Bus Service Routes

2.7.2 Park and Ride

Rangiora currently has three Park and Ride sites as shown in Figure 2-24. The aim of Park and Ride facilities is to support the direct bus services (Number-1) providing peak hour commuters with faster trips into Christchurch City and parking for residents who wish to carpool. Parking is free at these sites.

Figure 2-24: Park and Ride Facilities in Rangiora

2.8 Walking and Cycling

The existing cycle infrastructure in vicinity of the project site can be seen in Figure 2-25 below.

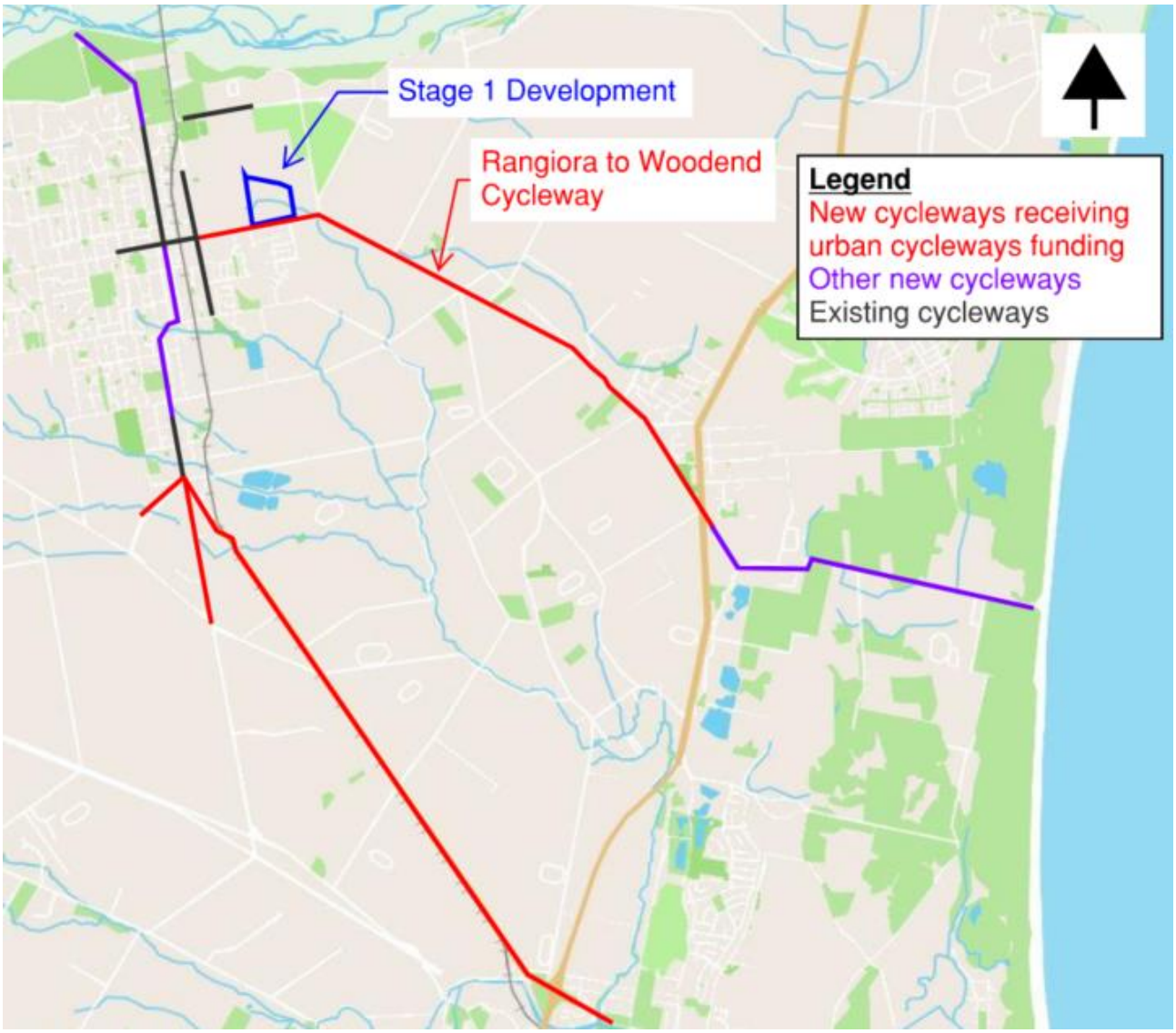


Figure 2-25: Existing Cycle Infrastructure

The Rangiora to Woodend cycleway already in existence passes by the proposed development and is located on the south side of Kippenberger Avenue. In the immediate vicinity of the Stage 1 development, there is a footpath on the south side of Kippenberger Avenue only, and on both sides of East Belt which follows the cycleway. No other pedestrian infrastructure is noted until the Kippenberger Avenue / East Belt / High Street roundabout to the west of the development.

3 Future and Recent Transport Network Changes

3.1 Rangiora Eastern Link

The Rangiora Eastern Link Road is a roading link that will ultimately connect Lineside Road through to Coldstream Road, Rangiora. The proposed future Rangiora East Road Connection which forms part of this between Lineside Road and Northbrook Road is proposed to be designated as part of the pWDP (it is proposed through largely rural land). The objective of the designation is to improve the safety and efficiency of the roading network. In particular, the Rangiora East Road Connection is intended to provide an alternative route into or around Rangiora; reduce congestion on the main north-to-south strategic route through Rangiora (easing pressure on the existing Percival Street / Southbrook Road route); and service expected growth in the east of the township. The connection between Kippenberger Avenue and Coldstream Road is encompassed by the Bellgrove development which Stage 1 is part of. Refer to Figure 3-1.

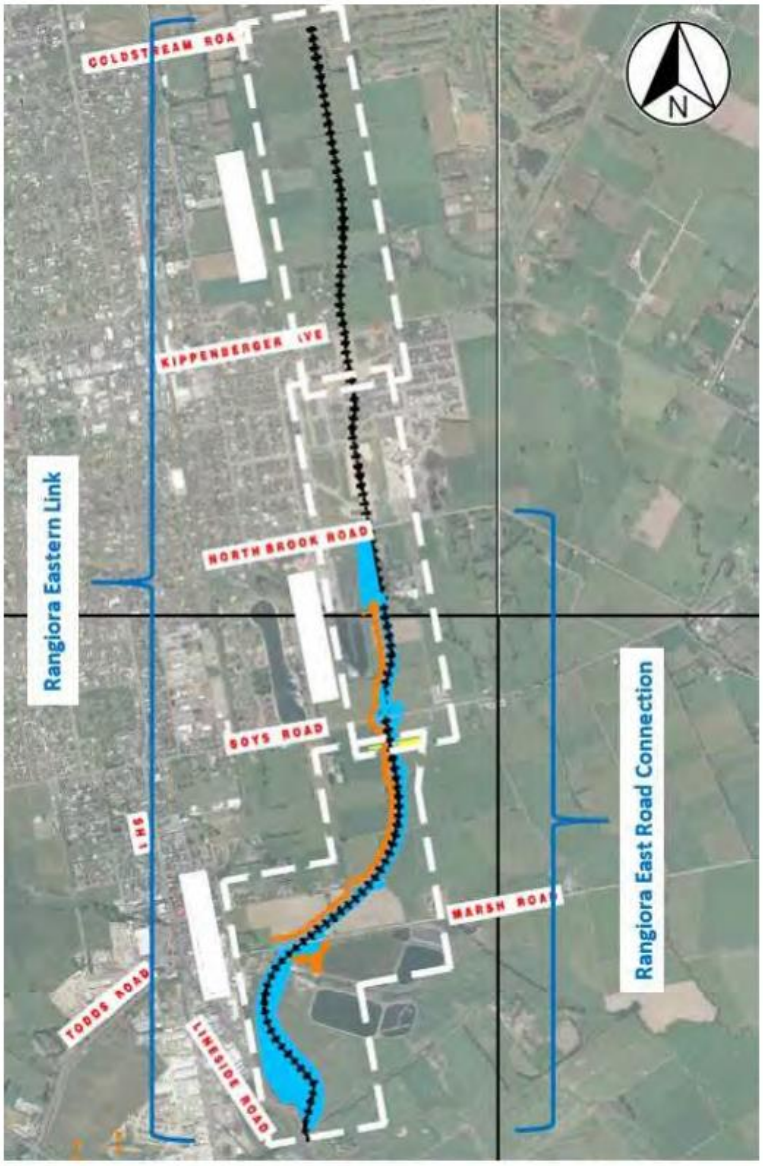


Figure 3-1: Rangiora Eastern Link Road Configuration (Courtesy: Rangiora Eastern Road Connection Technical Assessment - Transportation by WSP for the pWDP[1])

The exact delivery timeframe for the Rangiora Eastern Link is to be confirmed but the southern section of this link is proposed to be designed under the pWDP, and the modelling undertaken in support of this is

[1] https://www.waimakariri.govt.nz/__data/assets/pdf_file/0035/98189/WDC-New-designation-Rangiora-East-Road-Connection-Notice-of-Requirement-Appendix-C-Part-1.pdf

undertaken for the year 2038 indicating that the full Eastern Link Road is anticipated to be fully operational by that date.

3.2 Rangiora Town Centre Strategy 2030+

WDC's Rangiora Town Centre Strategy (RTCS) 2030 creates a vision for what the Centre should look and feel like by 2030. The work set out in the Strategy builds on the RTCS 2020 which was adopted by WDC in 2010 which sought to provide for growth and improve access to Rangiora Town Centre. The RTCS 2030 was created in June 2020 and identifies ten major projects within the Rangiora Town Centre which can be seen in Figure 3-2. Brief descriptions of these projects are provided below:

1. Reinforce the role of High Street as the heart of the Town Centre. Enhance and maintain the main street through the attractive and appropriate use of gateways, streetscapes, buildings and connections that improve safety and accessibility. This includes opportunities to improve the Gables Arcade.
2. Connect the East to the Town Centre by improving the pedestrian journey between the Cenotaph Corner intersection and the large format retail hub east of the railway. This project aims to ensure the character of the Centre continues in the east through an attractive streetscape and buildings that reflect High Street character. This project may improve the safety and attractiveness of pedestrian journeys between the proposed Stage 1 development and the Town Centre.
3. Develop the BNZ Corner to define it as the key gateway to the main retail area. This project aims to support more intensive commercial activity to the north, create a lively street environment through active uses at the ground level, and connect to a new retail/car parking development at Ashley Street.
4. Transform Station Corner to create a unique Town Centre expansion area for a mix of commercial and employment uses. This includes the opportunity to connect the Town Centre to a future transport hub and to Rangiora's north-eastern residential growth area through great walking connections, attractive public spaces and a new railway crossing point.
5. Complete the North of High Development in line with the Rangiora Central Outline Development Plan. This sees the extension of the laneways concept to create friendly and vibrant public places, supported by hospitality, new retail opportunities and public car parking. There are also opportunities for comprehensive redevelopment north of Blake Street.
6. Revamp the Civic Precinct which includes the Council Service Centre on High Street, Rangiora Library, green spaces and the public car park. This includes making the buildings fit for purpose by refurbishment and extension. There are also opportunities to enhance the public spaces in this precinct, such as the connectivity to Victoria Park and ensuring neighbouring activities, particularly at Percival Street and from the Council carpark create a lively, active edge with the park.
7. Support Durham Street Redevelopment to achieve an appropriate and attractive development. Ideally this will strengthen the Centre's evening economy by creating a hospitality and entertainment area that complements the Town Hall.
8. Enable South of High Opportunities through advocacy and partnership with the private sector to ensure redevelopment reflects the vision of the RTCS. This area could consist of a mix of commercial and retail with quality buildings, public car parking, places to live and attractive pedestrian connections.
9. Provide Access to the Town Centre through consolidated public car parking in key locations, including a proposed parking building at Ashley Street. This will be achieved through facilitating and encouraging the use of alternative and future modes of transport and continue to seek improvements to the greater public transport network.
10. Encourage Living in the Centre by guiding and collaborating on mixed-use / residential developments and providing regulatory incentives. Together, such efforts aim to meet requirements for diverse living choices, enhance vibrancy and further invigorate the Town Centre's daytime and evening economies.

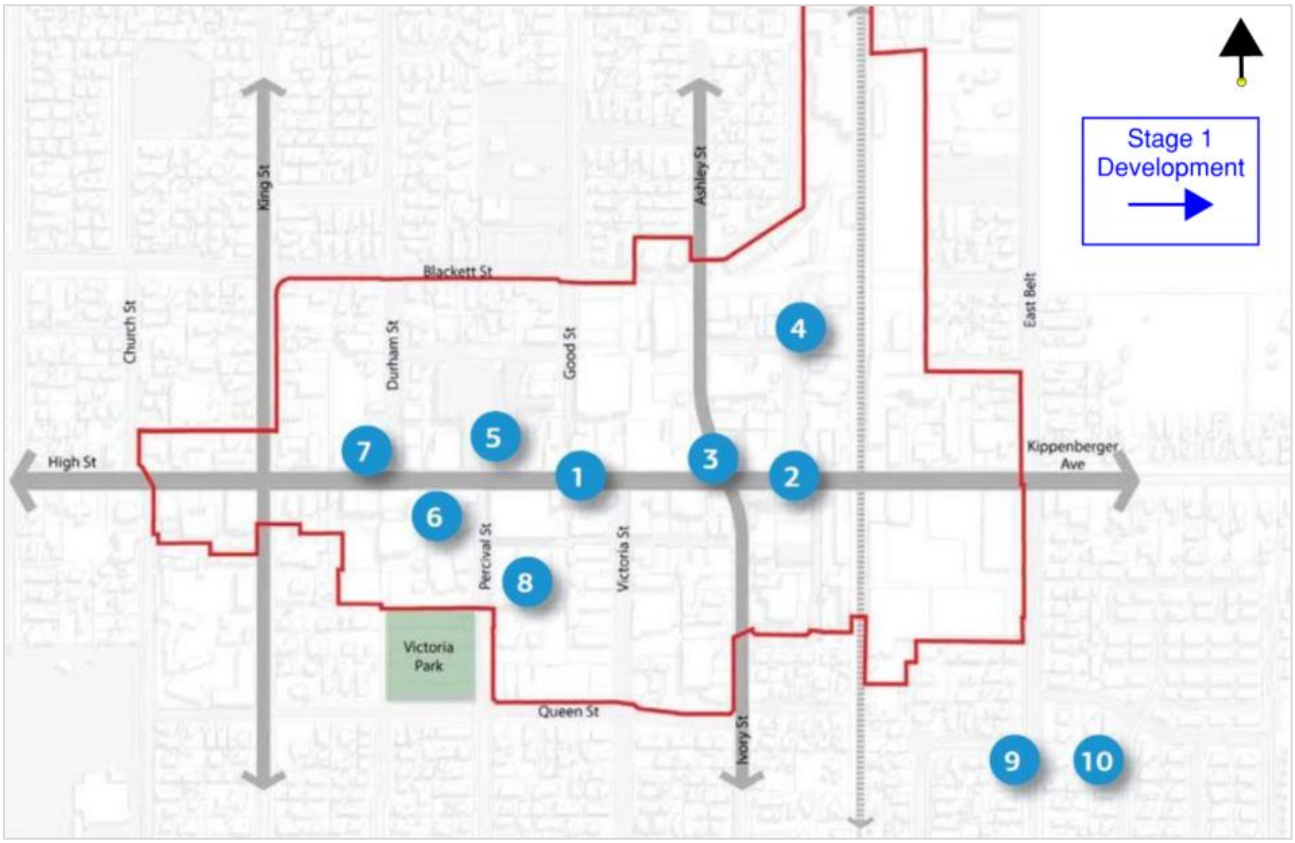


Figure 3-2: RTCS 2030 Major Project Locations

3.3 Kippenberger Avenue

In discussions about the Bellgrove development, WDC have highlighted a desire to upgrade sections of Kippenberger Avenue which are outside the immediate area of this development. This includes:

- The area to the west of the Bellgrove development between MacPhail Avenue and the residential area on the north side of Kippenberger Avenue (starting just west of Watkins Drive). It is proposed that this section of road be upgraded to be consistent with the proposed cross section along the Bellgrove Stage 1 development frontage
- Provision of two new bus stops to the west of the development as shown in Figure 3-3; and
- Provision of a memorial to Major General Sir Howard Kippenberger somewhere to the east of the proposed development.

Whilst landscaping is outside the scope of this ITA, it is understood that WDC are intending to design Kippenberger Avenue as a town entrance road incorporating replacement trees on the north side. The timing of the upgrades identified above is unknown and dependent on WDC.

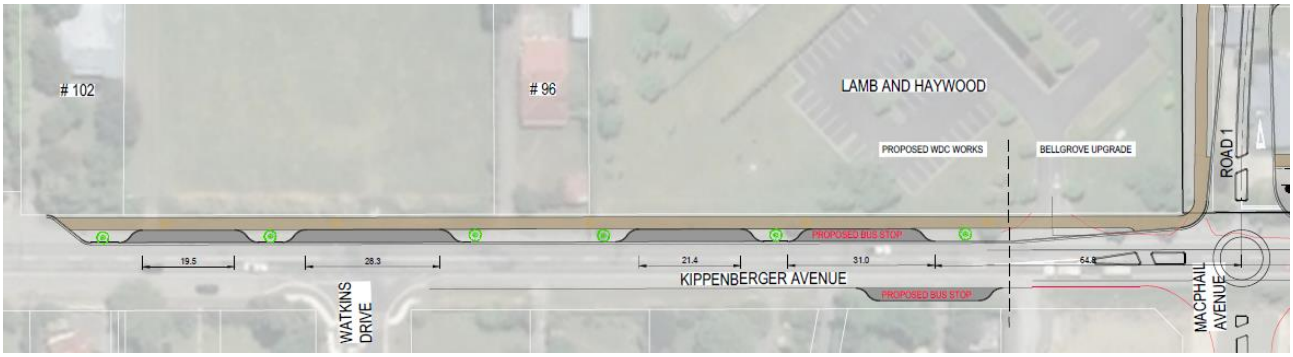


Figure 3-3: Proposed New Bus Stops Outside the Bellgrove Development

It is also noted that the section of Kippenberger Avenue from approximately Watkins Drive to the East Belt / High Street roundabout has a wide carriageway (wide shoulders) but currently no marked cycle facilities.

There is the opportunity for this section to be developed in the future to use some of the existing carriageway to formalise cycle facilities and provide consistency with the road layout west of the East Belt / High Street roundabout and it is understood that this is currently under further investigation by WDC. Opportunities for Kippenberger Avenue are discussed further in Section 6.2 of this report.

3.4 New Development Areas

The recently notified pWDP provides for four new residential development areas for future urban development in the Waimakariri District, two of which are in Rangiora East (the North-East Rangiora and South-East Rangiora Development Areas). According to the pWDP, these future development areas are required to respond to population growth. These urban development areas are likely to impact the existing transport network with increased traffic generation and network connectivity.

3.5 Greater Christchurch Public Transport Combined Business Case

The Greater Christchurch Public Transport Futures programme was established by Waka Kotahi, Environment Canterbury (ECan), WDC, Christchurch City Council and Selwyn District Council to increase the uptake of public transport within the Canterbury region. A business case was submitted December 2020 describing a recommended programme to increase public transport patronage over two horizons: short-term and medium-term.

- **Short term horizon (first 6 years of the programme)** focuses on improvements for the inner core of Greater Christchurch (an area encompassed within an approximate 5km radius from the central city) as this area represents the greatest potential for future public transport users.
- **Medium term horizon (years 7-10 of the programme)** leverages capacity created in the short term to improve access to economic and social opportunities to residents in the outer suburbs.

As part of the medium-term solutions, the business case proposed a new route to provide direct services to Christchurch City from Rangiora and Kaiapoi. If this is to be implemented, this route will need to be consulted as its own project, at which stage consideration should be given to the integration of the Bellgrove subdivision. The proposed bus routes can be seen below in Figure 3-4.

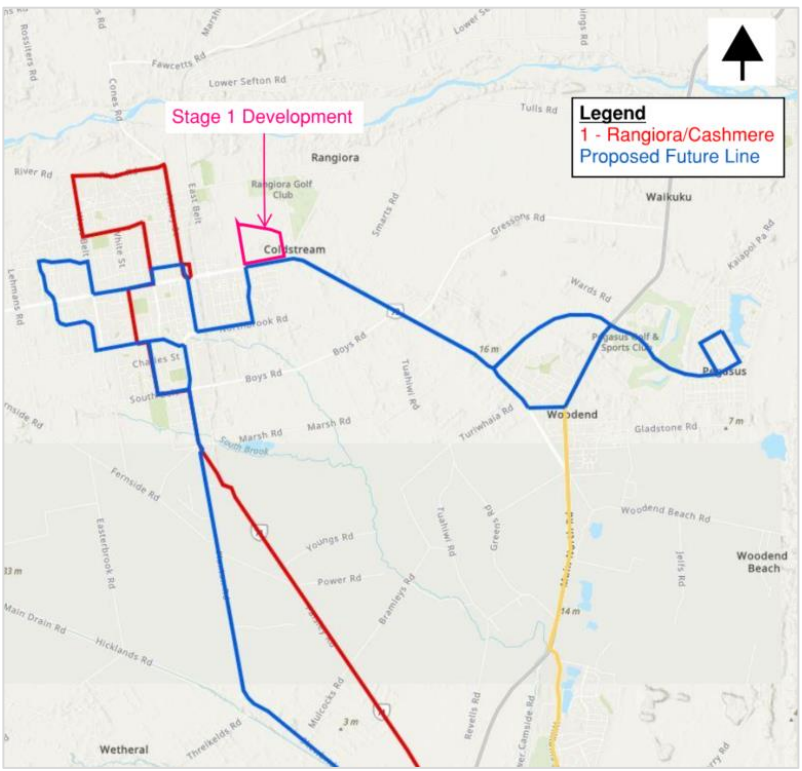


Figure 3-4: Proposed Future Public Transport Network

4 Proposed Development

4.1 Proposed Subdivision

The proposed Stage 1 layout can be seen in Figure 4-1.

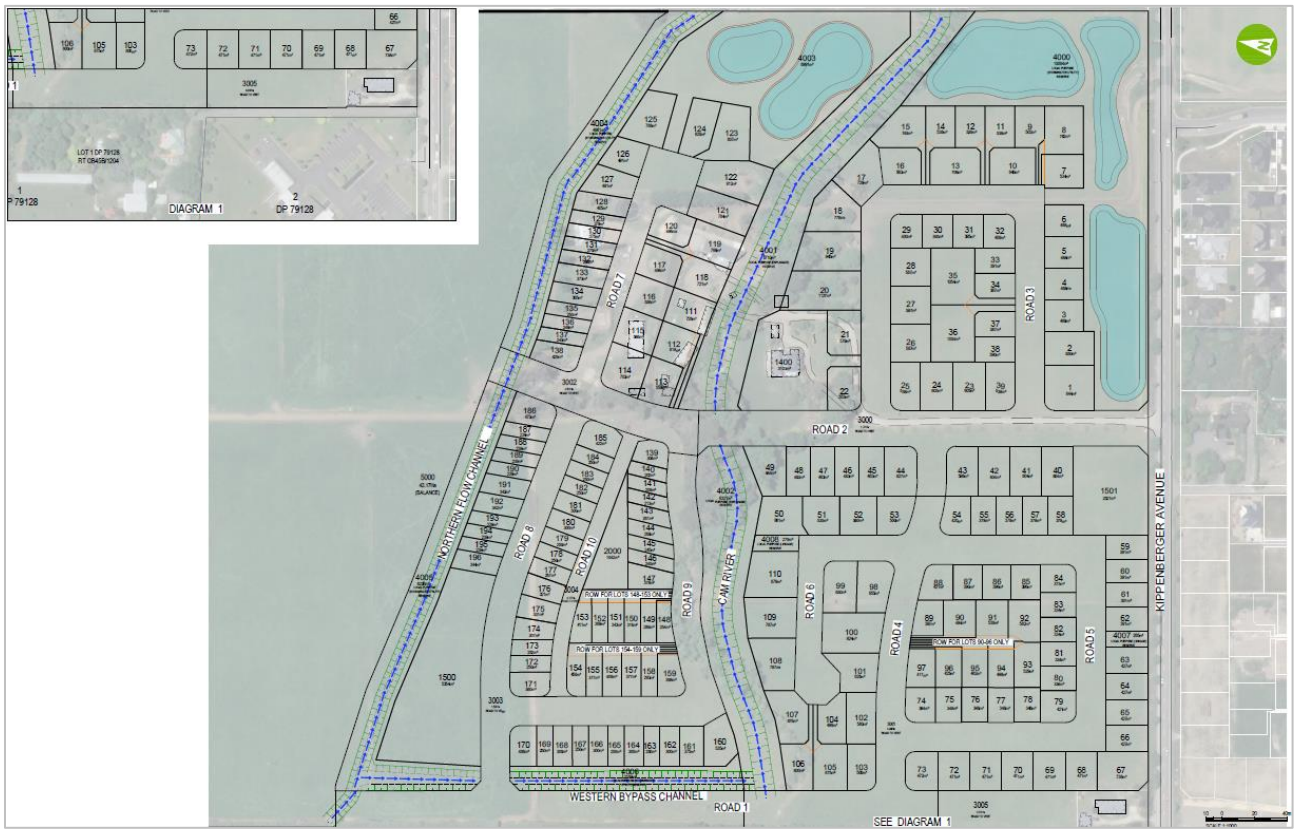


Figure 4-1: Proposed Subdivision Layout for Stage 1

The site is expected to comprise of:

- 196 residential allotments ranging from 250m^2 to 1000m^2
- Residential super-allotment (Lot 1501)
- Historic homestead residential allotment (Lot 1400); and a
- Future commercial allotment (Lot 1500).

It should be noted that details of future development occurring on the commercial allotment are unknown at this phase and will be considered under a separate application.

The Stage 1 development proposes the following road network changes:

- 10 new internal roads with all roads providing at least one footpath
- Shared path on Road 1 and on-road cycle lanes on Road 2
- A shared path and on-road cycle lane on the northern side of Kippenberger Avenue
- The intersection of Kippenberger Avenue / MacPhail Avenue is to be changed from a T-intersection to a four-legged roundabout with the inclusion of Road 1; and
- A new T-intersection to be formed on Kippenberger Avenue with Road 2.

4.2 Proposed Road Network

4.2.1 Road Layout

The future road network for the area under consideration is outlined in the 'DEV-NER-APP1 – North-East Rangiora Outline Development Plan' (NER ODP) included in the pWDP and reproduced below in Figure 4-2.

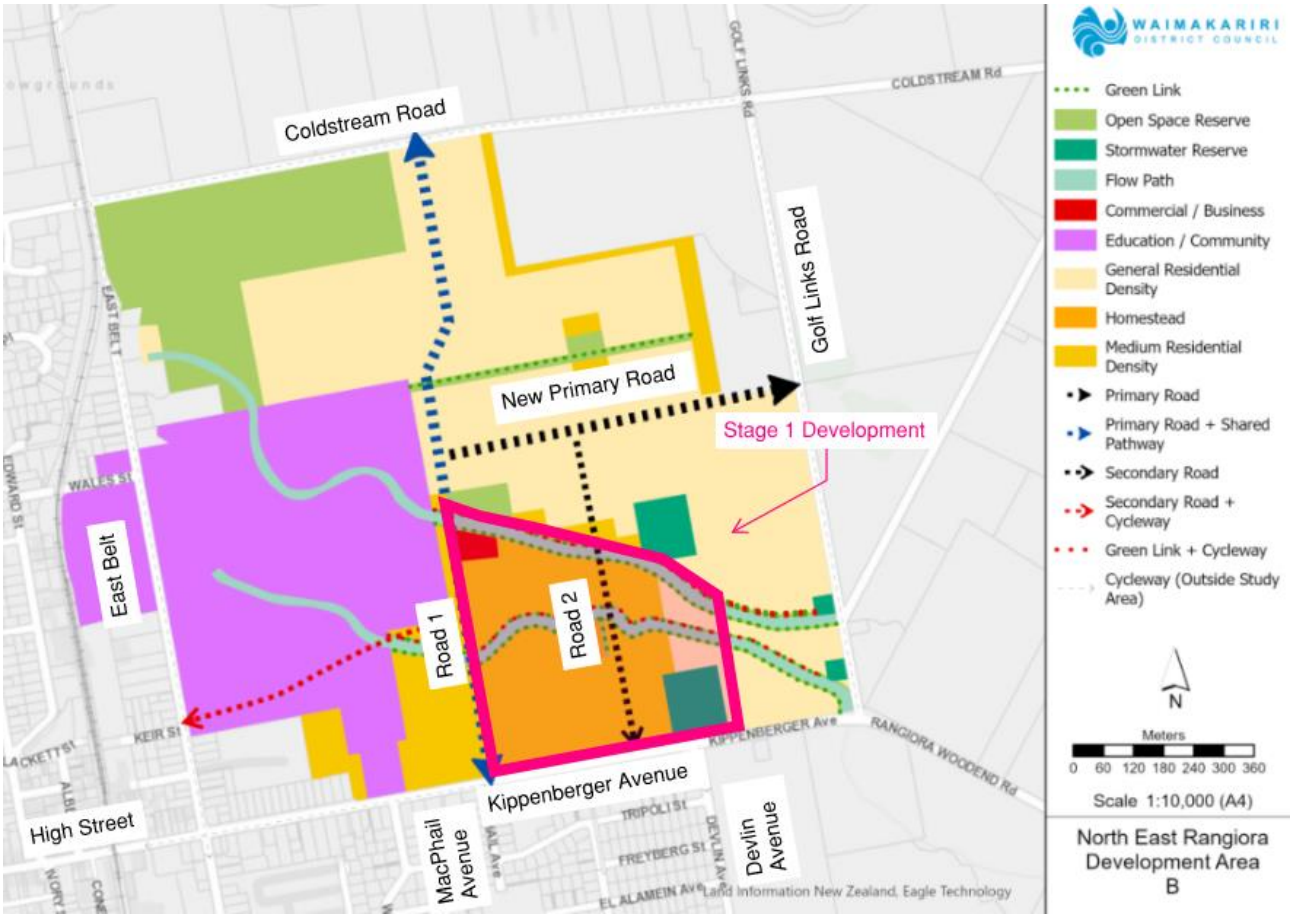


Figure 4-2: Future Transport Network with Stage 1 Key Roads Annotated

The proposed roading alignment generally aligns with the NER ODP. The Stage 1 development does not extend north to Coldstream Road but stops at the Northern Flow Channel (stormwater drainage) hence only forms this aspect of the proposed roading network.

Under the NER ODP Movement Plan, Coldstream Road and Kippenberger Avenue are to be connected via a Primary Road with a separated shared path (proposed Road 1 of the proposed development). Road 1 borders the western edge of the Stage 1 development and is to be connected to an existing T-intersection at Kippenberger Avenue / MacPhail Avenue. Road 1 generally aligns with the location and intent of the future Rangiora Eastern Link. There will be no vehicle crossings off Road 1 for any of the lots created within Stage 1.

The NER ODP shows a new Primary Road is to be constructed to connect Golf Links Road and Road 1 north of the current extent of Stage 1. This road will run broadly east to west and will include a new intersection at Golf Links Road (design to be determined at subsequent stages of future development).

A Secondary Road as part of the NER ODP (Road 2 of the proposed development), will run through the middle of the Stage 1 proposed development. This new road will provide a future connection to the New Primary Road and Kippenberger Avenue. This will be in the form of a GIVE WAY T-intersection with priority given to Kippenberger Avenue.

According to the NER ODP, the specific roading classification of all roads will be determined at the time of development. Based on the layout of the subdivision, and the proposed design, Road 1 is best classified as a Primary Collector Road according to the ONRC, and Road 2 as a Secondary Collector Road with all other

roads as Local Roads. Engagement with WDC Transport, has indicated that the WDC preference is for Road 2 to have a Local Road classification. This feedback has not been adopted given:

- The NER ODP movement plan only identifies “those more significant roads” and shows Road 2 as a secondary road. Interpretation of the pWDP is that a Local Road would not constitute a significant road
- The 22m wide carriageway for Road 2, identified as the “secondary north-south road in the middle of phase 1”, was agreed upon by WDC during the early stages of design (July 2021) as a non-compliance for the requirements of a Collector Road for the draft pWDP standards as shown in Appendix I; and
- Road 2 will also provide direct access to Stage 2 of the development and provide future connectivity to Stages 3, 4 and 5.

The detailed road layout and road classification for Stage 1 can be seen in Figure 4-3 below. These are the road classifications used for the assessment against the WDP and pWDP below.

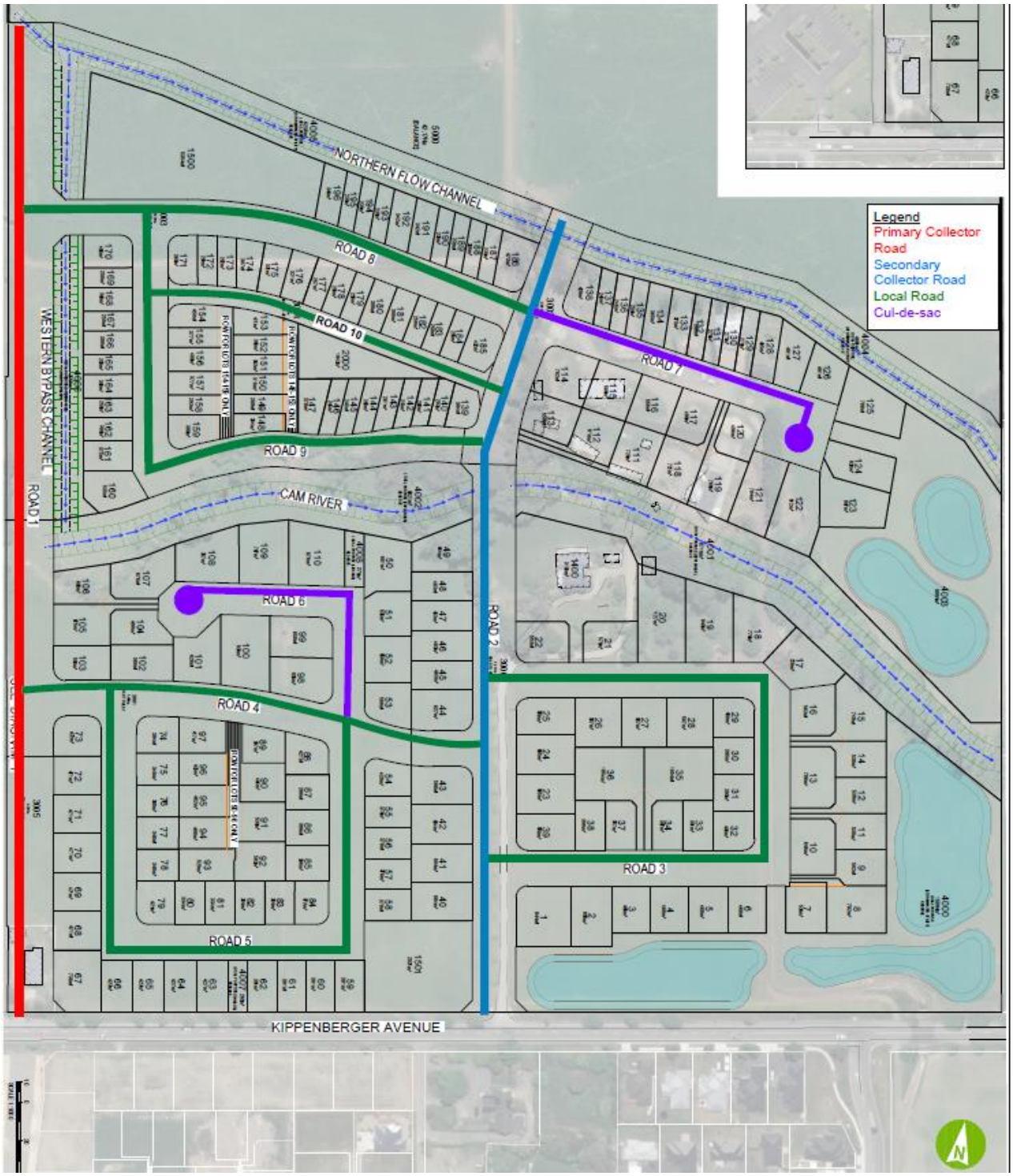


Figure 4-3: Road Classification

4.2.2 Road Cross Sections

The road design attributes for the new internal roads have been assessed against the WDP and pWDP. The site is currently rural zoned; however, the predominant land occupancy will be for a residential activity and therefore the new internal roads have been designed to meet the requirements outlined in the WDP for residential zones.

It should be noted that the designs of the internal roads are not fully compliant with the residential road specifications outlined in the WDP and pWDP. For an assessment of non-compliances refer to Section 8.2.

Road 1, as a Primary Collector Road, will have a total carriageway width of 23m, with a 2.5m wide shared path on one side and 1.8m wide footpath on the other. There are provisions for 2.5m wide on-street parking on both sides of the road which are adjacent to two 3.5m wide live lanes north of the Cam River. The live lanes are separated by a grassed median. A cross section of Road 1 north of Cam River can be seen in Figure 4-4 and south of Cam River (where the on-street parking provision is replaced by landscaped berm) in Figure 4-5 below.

Road 2, as a Secondary Collector Road, will have a total carriageway width of 22m with two 1.8m wide footpaths on both sides of the road. Adjacent to the footpath are two 2.5m wide on-street parking lanes which are separated from the 3.5m wide live lanes by 1.8m wide cycle lanes on both sides of the road. A typical cross section of Road 2 can be seen in Figure 4-6 below.

Roads 3, 5 and 9 will be Local Roads and have the same typical cross section which consists of a 1.8m wide footpath on one side which is next to a 2.5m wide grassed berm. There are two 4m wide live lanes with 2.5m wide on-street parking provided on one side of the road. The total carriageway of these roads equates to 18m and can be seen in Figure 4-7 below.

Road 4 is a Local Road and has a carriageway width of 18m. This road has a 1.8m wide footpath on both sides of the road adjacent to one 2m wide on-street parking lane. There are two live lanes of 4m width each. The proposed cross section can be found in Figure 4-8.

Road 8 will be a Local Road and has a carriageway width of 18m. This road has a 1.8m wide footpath on both sides of the road adjacent to two 2m parking lanes. There are two live lanes of 4m width each. The proposed cross section can be found in Figure 4-9 below.

Road 10 will be a Local Road with a carriageway width of 10m. This road has a 1.8m wide footpath next to a 0.3m wide grassed berm. Adjacent to the reserve are 2.1m wide indented parking bays. There are two live lanes of traffic of 2.25m width each. The proposed cross section can be found in Figure 4-10 below.

Roads 6 and 7 are assumed to be the equivalent to a Local Road being culs-de-sac and have a carriageway width of 16m as shown in Figure 4-11. A footpath is provided on only one side of the road which is adjacent to the two 4m wide live lanes. The remaining width of the carriageway is grassed.

Kippenberger Avenue is to be upgraded to accommodate additional pedestrian movements. The proposed upgrade is being developed in consultation with WDC and is proposed to comprise of the installation of a 2.5m shared path and 2.5m wide parking bays on the north side of the street adjacent to a 1.8m wide on road cycle lane. The proposed cross section west of Road 2 can be seen in Figure 4-12 and east of Road 2 in Figure 4-13.

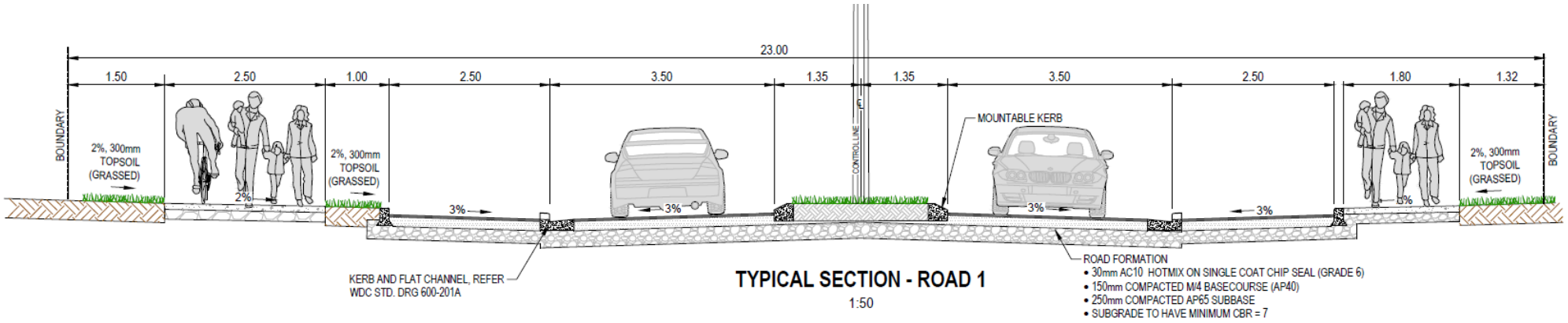


Figure 4-4: Typical Cross Section for Road 1 North of Cam River

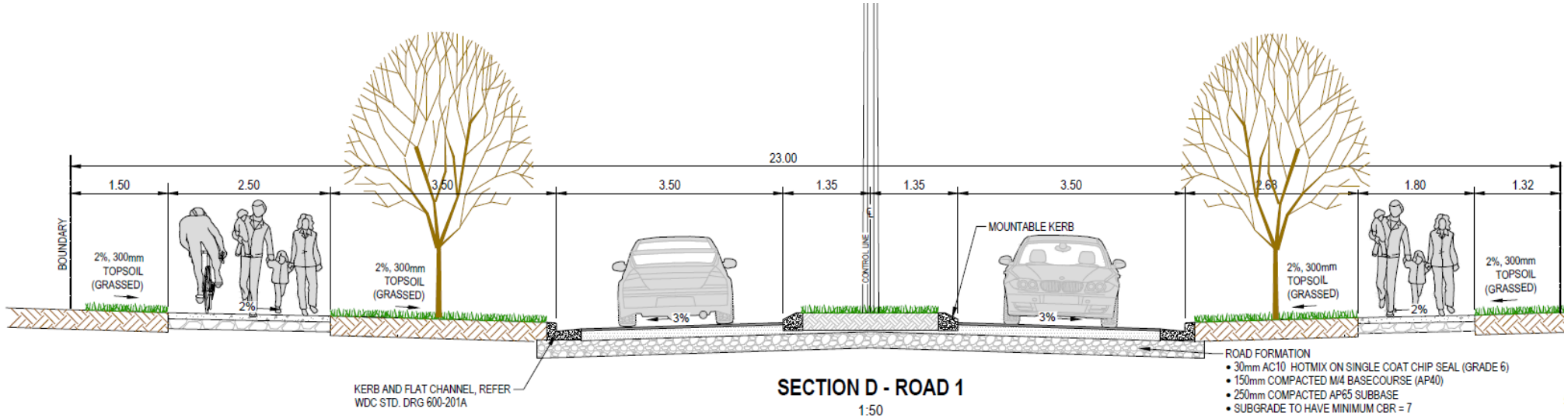
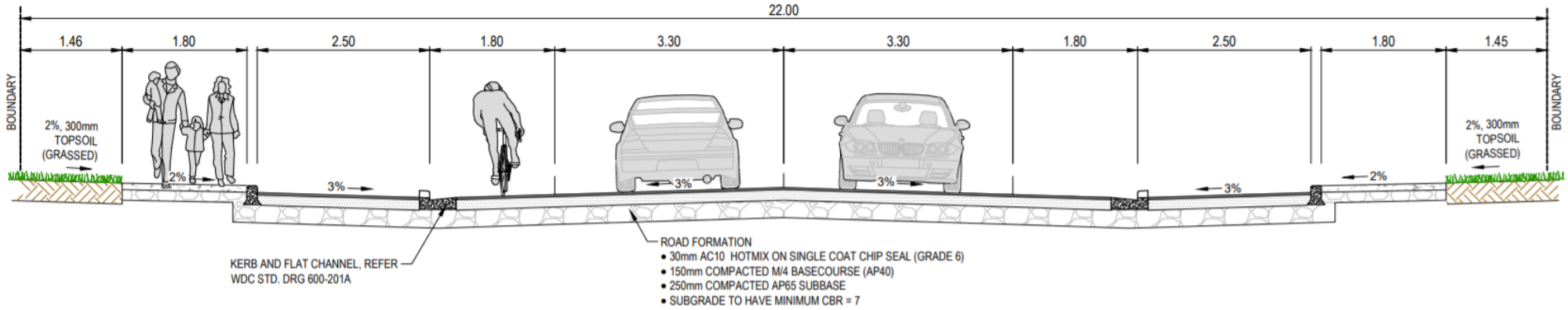


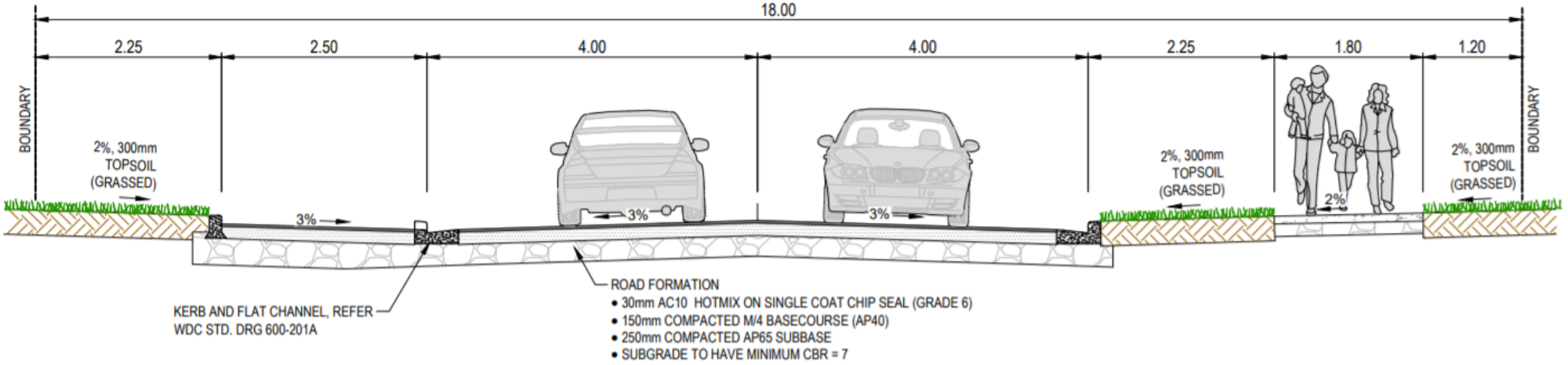
Figure 4-5: Typical Cross Section for Road 1 South of Cam River



TYPICAL SECTION - ROAD 2

1:50

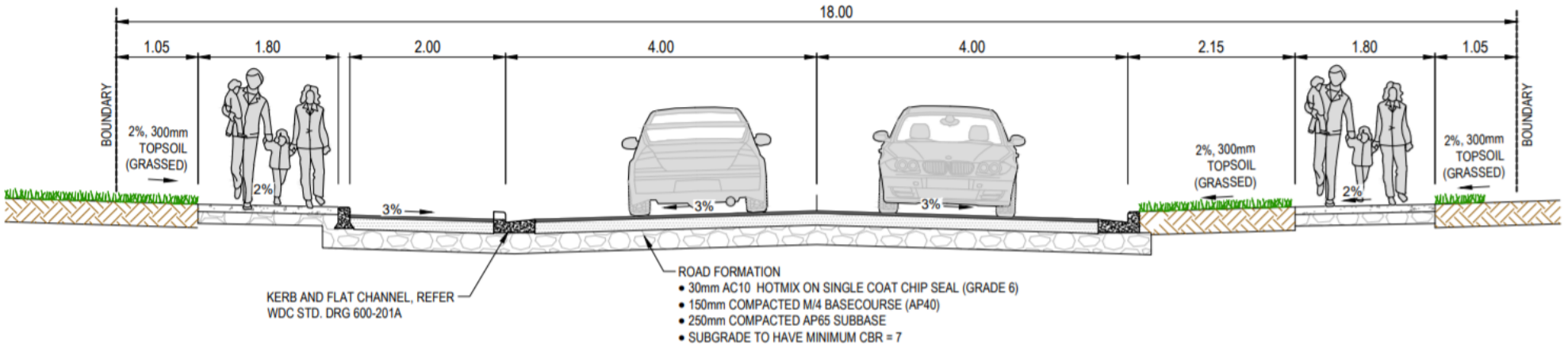
Figure 4-6: Typical Cross Section for Road 2



TYPICAL SECTION - ROADS 3,5 & 9

1:50

Figure 4-7: Typical Cross Section for Roads 3, 5 and 9



TYPICAL SECTION - ROAD 4

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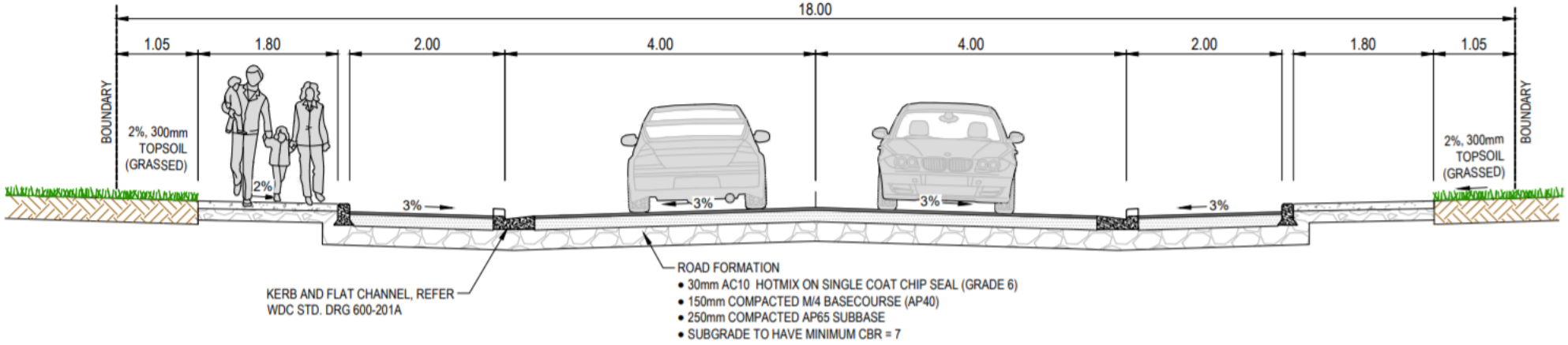
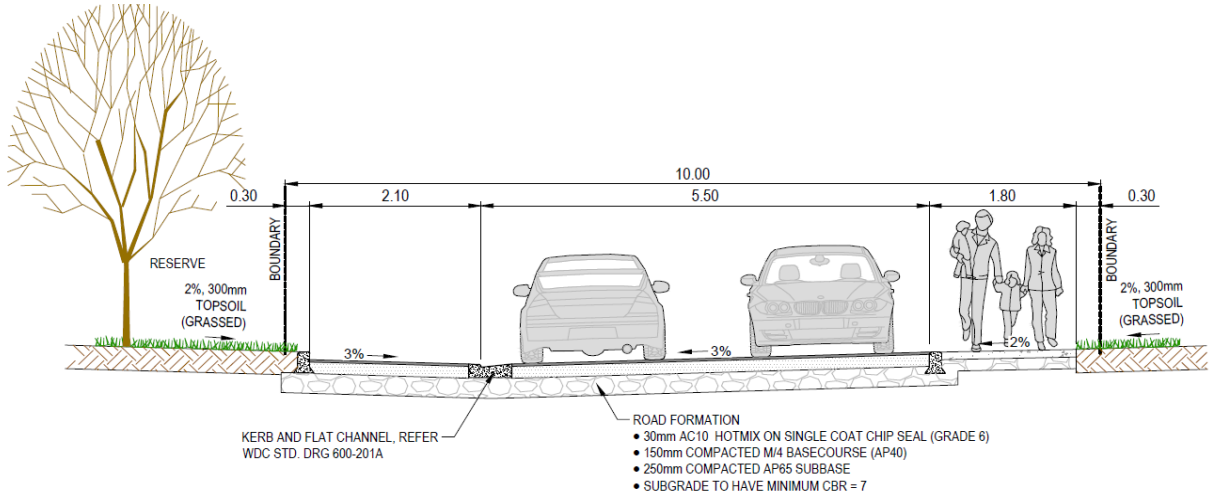
Figure 4-8: Typical Cross Section for Road 4



TYPICAL SECTION - ROAD 8

1:50

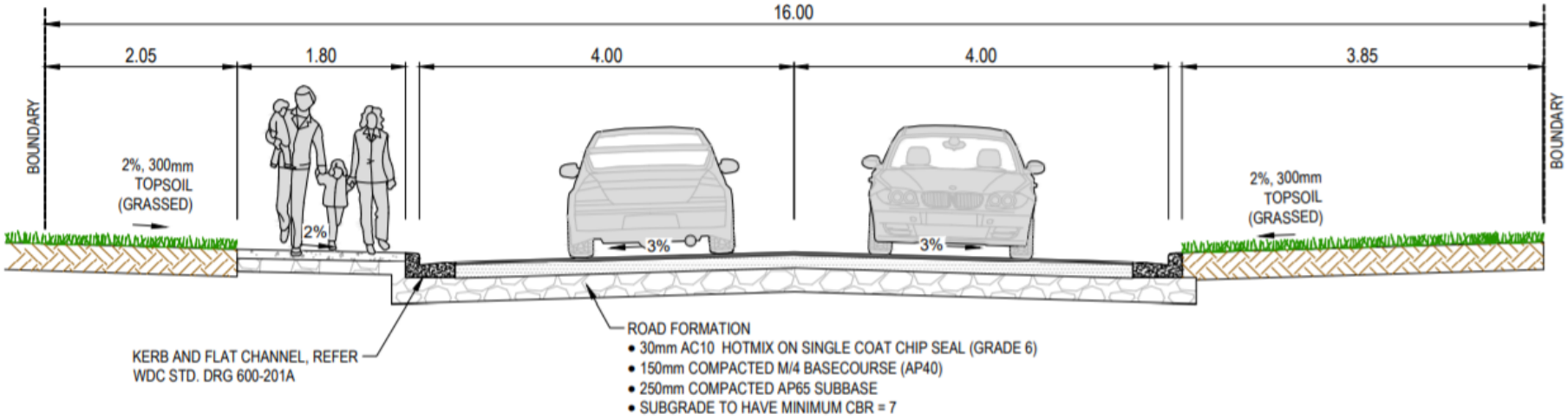
Figure 4-9: Typical Cross Section for Road 8



TYPICAL SECTION - ROAD 10

1:50

Figure 4-10: Typical Cross Section for Road 10



TYPICAL SECTION - ROADS 6 & 7

1:50

Figure 4-11: Typical Cross Section for Roads 6 and 7

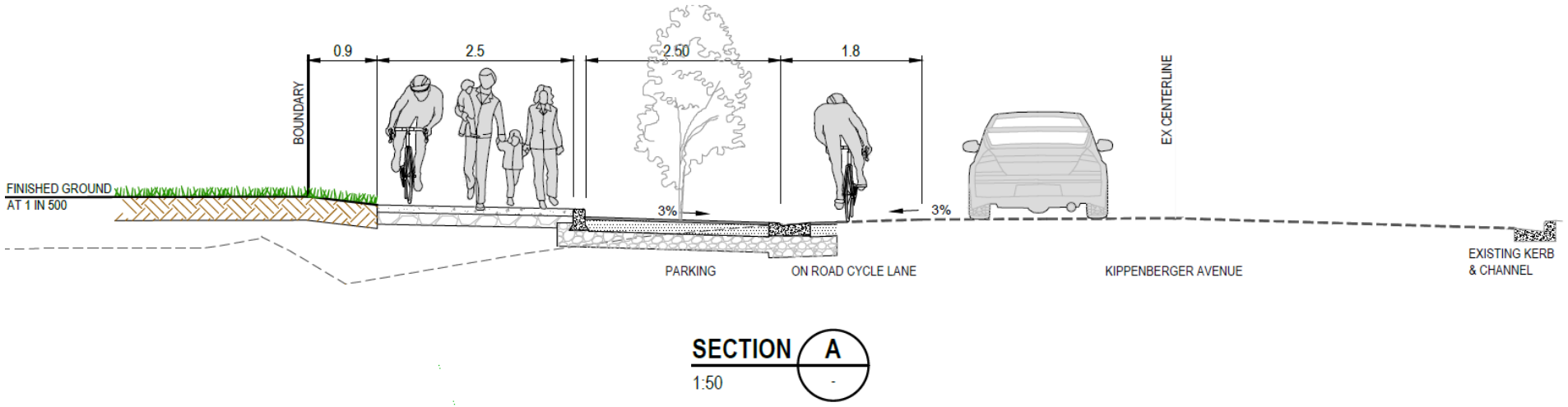


Figure 4-12: Upgraded Cross Section for Kippenberger Avenue (West of Road 2)

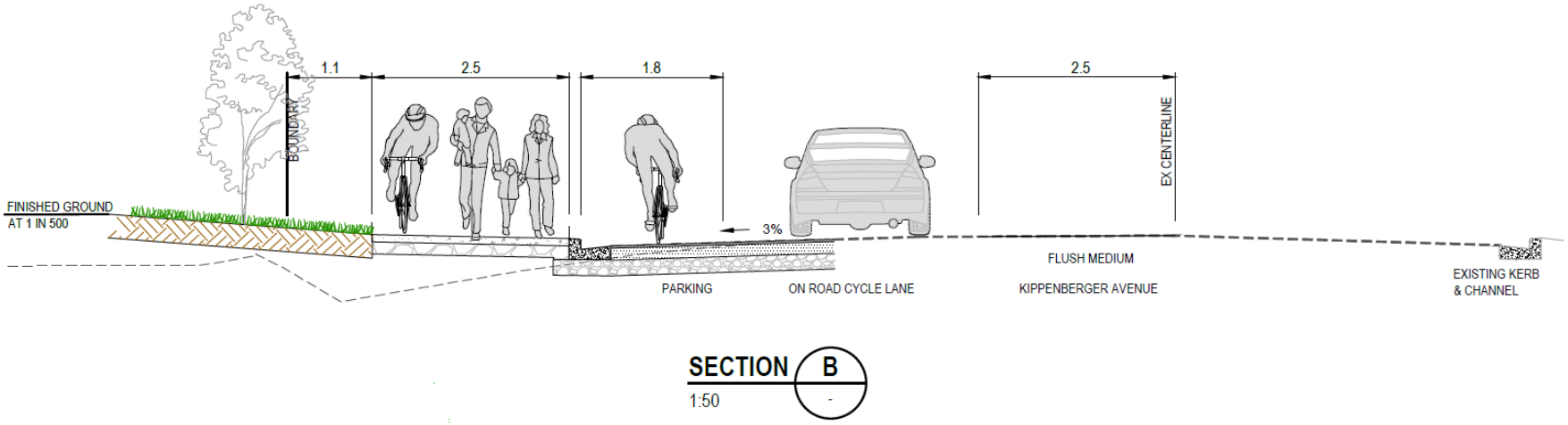


Figure 4-13: Upgraded Cross Section for Kippenberger Avenue (East of Road 2)

4.2.3 Intersections

The intersections of Road 1 / Kippenberger Avenue / MacPhail Avenue and Road 2 / Kippenberger Avenue and their proposed controls have been assessed against the existing 50km/h speed limit on Kippenberger Avenue. It is recommended that Road 1 is set at 50km/h while Roads 2 – 9 be set at 40km/h. Road 10 should be set at 30km/h as outlined in Section 6.3 below.

Road 1 / Kippenberger Avenue / MacPhail Avenue

The intersection at Road 1 / Kippenberger Avenue / MacPhail Avenue is proposed to be a four-legged roundabout as shown in Figure 4-14. All roundabout legs are designed to have splitter islands which will provide refuge for pedestrians and it is recommended that raised platforms be included at the crossing locations similar to the Kippenberger Avenue / East Belt / High Street roundabout. The layout below is a concept only.

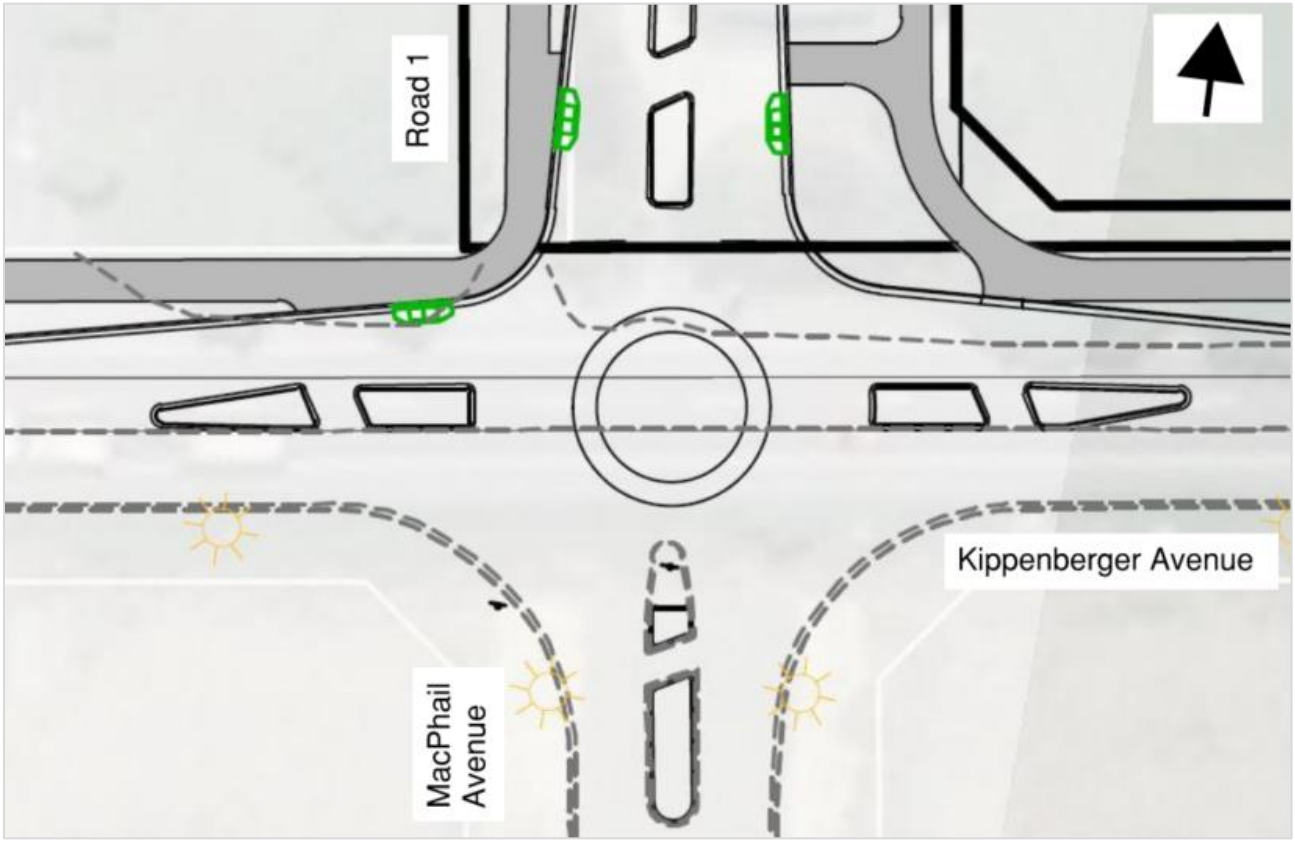


Figure 4-14: Proposed Intersection Layout Road 1 / Kippenberger Avenue / MacPhail Avenue

Road 2 / Kippenberger Avenue

The intersection of Road 2 / Kippenberger Avenue is proposed to be a three-way T-intersection as shown in Figure 4-15. According to the intersection requirements from the Manual of Traffic Signs and Makings (MOTSAM) Part 1, the Road 2 / Kippenberger Avenue intersection has sufficient visibility to be GIVE WAY controlled for a 50km/h main road. As subsequent stages of the development are progressed, traffic volumes at the intersection of Road 2 / Kippenberger are likely to increase. With increased turning traffic, future development stages should include infrastructure that highlights the intersection and promotes a lower speed environment to provide a safe system intersection. Such treatments may include raised platforms and visual cues (surface treatment). To minimise risk of death or serious injury to vulnerable road users, speeds at intersections and crossing locations, such as the central splitter islands designed for below, should be managed to maintain vehicle speed at 30km/h or less.

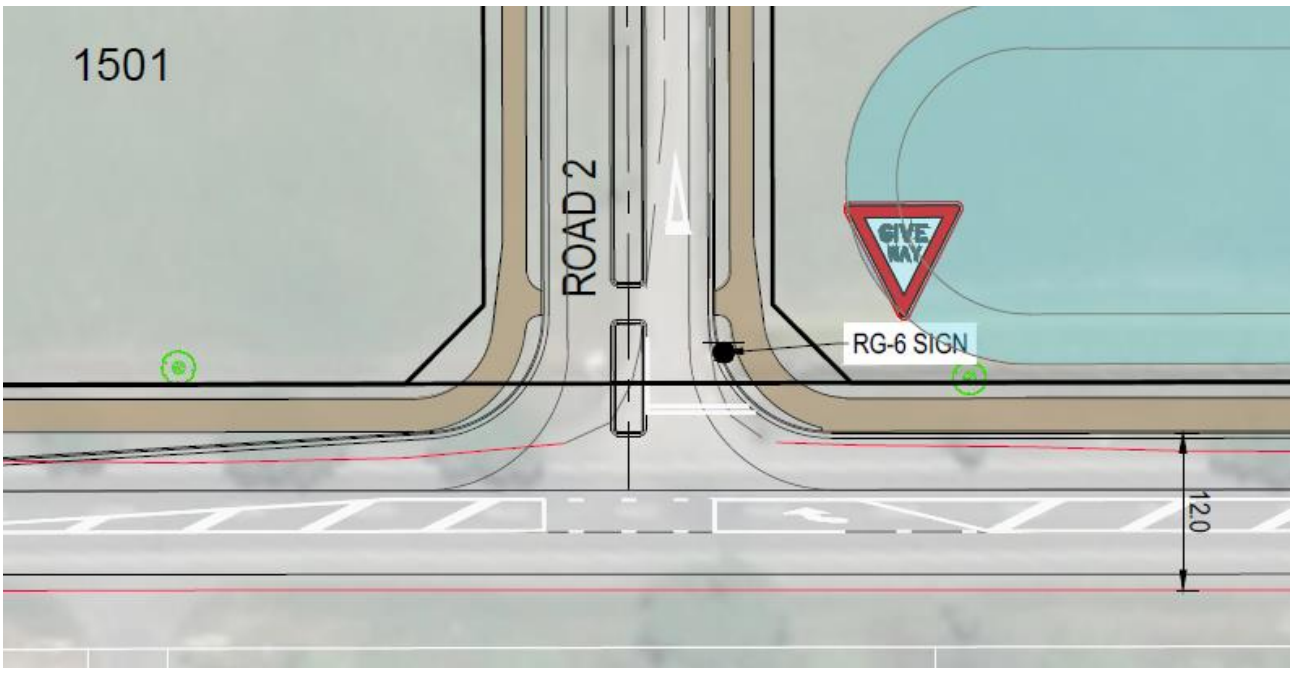


Figure 4-15: Proposed Intersection Layout of Road 2 / Kippenberger Avenue

Internal T-intersections

The proposed road layout provides eight T-intersection within the internal roads. These are:

- Road 1 / Road 4
- Road 1 / Road 8
- Road 8 / Road 9
- Road 10 / Road 9
- Road 2 / Road 10
- Road 2 / Road 9
- Road 2 / Road 3 (two intersections)
- Road 2 / Road 4; and
- Road 4 / Road 5.

These intersections are to be priority controlled. These intersections provide sufficient sight distance as shown in

Table 4-1; however, the need for GIVE WAY controls at specific internal intersections will be determined at the detailed design stage with consideration given to the proposed properties boundaries, fencing and landscaping to ensure adequate sight lines are maintained. It should be noted that the sight distances were compared to the Residential requirements of the WDP and pWDP as although the site is Rural zoned, it will have function as a residential environment.

Table 4-1: Sight Distances for T-intersections

Intersection	WDP Residential Minimum Sight Distance (m)	pWDP Residential Minimum Sight Distance (m)	Measured Sight Distance (m)
Road 1 / Road 4	45	100	100+
Road 1 / Road 8	45	100	100+
Road 8 / Road 9	45	75	112
Road 10 / Road 9	45	-	45
Road 2 / Road 10	45	100	100+
Road 2 / Road 9	45	100	100+
Road 2 / Road 3	45	100	100+
Road 2 / Road 4	45	100	100+
Road 4 / Road 5	45	75	116

Internal Four-way Intersections

The proposed layout provides two four-way intersections within the internal roads:

- Road 2 / Road 7 / Road 8; and
- Road 4 / Road 5 / Road 6.

These intersections are to be priority controlled. These intersections provide sufficient sight distance as shown in Table 4-2; however, the need for GIVE WAY controls at specific intersections will be determined at the detailed design stage with consideration given to the proposed properties boundaries, fencing and landscaping to ensure adequate sight lines are maintained.

Table 4-2: Sight Distances for Four-way Intersections

Intersection	WDP Minimum Sight Distance (m)	pWDP Minimum Sight Distance (m)	Measured Sight Distance (m)
Road 2 / Road 7 / Road 8	45	100	100
Road 4 / Road 5 / Road 6	45	75	76

4.2.4 Right-of-ways

Stage 1 will accommodate 11 right-of-ways which have been largely designed in accordance with the WDP and pWDP with details outlined in Table 4-3 below.

Table 4-3: Right-of-way Dimensions

Number of Lots Serviced	Lots Serviced	Legal Width (m)
2	Lots 8 & 9	5.5
2	Lots 11 & 12	5.5
2	Lots 14 & 15	5.5
1	Lot 1400	7
2	Lots 35 & 36	8
7	Lots 90 – 96	8
2	Lots 105 & 106	5.5
2	Lots 111 & 112	5.5
2	Lots 118 & 119	5.5
6	Lots 148 – 153	8
6	Lots 154 - 159	8

It should be noted that the right-of-ways servicing Lots 148 – 153 and 154 – 159 will only provide for vehicular access from Road 9. This will ensure that they are not used as a public through route. In order to enable pedestrian access to Road 10 via these two right-of-ways but prevent vehicle thoroughfare, bollards or other obstructing objects will be implemented.

As right-of-ways are considered vehicle crossings and accessways in the WDP and pWDP, they must comply with the pedestrian visibility requirements. Where the legal width of the right-of-way is at least 6m, it is recommended that the formed width be at least 5m to allow for two trafficable lanes for entry and egress of the accessway. This will limit the visibility splay of the accessway to only be required on the egress side of the right-of-way.

4.3 Walking and Cycle Connectivity

4.3.1 Connectivity within the Development

The proposed development provides a coherent and connected walking and cycling network, to allow for filtration within the development via active modes. The proposed walking and cycling network is shown in Figure 4-16.

Figure 4-16: Proposed Linkages

4.3.2 Wider Connectivity

Figure 4-17 below shows the walking times and distances from the Stage 1 development to key amenities within and around the Rangiora Town Centre. It demonstrates that a majority of amenities are accessible within a 1.6km radius (20-minute walk) of the new development.

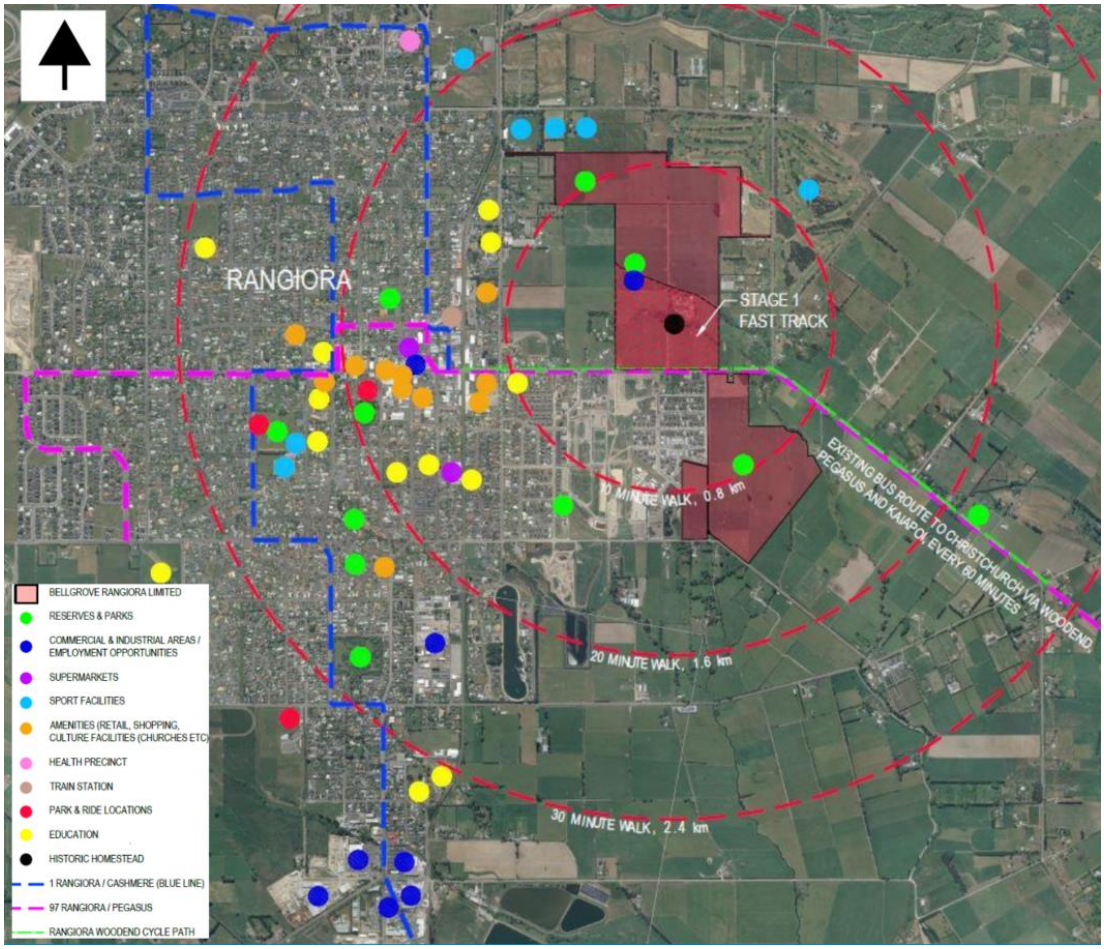


Figure 4-17: Amenity Access Plan

Shared paths are proposed north of the flow channels in Stage 1 which will connect to the shared path and cycle lane running north to south. The cycle provisions provide an integrated system connecting to the Rangiora to Woodend cycleway. A shared path and on-road cycle lane are proposed for the north side of Kippenberger Avenue to accommodate an increase in pedestrian and cycling movements. This aligns with The Waimakariri Walking and Cycling Strategy 2017 – 2022 from WDC which aims to create a high quality physical and social environment, safe communities, and a healthy economy.

Existing cycleways exist on East Belt and Kippenberger Avenue (Devlin Avenue eastward) with a new cycleway on Coldstream Road and Golf Links Road to be constructed; however, these cycleways are outside the scope of the development. Figure 4-18 shows the cycle connectivity to the wider network where the dashed lines show proposed future cycle infrastructure as part of subsequent stages of the development. Refer to Section 6.4 for an assessment of effects and recommendations relating to walking and cycling.

Figure 4-18: Proposed Cycle Connections in the context of the Wider Cycle Network

4.3.3 Crossings of Kippenberger Avenue

Given Kippenberger Avenue's function as an Arterial Road, it is important that safe pedestrian crossing opportunities be provided between current and future residential areas to provide safe connectivity for pedestrians and reduce severance effects which a busy road can cause. Given the location of the bus stops at the eastern end of the Bellgrove development, it is important that a safe crossing point be established close to encourage public transport use and considering that the users of public transport are generally more vulnerable than average e.g. children, the elderly, or those with restricted mobility. In this instance, as a minimum, a safe crossing point would be considered to include a pedestrian refuge island in the centre of the road to allow the crossing to be completed in two stages (crossing one-lane of traffic at a time).

There is the opportunity to widen Kippenberger Avenue by approximately 2.5m to accommodate a pedestrian island on Kippenberger Avenue to provide refuge as shown in Figure 4-19.

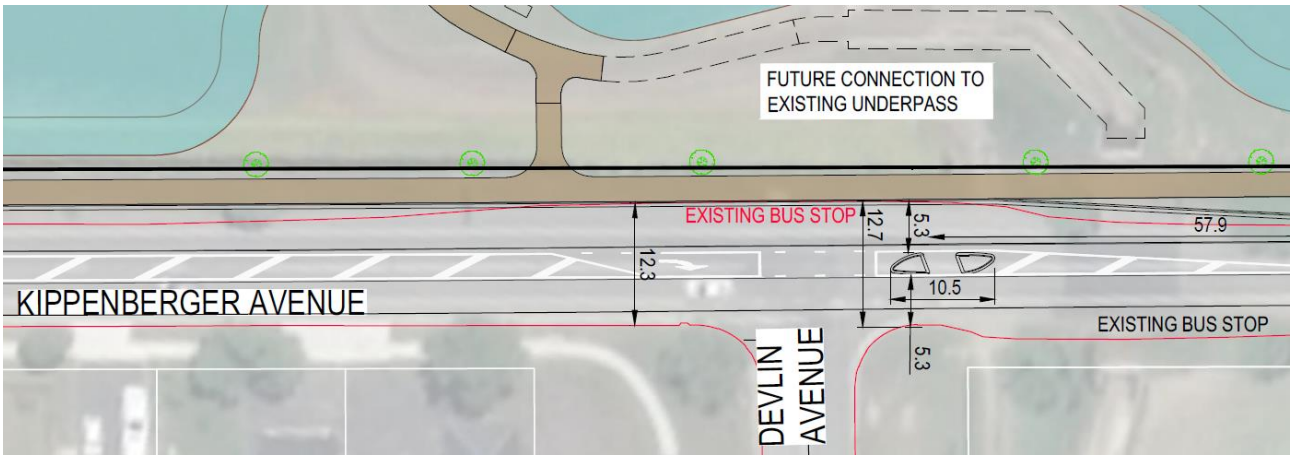


Figure 4-19: Proposed Pedestrian Island on Kippenberger Avenue

4.4 Public Transport

Existing bus stops are located within a 200m to 1.2km walk of the site, which allows residents to access the Number-97 (Rangiora / Pegasus) and Number-1 (Rangiora / Cashmere) routes. It should be noted that the existing eastbound bus stop near the intersection of Kippenberger Avenue / Devin Avenue will be moved to accommodate the proposed pedestrian refuge provisions as shown in Figure 4-20 below.

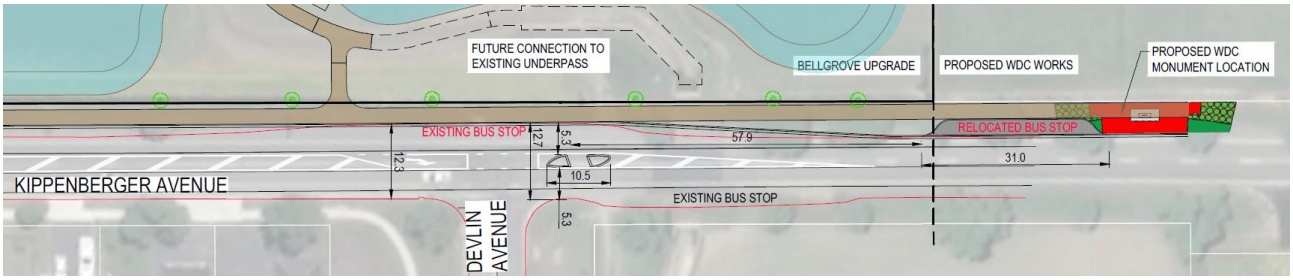


Figure 4-20: Relocation of Existing Bus Stop on the North side of Kippenberger Avenue to the East of the Bellgrove Development

The proposed footpath provision on the northern side of Kippenberger Avenue will accessible connectivity between the residents of the subdivision and the bus stops.

All internal road widths for the development, except for Road 10, comply with the WDP and are therefore designed appropriately to accommodate bus services if in the future there are changes which result in bus routes through the site.

It is recommended that the bus stops and corresponding infrastructure on Kippenberger Avenue be designed in accordance with the WDC Engineering Code of Practice. ECan are to be informed of the proposed bus stops. Refer to Section 6.4 for an assessment of effects and recommendations relating to public transport.

5 Traffic Generation

For the purposes of determining the likely level of additional traffic generated by the proposed Stage 1 development, land use traffic generation data published by Waka Kotahi (Research Report 453 – Trips and Parking Related to Land Use, November 2011) has been used.

The potential trip generation of the site has been calculated based on a desired net residential density specified in the pWDP of 15 households per hectare within the site. This calculation was undertaken using the 'net density' definition (excluding stormwater retention and treatment areas; areas set aside to protect significant historic heritage or landscape values; esplanade reserves; and commercial land). Based on the current subdivision road layout this equated to a maximum theoretical household number of 227 households for Stage 1 (inclusive of the historic homestead allotment Lot 1400). This is a conservative trip generation for the site, noting that the current concept layout provides for 197 residential lots.

The potential trip generation of the site is provided in Table 5-1 with no reduction factors for alternative transport use applied. The traffic generation for Stage 1 is therefore considered to be conservative.

Table 5-1: Potential Trip Generation Rates

	Peak Hour Trip* Generation	**Daily Trip* Generation**
Residential Suburban Dwelling Trip Generation Rate	*1.2 trips per unit*	*10.9 trips per unit*
Proposed (226 units)	272 trips	2464 trips
Residential Outer Suburban Dwelling Trip Generation Rate	*0.9 trips per unit*	*8.2 trips per unit*
Historic Homestead Allotment (1 unit)	1 trip	8 trips
Medium Retail Shop Trip Generation Rate	*17.2 trips / 100m^2 GFA*	*101 trips / 100m^2 GFA*
Commercial Allotment 5354m^2 Lot Area (assuming 30% GFA of 1606m^2)	276 trips	1622 trips
Potential Trip Generation	**549 trips**	**4094 trips**

*A trip can be either an in or an out movement (i.e. 1 vehicle movement in + 1 vehicle movement out = 2 trips)

As shown above, it is anticipated that the proposed development could generate up to 4094 vehicle trips per day. The residential development has been assessed as residential suburban. It should be noted that trip generation of the Stage 1 development may change when the large lots within Stage 1 are developed. The nature of development proposed on Lot 1501 is yet to be confirmed, however, for the purposes of this trip generation assessment is has been considered reasonable that there may be as many as four residential dwellings established on site. This has been accounted for by the conservative trip generation assumptions used in Table 5-1.

It is also expected that heavy vehicle movements are not expected to exceed 50 vehicle movements per day (vmpd) based on the activities on site. Refer to Section 6.1.3 for an assessment of effects of the potential trip generation.

6 Assessment of Effects

6.1 Impact on Surrounding Road Network

Traffic modelling has previously been conducted by Abley on behalf of WDC to assess the entire NER ODP and the Rangiora South-East Outline Development Plan Areas. A copy of the full report is included in Appendix D. This modelling has been used to inform the traffic assessments for Stage 1.

As part of Stage 1, the two intersections of interest are Kippenberger Avenue / MacPhail Avenue / Road 1 and Kippenberger Avenue / Road 2.

According to the modelling conducted by Abley, the majority of the traffic generated by full development of the NER ODP area will link into the greater transport network towards the south (54%) and to the west (41%). Kippenberger Avenue, East Belt and MacPhail Avenue are the primary connections for the traffic generated by the development as it heads towards the Town Centre and further south in the morning peak, while traffic returns via the same routes in the opposite direction during the evening peak.

Intersection capacity was determined based on level of service (LoS) rankings. LoS is a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A LoS definition generally describes these conditions in terms of factors such as speed and travel time, delay, density, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

6.1.1 Kippenberger Avenue / MacPhail Avenue / Road 1 Roundabout

Abley's 2048 traffic modelling outputs for the Kippenberger Avenue / MacPhail Avenue / Road 1 roundabout can be seen in Figure 6-1 below.

		08:00 to 09:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach Delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach Delay	Approach LOS
South	Left												
South	Thru	107	29	5	A			185	26	5	A		
South	Right	6	13	4	A	5	A	10	10	3	A	5	A
West	Left	101	14	3	A			152	19	4	A		
West	Thru	394	15	3	A			408	20	4	A		
West	Right	23	10	3	A	3	A	26	15	4	A	4	A
North	Left	17	19	5	A			8	11	4	A		
North	Thru	169	24	5	A			95	20	3	A		
North	Right	127	22	4	A	5	A	73	20	4	A	4	A
East	Left	12	14	4	A			7	6	2	A		
East	Thru	309	22	4	A			353	13	3	A		
East	Right	12	9	3	A	4	A	17	7	2	A	3	A
Intersection		**1278**		**4**	**A**	**4**	**A**	**1336**		**4**	**A**	**4**	**A**

Figure 6-1: 2048 Kippenberger Avenue / MacPhail Avenue / Road 1 Modelling Outputs

As shown above, in the morning and evening peak hours of 08:00-09:00 and 17:00-18:00, the proposed new Kippenberger Avenue / MacPhail Avenue / Road 1 roundabout functions at a LoS A, indicating minimal delay times allowing for full development of both the North-East and South-East Rangiora Development Areas.

Given Figure 6-1 above shows that the proposed new Kippenberger Avenue / MacPhail Avenue / Road 1 roundabout intersection is functional for the entire North-East and East Rangiora Outline Development Plans, it is reasonable to assume this intersection will operate satisfactory for all stages of the Bellgrove development.

Stage 1 Interpretation

Construction staging of the Road 1 / Kippenberger Avenue / MacPhail Avenue roundabout may occur towards the end of the development of Stage 1. Isolated SIDRA modelling has been undertaken to assess the effect of having the Road 2 / Kippenberger Avenue T-intersection as the only route into and out of the

development for Stage 1. Modelling was based on the AM and PM peak hour flows of 08:00 – 09:00 and 17:00 – 18:00 and directional split as determined by the Abley model was used in conjunction with the peak hour trip generation determined in Section 5. The model tested the capacity of the Road 2 / Kippenberger Avenue intersection by varying the percentage of completion of Stage 1. Outputs can be found in Appendix E.

The SIDRA modelling has determined that with Stage 1 at 100% completion, and needing to access the main transport network via Road 2 / Kippenberger Avenue, Road 2 operates at LoS B and the right turn movement from Kippenberger Avenue into Road 2 operates at LoS A. Road 2 right turn movements onto Kippenberger Avenue operate at a LoS C in the AM and B in the PM. This shows that should the Road 1 / Kippenberger Avenue / MacPhail Avenue roundabout be constructed later in the construction staging of Stage 1, that the proposed new Road 2 / Kippenberger Avenue intersection is able to service the development without compromising the operational efficiency of the existing road network.

6.1.2 Kippenberger Avenue / Devlin Avenue / Road 2 Intersection

Entire Development Plan Assessment

Abley's 2048 traffic modelling outputs for the Kippenberger Avenue / Devlin Avenue / Road 2 roundabout are reproduced in Figure 6-2.

		08:00 to 09:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach Delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach Delay	Approach LOS
North	Left	43	14	2	A			24	11	2	A		
North	Thru	21	8	1	A			13	10	2	A		
North	Right	33	13	4	A	3	A	22	12	4	A	3	A
East	Left	9	2	0	A			23	5	1	A		
East	Thru	286	15	4	A			344	11	3	A		
East	Right	19	5	1	A	3	A	36	9	3	A	3	A
South	Left	15	9	3	A			11	11	4	A		
South	Thru	30	11	3	A			24	12	4	A		
South	Right	14	8	2	A	3	A	9	7	2	A	4	A
West	Left	23	9	2	A			43	11	3	A		
West	Thru	372	11	3	A			346	12	3	A		
West	Right	12	6	2	A	3	A	38	11	3	A	3	A
Intersection		**887**		**3**	**A**	**3**	**A**	**934**		**3**	**A**	**3**	**A**

Figure 6-2: 2048 Kippenberger Avenue / Devlin Avenue / Road 2 Modelling Outputs

In the morning and evening peak hours of 08:00-09:00 and 17:00-18:00, the proposed roundabout functions at a LoS A, indicating minimal delay times, allowing for full development of both the North-East and East Rangiora Outline Development Plan areas.

It should be noted that the Abley traffic model assumes that the Road 2 connection to Kippenberger Avenue is at Devlin Avenue and is a four-legged roundabout; whereas the proposed design allows for two separate T-intersections consisting of Kippenberger Avenue / Road 2 (new) and Kippenberger Avenue / Devlin Avenue (existing). To validate the performance of the Kippenberger Avenue / Road 2 intersection as a T-intersection as proposed in the NER ODP, SIDRA modelling was undertaken. The modelling confirmed that Road 2 will operate at a Los B with the overall intersection operating at a LoS A as shown in Appendix E.

6.1.3 Impact of Potential Trip Generation

The Stage 1 traffic generation, as determined in Section 5, combined with the directional split (as per the Abley assumption) will add 839 vmpd heading west, 102 vmpd heading east and 1105 vmpd heading south, which equates to a 25% daily overall increase in peak hour traffic to the existing network (predominantly Kippenberger Avenue). As noted from the existing traffic volume in Table 2-1, the existing network has adequate spare capacity to accommodate the increased traffic with little effect. This is demonstrated in the Abley model.

It is noted that while not required, the significant increased development (and trip generation) anticipated on the eastern side of Rangiora should be considered when designing infrastructure on the surrounding transport network. This is discussed below relating to Kippenberger Avenue.

6.2 Kippenberger Avenue Considerations

Kippenberger Avenue is classified as an arterial road and provides an important east-west connection between Rangiora and SH1, being a critical link for traffic to and from Christchurch. Whilst traffic volumes generated from the development are well below that considered acceptable for an arterial road, it is noted that this key east-west link is anticipated to only become more important as Eastern Rangiora is developed as anticipated by the plan.

Given the above, the following opportunities are identified as opportunities to futureproof Kippenberger Avenue as the key east-west link into Rangiora from SH1 and Woodend. For clarity, they are not necessary in terms of the proposed Bellgrove development.

These considerations are recommended as opportunities to be incorporated into design now (to ensure additional carriageway and road reserve space is included within the design upgrades to the northern side of Kippenberger Avenue.

6.2.1 Crossing Facilities

It is noted that a livestock underpass exists near this proposed development. While this is not proposed to be upgraded as part of Stage 1 (it will be fenced off with no formal connection provided), it does provide a future connection opportunity for future stages to provide enhanced connectivity to the south and to the nearby bus stops. Any future connection here will need to address the risks:

- The underpass appears to be of insufficient height to accommodate an average height adult or a cyclist
- Underpasses have known security and social issues which would need a full crime prevention through environmental design (CPTED) review to confirm safe accommodation for underpass users. This review should be undertaken to inform future stages of the development
- Underpasses are not always attractive to pedestrians including those with restricted mobility as they often involve increased journey distance and ramps to get down and up from the underpass hence there is a risk it would not be well used; and
- The underpass crosses into private land on the south side of Kippenberger Avenue. This land is planned to be developed in the future once the northern block has been completed, therefore it will be a number of years away. Early works would be required to establish safe legal access to the south side of this underpass.

Whilst a safe crossing point at the eastern end of the development of Kippenberger Avenue is proposed (and considered the most critical due to the connectivity it provides at the bus stops and to Devlin Avenue) a safe crossing point near Road 2 would also provide benefit in that it would:

- Provide a safe crossing point to those properties on the south side of Kippenberger Avenue noting that there is no parking on the south side so residents or visitors parking on the street will park on the north side and cross Kippenberger Avenue to access their properties
- Provides a safe crossing point for direct access to Bellgrove and its associated facilities (i.e. the recreation paths and future commercial lot), particularly for any residences on the south side of Kippenberger Avenue who may need to walk a longer distance to use a crossing at Road 1 or near Devlin Avenue; and
- It will provide improved connectivity and reduce the impact of severance issues that a busy arterial road can cause. The value of this will increase as development and associated traffic volumes on Kippenberger Avenue increase.

A pedestrian refuge crossing should be considered in conjunction with any provision of a right-turn bay into Road 2 as space will be available to implement pedestrian refuge islands should a right-turn bay be installed.

6.2.2 Right-turn into Road 2

While it is understood through discussions with WDC that Road 2 is preferred to be a Local Road with limited access resulting in no right-turn entries, there are no reasons from a traffic perspective that require this. Road 2 is considered likely to be an attractive entry point to the Bellgrove development as it will be an attractive and shorter route for traffic entering the development from the east including traffic from Christchurch as opposed to using Road 1.

To safely support all movement access at the Road 2 / Kippenberger intersection is recommended that a right-turn bay into Road 2 be provided. While not required for the development of the first stage of the Bellgrove which is anticipated to operate safely in the immediate term, there is a risk that as residential development and traffic volumes on the east side of Rangiora increase, right turn movements into Road 2 would be more safely accommodated with a dedicated right-turn bay.

It is recommended that a right-turn bay in this location would alleviate some of the potential long-term safety and efficiency risks by:

- Separating right-turning traffic from through traffic on Kippenberger Avenue which is safer for all users and will reduce the risk of a turning or rear end crashes at this location
- Providing a right turn will allow through traffic to safely pass right-turning traffic avoiding the risk of through vehicles colliding with right-turning vehicles when trying to squeeze past or colliding with a cyclist as they will need to occupy the cycle lane if attempting to squeeze past
- A right-turn bay will improve the efficiency of Kippenberger Avenue as right-turning vehicles will not obstruct through movements
- It will safeguard capacity of the Kippenberger Avenue / Road 2 Intersection for future traffic growth; and
- A right-turn bay also provides space to accommodate another pedestrian refuge crossing point of Kippenberger Avenue which will provide improved connectivity and reduce the impact of severance issues that a busy arterial road can cause. The value of this will increase as development and associated traffic volumes on Kippenberger Avenue increase.

A right-turn bay would provide a safe secondary entry point to the Bellgrove development in addition to the roundabout proposed at Road 1. This will also ensure greater capacity is retained at the roundabout and for the future Rangiora Eastern Link.

The provision of a right-turn bay to Road 2 is not anticipated to increase the use of this intersection as a through route within the North-East Rangiora Development Area given Road 2 will only provide primary access to Stages 1 and 2, as well as a proposed new Primary Road as detailed in Section 4.2.1 (it will provide access to Bellgrove but not direct access north to Coldstream Road). Road 1 provides this function and would continue to be a more attractive route for longer north-south movements should a right-turn bay be provided at Road 2.

6.2.3 Flush Median

Given carriageway widening would be required to provide both a pedestrian refuge crossing near Devlin Road and/or a right-turn bay with pedestrian refuge at Road 2 consideration should also be given to the provision of flush median throughout the full length of Kippenberger Avenue. It is understood through discussions with WDC that this is not desired as this would require additional road reserve space to accommodate whilst also retaining proposed Town Entrance landscaping. However, the following advantages (in additional to providing space for pedestrian crossings and right turns as outlined above) of a flush median are noted:

- The flush median would provide space for a right turn bay into Devlin Avenue
- The flush median would provide space for residents to safely turn right into properties on the south side of Kippenberger Avenue without impeding the flow of traffic on Kippenberger Avenue
- It would avoid traffic lanes having to meander to create space for right-turn bays or pedestrian refuge islands

- It would improve general safety for all users on Kippenberger Avenue as the flush median provides more space at potential traffic conflict points, separates opposing traffic movements, provides more space for large vehicles / buses and allows traffic to give cyclists a wider berth when passing
- It would provide an improved route for emergency services (more frequent and safer passing opportunities)
- It would safeguard the route from disruption during maintenance activities involving temporary traffic management as more space would be available to carry out these activities while maintaining two open lanes; and
- There is a flush median incorporated west of where Kippenberger Avenue becomes High Street at the East Belt intersection and between its intersections of East Belt / High Street and Watkins Drive, the carriageway width is generally sufficient to accommodate a flush median without compromising on-street parking should it be desired in future. There is an opportunity to develop Kippenberger Avenue with a consistent cross section including a flush median throughout its length to improve safety and protect its function as a key arterial route.

In summary, whilst the immediate residential development (Stage 1) does not necessitate provision of right-turn bays or a flush median on Kippenberger Avenue there are numerous benefits in protecting the high level of service desired for this east-west arterial route given its function as a key east-west corridor and important route for connectivity to Christchurch. This will become more critical once the eastern areas of Rangiora are developed which may lead to more residents communing to Christchurch via Kippenberger Avenue especially if possible improvements to SH1 connections are also undertaken.

Any decision to incorporate a flush median via increasing the road reserve space needs to be considered now prior to the subdivision of the study site taking place. Whilst there will be additional infrastructure cost in achieving a wider carriageway it would be significantly more cost effective to accommodate this in conjunction with the development of the Bellgrove development rather than retrofitting the corridor in the future. See Figure 6-3 for an example layout of Kippenberger Avenue with a flush median included.

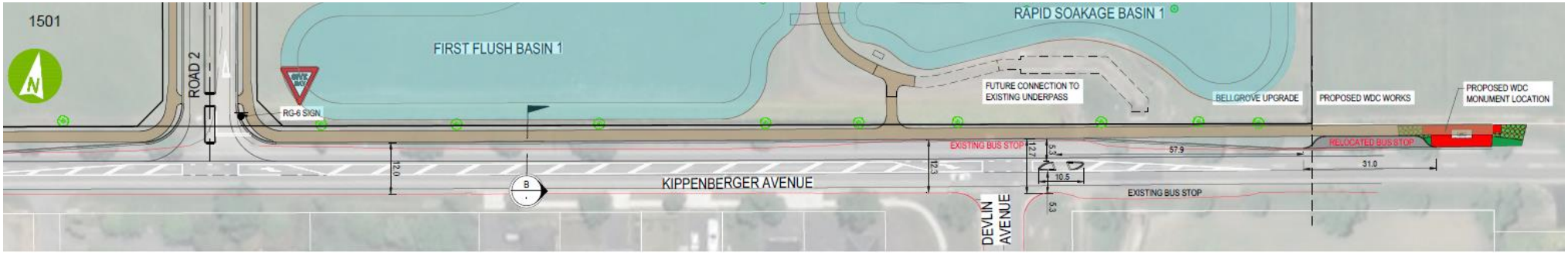


Figure 6-3: Extent of Right-turn Bay and Flush Median on Kippenberger Avenue East of Road 2

6.3 Safety

6.3.1 Crashes

Two collisions occurred at the intersection of Kippenberger Avenue / East Belt / High Street which involved cyclists, as noted in Section 2.6. While this is an existing safety concern, the proposed subdivision is expected to increase cycle connectivity within the subdivision and to the surrounding road network. It is therefore expected that a greater volume of cyclists will operate in vicinity of the Kippenberger Avenue / East Belt / High Street roundabout, which could increase the potential for collisions involving cyclists. The provision of additional infrastructure to support cyclist movements at this roundabout is recommended. This may include transforming the footpath into a shared use path approximately 80m from the roundabout on all legs, adding kerb cutdowns to allow cyclists to transition from the on-road cycle lanes to the shared user path, and cross safely at the raised platforms.

It is not expected that any other aspects of the design will contribute to a higher risk of crashes. Roundabouts, such as the one proposed at MacPhail Avenue, generally have much lower crash severity risk than a signalised intersection or priority-controlled intersection. The road cross sections proposed are all appropriate for the function and traffic volumes expected and appropriate cycle and pedestrian facilities are included. Opportunities to further improve safety on Kippenberger Avenue as traffic volumes increase are highlighted in Section 6.1.

6.3.2 Posted Speed Limits

Waka Kotahi are currently reviewing the appropriateness of existing road speed limits via The Speed Management Framework 2020. Any proposal to reduce speed limits is driven by the need to improve safety and reduce harm for all road users. Safe and appropriate speeds have been identified for some NZ roads using a risk-based assessment tool. Waka Kotahi have identified the following safe and appropriate speeds for the surrounding network near the Stage 1 development which WDC are in the process of reviewing and have already adopted some of the recommendations.

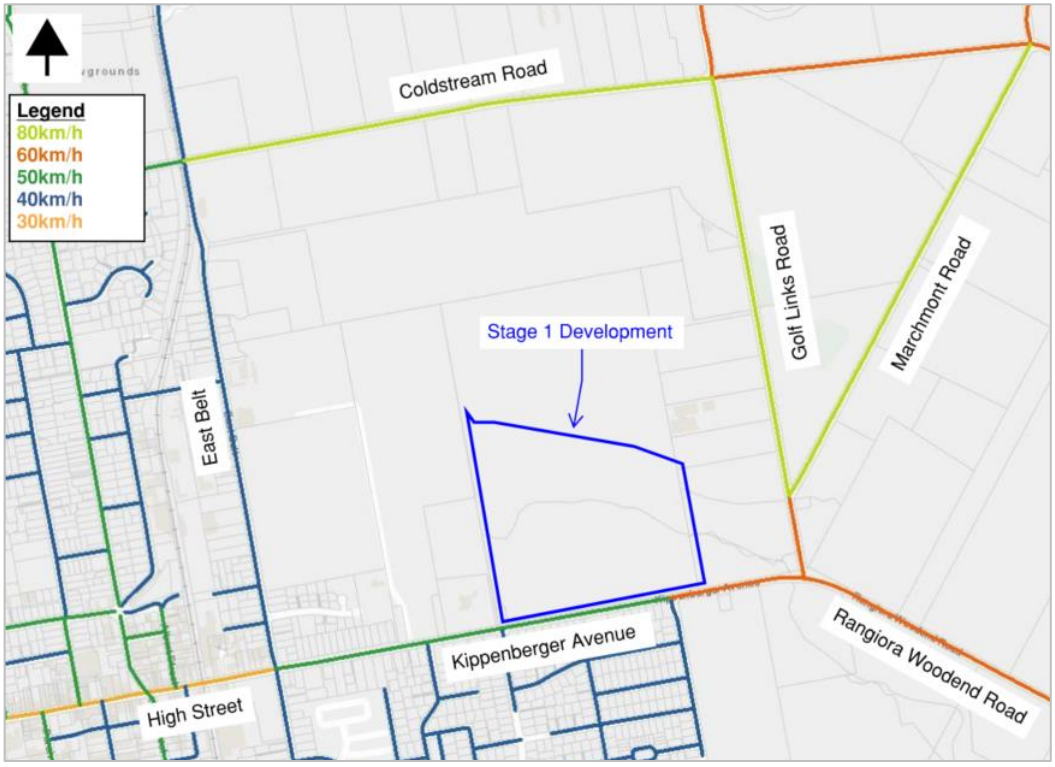


Figure 6-4:Safe and Appropriate Speed Limits

The Speed Management Framework 2020 recommends a speed reduction from 50km/h to 40km/h on surrounding local roads. It is therefore recommended that the proposed Local Roads (Road 3 – 9) and Road

2 within Stage 1 be set at 40km/h and Road 10 be set at 30km/h, while Road 1 be set at 50km/h to align with the safe and appropriate speeds identified by the Speed Management Framework 2020.

6.3.3 Road Dimensions

Roads 3 – 9 are Local Roads and have been designed to have a 4m wide lane width in accordance with the pWDP. While this provides sufficient width to accommodate on-road cycling movements, the additional width also has the potential to result in higher traffic speeds. Consequently, traffic calming measures are to be considered at the detailed design stage if required.

6.4 Active Modes and Public Transport

Walking and cycling has been well catered for in the proposed development on internal roads and within the reserve areas. In addition, the proposed cross sections are of sufficient width to cater for future changes to public transport routes that may occur through the development. The provision of a shared path and an on-road cycle lane on Kippenberger Avenue provides a suitable connection from the Stage 1 development to the Rangiora Town Centre and east to Woodend.

Stage 1 will increase the amount of pedestrian movements within the vicinity and will likely increase the demand for crossing movements across Kippenberger Avenue. This stage of the development is unlikely to have an immediate impact on the level crossing at the intersection of East Belt / Coldstream Road, it is recommended that KiwiRail be informed of the full extent of the proposed subdivision which in turn will create additional pedestrian and cyclist movements, some of which could be along Coldstream Road.

7 Construction Management

During construction, a construction management plan will need to be implemented for the site development and construction activities. This will assist with the management of arriving and departing traffic related to the works and help minimise the impact of these activities on adjacent property and the road network. It will be important that construction traffic is minimised during peak commuter periods.

Preparation of the Construction Management Plan (CMP) is generally prepared by the contractor undertaking the work and is submitted for approval prior to commencement of construction.

The CMP will address the following transportation matters:

- **Time frame:** Staging, programme of construction activities.
- **Description of work activities:** What the project entails, methodology of activities.
- **Access to Site:** Details of site access provisions (consistent with the Civil Infrastructure Report). For completeness, a dedicated stabilised access way will be constructed off Kippenberger Avenue during Stages 1A-1B with a secondary access coming off Golf Links Road enabling a separate entrance to be used during Stages 1C-1D.
- **Traffic Management:** Routes to be used to and from the site, times of day, days of the week, load sizes, over dimensional permits if applicable, temporary traffic control, temporary speed limits, road controlling authority approvals. Temporary traffic management will apply to both state highway and local roads.

The CMP will include at a minimum the following:

a) A location plan showing the proposed works, site access points, site yard, and any other point on the local roading network to be regularly accessed during the works

b) A schedule of various work stages and anticipated traffic generation

c) A schedule of roads to be used for haul roads for supply of materials, as well as haul roads used between various stages/locations of the work site

d) The hours during which traffic will be generated in the vicinity of the site

e) Identification of events, holidays and other periods when traffic patterns are likely to be uncharacteristic

f) Details of signage, speed restrictions, detours, road closures and any other traffic management provisions to meet the requirements described in the NZTA Code of Practice for Temporary Traffic Management; and

g) Contact names and telephone numbers, including 24-hour emergency contact details.

It is expected that the existing transport network will be able to safely accommodate construction traffic generated from the Bellgrove development with minimal adverse effects.

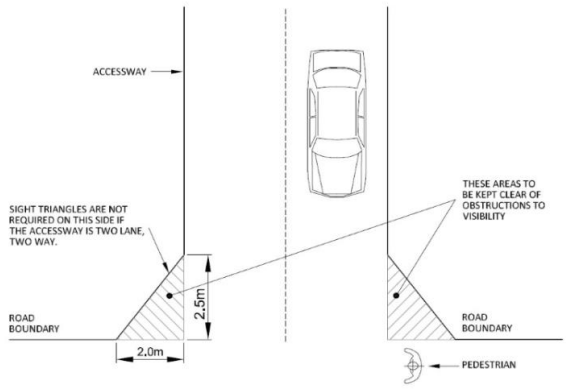
8 District Plan

8.1 District Plan Assessments

An assessment of the proposed development has been undertaken against both the WDP and pWDP. The WDP is the current operative plan that this ITA is required to be assessed against. However, it is recognised that the pWDP has recently been notified and it is appropriate to consider how the proposed development aligns with the notified provisions. The assessment of each plan is summarised in Table 8-1 and Table 8-2 respectively with any non-compliances highlighted in bolded text.

Table 8-1: WDP Assessment

Rule	Assessment	Status
30.1.1.9 **Roads constructed after 20 June 1998 shall comply with Table 30.1 (except for roads constructed in the Residential 6, 6A and Business 1 Zones at Pegasus, or in the Pegasus Rural Zone).**	**Stage 1 will require the formation of ten new internal roads which will be constructed after 20 June 1998. These will be generally designed in accordance with Table 30.1 but four roads will not meet the Residential requirements outlined:** **1. Road 1** **2. Road 6** **3. Road 7** **4. Road 10** **For an assessment of non-compliance refer to Section 8.2.1.**	**Non-compliant.**
30.6.1.1 **All land uses in any Residential Zone or Business Zone, and any dwelling house in any Rural Zone, shall be located on a site that has access to a road which complies with the design attributes of Table 30.1 and Table 30.2.**	**Table 30.2 is not applicable for this development. Stage 1 provides ten internal roads (six of which are designed in accordance with Table 30.1). The four exceptions are:** **1. Road 1** **2. Road 6** **3. Road 7** **4. Road 10** **It is noted that there is an existing non-compliance for Kippenberger Avenue given it does not currently meet the requirements of Table 30.1 for an Arterial Road.** **For an assessment of non-compliance refer to Section 8.2.1.**	**Non-compliant.** **Existing non-compliance.**

30.6.1.2 **Except where part of a cluster housing development under Rule 31.34.1 access to seven or more sites shall only be provided by way of a road which complies with the design attributes of Table 30.1, or Table 30.2 for the Residential 7 Zone.**	Right-of-way access is provided for: • **Lots 90-96 (7 lots)** • Lots 147-152 (6 lots) • Lots 153-158 (6 lots) **Right-of-way for Lots 90-96 services seven allotments and will not be designed in accordance with Table 30.2 as a Residential Cul-de-sac; instead, will remain as a right-of-way. For an assessment of non-compliance refer to Section 8.2.1.**	**Non-compliant.**
30.6.1.19 **The maximum number, spacing and width of vehicle crossings for all roads, other than State Highways where the posted speed limit is 70km/hr or greater, shall comply with Table 30.4.**	Vehicle crossings can be designed to comply with the 4m – 6m width for Rural and Residential sites. **Vehicle crossings will be designed to meet the residential requirement to be either less than 1m or greater than 7m apart with a maximum of one crossing per site per road frontage; however, where there is proposed medium density housing (Lots 126 – 195), there is the potential for this rule to be breached.** **For an assessment of non-compliance refer to Section 8.2.1.**	**Non-compliant.**
30.6.1.21 Any accessway on a road adjacent to a footpath shall achieve the minimum sight distances for pedestrian safety as depicted in Figure 30.3. Figure 30.3: Minimum Sight Lines for Pedestrian Safety  	All vehicle accessways will be designed to comply with the visibility splay dimensions outlined in Figure 30.3 where allotments or footpaths border right-of-ways (refer to draft conditions of consent). Any object within the splay area specified must not exceed 1m in height in order to allow for sufficient pedestrian visibility.	Compliant

30.6.1.22 The width of any vehicle crossing shall be the distance measured from side to side, across the flat part of the crossing at the kerb line; or, where there is no kerb and channel, the same measurement at the throat of the entrance way.	Noted.	Noted.
30.6.1.23 The distance between vehicle crossings shall be the distance measured parallel to the road centreline between the nearest edge of each respective vehicle crossing.	Noted	Noted.
30.6.1.24 **Vehicle crossings on arterial, strategic and collector roads shall have minimum unobstructed sight distances that comply with Table 30.5 and there shall be no obstruction to visibility inside the area bounded by the sight lines as depicted in Figure 30.4.**	Sight distances required in Table 30.5 for a 50km/h road of 45m for a Residential Zone and 80m in a Rural Zone are compliant. Refer to Section 4.2.3. **Rural Zone requirements are not fulfilled with limits to vehicle crossing locations along Road 2.**	**Non-compliant.**
30.6.1.25 The sight distances and sight lines shall be measured as depicted in Figure 30.4. The sight distances shall be measured from a height of 1.15m above: a) the existing road surface; and b) the proposed surface level of the vehicle crossing.	Noted.	Noted.

30.6.1.26 Distances of vehicle crossings to intersections shall comply with Table 30.6.	Design calculations determined the required distance for vehicle crossings for roads where the posted speed limit is 50km/hr or less. 1. Local frontage from Local Road / Local Road intersections to be spaced 10m. 2. Local frontage from Local Road / Collector Road intersection to be spaced 25m 3. Collector frontage from Collector Road / Local Road intersection to be spaced 20m. 4. Collector frontage from Collector Road / Arterial Road intersection to be spaced 55m Lots 73, 138, 139, 185, 186 and 1501 will be designed to comply by restricting vehicle crossings to a specific side of each allotment. For further detail refer to Section 8.2.1.	Will be designed to comply.
30.6.1.27 The distance between vehicle crossings and road intersections shall be measured from the centreline of the vehicle crossing to the nearest point of the formed road at the intersection on the same side as the vehicle crossing and shall be measured parallel to the road centreline.	Noted.	Noted.
30.6.1.32 **The minimum spacing between road intersections shall comply with Table 30.7.**	Kippenberger Avenue / Road 2 intersection is at least 125m from the Kippenberger Avenue / Devlin Avenue intersection and Kippenberger Avenue / MacPhail Avenue / Road 1 roundabout **Eight intersections involving internal roads are less than the required 125m distance for a 50km/h road. For an assessment of non-compliance refer to Section 8.2.1.**	Compliant. **Non-compliant.**
30.6.1.33 Distances between intersections shall be measured parallel to the boundaries of the site of the respective road intersection along the road centreline, except where any corner splay has been taken the distance shall be measured as though the corner splay had not been taken.	Noted.	Noted.

31.25.3 **Except as provided for by Rule 31.26, any land use in any zone resulting in a total of more than 250 motorised vehicle movements, either entering or exiting the site, per day is a discretionary activity (restricted). Council shall restrict the exercise of its discretion to the following matters:** **i) effects of the activity in terms of Policy 15.1.1.2** **l) whether on-site movement of vehicles is affected by the location of structures, topography, or the size and shape of the site**	**Trip generation calculations determined in Section 5 show that Stage 1 has the potential to create approximately 4000 trips per day For an assessment of non-compliance refer to Section 8.2.1.**	**Non-compliant.**

Table 8-2: pWDP Assessment

Rule	Assessment	Status
TRAN-R3 Formation of a new road. **Permitted where:** **1. any activity that includes the formation of a new road shall comply with the design standards for new roads in TRAN-S1 Table TRAN-3 or Table TRAN-4 (as applicable).**	**Stage 1's ten internal roads are designed in accordance with Table TRAN-3 (Design standards for new roads where the posted speed limit is 50km/hr or less) except for:** **1. Road 1** **2. Road 2** **3. Road 6** **4. Road 7** **5. Road 10** **For an assessment of non-compliance refer to Section 8.2.2.**	**Non-compliant.**
TRAN-R4 Formation of a new road intersection. **Permitted where:** 1. **any activity that includes the formation of a new road intersection shall comply with the minimum road intersection separation distances in TRAN-S2 (refer to Table TRAN-5).**	Kippenberger Avenue / Road 2 is approximately 182m away from Kippenberger Avenue / Devlin Avenue. This is compliant with the required 125m distance for a 50km/h road. **Eight intersections involving internal roads are less than the required 75m distance for a 50km/h road. For an assessment of non-compliance refer to Section 8.2.2.**	Compliant. **Non-compliant.**

TRAN-R5 Formation of a new vehicle crossing. 1. any activity that includes the formation of a new vehicle crossing shall comply with the design standards for new vehicle crossings in TRAN-S3 (refer Table TRAN-6) a) Maximum number of vehicle crossings per site road frontage b) Minimum separation distance between vehicle crossings c) Minimum separation distance for vehicle crossings from road intersections d) Minimum and maximum width of vehicle crossings e) Minimum sight distances from vehicle crossings f) Measurement of sight distances and sight lines from vehicle crossings	a) Maximum number of vehicle crossings per site road frontage – will be designed to comply **b) Minimum separation distance between vehicle crossings – will be designed to comply; however, where there is proposed high density terrace housing (Lots 126 – 195), there is the potential for this rule to be breached. For an assessment of non-compliance refer to Section 8.2.2.** c) Minimum separation distance for vehicle crossings from road intersections – will be designed to comply. d) Minimum and maximum width of vehicle crossings – will be designed to comply. e**) Minimum sight distances from vehicle crossings – Table TRAN-19 requires 80m minimum sight distance from vehicle crossings on 50km/h roads. For an assessment of non-compliance refer to Section 8.2.2.** f) Measurement of sight distances and sight lines from vehicle crossings - will be designed to comply.	Compliant. **Non-compliant.** Compliant. Compliant. **Non-compliant.** Compliant.
TRAN-R6 Formation of a new vehicle accessway. Permitted where: 1. any activity that includes the formation of a new vehicle accessway shall comply with the design standards for new vehicle accessways in TRAN-S4 (refer Table TRAN-7) 2. any new vehicle accessway that serves three or more sites shall achieve the minimum sight lines for pedestrian safety by way of a visibility splay as shown in Figure TRAN-4	1. Vehicle accessways will be designed to have the minimum legal width and be formed and sealed to be compliant within the range of widths specified in Table TRAN-7. 2. All vehicle accessways will be designed to comply with the visibility splay dimensions shown in Figure TRAN-4.	Compliant. Compliant.

TRAN-R8 Formation of a new vehicle crossing on a site with frontage to more than one road Where: 1. for any activity that includes a new vehicle crossing to be formed on a site that has frontage to both a State Highway and any other road in the District Plan road hierarchy, the new vehicle crossing shall not be to the State Highway; **2. other than in (1) above, for any activity that includes a new vehicle crossing to be formed on a site that has frontage to more than one road, the new vehicle crossing shall be to the road that has the lower classification in the District Plan road hierarchy; and** 3. the new vehicle crossing complies with TRAN-R5 and TRAN-R7 (as applicable).	Will be designed to comply for Lots 1, 22, 25, 39, 43, 44, 114, 138, 139, 185 and 186 where allotment access will be from adjacent Local Roads rather than Collector Road, Road 2. **The super allotment (Lot 1501) will have the opportunity to have access from Road 5 and Road 2. For an assessment of non-compliance refer to Section 8.2.2.**	Compliant. **Non-compliant.**

TRAN-R12 Formation of parking area, loading area, manoeuvring area, vehicle crossing or accessway. Permitted where: 1. except where specified in (2) and (3) below, for all activities. 2. except where specified in (3) below, for all activities in Rural Zones, Special Purpose Zone (Kāinga Nohoanga) or Special Purpose Zone (Pines Beach and Kairaki Regeneration): a) any vehicle crossing shall be formed, sealed and drained; b) any accessway, and on site parking area, loading area, and manoeuvring area, shall be either: i. formed, sealed and drained; or ii. formed to an all weather standard, and maintained to avoid: a. stormwater ponding on parking area, loading area, or manoeuvring area; b. stormwater runoff onto an adjoining site or road; c. c. adverse dust or noise effects being experienced beyond the boundaries of the site; d. d. vehicle traffic spreading loose gravel onto an adjoining sealed road; 3. the requirements in (1) and (2) above shall not apply to the following: a) sites where vehicle access is obtained from an unsealed road; and b) activities provided for as temporary activities under the provisions of the Temporary Activities Chapter of the District Plan.	All new vehicle crossings and accessways will be formed, sealed and drained. In addition, all accessways proposed will be formed to an all-weather standard.	Compliant.
TRAN-R14 Provision of new footpaths. **Permitted where:** **1. for any activity that includes the creation of a new road in Residential Zones, Special Purpose Zones, or Commercial and Mixed Use Zones, new footpaths (where none currently exist) shall be provided within the road reserve/road corridor in accordance with the requirements for new footpaths in TRAN-S9 (refer Table TRAN-12).**	**While the site is not currently a Residential Zone, it has been designed to comply with the requirements for residential footpaths except for:** **1. Roads 3, 5 and 9** **2. Roads 6 and 7** **3. Road 10** **For an assessment of non-compliance refer to Section 8.2.2.**	**Non-compliant.**

TRAN-R20 High Traffic Generators

Restricted Discretionary where:

1. **any activity generates an average daily traffic volume that exceeds the thresholds contained in Table TRAN-1 below; and**
2. **for the activities in (1) above:**
   a. **either a Basic ITA or Full ITA shall be required;**
   b. **the type of ITA to be provided shall be determined by the circumstances set out in Table TRAN-2 below; and**
   c. **the ITA shall be prepared by an independent suitably qualified and experienced transport engineer.**

Table TRAN-1: High Traffic Generation Thresholds

	Residential Zones	*Commercial and Mixed Use Zones /* *All other Special Purpose Zones / Industrial Zones*	*Rural Zones*
Average daily traffic generation	> 200 vmpd > 50 hvmpd	> 250 vmpd > 50 hvmpd	> 200 vmpd > 50 hvmpd

A full ITA is required given the proposal is anticipated to result in a daily trip generation exceeding 4000 trips.

Non-compliant.

8.2 Assessment of Non-compliance

8.2.1 Waimakariri Operative District Plan

Rules 30.1.1.9 and 30.6.1.1 – Dimensions of Internal Roads

The road design attributes of arterial, collector, local and cul-de-sac roads are stated in Table 30.1 of the WDP, for which the ten new internal roads are assessed against. While the site is currently zoned Rural, it is important to note that the Stage 1 development is Residential. The new roads have therefore been assessed against both the Rural and Residential requirements and non-compliances with all new roads have been identified (refer Appendix F).

Rural non-compliances were noted for Roads 2, 3, 4, 5, 6, 7, 8, 9 and 10. Since the development is Residential (instead of Rural), the non-compliance with the Rural standards of Table 30.1 is considered acceptable from a transport and traffic perspective given only four roads (Roads 1, 6, 7 and 10) do not comply with the residential requirements.

As Road 1 provides a 2.5m wide shared path, it only proposes one footpath. Having two footpaths is not considered necessary given pedestrian and cycling facilities have been adequately catered for (this non-compliance resulting from the fact that unlike the pWDP, the WDP does not anticipate shared paths in place of footpaths).

Roads 6 and 7 are culs-de-sac and require at least one 2m wide parking lane as part of their road design. These roads have been designed to have 4m wide trafficable lanes which can sufficiently accommodate a 2m wide parking lane, although unmarked and within the carriageway.

The intended purpose of Road 10 is to not act as a main through-route within the development with 2.5m wide traffic lanes in addition to 2.1m wide parking bays on one side of the road proposed. The reduction in traffic lane and parking bay widths from that required under the WDP is considered suitable when combined with a 30km/h operating speed limit to prevent rat-running of Road 10.This has been assessed from a transport and traffic perspective as being acceptable.

Rule 30.6.1.2 – Access to Seven or More Sites

The right-of-way access for Lots 90-96 services seven lots which exceeds the maximum requirements for a right-of-way in the WDP by one lot. Due to the surrounding residential land use (and associated anticipated travel behaviours) and the location of the right-of-way within the subdivision layout, an additional allotment is anticipated to have minimal effects on the network functionality of Road 4 and connecting roads. Should this right-of-way be designed as a road; additional space would be required to construct a Residential Cul-de-sac to the dimensions specified in Table 30.1 of the WDP and this would have additional land requirements and impact the proposed lot layout. This would not be as preferable for heavy vehicle movements (e.g. rubbish trucks), with the right-of-way requiring residents of Lots 90-96 to place their bins at the kerb of Road 4 improving safety and functionality. A cul-de-sac at this location is deemed excessive for the purposes of this development and it should be noted that under the pWDP there is no stipulation for a maximum number of residential units an accessway can service. This non-compliance is considered acceptable from a transport and traffic perspective.

Rule 30.6.1.19 – Dimensions of Vehicle Crossings

While the number of vehicle crossings will comply with the Residential requirements of a maximum of one crossing per site per road frontage; the spacing between crossings on the same side of the road will be non-compliant with the Rural requirements. For a Residential zone, *spacing shall be less than 1m or greater than 7m*; however, for a rural zone, *spacing shall be less than or equal to 10m or greater than 180m*. Compliance with the Rural requirements of crossing spaces is considered excessive when the site will be servicing predominantly residential activities. This non-compliance is therefore considered acceptable from a transport and traffic perspective and will comply with the Residential requirements.

In order to comply with the Residential requirements noted above, vehicle crossings will generally be designed less than 1m or greater than 7m apart from one another. While efforts will be made to align with the intent of this rule, there is the potential for this rule to be breached on the higher density housing lots particularly Lots 126 – 196.

This potential non-compliance has been assessed and considered acceptable from a transport and traffic perspective for the following reasons:

- Lots 126 – 138 are situated on Road 7 and account for 50% of the traffic generated down this road. Road 7 is unable to be used as a thoroughfare due to it being a cul-de-sac and therefore will only be servicing the lots located on it. The expected trip generation and possibility of conflict is considered low due to these lots having suitable visibility of the Road 2 / Road 7 intersection should vehicle crossings be non-compliant.
- Lots 139 – 147 and Lots 160 – 170 are lots with direct access to Road 9. Lots 139 – 147 are in close proximity but with suitable visibility to the Road 2 / Road 9 intersection. Due to the alignment of Road 9, it is expected to be a less favourable thoroughfare than Road 8 for east – west movements and it is therefore anticipated that the effects of this will be minor with a low possibility of conflict should vehicle crossings be non-compliant.
- Lots 148 – 153 and Lots 154 – 159 are situated down two private right-of-ways. As the only traffic using these right-of-ways are residents of those lots, the expected trip generation and possibility of conflict is considered low should vehicle crossings be non-compliant. Draft conditions are proposed to restrict fence height adjacent to these right-of-ways to ensure clear visibility for vehicles exiting the right-of-ways.
- Lots 171 – 185 are the only lots situated on Road 10. As mentioned in Section 4.2.2, Road 10 is designed to be a significantly narrower Local Road compared to other Local Roads of Stage 1. It is anticipated that Road 10 will not be used as a main thoroughfare, servicing only Lots 171 – 185. The expected trip generation and possibility of conflict is considered low should vehicle crossings be non-compliant.
- Lots 186 – 196 are the only lots besides Lot 1500 to have direct access onto Road 8. These lots are in close proximity with suitable visibility to the Road 2 / Road 8 intersection. The expected trip generation and possibility of conflict is considered low should vehicle crossings be non-compliant.

Rule 30.6.1.24 – Unobstructed Vehicle Crossing Sight Distance

The development will not enable any direct vehicle crossing off Road 1 due to it being the primary Collector Road and being the main through route for the Bellgrove development. Road 1 will also form part of the future Rangiora Eastern Link Road and is likely to have a higher traffic volume than Road 2. Road 2 is a Collector Road and will provide vehicle access to several properties along its route.

As part of Rule 30.6.1.24, the sight distances required for a 50km/h in a Residential Zone is 45m and 80m in a Rural Zone. As shown in Figure 8-1, the 80m requirement for a Rural Zone is non-compliant and will never be fulfilled for Lots 1501 and 1. It has been determined that since the site will be servicing predominantly residential activities, this non-compliance is considered acceptable from a transport and traffic perspective.

Future development on Lots 1501 and 1 can be designed to comply with a 45m sight distance; however, this requires any future vehicle crossings to be set back 33m from the Kippenberger Avenue road frontage boundary of the site (providing a distance of 7.8m between Lots 1501 and 40 for a future vehicle crossing access to be established).

As the southern property boundary for Lot 1 is 39.5m away from the measurement point, it is non-compliant with the Residential requirements of 45m. While this is a 5.5m non-compliance, it is likely to have sufficient visibility as a 45m line of sight measured from the southern property boundary is able to capture the east-bound live lane on Kippenberger Avenue and will be able to clearly see vehicles accessing Road 2 at the intersection.

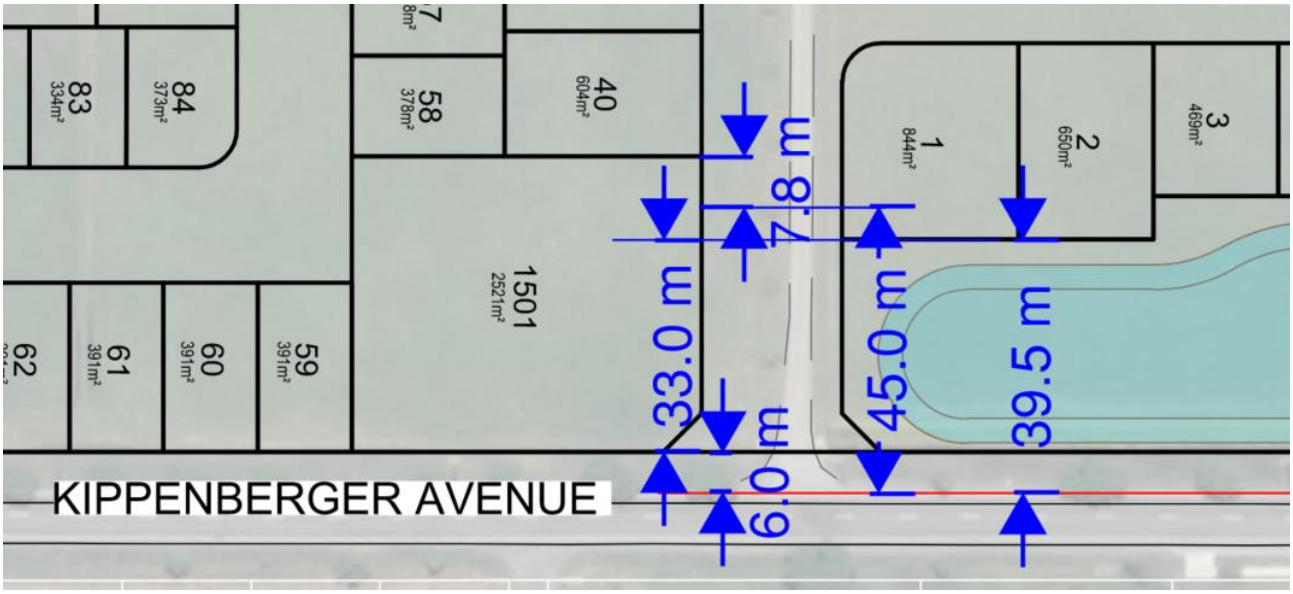


Figure 8-1: Visibility Distances for Road 2 at Lots 1501 and 1

Rule 30.6.1.32 – Spacing Between Road Intersections

Table 30.7 in the WDP specifies the minimum distance between adjacent intersections based on the legal speed limits of the main roads. It has been assumed that the internal roads will function at 50km/h or less which corresponds to a minimum intersection spacing distance of 125m. Distances between intersections are measured in accordance with Rule 30.6.1.33:

30.6.1.33 Distances between intersections shall be measured parallel to the boundaries of the site of the respective road intersection along the road centreline, except where any corner splay has been taken the distance shall be measured as though the corner splay had not been taken.

Based on this rule, approximate measurements have been taken to identify areas of non-compliance as shown in Figure 8-2 below.

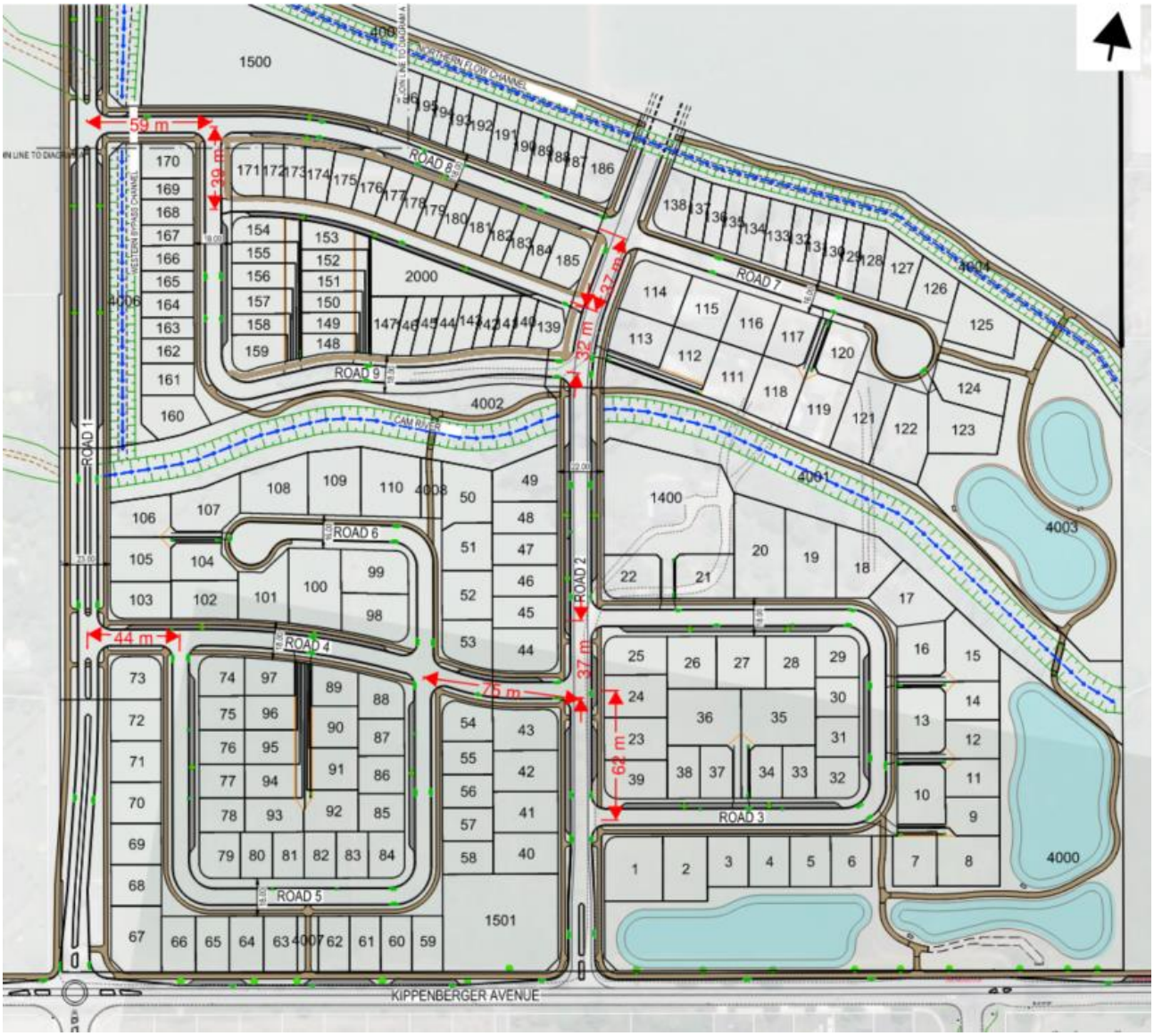


Figure 8-2: Non-compliant Intersection Spacing

Austroads Guide to Road Design (AGRD) Part 4: Intersections and Crossings provides insight into the location of intersections as found in Appendix G. According to AGRD, intersection location must consider environmental factors such as land use, topography and heritage points.

No standards have been provided for Local Road – Local Road intersections by AGRD or Waka Kotahi. Although not within the Christchurch District, guidance has been sought from the Christchurch City Council Infrastructure Design Standard (Part 8 Roading) which can be seen in Appendix H. From this standard, the minimum spacing between Local Road – Local Road intersections is 40m while the shortest Local Road – Local Road spacing proposed is 32m being an 8m non-compliance. This distance is deemed appropriate as Local Road design and volume attributes according to the Christchurch District Plan are similar to what is stipulated in the WDP.

It is also expected that the intersection spacings less than 125m will be used by the residents of the development and are not through-routes for rat-runners. This non-compliance is therefore considered acceptable from a transport, traffic and safety perspective.

Rule 31.25.3 – High Trip Generation Discretionary Activity

The proposed subdivision is expected to generate significant additional vehicle trips as estimated in Section 5. The matters of discretion for this proposal under Rule 31.25.3 relates to access and manoeuvring, design and layout, and network effects.

Rule 31.25.3: Except as provided for by Rule 31.26, any land use in any zone resulting in a total of more than 250 motorised vehicle movements, either entering or exiting the site, per day is a discretionary activity (restricted). Council shall restrict the exercise of its discretion to the following matters:

i) effects of the activity in terms of Policy 15.1.1.2;

l) whether on-site movement of vehicles is affected by the location of structures, topography, or the size and shape of the site.

Policy 15.1.1.2: Within the urban environment subdivision, land use, development and protection should avoid, or mitigate adverse effects on:

a) the rural setting of the District's towns and settlements;

b) efficient and effective functioning of roads;

c) ease and efficiency of access;

d) urban water bodies, and downstream effects on rural water bodies;

e) mixed density housing from low scale, low density to higher density levels in areas designed as a comprehensive development. This provides for flexibility in some areas allowing for varied housing needs;

f) quiet and safe environments;

g) cycleways; and

h) the individual character of the settlement.

In this regard the following is noted:

- The Stage 1 proposed development has been designed in accordance with the NER ODP, proposing two north-south Collector Roads (Road 1 and Road 2).
- Subsequent intersections involving Kippenberger Avenue are designed to be a compliant distance away from other existing intersections, ensuring the network will continue to function sufficiently. Traffic modelling for 2048 conducted by Abley show that all three intersections which involve Kippenberger Avenue (East Belt / High Street, Road 2 / MacPhail Avenue and Devlin Avenue) will operate at a LoS A. The existing network has adequate spare capacity to accommodate the increased traffic with little effect as demonstrated in the Abley model. Isolated SIDRA modelling shows that for the trip generation calculated in Section 5, the proposed new Road 2 / Kippenberger Avenue intersection is able to service the development without compromising the operational efficiency of the existing road network, should it be the only entry/exit for the development.
- Intersection dimensions will be designed in accordance with best-practice guidelines set by WDC to ensure safe and comfortable access via all proposed new roads.
- Upgrades to Kippenberger Avenue as well as the proposed formation of Road 1 and Road 2 involve additional cycle infrastructure that will boost cycle connectivity. Proposed Local Roads (Roads 3-9) have been designed to have a 4m wide lane width in accordance with the pWDP which provides sufficient width to accommodate on-road cycling movements. Road 10, while a Local Road, has not been designed in accordance with the pWDP; however, this road has the intended purpose of not being a main thoroughfare and has a lower speed limit of 30km/h.
- On-site vehicle movements were assessed via vehicle tracking of the largest known service vehicle to access the development, a 11.5m large rigid truck. Vehicle tracking shows that the orientation, location and configuration of the proposed roading network for Stage 1 does not affect the ability for an 11.5m large rigid truck to service the development as shown in Figure 8-3 and Figure 8-4. It should be noted that the Road 6 cul-de-sac requires the large rigid truck to complete one reverse movement in order to manoeuvre the turn head; however, this is considered a safe traffic manoeuvre.

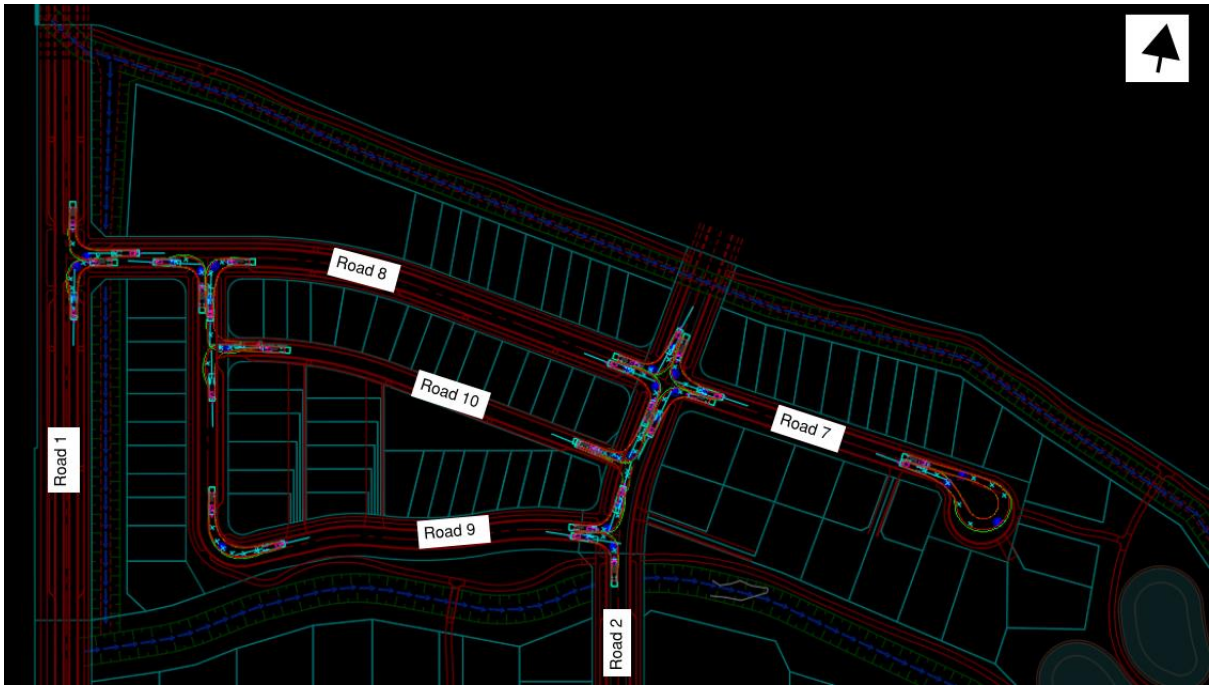


Figure 8-3: Stage 1 North Block Vehicle Tracking for Large Rigid Truck

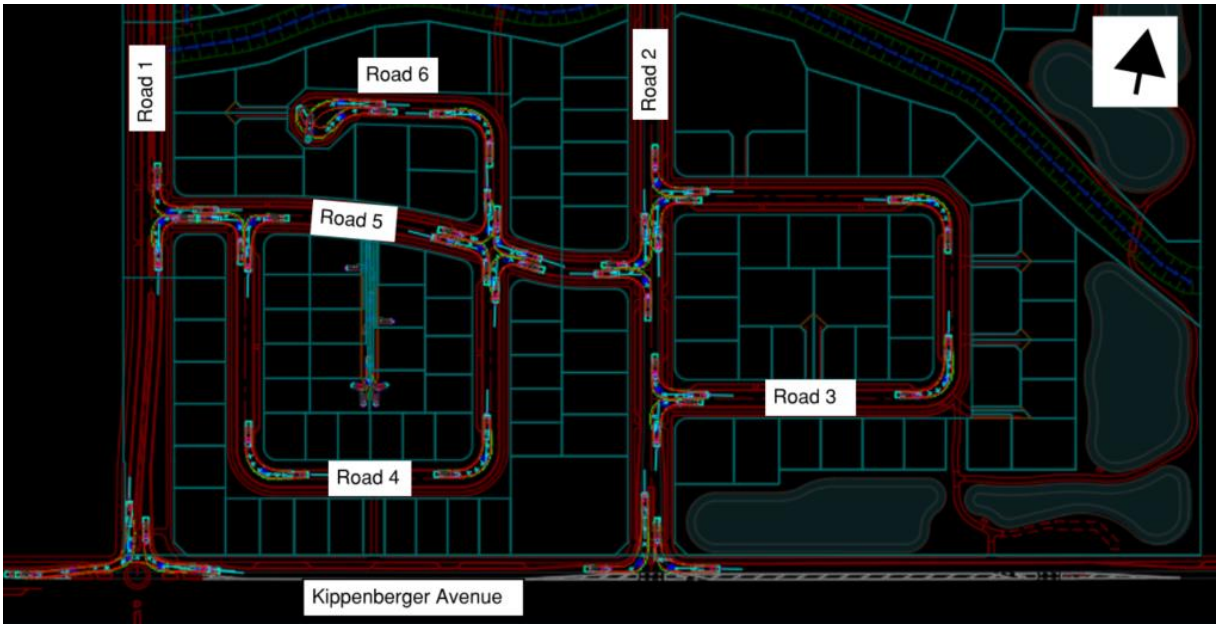


Figure 8-4: Stage 1 South Block Vehicle Tracking for Large Rigid Truck

Existing Non-compliance of Kippenberger Avenue

Kippenberger Avenue is existing and borders the southern boundary of the site. Its current design does not comply with the requirements of the WDP.

When compared to the Rural requirements of the WDP, the minimum rural lane width required is 3.7m; however, it is currently 3.3m. When compared to the Residential requirements, Kippenberger Avenue does not provide the required two 2.5m wide parking lanes, and provides only one 1.5m wide footpath when it is required to have two.

While the development of Stage 1 does not address all the existing non-compliances of Kippenberger Avenue with regard to the WDP; a 2.5m wide shared path is to be constructed on the northern side of Kippenberger Avenue to improve cycle and pedestrian connectivity from the development to the Town Centre and east to Woodend. Additionally, 2.5m wide parking bays are to be implemented.

In summary, the proposed Kippenberger Avenue upgrades increase the compliance of Kippenberger Avenue with respect to the WDP which has been discussed and agreed with by WDC and has been determined as appropriate for the purposes of the proposed development.

Rule 30.6.1.26 – Distance of Vehicle Crossings to Intersections

The minimum separation distances between new vehicle crossings and intersections is specified in Table 30.6 of the WDP. The minimum distance of each vehicle crossing to intersection was measured for each allotment for Stage 1 with the following requirements needing to be complied with such to not breach the WDP:

- Lot 73 – unable to meet the requirements for 25m distance from the intersection of Road 1 / Road 4 and the 10m distance from the intersection of Road 5 / Road 4; therefore, any future vehicle crossing must be placed at least 10m south from the Road 5 / Road 4 intersection on the eastern side of the allotment (accessed from Road 5).
- Lot 138 – unable to meet the requirements for 25m distance from the intersection of Road 2 / Road 7 for a vehicle crossing to be located on the southern side of the allotment; therefore, vehicle crossing must be placed at least 20m north of the Road 2 / Road 7 intersection on the western side of the allotment (accessed from Road 2).
- Lot 139 –u nable to meet the requirements for 25m distance from the intersection of Road 2 / Road 9 for a vehicle crossing to be located on the southern side of the allotment; therefore, vehicle crossing must be placed at least 20m north of the Road 2 / Road 9 intersection on the western side of the allotment (accessed from Road 2).
- Lot 185 – unable to meet the requirements for 25m distance from the intersection of Road 2 / Road 8 for a vehicle crossing to be located on the northern side of the allotment; therefore, vehicle crossing must be placed at least 20m south of the Road 2 / Road 8 intersection on the eastern side of the allotment (accessed from Road 2).
- Lot 186 – unable to meet the requirements for 25m distance from the intersection of Road 2 / Road 8 for a vehicle crossing to be located on the southern side of the allotment; therefore, vehicle crossing must be placed at least 20m north of the Road 2 / Road 8 intersection on the eastern side of the allotment (accessed from Road 2).
- Lot 1501 – unable to meet the requirements for 55m distance from the intersection of Road 2 / Kippenberger Avenue for a vehicle crossing to be located on the eastern side of the allotment. Under this rule, no vehicle crossing is able to be formed due to insufficient space.

While vehicle crossings for Lots 138, 139, 185 and 186 are required under the WDP to be on Road 2, it is undesirable to have vehicle access from Road 2 as a Collector Road if there is an adjacent Local Road to maintain the efficiency of the road as well as minimise the risk of collision with vehicles manoeuvring out of accessways. Under the pWDP, a distance of 15m between vehicle crossing and intersection of Local Road / Collector Road is required which allows vehicle crossing for Lots 138, 139, 185 and 186 to be formed on their adjacent Local Roads. The 25m distance requirement in the WDP for Lots 138, 139, 185 and 186 to have vehicle crossings formed on the adjacent Local Roads is therefore deemed excessive and the 15m distance requirement under the pWDP should be adhered to.

For Lot 1501, the pWDP requires a minimum separation distance of 20m between a vehicle crossing and Collector Road / Arterial Road intersection. This is a 35m distance reduction compared to the WDP which will allow a vehicle crossing to be formed on the eastern side of the allotment (Road 2).

Rule 30.6.1.26 distance of vehicle crossing to intersections in the WDP is therefore deemed excessive for the Bellgrove development this non-compliance was not discovered under the pWDP. This non-compliance is therefore considered acceptable from a transport and traffic perspective.

8.2.2 Waimakariri Proposed District Plan

TRAN-R3 and TRAN-R14 – Formation of a New Road

Table TRAN-3 specifies the road design attributes for new roads which the nine new internal roads of Stage 1 are assessed against. It was determined from this assessment that all roads except Roads 4 and 8 are non-compliant with the dimension requirements of Table TRAN-3.

Road 1 is a Collector Road but does not provide two 1.8m wide on road cycle lanes as part of the design. As this road provides a 2.5m wide shared path, this non-compliance is considered acceptable as cycling facilities are provided for and has been agreed with WDC (Appendix I). WDC advised *"we would not expect on-street cycle lanes on the west-side collector, but a 2.5m shared-use path on the west side and 1.8m footpath on the east side".*

Road 2 is a Collector Road with a road width of 22m, 1m less than the 23m required road width stated in the pWDP. There is also a non-compliance due to the lack of provisions for a 2.5m wide shared path. The 22m road width has been assessed by WDC with confirmation shown in Appendix I that this non-compliance is acceptable from a transport and safety perspective. On road cycle lanes are provided on Road 2 which eliminates the need for an additional shared path as cyclists are sufficiently provided for. This non-compliance is therefore considered acceptable from a transport and traffic perspective.

Roads 3, 5, 9 and 10 are Local Roads and Roads 6 and 7 are Culs-de-sac, and have also been assessed against the requirements of Local Roads as shown in Appendix F. All roads listed above only provide one 1.8m wide footpath on one side of the road while being required to provide two. Based on the location and length of the culs-de-sac, it is determined that the installation of two 1.8m wide footpaths is excessive as these roads provide walking access to a small amount of lots. Roads 6 and 7 also require an 18m wide road reserve; however, as a cul-de-sac will not be used as a thoroughfare and will only service the allotments located down it, a 2m reduction is considered minor and not a safety or operational issue. Additionally, Road 10 will have a road reserve width of 10m, 2.5m wide live lanes and 2.1m wide indented parking bays. The right-of-ways servicing Lots 148 – 153 and Lots 154 – 159 will not have vehicular access onto Road 10 to limit the traffic traversing the road. Access from these right-of-ways will be blocked via a bollard or similar; however, will enable pedestrian access. The proposed 30km/h speed limit, and the intent of this road not being used as a main thoroughfare, the confined feel of narrow lanes will help in deterring rat-running and help mitigate any adverse effects of the design which doesn't comply with the standards sought by the pWDP.

TRAN-R14 Table TRAN-12 requires all new roads servicing 200 or more residential units to have two footpaths of 1.8m width. For the purposes of being consistent with the requirements of new road formations in Table TRAN-3, a shared path has been considered a footpath. Roads 3, 5, 6, 7, 9 and 10 are non-compliant with this rule; however, based on the length of the roads, number of properties serviced and location of these roads, it is deemed excessive to provide two 1.8m wide footpaths on these roads. Pedestrian and cycling facilities have been assessed as being adequately provided for with safety and functionality within the development uncompromised. As such, this non-compliance is considered acceptable from a transport and traffic perspective, noting that all new roads within the development provide at least one compliant footpath.

TRAN-R4 – Formation of a New Road Intersection

Table TRAN-S2 states the minimum road intersection separation distances based on the posted speed limit of the main road versus the intersecting road. According to the assumed speed limit of 50km/h or less and the classification of internal roads being Local apart from Road 1 and 2, the minimum separation distance is 75m. This non-compliance is similar to Rule 30.6.1.32, another non-compliance assessed in the WDP. Refer to Section Rule 30.6.1.32 – Spacing Between Road Intersections for an assessment of this non-compliance.

TRAN-R5 – Formation of a New Vehicle Crossing

Matter b) of TRAN-R5 references Table TRAN-16 which states that for roads where the posted speed limit is 50 km/h or less in a Residential Zone

- Where site road frontage length is < 12m then the minimum separation distance between vehicle crossings is less than 4m or greater than 7m; or
- Where the road frontage length is ≥ 12m then the minimum separation distance is less than 2m or greater than 7m or less than 4m or greater than 7m where the site road frontage includes a minimum of 7m for on-street parking.

This non-compliance is similar to Rule 30.6.1.19, another non-compliance assessed in the WDP. Refer to Section Rule 30.6.1.19 – Dimensions of Vehicle Crossings for an assessment of this non-compliance. Matter e) of TRAN-R5 references Table TRAN-19 which states that for a road with a posted speed limit of 50km/h, the minimum sight distance from vehicle crossings is to be 80m for residential activities. Lots 1501, 40 and 1 cannot achieve 80m clear visibility to the Road 2 / Kippenberger Avenue intersection as shown in Figure 8-5. This 80m requirement is deemed to be excessive for a residential / urban development and it is noted that this is the same specification stated for a Rural Zone in the WDP. Refer to Section 8.2.1, Rule 30.6.1.24 – Unobstructed Vehicle Crossing Sight Distance, for an assessment of this non-compliance.

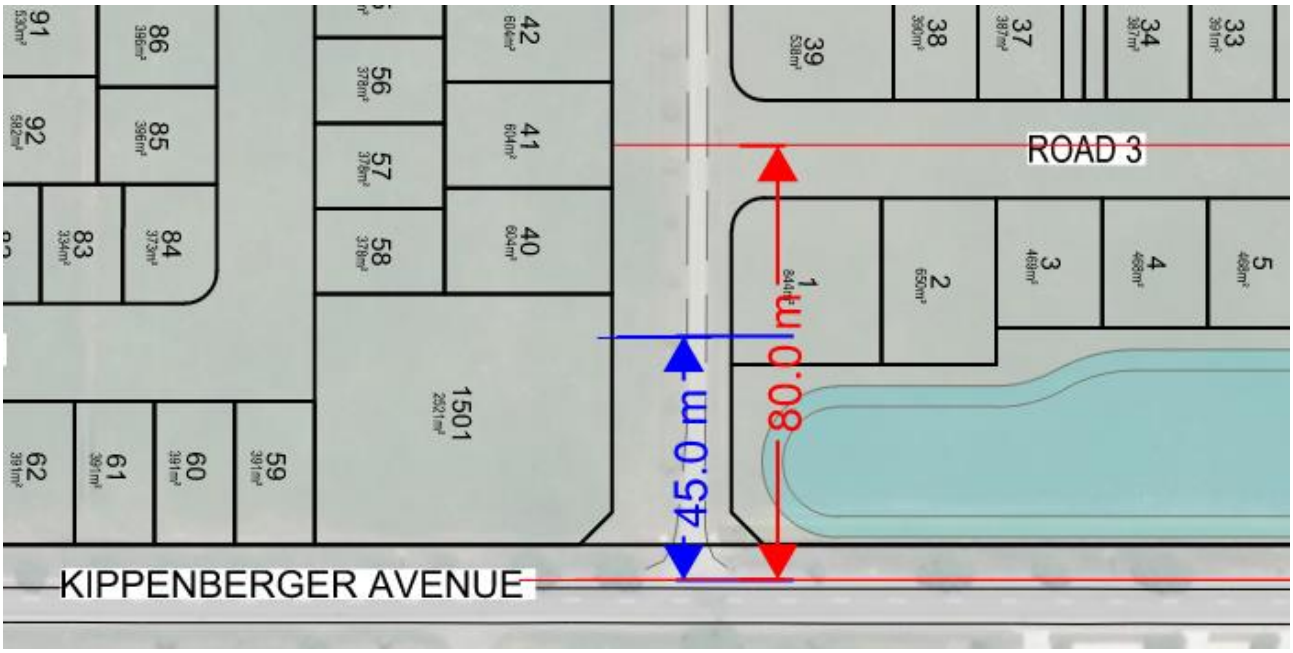


Figure 8-5: Visibility Distances for Road 2 at Lots 1501, 41, 40 and 1

TRAN-R8 – Formation of a New Vehicle Crossing on a Site with Frontage to more than one Road.

Matter 2) of TRAN-R8 states that for any new activity that includes a new vehicle crossing to be formed on site that has frontage to more than one road, the new vehicle crossing shall be to the road that has the lower classification in the pWDP hierarchy. Lot 1501 is classified as a super allotment with future development at this site to be confirmed.

Due to the unknown activity type at Lot 1501, it is preferable that flexibility be sought for future vehicle access so that it is not restricted to just being from Local Road, Road 5. There is anticipated to be no adverse traffic effects of having light vehicles access the site from either Road 5 and/or Road 2 provided that vehicle access is sufficiently set back from the intersection with Kippenberger Avenue (refer to TRAN-R5 – Formation of a New Vehicle Crossing). It is recommended that a safety assessment be carried out on access locations once site usage is known.

TRAN-R20 – High Traffic Generators

As the expected trip generation, as estimated in Section 5, is to exceed 200 vmpd for Residential and Rural zones, the site is non-compliant and classified as a high traffic generator. A full ITA is required with the intended scope identified in TRAN-MD11 which is reproduced below:

1. *The findings of an ITA, and the extent to which the ITA addresses the following matters:*
    a. *Basic ITA and Full ITA:*
        i. *The estimated number of trips generated by each transport mode to and from the development (public transport, walking, cycling and private vehicles, including heavy vehicles).*
        ii. *The extent to which any additional vehicle movements will affect the capacity of the road network.*
        iii. *The extent of effects on the operation of public transport infrastructure and any vehicle and pedestrian/cyclist conflicts likely to arise from vehicle movements to and from the development.*
        iv. *Access and manoeuvring (safety and efficiency):*
            a. *The extent to which the provision of access and on site manoeuvring area associated with the activity, including vehicle loading and servicing deliveries, affects the safety, efficiency, accessibility of the site (including for people whose mobility is restricted and for emergency service vehicles) and the transport system (including considering the classification of the frontage road in the District Plan road hierarchy).*
        v. *Design and layout:*
            a. *The extent to which the design and layout of the proposed activity maximises opportunities, to the extent practicable, for travel other than by private vehicle, including providing safe and convenient access for travel by such modes.*
            b. *The extent to which the design of the development will encourage public transport use.*
            c. *The extent to which the design of the proposed development will encourage walking and cycling to nearby destinations.*
        vi. *Heavy vehicles:*
            a. *For activities that will generate 50 or more heavy vehicle movements per day, the extent to which there are any effects from these trips on the roading infrastructure.*
        vii. *Accessibility of the location:*
            a. *The extent to which the proposed activity has demonstrated the accessibility of the site by a range of transport modes, and the extent to which the activity's location will minimise or reduce travel to and from the activity by private vehicles and encourage public and active transport use.*
            b. *The safety, distance and suitability of pedestrian routes to the nearest bus stop.*
    b. *Full ITA only (as well as the matters in (a)(i) to (vii) above):*
        i. *Network effects:*
            a. *Having particular regard to the level of additional traffic generated by the activity and the extent to which the activity is permitted by the zone in which it is located, the extent to which measures are proposed to adequately mitigate the actual or potential effects on the transport system arising from the anticipated trip generation (for all transport modes) from the proposed activity, including consideration of cumulative effects with other activities in the vicinity, proposed infrastructure, and construction work associated with the activity.*
            b. *The extent to which the design and layout of the proposed development maximises opportunities, to the extent considered reasonably practicable, for travel other than by private car.*
            c. *The extent of effects of construction traffic on the transport network.*
            d. *The extent of any new or modified infrastructure required for public transport, pedestrian, cycling, private vehicles and freight.*
            e. *The extent of any mitigation required to improve safety issues for pedestrians, cyclists or mobility impaired users and the nature of those measures.*
            f. *The extent to which travel demand management tools such as travel plans are proposed to reduce vehicle trips and associated effects, influence*

This ITA addresses all the assessment matters listed above from TRAN-MD11, and considers the wider transport network impacts of the development in Section 6. The traffic generation anticipated as a result of the Proposal can be safely accommodated within the transport network.

9 Conclusions and Recommendations

The ITA indicates that the proposed Stage 1 development can be implemented with less than minor effects on the immediate transport network and can be supported accordingly providing the following are implemented:

- Raised platforms and/or visual cues to indicate a change in speed environment;
- Access, public roads and pedestrian connections to be generally in accordance with the concept provided in the application; and
- WDC implements speed reductions to the roads in vicinity of the development in accordance with The Speed Management Framework 2020. The 40km/h recommendation applies to the Local Roads and Road 2 within the Stage 1 development.

The estimated operational traffic generation of Stage 1 can be readily accommodated by the existing and proposed network design.

It is expected that the existing transport network will also be able to safely accommodate construction traffic generated from Stage 1 with minimal adverse effects.

The Stage 1 development will have positive transport effects in that it is well serviced by alternative transport modes with provision to quality access to public transport and the provision of high-quality walking and cycling facilities. The location of the future commercial allotment (Lot 1500) will also encourage residents to walk or cycle as multiple pedestrianised links are to be provided.

An assessment against the WDP and the pWDP has been conducted to demonstrate general alignment with both the operative and proposed District Plan requirements. Non-compliances have been assessed in Section 8.2 of this report and those are considered to be acceptable from a safety and functionality perspective.

Overall, the development is considered acceptable from a traffic, transport and safety perspective.

Appendix A
Traffic Counts

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0142A **Location:** [-43.288197 +172.630275]
Description: COLDSTREAM RD (A>B) 550m east of Marchmont Rd <100> @ 0.509
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 Wednesday, May 19, 2021 to 0:00 Wednesday, May 26, 2021 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**464**	**501**	**549**	**483**	**556**	**530**	**415**	**2553**	**945**	**3498**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	2	0	0	0	0	2	5	**0**	**4**	**1**
0100	1	0	0	0	1	5	1	**0**	**3**	**1**
0200	1	0	1	1	1	0	0	**1**	**0**	**1**
0300	0	0	0	0	0	0	0	**0**	**0**	**0**
0400	2	2	1	1	1	0	0	**1**	**0**	**1**
0500	4	2	2	2	3	1	2	**3**	**2**	**2**
0600	10	15	17	13	17	3	1	**14**	**2**	**11**
0700	32	35	30	33	29	15	8	**32**	**12**	**26**
0800	42	46	27	28	45	15	6	**38**	**11**	**30**
0900	18	29	48	26	39	33	28	**32**	**31**	**32**
1000	23	29	39	33	40	38	37	**33**	**38**	**34**
1100	26	31	35	30	39	51	42	**32**	**47**	**36**
1200	35	33	35	55	34	45	38	**38**	**42**	**39**
1300	37	37	47	35	36	55	56	**38**	**56**	**43**
1400	39	44	51	31	48	44	54	**43**	**49**	**44**
1500	61	48	60	46	52	47	39	**53**	**43**	**50**
1600	41	51	46	46	46	51	40	**46**	**46**	**46**
1700	36	39	51	44	40	35	20	**42**	**28**	**38**
1800	16	31	19	28	31	33	11	**25**	**22**	**24**
1900	17	11	19	15	14	16	14	**15**	**15**	**15**
2000	14	9	9	10	15	10	7	**11**	**9**	**11**
2100	6	7	6	3	18	9	3	**8**	**6**	**7**
2200	1	2	3	3	6	13	1	**3**	**7**	**4**
2300	0	0	3	0	1	9	2	**1**	**6**	**2**
Total	**464**	**501**	**549**	**483**	**556**	**530**	**415**	**511**	**473**	**500**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	42	46	48	33	45	51	42	**38**	**47**	**36**
AM Time	0800	0800	0900	0700	0800	1100	1100	**0800**	**1100**	**1100**
PM Total	61	51	60	55	52	55	56	**53**	**56**	**50**
PM Time	1500	1600	1500	1200	1500	1300	1300	**1500**	**1300**	**1500**
Day Total	61	51	60	55	52	55	56	**53**	**56**	**50**
Day Time	1500	1600	1500	1200	1500	1300	1300	**1500**	**1300**	**1500**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	1	1	0	2	6	7	14	**2**	**11**	**4**	0.9
2 - PC&LCV	399	433	465	410	469	458	356	**435**	**407**	**427**	85.5
3 - PC&LCV	14	6	18	20	11	23	18	**14**	**21**	**16**	3.1
4 - BUS&MCV	28	41	46	37	48	35	24	**40**	**30**	**37**	7.4
5 - BUS&HCV1	4	10	1	5	5	4	2	**5**	**3**	**4**	0.9
6 - HCV1	0	1	2	1	3	0	0	**1**	**0**	**1**	0.2
7 - HCV1	0	0	1	0	0	0	0	**0**	**0**	**0**	0.0
8 - HCV2	4	2	1	2	3	1	0	**2**	**1**	**2**	0.4
9 - HCV2	0	1	2	0	1	0	0	**1**	**0**	**1**	0.1
10 - HCV2	1	0	0	1	2	0	0	**1**	**0**	**1**	0.1
11 - HCV2	6	2	10	4	6	0	0	**6**	**0**	**4**	0.8
12 - HCV2	7	4	3	0	1	2	1	**3**	**2**	**3**	0.5
13 - HCV2	0	0	0	1	1	0	0	**0**	**0**	**0**	0.1
14 - ???	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0

Speed Statistics - PSL 100km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	77.6	76.9	76.9	76.8	79.0	78.6	77.2	**77.5**	**78.0**	**77.6**
Median	77.0	76.7	76.0	76.4	78.0	78.0	77.4	**76.8**	**77.8**	**77.1**
85%ile	89.4	90.2	87.4	88.4	91.3	90.9	88.7	**89.3**	**89.4**	**89.3**
95%ile	99.7	96.4	98.5	96.5	103.0	98.1	97.8	**98.7**	**97.9**	**98.5**
Mean >PSL	106.6	104.8	110.3	110.5	111.9	110.7	109.3	**109.6**	**110.1**	**109.7**
Number >PSL	20	11	24	17	34	22	16	**106**	**38**	**144**
Percent >PSL	4.3	2.2	4.4	3.5	6.1	4.2	3.9	**4.2**	**4.0**	**4.1**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0142B **Location:** [-43.289905 +172.609037]
Description: COLDSTREAM RD (A>B) 400m west of Golf Links Rd <100> @ 2.263
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 Wednesday, May 19, 2021 to 0:00 Wednesday, May 26, 2021 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**1485**	**1606**	**1739**	**1620**	**1558**	**1788**	**1304**	**8008**	**3092**	**11100**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	1	1	0	2	1	10	17	**1**	**14**	**5**
0100	2	1	0	1	5	4	5	**2**	**5**	**3**
0200	1	1	1	1	4	3	3	**2**	**3**	**2**
0300	0	2	2	2	1	3	2	**1**	**3**	**2**
0400	2	2	3	4	1	6	2	**2**	**4**	**3**
0500	12	9	7	9	13	2	3	**10**	**3**	**8**
0600	42	38	46	49	46	10	2	**44**	**6**	**33**
0700	80	101	98	86	87	30	13	**90**	**22**	**71**
0800	119	136	107	119	113	111	35	**119**	**73**	**106**
0900	82	109	118	91	93	141	62	**99**	**102**	**99**
1000	95	84	105	92	127	186	119	**101**	**153**	**115**
1100	95	88	97	101	107	182	120	**98**	**151**	**113**
1200	88	77	120	109	110	179	122	**101**	**151**	**115**
1300	92	109	115	97	109	163	159	**104**	**161**	**121**
1400	104	127	145	131	138	174	171	**129**	**173**	**141**
1500	189	142	173	164	151	147	139	**164**	**143**	**158**
1600	178	187	196	192	162	136	127	**183**	**132**	**168**
1700	137	165	199	158	117	133	79	**155**	**106**	**141**
1800	81	87	81	102	52	49	42	**81**	**46**	**71**
1900	30	66	59	48	36	28	27	**48**	**28**	**42**
2000	29	32	28	34	33	18	32	**31**	**25**	**29**
2100	15	33	25	14	29	27	15	**23**	**21**	**23**
2200	6	9	9	12	12	24	7	**10**	**16**	**11**
2300	5	0	5	2	11	22	1	**5**	**12**	**7**
Total	**1485**	**1606**	**1739**	**1620**	**1558**	**1788**	**1304**	**1602**	**1546**	**1586**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	119	136	118	119	127	186	120	**119**	**153**	**115**
AM Time	0800	0800	0900	0800	1000	1000	1100	**0800**	**1000**	**1000**
PM Total	189	187	199	192	162	179	171	**183**	**173**	**168**
PM Time	1500	1600	1700	1600	1600	1200	1400	**1600**	**1400**	**1600**
Day Total	189	187	199	192	162	186	171	**183**	**173**	**168**
Day Time	1500	1600	1700	1600	1600	1000	1400	**1600**	**1400**	**1600**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	4	5	3	7	12	25	28	**6**	**27**	**12**	0.8
2 - PC&LCV	1271	1414	1471	1405	1364	1617	1165	**1385**	**1391**	**1387**	87.5
3 - PC&LCV	59	37	61	67	51	62	51	**55**	**57**	**55**	3.5
4 - BUS&MCV	102	97	148	94	80	69	51	**104**	**60**	**92**	5.8
5 - BUS&HCV1	12	21	14	17	17	4	6	**16**	**5**	**13**	0.8
6 - HCV1	9	9	5	5	6	3	0	**7**	**2**	**5**	0.3
7 - HCV1	0	0	0	0	0	1	0	**0**	**1**	**0**	0.0
8 - HCV2	5	4	1	2	5	1	0	**3**	**1**	**3**	0.2
9 - HCV2	5	2	7	6	3	1	1	**5**	**1**	**4**	0.2
10 - HCV2	2	1	1	2	4	0	0	**2**	**0**	**1**	0.1
11 - HCV2	9	10	24	11	13	0	0	**13**	**0**	**10**	0.6
12 - HCV2	7	5	3	1	3	2	1	**4**	**2**	**3**	0.2
13 - HCV2	0	0	1	0	0	0	0	**0**	**0**	**0**	0.0
14 - ???	0	1	0	3	0	3	1	**1**	**2**	**1**	0.1

Speed Statistics - PSL 100km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	72.2	71.8	71.5	71.9	72.4	72.3	71.7	**71.9**	**72.0**	**72.0**
Median	72.1	71.8	71.5	72.2	72.5	72.5	71.8	**72.0**	**72.3**	**72.1**
85%ile	82.5	81.4	81.4	81.3	82.9	82.0	81.8	**81.8**	**81.9**	**81.9**

95%ile	89.6	89.5	88.4	88.1	90.1	87.8	87.6	**89.2**	**87.7**	**88.8**
Mean >PSL	103.7	104.2	105.6	105.5	106.3	106.9	118.8	**105.3**	**110.7**	**106.6**
Number >PSL	10	16	20	11	26	17	8	**83**	**25**	**108**
Percent >PSL	0.7	1.0	1.2	0.7	1.7	1.0	0.6	**1.0**	**0.8**	**1.0**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0204C **Location:** [-43.300112 +172.599805]
Description: EAST BELT (A>B) 100m north of Keir St <50> OS# 101B
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 17 August, 2019 to 0:00 24 August, 2019 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	2336	2092	2347	2092	2406	1323	932	11273	2255	13528
Days	1	1	1	1	1	1	1	5	2	7

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	0	0	2	1	1	3	8	1	6	2
0100	0	0	0	0	0	2	2	0	2	1
0200	1	1	1	3	2	2	3	2	3	2
0300	5	5	4	4	2	2	5	4	4	4
0400	3	4	2	2	4	5	1	3	3	3
0500	6	5	5	7	7	4	2	6	3	5
0600	40	12	18	23	11	4	3	21	4	16
0700	61	77	58	63	56	12	5	63	9	47
0800	408	351	363	418	376	83	19	383	51	288
0900	108	194	194	129	132	80	117	151	99	136
1000	122	114	111	104	112	181	83	113	132	118
1100	138	148	170	90	117	161	97	133	129	132
1200	120	145	157	117	143	94	152	136	123	133
1300	137	174	216	179	198	112	83	181	98	157
1400	151	146	154	177	190	131	73	164	102	146
1500	278	225	247	339	318	108	67	281	88	226
1600	193	159	155	143	155	173	58	161	116	148
1700	121	112	169	121	177	74	41	140	58	116
1800	200	73	130	62	134	26	41	120	34	95
1900	138	51	69	36	119	19	17	83	18	64
2000	74	38	34	32	68	16	32	49	24	42
2100	20	45	70	23	58	13	16	43	15	35
2200	11	9	13	12	19	10	3	13	7	11
2300	1	4	5	7	7	8	4	5	6	5
Total	2336	2092	2347	2092	2406	1323	932	2255	1128	1933
								AWDT	AWET	ADT

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	408	351	363	418	376	181	117	383	132	288
AM Time	0800	0800	0800	0800	0800	1000	0900	0800	1000	0800
PM Total	278	225	247	339	318	173	152	281	123	226
PM Time	1500	1500	1500	1500	1500	1600	1200	1500	1200	1500
Day Total	408	351	363	418	376	181	152	383	132	288
Day Time	0800	0800	0800	0800	0800	1000	1200	0800	1000	0800

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	20	9	17	23	13	5	4	16	5	13	0.7
2 - PC&LCV	2181	1964	2212	1964	2291	1255	901	2122	1078	1824	94.4
3 - PC&LCV	7	10	12	8	13	11	2	10	7	9	0.5
4 - BUS&MCV	108	87	84	77	76	48	22	86	35	72	3.7
5 - BUS&HCV1	15	8	14	10	8	4	1	11	3	9	0.4
6 - HCV1	2	6	1	1	0	0	0	2	0	1	0.1
7 - HCV1	0	1	2	2	2	0	0	1	0	1	0.1
8 - HCV2	0	1	0	2	0	0	0	1	0	0	0.0
9 - HCV2	1	0	0	2	1	0	0	1	0	1	0.0
10 - HCV2	0	0	0	0	1	0	0	0	0	0	0.0
11 - HCV2	0	0	0	0	0	0	0	0	0	0	0.0
12 - HCV2	0	2	2	2	0	0	0	1	0	1	0.0
13 - HCV2	0	0	0	0	0	0	0	0	0	0	0.0
14 - ???	2	4	3	1	1	0	2	2	1	2	0.1

Speed Statistics - PSL 50km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	47.3	46.6	48.2	47.3	47.5	51.5	47.0	47.4	49.6	47.8
Median	47.9	47.3	48.3	47.8	48.3	51.4	48.1	48.0	50.1	48.3
85%ile	54.9	54.4	55.5	54.5	54.7	58.4	55.9	54.9	57.4	55.4
95%ile	59.5	59.0	60.3	59.0	59.1	63.6	60.8	59.4	62.5	60.1
Mean >PSL	55.2	55.1	55.4	54.9	54.8	56.3	55.5	55.1	56.1	55.3
Number >PSL	885	709	935	762	946	772	366	4237	1138	5375
Percent >PSL	37.9	33.9	39.8	36.4	39.3	58.4	39.3	37.6	50.5	39.7

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0204D **Location:** [-43.304435 +172.600870]
Description: EAST BELT (A>B) 150m south of Kippenberger Ave <50> OS# 61
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 17 August, 2019 to 0:00 24 August, 2019 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**3880**	**3873**	**4121**	**4026**	**4346**	**3428**	**2719**	**20246**	**6147**	**26393**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	3	2	4	1	7	14	12	**3**	**13**	**6**
0100	1	8	5	4	3	7	18	**4**	**13**	**7**
0200	2	2	2	3	8	2	8	**3**	**5**	**4**
0300	5	9	6	7	8	1	4	**7**	**3**	**6**
0400	12	14	8	11	13	6	2	**12**	**4**	**9**
0500	21	10	15	20	13	7	4	**16**	**6**	**13**
0600	64	57	63	64	53	16	14	**60**	**15**	**47**
0700	123	133	146	134	125	45	20	**132**	**33**	**104**
0800	377	374	348	395	385	136	68	**376**	**102**	**298**
0900	198	257	295	280	275	267	182	**261**	**225**	**251**
1000	256	258	251	243	244	306	226	**250**	**266**	**255**
1100	260	259	296	245	324	369	241	**277**	**305**	**285**
1200	279	292	318	285	310	350	320	**297**	**335**	**308**
1300	293	298	331	321	358	350	275	**320**	**313**	**318**
1400	288	303	309	317	342	318	297	**312**	**308**	**311**
1500	414	417	388	451	449	279	271	**424**	**275**	**381**
1600	409	340	384	381	374	285	229	**378**	**257**	**343**
1700	298	318	341	352	381	240	220	**338**	**230**	**307**
1800	236	219	226	194	262	168	135	**227**	**152**	**206**
1900	153	128	153	121	177	93	63	**146**	**78**	**127**
2000	91	93	116	95	84	47	54	**96**	**51**	**83**
2100	54	53	74	67	94	50	30	**68**	**40**	**60**
2200	28	19	29	24	33	37	14	**27**	**26**	**26**
2300	15	10	13	11	24	35	12	**15**	**24**	**17**
Total	**3880**	**3873**	**4121**	**4026**	**4346**	**3428**	**2719**	**4049**	**3074**	**3770**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	377	374	348	395	385	369	241	**376**	**305**	**298**
AM Time	0800	0800	0800	0800	0800	1100	1100	**0800**	**1100**	**0800**
PM Total	414	417	388	451	449	350	320	**424**	**335**	**381**
PM Time	1500	1500	1500	1500	1500	1200	1200	**1500**	**1200**	**1500**
Day Total	414	417	388	451	449	369	320	**424**	**335**	**381**
Day Time	1500	1500	1500	1500	1500	1100	1200	**1500**	**1200**	**1500**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	27	30	28	46	30	10	26	**32**	**18**	**28**	0.7
2 - PC&LCV	3655	3666	3898	3798	4120	3281	2592	**3827**	**2937**	**3573**	94.8
3 - PC&LCV	27	21	39	27	42	26	22	**31**	**24**	**29**	0.8
4 - BUS&MCV	131	117	116	127	124	98	71	**123**	**85**	**112**	3.0
5 - BUS&HCV1	12	8	17	9	7	0	2	**11**	**1**	**8**	0.2
6 - HCV1	8	12	3	2	9	3	1	**7**	**2**	**5**	0.1
7 - HCV1	3	1	2	2	4	2	1	**2**	**2**	**2**	0.1
8 - HCV2	0	1	4	0	1	0	0	**1**	**0**	**1**	0.0
9 - HCV2	4	5	2	6	1	0	0	**4**	**0**	**3**	0.1
10 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
11 - HCV2	0	1	1	0	0	0	0	**0**	**0**	**0**	0.0
12 - HCV2	5	2	2	2	5	0	0	**3**	**0**	**2**	0.1
13 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
14 - ???	8	9	9	7	3	8	4	**7**	**6**	**7**	0.2

Speed Statistics - PSL 50km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	46.8	45.8	47.0	46.4	46.4	46.1	46.6	**46.5**	**46.3**	**46.5**
Median	47.7	46.4	47.5	47.1	46.9	46.6	47.3	**47.2**	**47.0**	**47.1**
85%ile	53.7	52.8	53.9	53.4	53.3	53.3	53.9	**53.5**	**53.6**	**53.5**
95%ile	57.5	57.0	58.2	57.9	57.4	57.2	57.7	**57.6**	**57.4**	**57.6**
Mean >PSL	54.2	54.3	54.6	54.4	54.2	54.2	54.3	**54.3**	**54.2**	**54.3**
Number >PSL	1341	1035	1427	1250	1344	1030	904	**6397**	**1934**	**8331**
Percent >PSL	34.6	26.7	34.6	31.0	30.9	30.0	33.2	**31.6**	**31.5**	**31.6**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0204E **Location:** [-43.291510 +172.596683]
Description: EAST BELT (A>B) 250m north of Wales St <50> OS# 143
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 24 July, 2019 to 0:00 31 July, 2019 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**1179**	**1179**	**1151**	**1055**	**1104**	**798**	**639**	**5668**	**1437**	**7105**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	1	2	2	2	1	0	5	**2**	**3**	**2**
0100	1	0	0	0	1	4	3	**0**	**4**	**1**
0200	0	0	0	0	1	1	2	**0**	**2**	**1**
0300	2	2	2	1	0	1	2	**1**	**2**	**1**
0400	0	3	1	1	0	2	0	**1**	**1**	**1**
0500	5	4	4	3	3	1	2	**4**	**2**	**3**
0600	8	7	9	7	7	2	3	**8**	**3**	**6**
0700	41	30	28	30	27	6	4	**31**	**5**	**24**
0800	206	164	235	187	183	34	21	**195**	**28**	**147**
0900	62	100	74	45	59	89	40	**68**	**65**	**67**
1000	67	47	37	51	65	128	62	**53**	**95**	**65**
1100	71	66	63	55	59	101	54	**63**	**78**	**67**
1200	77	68	49	67	75	86	83	**67**	**85**	**72**
1300	89	69	88	70	94	60	64	**82**	**62**	**76**
1400	79	88	84	86	109	65	74	**89**	**70**	**84**
1500	172	135	144	149	174	63	67	**155**	**65**	**129**
1600	95	95	93	90	83	53	50	**91**	**52**	**80**
1700	65	97	114	87	58	36	45	**84**	**41**	**72**
1800	42	72	53	48	39	24	20	**51**	**22**	**43**
1900	30	39	33	30	18	15	8	**30**	**12**	**25**
2000	29	51	17	24	17	4	15	**28**	**10**	**22**
2100	21	28	10	13	19	12	9	**18**	**11**	**16**
2200	10	10	9	9	7	3	2	**9**	**3**	**7**
2300	6	2	2	0	5	8	4	**3**	**6**	**4**
Total	**1179**	**1179**	**1151**	**1055**	**1104**	**798**	**639**	**1134**	**719**	**1015**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	206	164	235	187	183	128	62	**195**	**95**	**147**
AM Time	0800	0800	0800	0800	0800	1000	1000	**0800**	**1000**	**0800**
PM Total	172	135	144	149	174	86	83	**155**	**85**	**129**
PM Time	1500	1500	1500	1500	1500	1200	1200	**1500**	**1200**	**1500**
Day Total	206	164	235	187	183	128	83	**195**	**95**	**147**
Day Time	0800	0800	0800	0800	0800	1000	1200	**0800**	**1000**	**0800**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	11	10	5	8	4	6	2	**8**	**4**	**7**	0.6
2 - PC&LCV	1076	1085	1091	984	1040	757	598	**1055**	**678**	**947**	93.3
3 - PC&LCV	9	3	7	11	7	4	11	**7**	**8**	**7**	0.7
4 - BUS&MCV	52	61	40	38	45	29	27	**47**	**28**	**42**	4.1
5 - BUS&HCV1	28	17	7	6	4	0	0	**12**	**0**	**9**	0.9
6 - HCV1	3	1	1	5	1	1	0	**2**	**1**	**2**	0.2
7 - HCV1	0	1	0	1	1	0	1	**1**	**1**	**1**	0.1
8 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
9 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
10 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
11 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
12 - HCV2	0	0	0	0	1	0	0	**0**	**0**	**0**	0.0
13 - HCV2	0	0	0	0	0	0	0	**0**	**0**	**0**	0.0
14 - ???	0	1	0	2	1	1	0	**1**	**1**	**1**	0.1

Speed Statistics - PSL 50km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	42.9	42.4	41.9	42.4	43.0	47.6	44.2	**42.5**	**46.1**	**43.3**
Median	43.2	43.0	42.9	43.4	43.7	48.2	45.3	**43.2**	**47.0**	**43.8**
85%ile	51.4	50.2	49.8	51.1	51.2	55.9	52.7	**50.9**	**54.5**	**51.7**
95%ile	56.9	56.1	54.3	56.7	56.7	60.6	57.1	**56.3**	**59.7**	**57.0**
Mean >PSL	54.8	55.4	54.4	54.7	55.3	55.5	54.5	**54.9**	**55.1**	**55.0**
Number >PSL	238	183	168	199	208	314	170	**996**	**484**	**1480**
Percent >PSL	20.2	15.5	14.6	18.9	18.8	39.3	26.6	**17.6**	**33.7**	**20.8**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0270A **Location:** [-43.294298 +172.614958]
Description: GOLF LINKS RD (A>B) 600m south of Coldstream Rd <100> @ 0.725
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 Wednesday, May 19, 2021 to 0:00 Wednesday, May 26, 2021 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	1100	1159	1282	1203	1102	1337	1021	5846	2358	8204
Days	1	1	1	1	1	1	1	5	2	7

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	0	1	0	2	1	8	12	1	10	3
0100	1	1	0	1	4	2	3	1	3	2
0200	1	2	0	0	3	3	2	1	3	2
0300	2	1	2	2	1	3	1	2	2	2
0400	2	3	5	5	3	8	2	4	5	4
0500	6	6	6	6	8	2	1	6	2	5
0600	33	27	40	37	34	8	1	34	5	26
0700	60	70	63	62	58	24	6	63	15	49
0800	90	90	75	83	80	89	37	84	63	78
0900	91	76	107	68	63	120	43	81	82	81
1000	71	58	72	63	101	147	99	73	123	87
1100	68	64	69	70	64	141	89	67	115	81
1200	56	60	87	66	74	154	112	69	133	87
1300	54	77	76	70	80	116	119	71	118	85
1400	62	90	104	100	85	70	146	88	108	94
1500	154	106	125	121	126	106	97	126	102	119
1600	131	130	150	154	127	118	93	138	106	129
1700	110	130	150	121	82	109	70	119	90	110
1800	58	61	61	85	36	32	28	60	30	52
1900	15	48	38	39	18	17	17	32	17	27
2000	20	27	22	26	22	17	26	23	22	23
2100	6	22	24	11	16	18	11	16	15	15
2200	7	8	4	9	7	12	5	7	9	7
2300	2	1	2	2	9	13	1	3	7	4
Total	1100	1159	1282	1203	1102	1337	1021	1169	1179	1172
								AWDT	AWET	ADT

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	91	90	107	83	101	147	99	84	123	87
AM Time	0900	0800	0900	0800	1000	1000	1000	0800	1000	1000
PM Total	154	130	150	154	127	154	146	138	133	129
PM Time	1500	1600	1600	1600	1600	1200	1400	1600	1200	1600
Day Total	154	130	150	154	127	154	146	138	133	129
Day Time	1500	1600	1600	1600	1600	1200	1400	1600	1200	1600

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	4	8	17	11	11	30	33	10	32	16	1.4
2 - PC&LCV	967	1040	1111	1048	979	1214	930	1029	1072	1041	88.8
3 - PC&LCV	53	32	41	47	43	50	30	43	40	42	3.6
4 - BUS&MCV	50	43	81	70	44	34	21	58	28	49	4.2
5 - BUS&HCV1	4	15	9	6	4	0	1	8	1	6	0.5
6 - HCV1	10	7	1	4	4	2	4	5	3	5	0.4
7 - HCV1	0	0	1	0	2	1	0	1	1	1	0.0
8 - HCV2	2	2	0	0	2	0	0	1	0	1	0.1
9 - HCV2	5	1	4	6	1	0	0	3	0	2	0.2
10 - HCV2	1	1	1	1	2	0	0	1	0	1	0.1
11 - HCV2	3	9	16	6	8	0	0	8	0	6	0.5
12 - HCV2	1	1	0	1	1	2	0	1	1	1	0.1
13 - HCV2	0	0	0	0	0	0	0	0	0	0	0.0
14 - ???	0	0	0	3	1	4	2	1	3	1	0.1

Speed Statistics - PSL 100km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	73.3	74.5	73.7	74.8	73.0	73.1	71.1	73.9	72.2	73.4
Median	73.8	74.9	74.6	75.4	74.0	74.0	72.6	74.5	73.5	74.3
85%ile	85.7	86.6	85.9	86.6	85.6	84.6	83.6	86.0	84.2	85.5
95%ile	94.2	95.1	92.7	95.9	93.3	93.8	91.6	94.2	92.6	93.7
Mean >PSL	105.4	107.4	111.0	106.2	106.1	104.2	104.8	107.1	104.3	106.5
Number >PSL	27	33	22	35	25	27	7	142	34	176
Percent >PSL	2.5	2.8	1.7	2.9	2.3	2.0	0.7	2.4	1.4	2.1

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0303A **Location:** [-43.302935 +172.599485]
Description: HIGH ST RANGIORA (A>B) 100m west of East Belt <50> @ 0.077
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 27 August, 2019 to 0:00 3 September, 2019 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**9024**	**9845**	**10060**	**10349**	**10489**	**9304**	**7960**	**49767**	**17264**	**67031**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	0	8	8	16	16	19	37	**10**	**28**	**15**
0100	3	6	4	5	13	20	23	**6**	**22**	**11**
0200	4	10	4	6	10	10	9	**7**	**10**	**8**
0300	11	10	17	13	9	9	6	**12**	**8**	**11**
0400	21	22	17	19	27	6	12	**21**	**9**	**18**
0500	47	45	59	56	49	35	23	**51**	**29**	**45**
0600	108	122	134	140	123	49	35	**125**	**42**	**102**
0700	289	306	325	309	298	122	69	**305**	**96**	**245**
0800	745	751	796	799	778	316	205	**774**	**261**	**627**
0900	624	678	684	653	656	633	488	**659**	**561**	**631**
1000	658	667	662	761	741	827	711	**698**	**769**	**718**
1100	679	798	774	812	797	993	844	**772**	**919**	**814**
1200	692	769	748	830	799	952	894	**768**	**923**	**812**
1300	797	797	826	825	911	859	774	**831**	**817**	**827**
1400	727	796	857	865	897	849	788	**828**	**819**	**826**
1500	927	980	978	968	1004	772	767	**971**	**770**	**914**
1600	838	860	936	961	983	715	673	**916**	**694**	**852**
1700	731	784	827	863	820	686	602	**805**	**644**	**759**
1800	427	605	512	566	619	537	437	**546**	**487**	**529**
1900	306	296	391	389	380	352	269	**352**	**311**	**340**
2000	213	305	261	235	283	227	169	**259**	**198**	**242**
2100	116	169	138	170	155	152	71	**150**	**112**	**139**
2200	52	31	70	65	80	96	33	**60**	**65**	**61**
2300	9	30	32	23	41	68	21	**27**	**45**	**32**
Total	**9024**	**9845**	**10060**	**10349**	**10489**	**9304**	**7960**	**9953**	**8632**	**9576**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	745	798	796	812	797	993	844	**774**	**919**	**814**
AM Time	0800	1100	0800	1100	1100	1100	1100	**0800**	**1100**	**1100**
PM Total	927	980	978	968	1004	952	894	**971**	**923**	**914**
PM Time	1500	1500	1500	1500	1500	1200	1200	**1500**	**1200**	**1500**
Day Total	927	980	978	968	1004	993	894	**971**	**923**	**914**
Day Time	1500	1500	1500	1500	1500	1100	1200	**1500**	**1200**	**1500**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	37	31	49	49	46	54	49	**42**	**52**	**45**	0.5
2 - PC&LCV	8360	9268	9412	9723	9797	8715	7489	**9312**	**8102**	**8966**	93.6
3 - PC&LCV	83	97	98	85	103	132	84	**93**	**108**	**97**	1.0
4 - BUS&MCV	433	333	386	376	406	315	277	**387**	**296**	**361**	3.8
5 - BUS&HCV1	37	42	30	43	50	27	9	**40**	**18**	**34**	0.4
6 - HCV1	20	16	24	23	17	11	10	**20**	**11**	**17**	0.2
7 - HCV1	16	17	20	27	23	22	16	**21**	**19**	**20**	0.2
8 - HCV2	2	3	3	3	6	4	1	**3**	**3**	**3**	0.0
9 - HCV2	2	1	5	0	2	0	0	**2**	**0**	**1**	0.0
10 - HCV2	1	2	1	1	1	2	0	**1**	**1**	**1**	0.0
11 - HCV2	7	4	3	0	4	1	0	**4**	**1**	**3**	0.0
12 - HCV2	3	5	6	4	1	1	2	**4**	**2**	**3**	0.0
13 - HCV2	2	0	2	0	1	1	0	**1**	**1**	**1**	0.0
14 - ???	21	26	21	15	32	19	23	**23**	**21**	**22**	0.2

Speed Statistics - PSL 50km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	38.7	37.7	37.9	37.1	37.4	37.4	38.2	**37.7**	**37.7**	**37.7**
Median	39.7	38.8	39.1	38.3	38.5	38.7	39.2	**38.9**	**39.0**	**38.9**
85%ile	45.5	44.6	44.7	44.3	44.5	44.7	45.3	**44.7**	**45.0**	**44.8**
95%ile	49.0	48.1	48.3	48.1	48.0	48.4	49.2	**48.3**	**48.8**	**48.4**
Mean >PSL	53.1	52.7	53.0	54.2	52.8	53.1	53.1	**53.2**	**53.1**	**53.2**
Number >PSL	317	261	286	271	256	283	302	**1391**	**585**	**1976**
Percent >PSL	3.5	2.7	2.8	2.6	2.4	3.0	3.8	**2.8**	**3.4**	**2.9**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0361A **Location:** [-43.301120 +172.613320]
Description: KIPPENBERGER AVE (A>B) 170m west of Golf Links Rd <80> @ 0.275
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 Tuesday, 13 October 2020 to 0:00 Tuesday, 20 October 2020 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	6018	6286	6262	6243	6726	6110	5161	31535	11271	42806
Days	1	1	1	1	1	1	1	5	2	7

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	9	3	7	3	12	21	15	**7**	**18**	**10**
0100	3	6	5	5	7	19	8	**5**	**14**	**8**
0200	0	1	4	4	5	10	10	**3**	**10**	**5**
0300	16	9	9	12	13	16	4	**12**	**10**	**11**
0400	15	16	12	13	12	16	11	**14**	**14**	**14**
0500	55	48	53	58	44	20	16	**52**	**18**	**42**
0600	95	107	92	94	92	34	29	**96**	**32**	**78**
0700	229	243	248	221	255	114	53	**239**	**84**	**195**
0800	452	509	433	508	437	269	150	**468**	**210**	**394**
0900	420	395	471	401	434	407	300	**424**	**354**	**404**
1000	385	442	456	386	462	536	438	**426**	**487**	**444**
1100	421	420	447	424	473	594	545	**437**	**570**	**475**
1200	478	452	447	423	500	648	581	**460**	**615**	**504**
1300	473	466	442	441	480	588	557	**460**	**573**	**492**
1400	497	476	502	518	592	488	524	**517**	**506**	**514**
1500	538	605	589	605	622	481	518	**592**	**500**	**565**
1600	579	608	614	610	609	488	366	**604**	**427**	**553**
1700	499	543	536	596	526	393	305	**540**	**349**	**485**
1800	329	353	351	337	423	327	246	**359**	**287**	**338**
1900	227	272	238	268	323	254	224	**266**	**239**	**258**
2000	155	169	149	175	190	155	164	**168**	**160**	**165**
2100	98	100	96	90	124	104	67	**102**	**86**	**97**
2200	36	30	39	33	57	81	21	**39**	**51**	**42**
2300	9	13	22	18	34	47	9	**19**	**28**	**22**
Total	**6018**	**6286**	**6262**	**6243**	**6726**	**6110**	**5161**	6307	5636	6115
								AWDT	AWET	ADT

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	452	509	471	508	473	594	545	**468**	**570**	**475**
AM Time	0800	0800	0900	0800	1100	1100	1100	**0800**	**1100**	**1100**
PM Total	579	608	614	610	622	648	581	**604**	**615**	**565**
PM Time	1600	1600	1600	1600	1500	1200	1200	**1600**	**1200**	**1500**
Day Total	579	608	614	610	622	648	581	**604**	**615**	**565**
Day Time	1600	1600	1600	1600	1500	1200	1200	**1600**	**1200**	**1500**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	23	26	17	9	24	22	45	**20**	**34**	**24**	0.4
2 - PC&LCV	5611	5857	5863	5873	6275	5798	4854	**5896**	**5326**	**5733**	93.8
3 - PC&LCV	89	74	77	77	107	93	83	**85**	**88**	**86**	1.4
4 - BUS&MCV	261	290	262	255	261	173	166	**266**	**170**	**238**	3.9
5 - BUS&HCV1	16	21	17	13	24	8	2	**18**	**5**	**14**	0.2
6 - HCV1	2	5	6	4	10	4	0	**5**	**2**	**4**	0.1
7 - HCV1	4	4	8	9	11	8	4	**7**	**6**	**7**	0.1
8 - HCV2	2	2	0	0	5	1	0	**2**	**1**	**1**	0.0
9 - HCV2	3	1	0	0	2	0	0	**1**	**0**	**1**	0.0
10 - HCV2	0	1	0	0	1	0	0	**0**	**0**	**0**	0.0
11 - HCV2	2	0	6	0	0	0	0	**2**	**0**	**1**	0.0
12 - HCV2	2	2	4	3	6	3	3	**3**	**3**	**3**	0.1
13 - HCV2	0	1	1	0	0	0	0	**0**	**0**	**0**	0.0
14 - ???	3	2	1	0	0	0	4	**1**	**2**	**1**	0.0

Speed Statistics - PSL 80km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	59.1	59.3	58.2	58.3	59.3	59.4	59.6	**58.8**	**59.5**	**59.0**
Median	58.5	58.7	57.4	57.6	58.6	58.7	59.0	**58.1**	**58.8**	**58.3**
85%ile	67.6	67.5	66.6	66.3	67.4	67.5	68.1	**67.0**	**67.8**	**67.2**
95%ile	73.5	73.4	72.0	72.3	72.8	73.6	74.0	**72.8**	**73.8**	**73.1**
Mean >PSL	86.0	86.1	87.3	85.8	85.4	86.7	86.5	**86.0**	**86.6**	**86.2**
Number >PSL	72	78	54	67	82	81	70	**353**	**151**	**504**
Percent >PSL	1.2	1.2	0.9	1.1	1.2	1.3	1.4	**1.1**	**1.3**	**1.2**

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0361B **Location:** [-43.302412 +172.603270]
Description: KIPPENBERGER AVE (A>B) 150m west of Watkins Pl <50> OS# 112
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 17 August, 2019 to 0:00 24 August, 2019 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	6608	6673	6782	6731	7504	6095	5599	34298	11694	45992
Days	1	1	1	1	1	1	1	5	2	7

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	2	4	4	5	13	17	22	6	20	10
0100	2	7	4	7	4	8	20	5	14	7
0200	3	2	1	3	8	5	8	3	7	4
0300	11	9	8	10	14	3	6	10	5	9
0400	19	15	20	16	14	7	6	17	7	14
0500	36	40	43	40	51	15	12	42	14	34
0600	129	104	113	115	127	27	26	118	27	92
0700	240	244	245	248	269	77	58	249	68	197
0800	502	533	528	542	510	224	148	523	186	427
0900	434	447	477	414	491	361	301	453	331	418
1000	409	459	472	445	535	541	485	464	513	478
1100	499	503	480	475	547	686	586	501	636	539
1200	519	468	495	446	531	628	640	492	634	532
1300	641	523	484	471	562	542	613	536	578	548
1400	474	543	524	559	585	497	610	537	554	542
1500	690	657	595	637	696	537	537	655	537	621
1600	696	616	592	698	683	516	482	657	499	612
1700	513	598	591	595	624	451	413	584	432	541
1800	327	352	456	405	497	348	253	407	301	377
1900	198	240	303	263	307	238	158	262	198	244
2000	143	155	168	180	192	105	101	168	103	149
2100	77	98	97	104	132	113	80	102	97	100
2200	31	37	58	35	70	92	23	46	58	49
2300	13	19	24	18	42	57	11	23	34	26
Total	6608	6673	6782	6731	7504	6095	5599	6860	5847	6570
								AWDT	AWET	ADT

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	502	533	528	542	547	686	586	523	636	539
AM Time	0800	0800	0800	0800	1100	1100	1100	0800	1100	1100
PM Total	696	657	595	698	696	628	640	657	634	621
PM Time	1600	1500	1500	1600	1500	1200	1200	1600	1200	1500
Day Total	696	657	595	698	696	686	640	657	636	621
Day Time	1600	1500	1500	1600	1500	1100	1200	1600	1100	1500

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	24	15	19	29	27	11	34	23	23	23	0.3
2 - PC&LCV	6193	6330	6433	6350	7108	5751	5341	6483	5546	6215	94.6
3 - PC&LCV	85	63	68	70	89	45	53	75	49	68	1.0
4 - BUS&MCV	237	211	207	228	231	256	145	223	201	216	3.3
5 - BUS&HCV1	27	23	25	15	13	14	14	21	14	19	0.3
6 - HCV1	11	9	6	9	14	5	3	10	4	8	0.1
7 - HCV1	5	5	6	5	3	3	1	5	2	4	0.1
8 - HCV2	1	2	2	1	0	0	0	1	0	1	0.0
9 - HCV2	2	2	1	3	2	0	1	2	1	2	0.0
10 - HCV2	0	0	0	2	1	0	0	1	0	0	0.0
11 - HCV2	10	7	9	10	9	0	0	9	0	6	0.1
12 - HCV2	6	3	2	1	2	1	2	3	2	2	0.0
13 - HCV2	0	1	0	0	0	0	0	0	0	0	0.0
14 - ???	7	2	4	8	5	9	5	5	7	6	0.1

Speed Statistics - PSL 50km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	51.0	50.8	51.0	50.8	51.0	52.1	51.5	50.9	51.8	51.1
Median	51.1	50.7	50.9	50.7	50.9	52.0	51.4	50.9	51.8	51.0
85%ile	55.8	55.5	55.8	55.5	55.6	57.0	56.3	55.6	56.7	56.0
95%ile	59.8	59.2	59.4	59.5	59.3	60.3	59.9	59.4	60.1	59.7
Mean >PSL	54.3	54.2	54.2	54.1	54.1	54.7	54.5	54.2	54.6	54.3
Number >PSL	3949	3769	4003	3839	4408	4133	3502	19968	7635	27603
Percent >PSL	59.8	56.5	59.0	57.0	58.7	67.8	62.5	58.2	65.3	60.0

Agfirst MetroCount Traffic Executive
Traffic Summary - Combined

Site: 0545G **Location:** [-43.303207 +172.623555]
Description: RANGIORA WOODEND RD (A>B) 400m east of Golf Links Rd <80> @ 4.566
Profile: NZTA2011 Cls(1-14) Dir(NESW) Sp(0,160) Headway(>0) Span(0 - 100) Lane(0-16)
Duration: 0:00 Wednesday, May 19, 2021 to 0:00 Wednesday, May 26, 2021 (7 days)
Created by MTE version 4.0.9.0

Grand Total

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Volume	**6803**	**7269**	**7664**	**7641**	**8083**	**7441**	**5990**	**37460**	**13431**	**50891**
Days	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**2**	**7**

Average Volume

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
0000	11	5	7	10	12	22	70	**9**	**46**	**20**
0100	2	8	10	8	11	8	21	**8**	**15**	**10**
0200	2	4	6	7	7	8	12	**5**	**10**	**7**
0300	11	14	11	13	11	11	8	**12**	**10**	**11**
0400	14	17	18	13	10	13	14	**14**	**14**	**14**
0500	57	47	46	43	55	18	14	**50**	**16**	**40**
0600	138	136	162	160	133	46	24	**146**	**35**	**114**
0700	327	328	324	323	322	119	45	**325**	**82**	**255**
0800	521	593	542	584	550	343	183	**558**	**263**	**474**
0900	479	508	505	476	492	522	334	**492**	**428**	**474**
1000	471	444	479	472	604	697	441	**494**	**569**	**515**
1100	466	520	503	505	568	722	640	**512**	**681**	**561**
1200	516	537	541	549	553	717	643	**539**	**680**	**579**
1300	469	510	561	533	643	723	632	**543**	**678**	**582**
1400	546	620	631	610	660	688	616	**613**	**652**	**624**
1500	666	656	712	710	814	598	616	**712**	**607**	**682**
1600	708	696	779	834	863	579	540	**776**	**560**	**714**
1700	629	639	752	702	669	542	465	**678**	**504**	**628**
1800	301	387	416	445	437	382	268	**397**	**325**	**377**
1900	184	232	289	304	254	250	181	**253**	**216**	**242**
2000	156	186	181	165	174	147	123	**172**	**135**	**162**
2100	73	123	125	109	133	136	60	**113**	**98**	**108**
2200	40	43	47	47	72	86	27	**50**	**57**	**52**
2300	16	16	17	19	36	64	13	**21**	**39**	**26**
Total	**6803**	**7269**	**7664**	**7641**	**8083**	**7441**	**5990**	**7492**	**6716**	**7270**
								AWDT	**AWET**	**ADT**

Average Peaks

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
AM Total	521	593	542	584	604	722	640	**558**	**681**	**561**
AM Time	0800	0800	0800	0800	1000	1100	1100	**0800**	**1100**	**1100**
PM Total	708	696	779	834	863	723	643	**776**	**680**	**714**
PM Time	1600	1600	1600	1600	1600	1300	1200	**1600**	**1200**	**1600**
Day Total	708	696	779	834	863	723	643	**776**	**681**	**714**
Day Time	1600	1600	1600	1600	1600	1300	1200	**1600**	**1100**	**1600**

Average Daily Classes

Class	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days	%
1 - MC&PC	9	17	15	21	10	46	32	**14**	**39**	**21**	0.3
2 - PC&LCV	6147	6560	6910	6916	7381	6814	5509	**6783**	**6162**	**6605**	90.9
3 - PC&LCV	92	81	86	108	105	105	81	**94**	**93**	**94**	1.3
4 - BUS&MCV	168	173	201	182	184	115	92	**182**	**104**	**159**	2.2
5 - BUS&HCV1	303	350	381	318	334	302	237	**337**	**270**	**318**	4.4
6 - HCV1	21	15	14	18	11	8	6	**16**	**7**	**13**	0.2
7 - HCV1	7	4	4	8	7	12	6	**6**	**9**	**7**	0.1
8 - HCV2	12	14	11	11	7	7	8	**11**	**8**	**10**	0.1
9 - HCV2	9	6	8	8	3	1	0	**7**	**1**	**5**	0.1
10 - HCV2	1	1	1	0	0	0	0	**1**	**0**	**0**	0.0
11 - HCV2	7	11	3	7	3	0	1	**6**	**1**	**5**	0.1
12 - HCV2	1	4	0	4	2	1	2	**2**	**2**	**2**	0.0
13 - HCV2	6	6	4	5	2	0	0	**5**	**0**	**3**	0.0
14 - ???	20	27	26	35	34	30	16	**28**	**23**	**27**	0.4

Speed Statistics - PSL 80km/h

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Weekend	All Days
Mean	76.8	76.8	76.8	77.0	76.7	77.6	77.7	**76.8**	**77.6**	**77.0**
Median	77.0	77.0	76.8	77.1	76.9	77.4	77.5	**77.0**	**77.4**	**77.0**
85%ile	82.4	82.8	82.8	83.1	82.8	83.6	83.6	**82.8**	**83.6**	**83.0**
95%ile	87.2	87.2	87.0	87.4	87.1	88.3	88.1	**87.1**	**88.2**	**87.4**
Mean >PSL	84.1	84.2	84.3	84.3	84.3	84.5	84.6	**84.2**	**84.5**	**84.3**
Number >PSL	1919	2141	2162	2312	2342	2451	1964	**10876**	**4415**	**15291**
Percent >PSL	28.2	29.5	28.2	30.3	29.0	32.9	32.8	**29.0**	**32.9**	**30.0**

Waimakariri District Council Metrocount Report
Weekly Event Counts (Virtual Week)

VirtWeeklyEvent-290 -- English (ENZ)

Datasets:

Site:	**[0414A] MARCHMONT RD 600m north of Golf Links Rd <100> @ 0.376**
Attribute:	[-43.295957 +172.618333]
Input A:	7 - North/South. - Lane= 1, Added to totals. (/2.000)
Input B:	0 - Unused or unknown. - Lane= 0, Excluded from totals.
Survey Duration:	11:22 Tuesday, 26 June 2018 => 10:26 Wednesday, 11 July 2018,
Zone:	
File:	0414A 0 2018-07-11 1026.EC1 (Plus)
Identifier:	S055SF0B MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Event Count (v4.08)
Data type:	Axle sensors - Separate (Count)

Profile:

Filter time:	**11:22 Tuesday, 26 June 2018 => 10:26 Wednesday, 11 July 2018 (14.9611)**
Separation:	GapX > 0 sec
Name:	Default Profile
Scheme:	Count events divided by setup divisor
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Events = 2109 / 2109 (100.00%)

Weekly Event Counts (Virtual Week)

VirtWeeklyEvent-290
Site: 0414A.1.0NS
Description: **MARCHMONT RD 600m north of Golf Links Rd <100> @ 0.376**
Filter time: **11:22 Tuesday, 26 June 2018 => 10:26 Wednesday, 11 July 2018**
Scheme: Count events divided by setup divisor
Filter: GapX(>0) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	1 - 7
Hour									
0000-0100	0.0	0.0	0.0	0.0	1.5	1.3	0.5	0.3	0.4
0100-0200	0.0	0.5	0.0	0.0	1.5	0.0	2.0	0.4	0.5
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.1	0.1
0400-0500	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1
0500-0600	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.1	0.1
0600-0700	2.0	3.0	1.7	3.8	3.0	1.5	1.0	2.5	2.2
0700-0800	7.8	5.0	9.7	9.3	12.0	2.5	1.5	8.7	6.9
0800-0900	4.5	6.0	5.8	7.0	6.5	2.5	1.5	5.9	4.9
0900-1000	6.5	**12.8**	8.7	**11.3**	6.0	10.0	5.5	8.9	8.6
1000-1100	**16.0**	11.3	**13.0**	9.3	10.5	13.0	10.5	**12.0**	11.9
1100-1200	6.5	9.3	7.8	10.5	**16.0**	**25.0**	**10.5**	9.9	**12.0**
1200-1300	10.5	9.5	8.5	14.8	16.0	12.5	9.0	11.5	11.3
1300-1400	12.8	14.8	15.0	13.8	15.0	**19.5**	11.3	14.2	14.5
1400-1500	7.0	11.2	18.5	14.8	**18.3**	9.8	**13.0**	13.5	12.9
1500-1600	9.0	**18.2**	6.0	**17.5**	13.0	12.5	10.3	13.2	12.7
1600-1700	**13.0**	15.5	**20.3**	15.8	11.5	17.0	12.3	**15.1**	**14.9**
1700-1800	10.0	10.7	6.0	11.8	12.0	6.8	6.0	10.1	9.1
1800-1900	4.5	3.0	7.0	8.0	7.0	9.8	4.5	5.6	6.0
1900-2000	4.3	2.8	2.0	7.5	9.5	4.0	1.5	4.9	4.3
2000-2100	1.5	2.0	2.5	3.0	5.5	3.0	1.0	2.8	2.6
2100-2200	4.0	1.3	2.5	1.0	2.0	2.8	0.5	2.1	1.9
2200-2300	0.5	0.7	1.0	1.5	3.0	1.0	0.0	1.3	1.1
2300-2400	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.1	

0.2								
Totals								
0700-1900	108.0	127.2	126.2	143.5	143.8	140.8	95.8	128.7
125.7								
0600-2200	119.8	136.3	134.8	158.8	163.8	152.0	99.8	141.1
136.8								
0600-0000	120.3	137.0	135.8	160.3	167.3	154.0	99.8	142.5
138.1								
0000-0000	120.3	137.5	135.8	161.3	170.3	155.3	103.8	143.3
139.3								
AM Peak	1000	0900	1000	0900	1100	1100	1100	
	16.0	12.8	13.0	11.3	16.0	25.0	10.5	
PM Peak	1600	1500	1600	1500	1400	1300	1400	
	13.0	18.2	20.3	17.5	18.3	19.5	13.0	

*** - No data.**

Appendix B
Turn Volumes

Time Period	Kippenberger Avenue (Eastbound)			Golf Links Road (Southbound)			Rangiora Woodend Road (Westbound)			Subtotal
	Left	Thru	U-Turn	Left	Right	U-Turn	Thru	Right	U-Turn	
07:30 – 08:30	9	126	0	60	6	0	210	36	0	**447**
14:30 – 15:30	20	214	0	32	17	0	262	48	0	**593**
17:00 – 18:00	8	278	0	26	4	0	247	116	0	**679**
Subtotal	**37**	**618**	**0**	**118**	**27**	**0**	**719**	**200**	**0**	**1719**

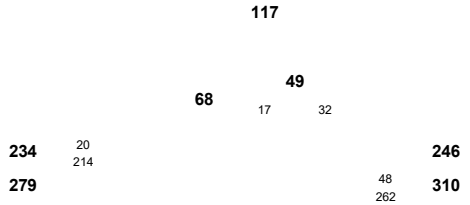
Study Name 00902 Rangiora Woodend/Golf Links/Kippenberger
Start Date 04/04/2016
Start Time 2:30 PM
Site Code 00902 Rangiora Woodend/Golf Links/Kippenberger
Project Waimakariri DC

Type Road
Classification Totals

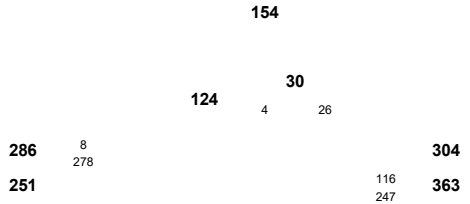
	A2 Golf Links SBD Southbound							A3 Rangiora Woodend WBD Westbound							A1 Kippenberger EBD Eastbound						
Start Time	Hard Left	Left	Bear Left	Thru	Bear Right	Right	Hard Right	U-Turn	Hard Left	Left	Bear Left	Thru	Bear Right	Right	Hard Right	U-Turn	Hard Left	Left	Bear Left	Thru	Bear Right	Right	Hard Right	U-Turn
2:30 PM		6				1		0				49		4		0		5		43				0
2:45 PM		4				3		0				52		16		0		6		54				0
3:00 PM		8				6		0				75		13		0		4		52				0
3:15 PM		14				7		0				86		15		0		5		65				0
Hour Total		**32**				**17**		**0**				**262**		**48**		**0**		**20**		**214**				**0**
5:00 PM		5				2		0				62		35		0		6		92				0
5:15 PM		8				0		0				72		24		0		1		80				0
5:30 PM		8				2		0				45		33		0		0		63				0
5:45 PM		5				0		0				68		24		0		1		43				0
Hour Total		**26**				**4**		**0**				**247**		**116**		**0**		**8**		**278**				**0**
7:30 AM		10				2		0				41		9		0		2		24				0
7:45 AM		19				2		0				58		11		0		2		36				0
8:00 AM		16				2		0				52		9		0		1		29				0
8:15 AM		15				0		0				59		7		0		4		37				0
Hour Total		**60**				**6**		**0**				**210**		**36**		**0**		**9**		**126**				**0**

00902 Rangiora Woodend/Golf Links/Kippenberger

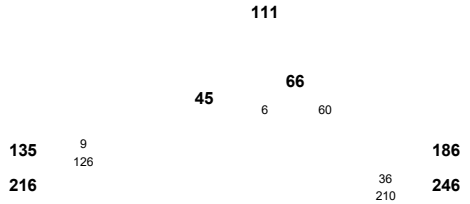
1430 to 1530



1700 to 1800



0730 to 0830



Appendix C
Crash Analysis

CODED CRASH ID	Crash road	FEATURE	Distance	Direction	Side road	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor
1013329	EAST BELT			150 S	COLDSTREAM ROAD	172.598068	-43.292702	201417204	18/10/2014	Sat	13:39	Car/Wagon1 NDB on EAST BELT lost control turning left, Car/Wagon1 hit non specific fence, non specific tree	CAR/WAGON1, alcohol test above limit or test refused, lost control when turning, new driver/under instruction, speed entering corner/curve	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	1
1125803	WALES ST	RAIL XING		40 N		172.597565	-43.296455	201739484	8/05/2017	Mon	8:47	Car/Wagon1 EDB on Wales hit Car/Wagon2 turning right onto AXROAD from the left	CAR/WAGON2, didnt look/notice other party - visibility obstruc, failed to give way entering roadway from driveway	Wet	Bright sun	Fine	Driveway	Nil	0	0	0
981925	COLDSTREAM ROAD			I	EAST BELT	172.597748	-43.291374	201321148	9/02/2013	Sat	15:10	SUV1 EDB on COLDSTREAM ROAD hit Car/Wagon2 crossing at right angle from right	CAR/WAGON2, alcohol test below limit, did not stop at stop sign, failed to notice control	Dry	Bright sun	Fine	Crossroads	Stop	0	0	1
1041777	EAST BELT			I	COLDSTREAM ROAD	172.597748	-43.291374	201515834	15/08/2015	Sat	10:05	SUV1 NDB on EAST BELT hit Car/Wagon2 crossing at right angle from right, SUV1 hit non specific kerb, non specific pole, non specific other,	SUV1, did not stop at stop sign	Wet	Overcast	Heavy rain	Crossroads	Stop	0	0	1
1009233	EAST BELT			I	COLDSTREAM ROAD	172.597748	-43.291374	201412990	11/05/2014	Sun	12:30	Car/Wagon1 NDB on EAST BELT hit SUV2 crossing at right angle from right	CAR/WAGON1, did not stop at stop sign, new driver/under instruction	Dry	Bright sun	Fine	Crossroads	Stop	0	0	2
944083	GRANT PLACE			40 N	HIGH ST	172.598831	-43.302582	201172429	11/08/2011	Thu	13:40	Car/Wagon1 SDB on GRANT PLACE hit Truck2 manoeuvring	TRUCK2, other inattentive CAR/WAGON1, other inattentive	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	0
921041	EAST BELT			130 S	WALES ST	172.599152	-43.29744	201121214	2/02/2011	Wed	8:55	Bus1 SDB on EAST BELT hit Pedestrian2 (Age 16)	BUS1, attention diverted by other traffic, too far left	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	1
1274242	WALES STREET			I	EAST BELT	172.598796	-43.296299	2021181056	16/02/2021	Tue	11:18	Car/Wagon1 NDB on EAST BELT lost control turning left; went off road to right, Car/Wagon1 hit traffic sign, parked (unattended) vehicle	CAR/WAGON1, alcohol test below limit, speed entering corner/curve, swung wide at intersection	Dry	Bright sun	Fine	T Junction	Give way	0	0	0
981904	HIGH ST			100 W	EAST BELT	172.599289	-43.302891	201321127	3/01/2013	Thu	14:20	Car/Wagon1 WDB on HIGH ST hit Pedestrian2 (Age 12) crossing road from left side	PEDESTRIAN2, pedestrian running across, heedless of traffic	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	1
1166626	HIGH ST	RAIL XING		50 E		172.598846	-43.30294	201840907	30/05/2018	Wed	14:50	Car/Wagon1 EDB on HIGH STREET, RANGIORA, WAIMAKARIRI lost control turning left, Car/Wagon1 hit non specific pole, non	CAR/WAGON1, alcohol test below limit, other steering	Dry	Bright sun	Fine	Driveway	Nil	0	0	0
1046954	EAST BELT			50 S	KEIR ST	172.600098	-43.3013	201531378	4/02/2015	Wed	15:20	Car/Wagon1 SDB on EAST BELT hit Car/Wagon2 parking	CAR/WAGON2, did not check/notice another party behind	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0
1004881	EAST BELT			I	HIGH ST	172.600494	-43.302731	201371742	1/07/2013	Mon	11:00	Car/Wagon1 EDB on EAST BELT hit Car/Wagon2 crossing at right angle from right	CAR/WAGON1, failed to give way at priority traffic control	Dry	Bright sun	Fine	Crossroads	Stop	0	0	0
982475	HIGH ST			I	EAST BELT	172.600494	-43.302731	201321700	23/04/2013	Tue	7:30	SUV1 WDB on HIGH ST hit Car/Wagon2 crossing at right angle from right	CAR/WAGON2, attention diverted by passengers, did not stop at stop sign, ENV:	Dry	Bright sun	Fine	Crossroads	Stop	0	0	1
1066206	KIPPENBERGER AVENUE			70 E	EAST BELT	172.601349	-43.302616	201552338	8/12/2015	Tue	15:10	Cycle1 WDB on KIPPENBERGER AVENUE hit Car/Wagon2 doing driveway manoeuvre	CYCLE1, did not check/notice another party from other dirn, driving or riding in pedestrian space	Dry	Bright sun	Null	Nil (Default)	Unknown	0	0	0
974839	KIPPENBERGER AVENUE			I	EAST BELT	172.600494	-43.302731	201272478	22/08/2012	Wed	19:10	Car/Wagon1 WDB on KIPPENBERGER AVENUE hit Car/Wagon2 crossing at right angle from right	CAR/WAGON2, did not check/notice another party from other dirn, failed to give way at priority traffic control	Dry	Dark	Fine	Crossroads	Stop	0	0	0
1224682	KIPPENBERGER AVENUE			I	EAST BELT	172.600582	-43.302689	2020149297	23/03/2020	Mon	10:20	Car/Wagon1 WDB on KIPPENBERGER AVENUE hit Cyclist2 (Age 66) crossing at right angle from right	CAR/WAGON1, did not check/notice another party from other dirn, failed to give way at priority traffic control, other inattentive	Dry	Overcast	Fine	Roundabout	Give way	0	1	0
1099136	KIPPENBERGER AVENUE			I	EAST BELT	172.600494	-43.302731	201651256	1/11/2016	Tue	1:40	SUV1 EDB on High Street lost control turning right, SUV1 hit non specific traffic island	SUV1, alcohol test above limit or test refused, lost control when turning, speed entering corner/curve	Dry	Dark	Fine	Roundabout	Give way	0	0	0
975642	KIPPENBERGER AVENUE			10 E	EAST BELT	172.600616	-43.302715	201273285	31/10/2012	Wed	9:50	Car/Wagon1 WDB on KIPPENBERGER AVENUE hit SUV2 parking/unparking	SUV2, blind spot, did not check/notice another party behind	Dry	Bright sun	Fine	Crossroads	Stop	0	0	0
1127861	KIPPENBERGER AVENUE			I	EAST BELT	172.600494	-43.302731	201741582	17/05/2017	Wed	8:20	Car/Wagon1 WDB on Kippenberger Ave hit rear end of Truck2 stop/slow for cross traffic	CAR/WAGON1, misjudged another vehicle	Wet	Overcast	Light rain	Roundabout	Give way	0	0	0
943402	KIPPENBERGER AVENUE			20 E	EAST BELT	172.600739	-43.302696	201171747	14/07/2011	Thu	9:00	SUV1 EDB on KIPPENBERGER AVENUE overtaking Car/Wagon2	SUV1, emotionally upset/road rage, intentional collision	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0
1125790	HIGH ST			50 W	EAST BELT	172.599884	-43.302811	201739471	4/05/2017	Thu	21:48	Car/Wagon1 WDB on High street lost control; went off road to left, Car/Wagon1 hit non specific kerb, non specific pole	CAR/WAGON1, attention diverted by cell phone, too far left CAR/WAGON1, speed on straight	Wet	Dark	Light rain	Nil (Default)	Unknown	0	0	0
1091786	HIGH ST			I	EAST BELT	172.600494	-43.302731	201643849	16/07/2016	Sat	11:53	Car/Wagon1 EDB on High street Rangiora hit Car/Wagon2 merging from the right	CAR/WAGON2, did not check/notice another party from other dirn, failed to give way turning to non-turning	Dry	Bright sun	Fine	Roundabout	Give way	0	0	0

1156869	EAST BELT		I	KIPPENBERGER AVENUE	172.600494	-43.302731	201831096	25/01/2018	Thu	9:00	VEHB turning right hit by oncoming SUV1 SDB on East belt	SUV1, did not check/notice another party from other dirn, failed to give way at priority traffic control	Dry	Overcast	Fine	Roundabout	Give way	0	0	0
1166222	HIGH ST		I	EAST BELT	172.600494	-43.302731	201840500	1/06/2018	Fri	18:55	Car/Wagon1 EDB on CORNER HIGH STREET AND KIPPENBERGER AVENUE, RANGIORA 7400 hit Car/Wagon2 crossing at right angle from right	CAR/WAGON1, alcohol test below limit, did not check/notice another party from other dirn, failed to give way at priority traffic control, new driver/under instruction	Dry	Dark	Fine	Roundabout	Give way	0	0	0
1005780	HIGH ST	50	W	EAST BELT	172.599884	-43.302811	201372648	30/09/2013	Mon	15:55	Cycle1 EDB on HIGH ST hit SUV2 manoeuvring Car/Wagon1 EDB on	CYCLE1, driving or riding in pedestrian space, ENV: entering or leaving private house /	Dry	Bright sun	Fine	Driveway	Nil	0	0	0
954784	HIGH ST		I	EAST BELT	172.600494	-43.302731	201222763	5/10/2012	Fri	14:09	HIGH ST cutting corner hit Car/Wagon2 head	CAR/WAGON1, cutting corner at intersection	Dry	Overcast	Fine	Crossroads	Stop	0	1	1
1017062	EAST BELT		I	KIPPENBERGER AVENUE	172.600494	-43.302731	201431970	12/02/2014	Wed	12:45	Car/Wagon1 NDB on EAST BELT hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON1, failed to notice car slowing, stopping/stationary, misjudged intentions of another party	Dry	Bright sun	Fine	Crossroads	Stop	0	0	0
943924	KIPPENBERGER AVENUE	110	E	EAST BELT	172.601822	-43.302555	201172270	19/07/2011	Tue	8:30	Car/Wagon1 EDB on KIPPENBERGER AVENUE hit Car/Wagon2 U-turning from same direction of travel	CAR/WAGON2, did not check/notice another party behind	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0
1003489	KIPPENBERGER AVENUE	120	E	EAST BELT	172.601944	-43.30254	201370343	18/02/2013	Mon	8:55	Truck1 EDB on KIPPENBERGER AVENUE hit obstruction, Truck1 hit non specific other	TRUCK1, misjudged own vehicle	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0
945364	KIPPENBERGER AVENUE	40	W	WATKINS PLACE	172.60463	-43.302189	201173712	27/12/2011	Tue	5:45	Van1 WDB on KIPPENBERGER AVENUE hit Car/Wagon2 manoeuvring, Van1 hit non specific parked	VAN1, misjudged own vehicle, stolen vehicle	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0
1006615	KIPPENBERGER AVENUE	10	W	WATKINS PLACE	172.604996	-43.302143	201410170	15/01/2014	Wed	9:50	Car/Wagon1 EDB on KIPPENBERGER AVENUE lost control; went off road to left, Car/Wagon1 hit non specific tree	CAR/WAGON1, sudden illness	Dry	Bright sun	Fine	T Junction	Nil	0	0	1
1098323	KIPPENBERGER AVENUE	100	E	WATKINS PLACE	172.606323	-43.301968	201650438	15/10/2016	Sat	7:00	Car/Wagon1 WDB on Kippenberger Avenue lost control but did not leave the road	CAR/WAGON1, other lost control, other tyres	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	0
1248530	KIPPENBERGER AVENUE	95	E	DEVLIN AVENUE	172.613723	-43.301017	2020171661	29/11/2020	Sun	4:10	Car/Wagon1 WDB on KIPPENBERGER AVENUE lost control; went off road to left, Car/Wagon1 hit tree	CAR/WAGON1, alcohol suspected, drugs suspected, too far left	Dry	Dark	Fine	Nil (Default)	Unknown	0	0	1
1267688	KIPPENBERGER AVENUE		I	DEVLIN AVENUE	172.612595	-43.301162	2020173472	19/12/2020	Sat	10:45	Left scene1 WDB on KIPPENBERGER AVENUE hit Ute2 turning right onto AXROAD from the left	UTE2, alcohol test below limit LEFT SCENE1, other overtaking	Dry	Bright sun	Fine	T Junction	Give way	0	0	0
1008837	KIPPENBERGER AVENUE		I	DEVLIN AVENUE	172.61261	-43.301151	201412591	1/01/2014	Wed	23:00	Car/Wagon1 NDB on KIPPENBERGER AVENUE missed intersection or end of road, Car/Wagon1 hit non specific fence	CAR/WAGON1, alcohol test above limit or test refused, failed to notice control, speed on straight	Dry	Dark	Fine	T Junction	Give way	0	0	1
1037070	KIPPENBERGER AVENUE		I	DEVLIN AVENUE	172.61261	-43.301151	201510789	23/01/2015	Fri	17:25	Truck1 EDB on KIPPENBERGER AVENUE lost control; went off road to left, Truck1 hit non specific tree	TRUCK1, attention diverted by food, cigarettes, beverages, other lost control, swerved to avoid	Dry	Bright sun	Fine	T Junction	Give way	0	1	0
1071304	COLDSTREAM ROAD		I	GOLF LINKS ROAD	172.613907	-43.289612	201612899	6/05/2016	Fri	17:05	Car/Wagon1 NDB on COLDSTREAM ROAD hit Car/Wagon2 crossing at right angle from right, Car/Wagon1 hit non specific fence, non specific traffic sign	CAR/WAGON1, did not stop at stop sign	Dry	Twilight	Fine	Crossroads	Stop	0	0	1
1041688	GOLF LINKS ROAD		I	COLDSTREAM ROAD	172.613907	-43.289612	201515745	26/07/2015	Sun	12:36	SUV1 WDB on GOLF LINKS ROAD hit SUV2 crossing at right angle from right, SUV1 hit non specific parked	SUV2, alcohol suspected, failed to give way at priority traffic control	Dry	Bright sun	Fine	Crossroads	Stop	0	0	1
1004728	GOLF LINKS ROAD	25	S	COLDSTREAM ROAD	172.613968	-43.289829	201371587	18/06/2013	Tue	13:30	Car/Wagon1 NDB on GOLF LINKS ROAD changing lanes to left hit Car/Wagon2	CAR/WAGON1, cut in after overtaking	Dry	Overcast	Fine	Crossroads	Stop	0	0	0
944973	COLDSTREAM ROAD		I	GOLF LINKS ROAD	172.613907	-43.289612	201173320	19/11/2011	Sat	4:00	Car/Wagon1 NDB on COLDSTREAM ROAD missed intersection or end of road, Car/Wagon1 hit non specific traffic sign, non specific ditch	CAR/WAGON1, alcohol suspected, failed to notice control, speed on straight	Dry	Dark	Fine	Crossroads	Stop	0	0	0
1237508	COLDSTREAM ROAD	251	E	GOLF LINKS ROAD	172.616955	-43.289343	2020157449	7/07/2020	Tue	16:09	Car/Wagon1 WDB on COLDSTREAM ROAD, RANGIORA, WAIMAKARIRI lost control; went off road to left, Car/Wagon1 hit fence	CAR/WAGON1, alcohol test below limit, attention diverted by passengers, too far left	Wet	Twilight	Fine	Nil (Default)	Nil	0	0	1
1005791	COLDSTREAM ROAD		I	GOLF LINKS ROAD	172.613907	-43.289612	201372659	18/09/2013	Wed	20:40	Car/Wagon1 SDB on COLDSTREAM ROAD hit Car/Wagon2 crossing at right angle from right	CAR/WAGON1, speed approaching a traffic control	Dry	Dark	Fine	Crossroads	Stop	0	0	0

1257759	KIPPENBERGER AVENUE	I	GOLF LINKS ROAD	172.616532	-43.300756	2020165692	3/10/2020	Sat	21:30	Car/Wagon1 EDB on KIPPENBERGER AVENUE hit Car/Wagon2 turning right onto AXROAD from the left	CAR/WAGON2, alcohol test below limit, did not check/notice another party from other dirn, failed to give way at priority traffic control, new driver/under instruction CAR/WAGON1, alcohol test below limit	Dry	Dark	Fine	T Junction	Give way	0	0	0
1005940	KIPPENBERGER AVENUE	I	GOLF LINKS ROAD	172.616592	-43.300636	201372808	11/10/2013	Fri	17:00	Car/Wagon1 EDB on KIPPENBERGER AVENUE hit Car/Wagon2 turning right onto AXROAD from the left	CAR/WAGON2, failed to give way at priority traffic control	Dry	Bright sun	Fine	T Junction	Give way	0	0	0
973994	RANGIORA WOODEND ROAD	I	GOLF LINKS ROAD	172.616592	-43.300636	201271631	19/06/2012	Tue	9:35	Car/Wagon1 EDB on RANGIORA WOODEND ROAD lost control turning right, Car/Wagon1 hit non specific fence	CAR/WAGON1, lost control when turning	Wet	Overcast	Mist or Fog	T Junction	Give way	0	0	0

NZ TRANSPORT AGENCY WAKA KOTAHI CAS

Bellgrove Stage 1

Saved sites

Bellgrove

Crash year

2011 — 2021

Site details report

Fatal crashes: 0 | **Injury crashes:** 16 | **Non-injury crashes:** 29 | **Total crashes:** 45

Overall crash statistics

Crash severity

Crash severity	Number	%	Social cost $(m)
Fatal	0	0	0
Serious	3	6.67	3.00
Minor-injury	13	28.89	1.35
Non-injury	29	64.44	0.88
TOTAL	45	100	5.23

Crash numbers

Year	Fatal	Serious	Minor	Non-injury
2011	0	0	1	5
2012	0	1	0	3
2013	0	0	3	6
2014	0	0	4	1
2015	0	1	2	2
2016	0	0	1	3
2017	0	0	0	3
2018	0	0	0	3
2020	0	1	2	2
2021	0	0	0	1
TOTAL	0	3	13	29
Percent	0	6.66	28.88	64.44

Crash type and cause statistics

Overall casualty statistics

Injury severity

Injury severity	Number	% all casualties
Fatal	0	0.00
Serious Injured	3	16.67
Minor Injured	15	83.33
TOTAL	18	100.00

Casualty numbers

Year	Fatal	Serious Injured	Minor Injured
2011	0	0	1
2012	0	1	1
2013	0	0	3
2014	0	0	5
2015	0	1	2
2016	0	0	1
2017	0	0	0
2018	0	0	0
2019	0	0	0
2020	0	1	2
2021	0	0	0
TOTAL	0	3	15
Percent	0.00	16.67	83.33

Note: Last 5 years of crashes shown (unless query includes specific date range).

Crash type

Crash type	Crash numbers	% All crashes
Overtaking crashes	2	4.44
Straight road lost control/head on	6	13.33
Bend - lost control/Head on	8	17.78
Rear end/obstruction	10	22.22
Crossing/turning	17	37.78
Pedestrian crashes	2	4.44
Miscellaneous crashes	0	0
TOTAL	45	100

Casualty types

Casualty types	Fatalities	Serious injuries	Minor injuries
Cyclists	0	1	0
Drivers	0	1	10
Motorcycle pillions	0	0	0
Motorcycle riders	0	0	0
Passengers	0	1	3
Pedestrians	0	0	2
Other	0	0	0
TOTAL	0	3	15

Note: Motorcycle stats include Mopeds.

Driver and vehicle statistics

Drivers at fault or part fault in injury crashes - by age

Age	Male	Female	Unknown	Total	Percentage (%)
0-4	0	0	0	0	0.00
5-9	0	0	0	0	0.00
10-14	0	0	0	0	0.00
15-19	4	1	0	5	35.71
20-24	0	1	0	1	7.14
25-29	1	1	0	2	14.29
30-34	1	1	0	2	14.29
35-39	0	0	0	0	0.00
40-44	0	0	0	0	0.00
45-49	0	0	0	0	0.00
50-54	2	0	0	2	14.29
55-59	0	1	0	1	7.14
60-64	0	0	0	0	0.00
65-69	0	0	0	0	0.00
70-74	0	0	0	0	0.00
75-79	0	0	0	0	0.00
80-84	0	0	0	0	0.00
85-89	1	0	0	1	7.14
90-94	0	0	0	0	0.00
95-99	0	0	0	0	0.00
100+	0	0	0	0	0.00
Unknown	0	0	0	0	0.00
TOTAL	9	5	0	14	-
Percent	64.29	35.71	0.00	100.00	-

Note: Driver information is not calculated for non-injury crashes.

Crash factors

Crash factors	Crash numbers	% All crashes
#N/A	8	17.78
Alcohol	6	13.33
Disabled, old age or illness	1	2.22
Failed to give way or stop	15	33.33
Fatigue	0	0.00
Incorrect lanes or position	6	13.33
Miscellaneous factors	3	6.67
Overtaking	2	4.44
Pedestrian factors	1	2.22
Poor handling	5	11.11
Poor judgement	8	17.78
Poor observation	22	48.89
Position on Road	2	4.44
Road factors	0	0.00
Travel Speed	7	15.56
Unknown	0	0.00
Vehicle factors	3	6.67
Weather	1	2.22
TOTAL	90	200.00

Crashes with:

Factor groups	Crash numbers	% All crashes
All road user factors	18	40.00
Driver only factors	39	86.67
Pedestrian factors	1	2.22
Vehicle factors	3	6.67
Road factors	0	0.00
Environment factors	1	2.22
No identifiable factors	0	0.00
Retired codes - no future use	3	6.67
TOTAL	65	144.44

Notes: Factors are counted once against a crash - i.e. two fatigued drivers count as one fatigue crash factor.

Driver/vehicle factors are not available for non-injury crashes for Northland, Auckland, Waikato and Bay of Plenty before 2007. This will influence numbers and percentages.

% represents the % of crashes in which the cause factor appears.

Number of parties in crash

Party type	All crashes	% All crashes
Single party	13	28.89
Multiple party, including pedestrian	2	4.44
Multiple party, excluding pedestrian	30	66.67
TOTAL	45	100

Drivers at fault or part fault in injury crashes - by licence

Licence	Male	Female	Unknown	Total	Percentage (%)
Full	7	1	0	8	57.14
Learner	2	1	0	3	21.43
Restricted	0	3	0	3	21.43
Overseas	0	0	0	0	0.00
Wrong class	0	0	0	0	0.00
Never Licensed	0	0	0	0	0.00
Unknown	0	0	0	0	0.00
Forbidden	0	0	0	0	0.00
TOTAL	9	5	0	14	-
Percent	64.29	35.71	0.00	100.00	-

Note: Driver information is not calculated for non-injury crashes.

Vehicles involved in injury crashes (vehicle count)

Vehicle type	No. of vehicles	% of vehicles in injury crashes
Unknown	0	0.00
Car/Wagon	15	60.00
SUV	7	28.00
Van	0	0.00
Ute	0	0.00
Truck	1	4.00
Truck HPMV	0	0.00
Bus	1	4.00
Motorcycle	0	0.00
Moped	0	0.00
Train	0	0.00
Cycle	1	4.00
Other	0	0.00
Unknown	0	0.00
50 Max	0	0.00
Left scene	0	0.00
Uncoupled towed vehicle	0	0.00
TOTAL	25	100.00

Vulnerable road users

Crash types	Number	Percentage (%)
Cyclist crashes	4	8.89
Pedestrian crashes	2	4.44
Motorcycle crashes	0	0.00
All other crashes	39	86.67

Note: Some crashes involve more than one vulnerable road user type.

Note: Motorcycle stats include Mopeds.

Road environment statistics

Road type

Road type	State highway	Local road	Unknown	N/A	Total	Percentage (%)
Urban	0	36	0	0	36	80.00
Open	0	9	0	0	9	20.00
Unknown	0	0	0	0	0	0.00
TOTAL	0	45	0	0	45	–
Percent	0.00	100.00	0.00	0.00	100.00	–

Natural light conditions

Conditions	Injury	Non-injury	Total	%
Light/overcast	12	22	34	75.56
Dark/twilight	4	7	11	24.44
Unknown	0	0	0	0.00
TOTAL	16	29	45	100

Conditions

Conditions	Injury	Non-injury	Total	%
Dry	14	25	39	86.67
Ice or Snow	0	0	0	0.00
Wet	2	4	6	13.33
Null	0	0	0	0.00
TOTAL	16	29	45	100

Intersection/midblock

Intersection/mid-block	Total	%
Intersection	29	64.44
Midblock	16	35.56
TOTAL	45	100

Vehicles involved in injury crashes (crash count)

Vehicle type	Injury crashes	% of injury crashes
Unknown	0	0.00
Car/Wagon	13	81.25
SUV	5	31.25
Van	0	0.00
Ute	0	0.00
Truck	1	6.25
Truck HPMV	0	0.00
Bus	1	6.25
Motorcycle	0	0.00
Moped	0	0.00
Train	0	0.00
Cycle	1	6.25
Other	0	0.00
Unknown	0	0.00
50 Max	0	0.00
Left scene	0	0.00
Uncoupled towed vehicle	0	0.00
TOTAL	21	131.25

Objects struck

Objects struck	Injury crashes	%	Non-injury crashes	%
Crashes w/obj struck	9	20.00	8	17.78

Object struck	Injury crashes	%	Non-injury crashes	%
Animals	0	0.00	0	0.00
Bridges/Tunnels	0	0.00	0	0.00
Cliffs	0	0.00	0	0.00
Debris	0	0.00	0	0.00
Embankments	0	0.00	0	0.00
Fences	4	8.89	1	2.22
Guide/Guard rails	0	0.00	0	0.00
Houses	0	0.00	0	0.00
Traffic Islands	0	0.00	1	2.22
Street Furniture	0	0.00	0	0.00
Kerbing	1	2.22	1	2.22
Landslips	0	0.00	0	0.00
Parked vehicle	1	2.22	2	4.44
Trains	0	0.00	0	0.00
Sight Rails	0	0.00	0	0.00
Poles	1	2.22	2	4.44
Stationary Vehicle	0	0.00	0	0.00
Roadwork	0	0.00	0	0.00
Traffic Sign	1	2.22	2	4.44
Trees	4	8.89	0	0.00
Drainage Structures	0	0.00	0	0.00
Ditches	0	0.00	1	2.22
Other	1	2.22	2	4.44
Thrown or dropped objects	0	0.00	0	0.00
Water	0	0.00	0	0.00
TOTAL	13	-	12	-

Note: % represents the % of crashes in which the object is struck.

Vehicle usage in injury crashes

Vehicle usage	Fatal Crash	Serious Crash	Minor Crash	Total	Percentage (%)
Private	0	2	2	4	16.00
Attenuator Truck	0	0	0	0	0.00
Agricultural	0	0	0	0	0.00
Ambulance	0	0	0	0	0.00
Campervan	0	0	0	0	0.00
Concrete mixer	0	0	0	0	0.00
Fire	0	0	0	0	0.00
Logging truck	0	0	0	0	0.00
Mobile crane	0	0	0	0	0.00
Police	0	0	0	0	0.00
Rental	0	0	0	0	0.00
Road Working	0	0	0	0	0.00
Scheduled service Bus	0	0	0	0	0.00
School bus	0	0	1	1	4.00
Tanker	0	0	0	0	0.00
Taxi	0	0	0	0	0.00
Tour Bus	0	0	0	0	0.00
Trade person	0	0	0	0	0.00
Work travel	0	0	0	0	0.00
Work vehicle	0	0	0	0	0.00
Other	0	0	0	0	0.00
Null	0	3	17	20	80.00
TOTAL	0	5	20	25	-
Percent	0.00	20.00	80.00	100.00	-

Time period statistics

Month by injury/ non-injury crashes

Month	Injury crashes	%	Non-injury crashes	%	Total	%
Jan	4	25	1	3.45	5	11.11
Feb	2	12.5	4	13.79	6	13.33
Mar	1	6.25	0	0	1	2.22
Apr	1	6.25	0	0	1	2.22
May	2	12.5	4	13.79	6	13.33
Jun	0	0	3	10.34	3	6.67
Jul	2	12.5	4	13.79	6	13.33
Aug	1	6.25	2	7	3	6.67
Sep	0	0	2	7	2	4.44
Oct	2	12.5	4	13.79	6	13.33
Nov	1	6.25	2	7	3	6.67
Dec	0	0	3	10.34	3	6.67
TOTAL	16	100	29	100	45	100

Day/period

Day/Period	All crashes	% All crashes
Weekday	33	73.33
Weekend	12	26.67
TOTAL	45	100

Day/period by hour

Day/Period	00:00 - 02:59	03:00 - 05:59	06:00 - 08:59	09:00 - 11:59	12:00 - 14:59	15:00 - 17:59	18:00 - 20:59	21:00 - 23:59	Total
Weekday	1	1	6	8	6	7	2	2	33
Weekend	0	2	1	3	3	1	1	1	12
TOTAL	1	3	7	11	9	8	3	3	45

Day/period by hour DOW

Day/Period	00:00 - 02:59	03:00 - 05:59	06:00 - 08:59	09:00 - 11:59	12:00 - 14:59	15:00 - 17:59	18:00 - 20:59	21:00 - 23:59	Total
Mon	0	0	2	2	0	1	0	0	5
Tue	1	1	2	2	1	2	0	0	9
Wed	0	0	2	2	2	1	2	1	10
Thu	0	0	0	2	2	0	0	1	5
Fri	0	0	0	0	1	3	1	0	5
Sat	0	1	1	3	1	1	0	1	8
Sun	0	1	0	0	2	0	0	0	3
TOTAL	1	3	7	11	9	8	3	3	45

Appendix D

Traffic Modelling Report by Abley

The levels of service for uninterrupted flow facilities are described in the Highway Capacity Manual 2010 as follows:

Level of service A: A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.

Level of service B: In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.

Level of service C: Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

Level of service D: Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.

Level of service E: Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.

Level of service F: In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Rangiora North-East

The Paramics modelling indicates that the majority of the traffic generated by the Rangiora North-East structure plan area links into the greater transport network towards the south and to the west. Kippenberger Ave, East Belt, and MacPhail Ave (which provides a direct connection between the northeast and the Eastern Arterial) are the primary connections for structure plan area traffic as it heads towards the town centre and further south in the morning peak (AM peak), and traffic returns by the same routes in the evening peak (PM peak). The education precinct generates significant incoming traffic on East Belt, Wales St and High St in the AM peak, but is less so in the PM peak.

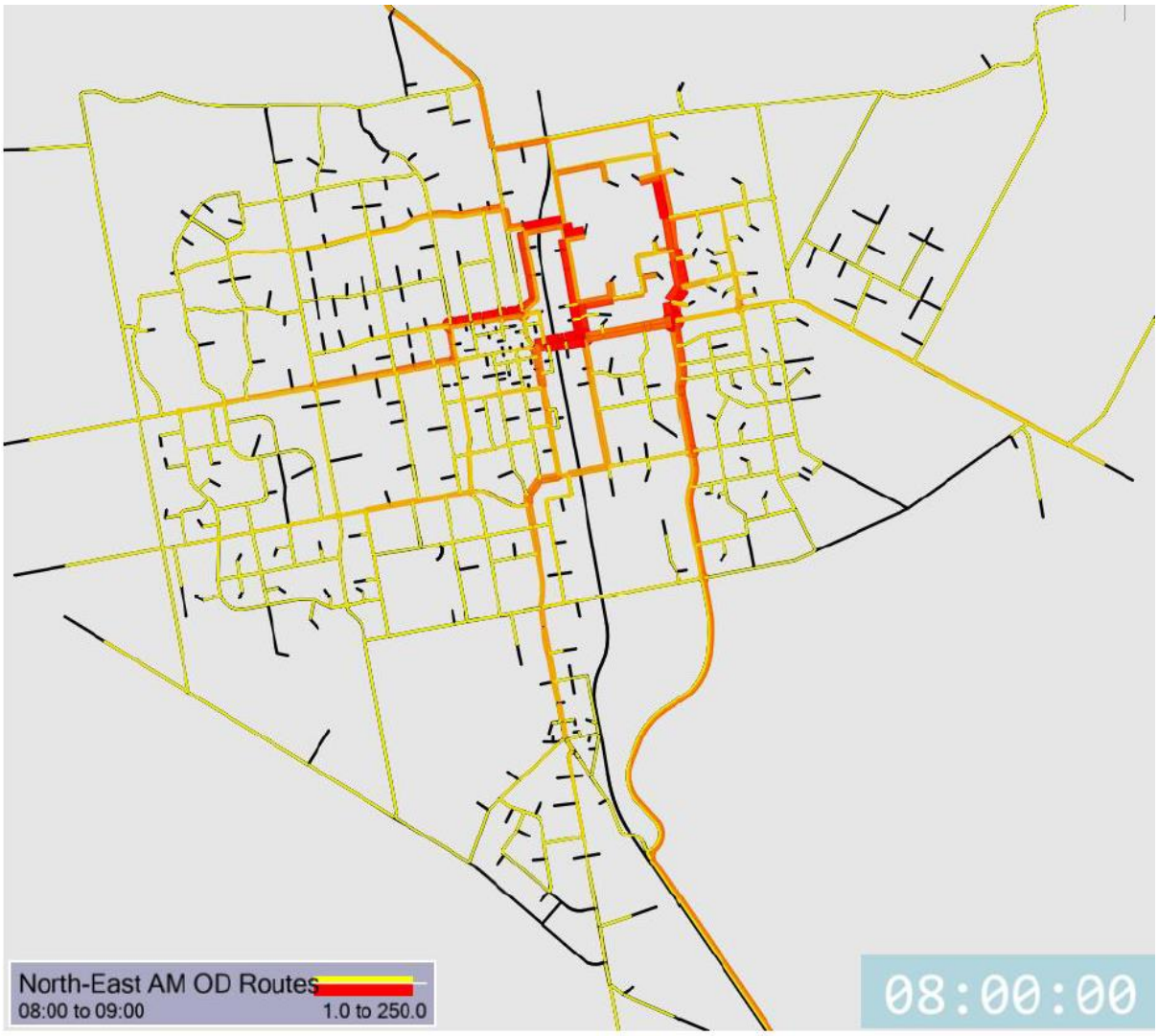


Figure 2.1 Volume of flow with origin or destination in Rangiora North-East, AM peak period

Much of the loading within the structure plan area falls on the primary north-south route, which forms an extension of the Eastern Arterial corridor and MacPhail Ave. The east-west link in the southwest of the structure plan area that connects into East Belt also carries a moderate proportion of the traffic generated. Intersections on the boundaries of the structure plan area perform within capacity. The High St / Kippenberger Ave / East Belt roundabout does show moments where the flow of traffic begins to break down, but these recover quickly and overall intersection LOS A in both periods. We consider the movement network in this area appropriate, but would note that it is important that the connection to East Belt is maintained in order to help balance flows on this roundabout and not overload the Kippenberger Ave arm.

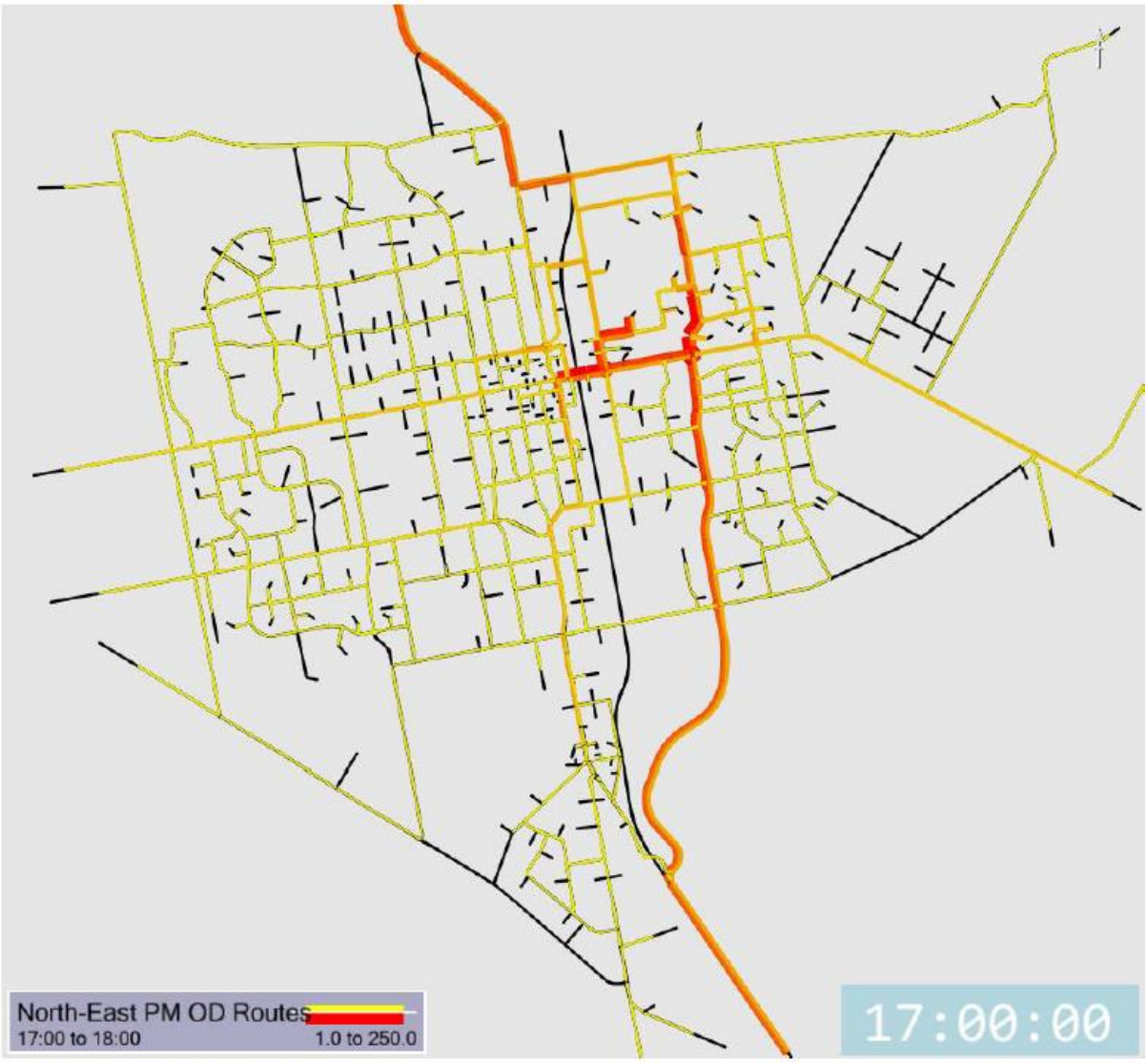


Figure 2.2 Volume of flow with origin or destination in Rangiora North-East, PM peak period

Rangiora East

Traffic generated by the Rangiora East structure plan area is again concentrated towards the south and west as it connects to the greater transport network. Major movement corridors in the AM peak are Northbrook Rd heading towards the town centre and beyond, the Eastern Arterial heading south, and South Belt heading towards the commercial and industrial areas to the south. These trends are reversed in the PM peak.

Within the structure plan area, the extension of MacPhail Ave south towards the Eastern Arterial carries the highest proportion of the generated traffic. This feeds into the intersection between the Eastern Arterial and Boys Rd, which performs at a LOS of A in the model. The other proposed primary north-south routes do not receive nearly as much traffic in comparison. It is likely that only as delays increase on the Eastern Arterial / MacPhail Ave corridor in future years, would more local traffic reroute to these other corridors to the east.

All other major intersections on the boundaries of the East Structure Plan perform at a LOS A in both periods.

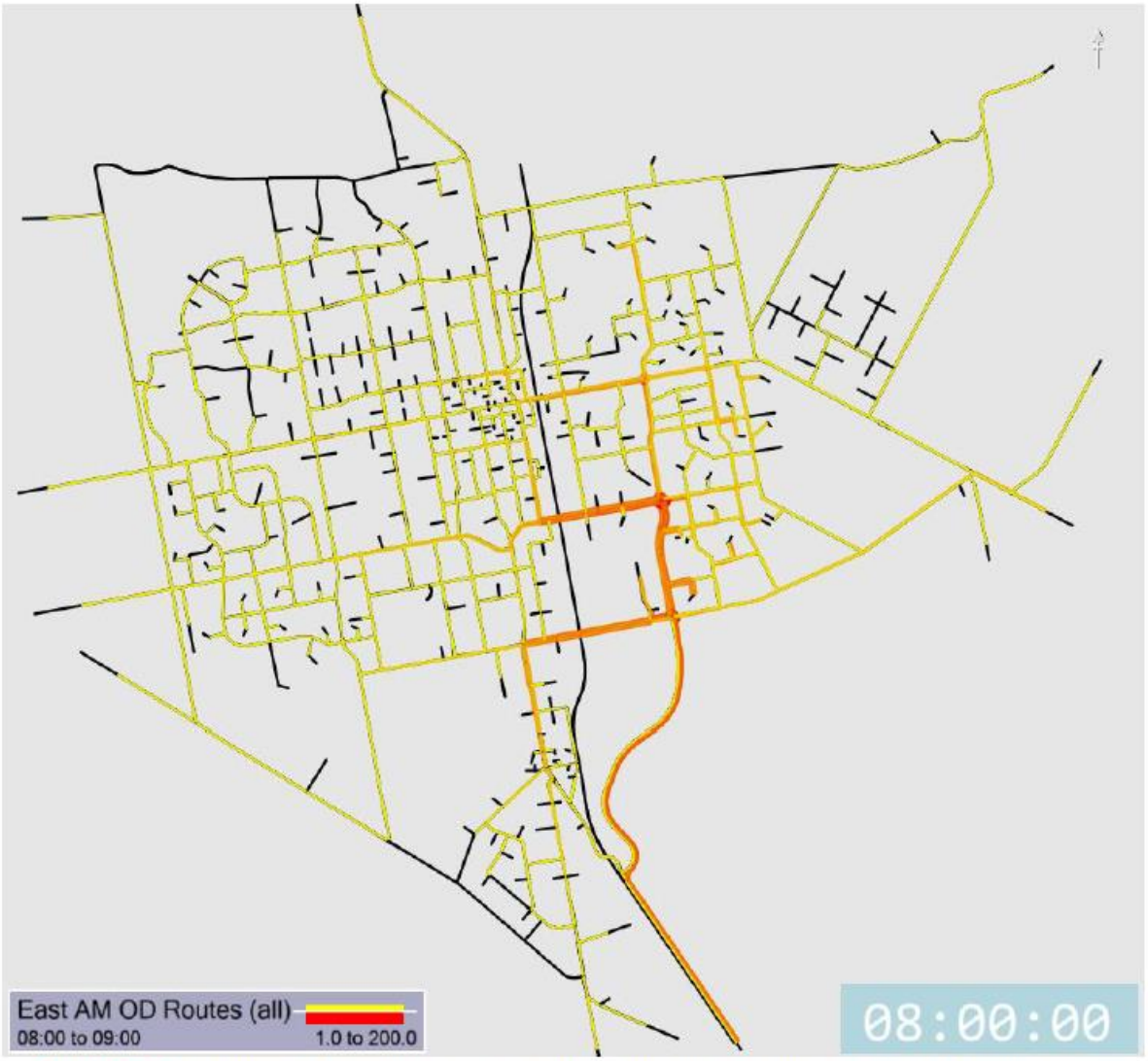


Figure 2.3 Volume of flow with origin or destination in Rangiora East, AM peak period

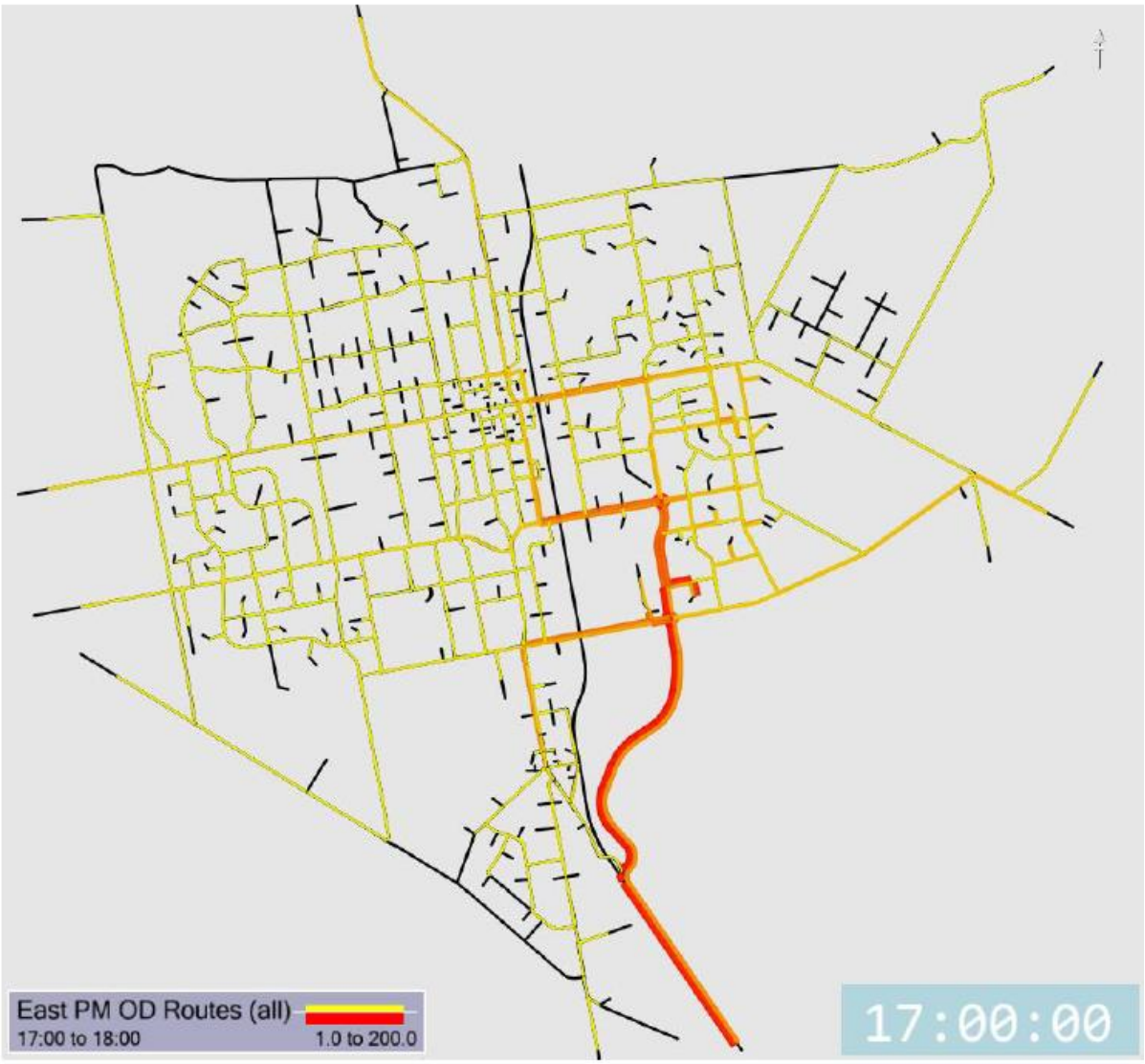


Figure 2.4 Volume of flow with origin or destination in Rangiora East, PM peak period

Wider network performance

The modelling demonstrates that the intersections on the boundaries of the structure plan areas perform satisfactorily, and this section considers network performance further afield that may be affected by the development.

On Rangiora Woodend Road, the intersections with Boys Rd and Tuahiwi Rd shows increased delays, particularly in the AM peak period, with right turns from Boys Rd onto Rangiora Woodend Rd (LOS D in the AM peak); and movements from Tuahiwi Rd to head northbound on Rangiora Woodend Road (LOS E in AM peak) both beginning to show signs of congestion. It should be noted that this is after taking into account the changes described in Section 2.1. With further development in Ravenswood in progress and the potential Woodend Bypass, there is potential that these intersections may need improvement sooner than anticipated.
Right turning delays also increase at the Ivory Street / Northbrook Rd priority intersection. In particular, the right turn from Northbrook Rd to head north on SH71 is LOS D in the AM and LOS C in the PM. The right turn from SH71 into Northbrook Rd westbound is LOS C in the AM and LOS B in the PM. While these delays are not necessarily severe, it should be noted that of the limited crossings over the Main North Line, the High Street/Kippenberger Ave corridor shows much higher flows than Northbrook Rd. Improvements at Ivory Street / Northbrook Road could distribute traffic generated by Rangiora East and Rangiora North-East more evenly.

4. Walking and cycling

From a review of the Indicative Structure Plans the walking and cycling networks are assumed to include the following elements:

- • Primary Road & Cycleway

- • Secondary Road & Cycleway
- • Green link – assumed to allow walking
- • Green link & Cycleway
- • Future intersection upgrade – assumed to provide pedestrian crossing facilities, and cycle facilities if connecting with a cycleway

We have assumed all secondary roads and local roads (not indicated in the structure plans) are designed for slow vehicle speeds and low traffic volumes so these are inherently cycle friendly connections. It is also assumed that footpaths would be provided on all roads and internal intersections would be designed to provide appropriate crossing facilities for people walking and cycling.
Ensuring Structure Plans guide the development of connected walking and cycling networks both internally and externally to the surrounding area is important. However, achieving a best practice urban development requires elements at the subdivision level to be appropriately planned and designed. This includes street cross section details, operational requirements such as traffic speeds, access arrangements for lots, walking/cycling accessways that provide more permeability for active modes compared with vehicles etc.
With regard to cycling facilities in particular, it is important to stipulate what is meant by 'Cycleway'. Whilst a shared path can be appropriate in some contexts, aspects such as frequent driveways or higher expected use, particularly by faster moving cyclists, can mean they do not operate optimally and can be less attractive for walking.
The following sections provide particular comments regarding each of the structure plan areas.

4.1 Rangiora

Rangiora North-East

The walking and cycling review of the Rangiora North-East structure plan area has prompted the following comments:

- • The location of the Coldstream Road Sports Hub is shown as Stormwater Reserve on the Indicative Structure Plan A (Plan B shows it correctly).
- • We agree that the main north-south spine road connecting Coldstream Road and Kippenberger Ave should include a separated cycleway.
- • We understand upgrades of Coldstream Road are planned – including a shared path on southern side, speed limit reduction, pedestrian refuges and intersection improvements. These facilities will support access into the structure plan area.
- • The Plan B version indicates Primary and Secondary roads through the structure plan area with no cycleways indicated on these roads. Therefore, this option would rely on cyclists using the road carriageway which is unlikely to be appropriate depending on road widths, traffic volumes and vehicle speeds.
- • We understand a crossing of the railway line is proposed between Blackett Street and Keir Street. Therefore, a walking/cycling connection into Rangiora North East from Keir Street will provide an important link to the residential area. A secondary road with cycleway (as shown on Plan A version) is likely to better serve this purpose. The Keir St/East Belt intersection may need to be upgraded to facilitate walking/cycling movements across East Belt.
- • Kippenberger Ave will become a key walking/cycling link to Rangiora North East. Walking and cycling facilities are likely to need improving (currently only a footpath on the southern side) and limited cycle facilities (shoulder).
- The Rangiora Woodend path currently connects to Kippenberger Ave at Golf Links Road. Plan A shows cycleways along the green links which should then connect to the Rangiora Woodend path. This option is preferred over Plan B which would only provide green links into the Rangiora North East area.

Rangiora East

The walking and cycling review of the Rangiora East structure plan area has prompted the following comments:

- • We agree that the north-south spine road connecting Kippenberger Ave and Boys Road should include a separated cycleway (potentially utilising the parallel green link).
- • There is an opportunity to connect the Rangiora Woodend path into Rangiora East from the eastern end of Kippenberger Ave.
- • It is assumed the key cycling connection from the town centre to Rangiora East would be via Kippenberger Ave (rather than Northbrook Road). Hence, providing a separate cycleway on Kippenberger Ave is important.
- • To provide access to the western portion of Rangiora East, it is recommended that cycle facilities are provided on Northbrook Road at least between East Belt and Rangiora East. Footpaths should also be provided on both sides of Northbrook Road.

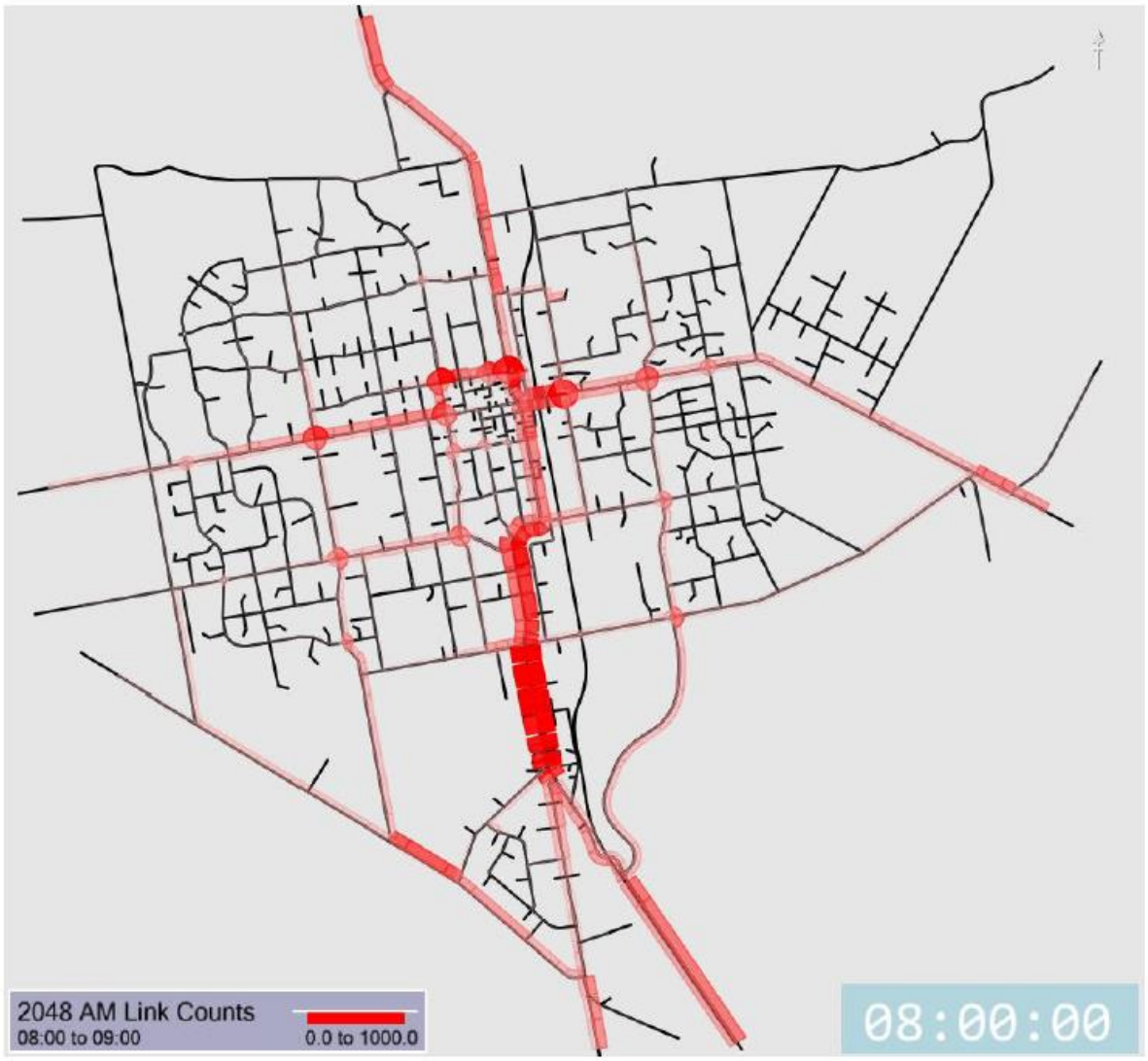
5. Conclusions

The proposed structure plan areas in Rangiora were tested in the 2048 Paramics model. This has identified no major issues at the intersections on the boundaries of the structure plan areas, though potential issues further afield have been noted including deteriorating Level of Service at the intersections of Rangiora Woodend Road / Boys Rd / Tuahiwi Rd, and Fernside Rd / Flaxton Rd.

All structure plan areas have been reviewed from a walking and cycling perspective. No major issues have been identified given the high-level nature of the plans, but several comments have been provided to assist in guiding their development.

Appendix A: Volume plots

Full 2048 model AM



Full 2048 model PM

Rangiora North-East 2048 AM

Rangiora North-East 2048 PM

Rangiora East 2048 AM

Rangiora East 2048 PM

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SH71 / Blackett St / Ashley St / Edwards St roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Ashley St N	Edward St	0	0	0	A			98	163	33	C			67	24	5	A			72	26	5	A		
Ashley St N	Blackett St E	106	27	5	A			365	174	37	D			160	23	5	A			180	28	5	A		
Ashley St N	Ashley St S	321	27	6	A	6	A	30	134	30	C	35	D	13	17	5	A	5	A	20	24	6	A	5	A
Ashley St N	Blackett St W	34	18	5	A			16	62	16	B			10	20	5	A			13	17	4	A		
Edward St	Blackett St E	11	23	6	A			118	84	19	B			40	25	4	A			45	23	4	A		
Edward St	Ashley St S	39	26	5	A			79	70	15	B			38	24	4	A			43	26	4	A		
Edward St	Blackett St W	19	14	4	A	5	A	0	0	0	A	17	B	0	0	0	A	4	A	0	0	0	A	4	A
Edward St	Ashley St N	0	0	0	A			1	0	0	A			4	4	1	A			2	4	2	A		
Blackett St E	Ashley St S	2	2	1	A			118	88	14	B			200	32	6	A			240	31	6	A		
Blackett St E	Blackett St W	72	25	5	A			29	72	14	B			85	29	5	A			93	29	5	A		
Blackett St E	Ashley St N	16	12	3	A	5	A	2	23	10	A	8	A	3	3	1	A	7	A	2	1	0	A	7	A
Blackett St E	Edward St	2	1	0	A			217	21	4	A			223	35	8	A			227	43	9	A		
Ashley St S	Blackett St W	111	15	3	A			146	20	4	A			303	39	9	A			320	44	10	A		
Ashley St S	Ashley St N	99	14	3	A			12	13	5	A			28	31	9	A			35	39	10	A		
Ashley St S	Edward St	8	9	3	A	3	A	1	0	0	A	4	A	1	0	0	A	9	A	0	0	0	A	10	A
Ashley St S	Blackett St E	0	0	0	A			21	22	5	A			37	34	8	A			37	32	9	A		
Blackett St W	Ashley St N	12	7	2	A			187	27	5	A			39	34	7	A			42	34	8	A		
Blackett St W	Edward St	23	10	2	A			280	29	5	A			226	42	8	A			262	40	8	A		
Blackett St W	Blackett St E	194	15	2	A	2	A	211	28	6	A	5	A	171	38	8	A	8	A	172	38	8	A	8	A
Blackett St W	Ashley St S	72	12	2	A																				
Intersection		**1140**		**4**	**A**	**4**	**A**	**1932**		**15**	**B**	**15**	**B**	**1648**		**7**	**A**	**7**	**A**	**1804**		**7**	**A**	**7**	**A**

Ashley St / Ivory St / High St signalised intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	17	30	10	B			27	39	14	B			8	32	13	B			11	33	12	B		
North	Thru	311	56	20	C	20	B	488	66	26	C	26	C	248	59	21	C	21	C	272	62	22	C	21	C
North	Right	40	51	21	C			132	56	27	C			127	55	20	C			132	55	21	C		
East	Left	62	55	19	B			143	74	25	C			145	63	23	C			150	61	23	C		
East	Thru	48	54	19	B	20	B	126	57	23	C	23	C	138	55	22	C	22	C	148	58	23	C	22	C
East	Right	114	54	20	C			226	59	23	C			195	56	22	C			203	55	22	C		
South	Left	148	71	17	B			243	188	46	D			201	92	28	C			210	100	30	C		
South	Thru	190	53	19	B	18	B	258	139	27	C	36	D	402	76	22	C	24	C	435	83	23	C	25	C
South	Right	2	16	7	A			1	12	6	A			3	26	12	B			3	25	15	B		
West	Left	2	15	8	A			2	3	1	A			5	52	25	C			3	36	19	B		
West	Thru	27	71	35	D	32	C	143	97	38	D	37	D	171	75	32	C	32	C	168	75	35	C	34	C
West	Right	3	27	16	B			6	48	20	C			16	64	31	C			12	69	31	C		
Intersection		964		20	B	20	B	1797		29	C	29	C	1659		24	C	24	C	1746		24	C	24	C

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Percival St / Southbrook Rd / South Belt signalised intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	116	47	15	B	19	B	190	52	18	B	23	C	396	40	12	B	14	B	416	41	13	B	15	B
South	Thru	498	59	19	B			634	61	22	C			788	47	15	B			854	47	15	B		
South	Right	95	56	19	B			191	102	32	C			151	40	14	B			164	41	14	B		
West	Left	9	45	18	B	26	C	16	86	26	C	49	D	11	65	28	C	40	D	11	69	33	C	42	D
West	Thru	69	64	23	C			150	151	40	D			89	93	31	C			98	79	33	C		
West	Right	233	72	27	C			347	193	53	D			128	137	47	D			139	145	50	D		
North	Left	9	56	23	C	31	C	9	54	28	C	36	D	9	51	21	C	29	C	9	52	21	C	28	C
North	Thru	597	74	31	C			867	83	36	D			380	71	29	C			426	72	28	C		
North	Right	5	39	18	B			12	49	23	C			21	81	28	C			20	72	33	C		
East	Left	142	80	33	C	33	C	226	112	38	D	38	D	63	72	32	C	30	C	78	72	29	C	31	C
East	Thru	21	77	32	C			45	84	35	D			83	76	29	C			96	75	32	C		
East	Right	5	56	26	C			10	69	34	C			23	74	29	C			23	74	32	C		
Intersection		**1800**		**25**	**C**	**25**	**C**	**2698**		**34**	**C**	**34**	**C**	**2142**		**21**	**C**	**21**	**C**	**2335**		**22**	**C**	**22**	**C**

Southbrook Rd / Pack'nSave / Mitre 10 signalised intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	18	13	2	A	3	A	24	14	2	A	4	A	4	24	8	A	18	B	4	15	8	A	17	B
South	Thru	608	20	3	A			770	30	4	A			1025	44	18	B			1075	45	17	B		
South	Right	2	14	7	A			4	33	13	B			3	26	12	B			3	15	7	A		
West	Left	37	7	1	A	1	A	60	10	2	A	2	A	94	24	3	A	4	A	101	27	4	A	4	A
West	Thru																								
West	Right	2	13	5	A			2	32	15	B			2	41	20	C			2	11	5	A		
North	Left	21	19	4	A	4	A	36	73	9	A	15	B	117	38	7	A	14	B	131	38	7	A	14	B
North	Thru	900	24	4	A			1176	110	15	B			419	44	14	B			468	53	14	B		
North	Right	48	33	9	A			77	89	19	B			38	69	26	C			43	76	31	C		
East	Left	1	0	0	A	34	C	1	29	15	B	38	D	2	21	11	B	29	C	3	40	20	C	29	C
East	Thru													0	0	0	A								
East	Right	11	79	37	D			19	79	40	D			91	74	29	C			97	72	29	C		
Intersection		**1647**		**4**	**A**	**4**	**A**	**2169**		**11**	**B**	**11**	**B**	**1796**		**16**	**B**	**16**	**B**	**1927**		**16**	**B**	**16**	**B**

Lineside Rd/Todds Rd priority intersection turns only

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	41	3	1	A			64	3	1	A			10	2	0	A			11	2	1	A		
West	Left	68	20	1	A			116	62	4	A			87	19	3	A			90	22	4	A		
West	Right	11	26	7	A			12	117	26	D			8	22	6	A			9	28	7	A		
North	Right	158	60	12	B			266	109	30	D			21	56	13	B			21	52	15	C		

11.69 in

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Lineside Rd/Flaxton Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	80	2	1	A	1	A	121	4	1	A	2	A	8	2	1	A	2	A	7	2	1	A	2	A
South	Thru	369	5	2	A			430	12	2	A			603	6	2	A			634	6	2	A		
West	Left	320	5	1	A	2	A	451	7	2	A	2	A	461	5	2	A	2	A	486	8	2	A	2	A
West	Right	8	49	18	C			11	38	13	B			4	23	12	B			3	17	8	A		
North	Thru	382	6	1	A	6	A	360	57	5	A	21	C	236	4	1	A	6	A	269	4	1	A	6	A
North	Right	317	56	11	B			489	116	33	D			158	56	12	B			180	67	13	B		
Intersection		1476		18	C	6	A	1863		33	D	21	C	1470		12	B	6	A	634		8	A	6	A

Fernside Rd / Flaxton Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	69	5	1	A	2	A	83	6	1	A	2	A	606	13	3	A	3	A	645	15	3	A	3	A
South	Thru	250	5	2	A			313	6	3	A			288	5	2	A			293	12	2	A		
West	Left	21	23	5	A	9	A	30	294	55	F	77	F	2	9	4	A	10	B	2	8	4	A	12	B
West	Right	286	47	10	A			435	375	79	F			341	45	10	B			390	62	12	B		
North	Thru	103	6	2	A	2	A	206	9	2	A	3	A	128	8	2	A	6	A	149	8	1	A	5	A
North	Right	9	17	5	A			15	35	10	B			8	240	82	F			6	219	80	F		
Intersection		738		10	A	9	A	1082		79	F	77	F	1374		82	F	10	B	1485		80	F	12	B

Fernside Rd / Townsend Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South East	Thru	81	4	2	A	2	A	115	7	2	A	3	A	236	9	2	A	4	A	254	10	2	A	4	A
South East	Right	41	17	3	A			68	24	5	A			518	24	5	A			560	26	5	A		
North West	Left	9	1	0	A	2	A	14	1	0	A	2	A	19	2	0	A	2	A	17	2	0	A	2	A
North West	Thru	211	6	2	A			383	8	2	A			148	7	2	A			160	6	2	A		
North	Left	244	27	8	A	8	A	407	114	30	D	30	D	245	28	6	A	6	A	274	51	7	A	7	A
North	Right	10	17	5	A			15	92	31	D			2	11	5	A			2	25	11	B		
Intersection		596		8	A	8	A	1003		31	D	30	D	1167		6	A	6	A	1267		11	B	7	A

Fernside Rd / Lehmans Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South East	Thru	71	13	4	A	4	A	101	25	5	A	6	A	109	31	7	A	7	A	118	33	8	A	7	A
South East	Right	17	14	4	A			30	25	7	A			124	28	7	A			136	31	7	A		
North West	Left	30	8	3	A	3	A	55	8	3	A	4	A	50	8	3	A	4	A	55	8	2	A	3	A
North West	Thru	82	12	3	A			137	17	5	A			78	12	4	A			78	12	4	A		
North	Left	143	15	5	A	5	A	259	27	6	A	5	A	91	11	4	A	4	A	98	15	4	A	4	A
North	Right	34	11	3	A			69	25	5	A			3	6	2	A			5	13	5	A		
Intersection		377		5	A	5	A	651		7	A	6	A	454		7	A	7	A	491		8	A	7	A

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Johns Rd/Lehmans Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	1	0	0	A	9	A	3	12	5	A	11	B	3	8	3	A	10	B	1	1	0	A	10	B
South	Thru	19	18	8	A			37	27	10	B			78	38	10	B			84	36	10	B		
South	Right	24	24	10	B			42	32	11	B			75	35	11	B			86	32	10	B		
West	Left	11	6	3	A	3	A	18	10	4	A	4	A	23	13	5	A	4	A	25	12	4	A	3	A
West	Thru	32	7	3	A			51	18	3	A			81	8	3	A			80	8	3	A		
West	Right	20	9	3	A			37	28	5	A			4	5	2	A			3	3	1	A		
North	Left	7	15	4	A	7	A	11	54	17	C	18	C	27	17	4	A	6	A	30	18	4	A	5	A
North	Thru	95	32	7	A			157	85	19	C			54	23	6	A			58	23	6	A		
North	Right	12	16	5	A			17	56	14	B			18	17	6	A			20	17	5	A		
East	Left	55	4	1	A	2	A	123	6	1	A	2	A	32	4	2	A	3	A	34	4	1	A	3	A
East	Thru	43	7	3	A			76	8	3	A			68	8	3	A			78	8	3	A		
East	Right	7	6	3	A			12	9	2	A			12	12	4	A			13	11	3	A		
Intersection		326		10	B	10	B	583		19	C	19	C	474		11	B	11	B	514		10	B	10	B

Oxford Rd / Lehmans Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	13	15	3	A	5	A	22	28	6	A	8	A	24	37	7	A	10	B	27	26	6	A	10	B
South	Thru	4	13	5	A			8	29	10	B			35	56	13	B			37	49	13	B		
South	Right	24	27	6	A			42	37	10	A			56	49	10	B			64	44	11	B		
West	Left	6	4	2	A	5	A	6	9	2	A	6	A	15	6	2	A	4	A	13	6	2	A	4	A
West	Thru	124	22	4	A			212	28	6	A			229	22	4	A			232	26	4	A		
West	Right	59	25	5	A			94	29	7	A			46	21	5	A			53	27	5	A		
North	Left	6	11	4	A	7	A	13	28	5	A	14	B	9	16	4	A	10	A	14	24	6	A	9	A
North	Thru	22	30	8	A			31	64	18	C			21	38	11	B			22	39	10	B		
North	Right	12	23	7	A			17	38	12	B			13	35	11	B			11	22	9	A		
East	Left	37	9	1	A	2	A	59	9	2	A	1	A	36	6	1	A	2	A	36	6	2	A	1	A
East	Thru	133	4	2	A			224	7	1	A			239	7	2	A			276	16	1	A		
East	Right	3	3	1	A			5	4	2	A			5	6	2	A			7	13	4	A		
Intersection		443		8	A	8	A	732		18	C	18	C	728		13	B	13	B	792		13	B	13	B

Townsend Rd / South Belt priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Thru	38	6	1	A	1	A	65	17	2	A	3	A	475	17	2	A	2	A	523	20	2	A	2	A
South	Right	12	8	2	A			17	21	5	A			54	15	3	A			54	17	3	A		
North	Left	40	2	0	A	2	A	87	2	0	A	2	A	46	2	0	A	2	A	55	1	0	A	2	A
North	Thru	223	5	2	A			361	6	2	A			221	6	2	A			237	6	2	A		
East	Left	40	20	4	A	3	A	61	29	6	A	5	A	33	38	8	A	12	B	39	32	7	A	10	B
East	Right	34	11	2	A			62	24	5	A			81	63	13	B			87	59	12	B		
Intersection		387		4	A	3	A	652		6	A	5	A	910		13	B	12	B	993		12	B	10	B

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Townsend Rd / Goldie Dr roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	11	8	2	A			21	16	3	A			12	7	2	A			13	7	2	A		
North	Thru	191	13	3	A	3	A	320	22	4	A	4	A	191	12	3	A	3	A	215	15	3	A	3	A
North	Right	8	5	2	A			20	13	3	A			24	8	2	A			26	9	3	A		
East	Left	11	14	3	A			20	19	5	A			15	12	3	A			11	13	4	A		
East	Thru	4	6	2	A	3	A	9	9	3	A	4	A	14	11	3	A	3	A	18	18	3	A	3	A
East	Right	1	0	0	A			7	11	3	A			6	5	2	A			4	3	1	A		
South	Left	38	3	0	A			73	6	1	A			178	13	1	A			195	11	2	A		
South	Thru	28	3	1	A	0	A	47	4	1	A	1	A	317	13	2	A	2	A	351	14	2	A	2	A
South	Right	5	1	0	A			6	3	0	A			58	8	1	A			61	10	1	A		
West	Left	10	3	1	A			25	7	2	A			17	11	4	A			16	12	4	A		
West	Thru	19	3	0	A	1	A	31	6	1	A	1	A	18	14	3	A	3	A	22	14	3	A	4	A
West	Right	63	7	1	A			109	10	1	A			63	15	3	A			65	19	4	A		
Intersection		390		2	A	2	A	687		3	A	3	A	913		2	A	2	A	997		2	A	2	A

Townsend Rd / West Belt / Johns Rd roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	32	8	3	A			68	23	4	A			30	14	3	A			34	12	3	A		
North	Thru	127	13	3	A	3	A	219	30	6	A	6	A	135	14	3	A	3	A	153	17	4	A	4	A
North	Right	16	8	2	A			28	20	5	A			26	15	4	A			28	9	3	A		
East	Left	18	7	1	A			42	13	3	A			58	12	2	A			58	11	2	A		
East	Thru	111	10	2	A	2	A	220	23	4	A	4	A	248	18	3	A	3	A	272	13	3	A	3	A
East	Right	13	8	2	A			41	20	5	A			34	11	3	A			41	12	3	A		
South	Left	7	4	1	A			13	8	2	A			77	21	4	A			75	20	4	A		
South	Thru	32	9	2	A	1	A	63	13	2	A	2	A	241	24	4	A	4	A	280	27	4	A	4	A
South	Right	13	6	1	A			39	14	3	A			27	19	4	A			30	21	4	A		
West	Left	23	6	1	A			58	10	2	A			44	11	3	A			39	13	3	A		
West	Thru	137	8	2	A	2	A	264	14	3	A	3	A	209	17	4	A	4	A	223	19	4	A	4	A
West	Right	35	8	3	A			65	13	4	A			36	12	4	A			42	17	5	A		
Intersection		566		2	A	2	A	1120		4	A	4	A	1165		3	A	3	A	1275		4	A	4	A

Goldie Dr / Johns Rd roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	18	7	1	A			39	9	2	A			22	9	2	A			33	12	2	A		
North	Thru	12	4	1	A	1	A	19	7	2	A	2	A	13	7	2	A	2	A	11	8	2	A	2	A
North	Right	9	5	1	A			28	8	2	A			11	7	2	A			13	8	2	A		
East	Left	2	1	0	A			5	2	1	A			6	2	1	A			4	1	0	A		
East	Thru	68	5	1	A	1	A	129	9	2	A	2	A	88	6	1	A	1	A	95	6	2	A	2	A
East	Right	7	2	1	A			15	4	2	A			26	5	2	A			32	6	2	A		
South	Left	12	6	2	A			25	9	3	A			20	8	2	A			27	9	2	A		
South	Thru	12	6	2	A	2	A	22	13	3	A	3	A	44	8	3	A	2	A	49	10	2	A	2	A
South	Right	5	3	1	A			11	7	2	A			5	4	2	A			6	5	2	A		
West	Left	3	2	1	A			6	2	0	A			15	4	1	A			15	6	1	A		
West	Thru	61	6	1	A	1	A	116	6	1	A	1	A	128	8	1	A	1	A	138	9	2	A	2	A
West	Right	8	5	2	A			11	5	2	A			13	5	2	A			15	6	2	A		
Intersection		218		1	A	1	A	425		2	A	2	A	392		2	A	2	A	439		2	A	2	A

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Goldie Dr extension / Oxford Rd roundabout

Approach	Movement	07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
		Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
East	Left	12	5	2	A	2	A	32	6	2	A	3	A	35	8	2	A	4	A	37	8	2	A	4	A
East	Thru	158	10	2	A			268	18	3	A			289	26	4	A			333	20	4	A		
South	Left	16	11	2	A	2	A	31	16	4	A	3	A	40	22	4	A	3	A	44	23	5	A	3	A
South	Right	21	9	2	A			54	15	4	A			38	15	3	A			38	19	5	A		
West	Thru	158	8	2	A	2	A	288	11	3	A	3	A	270	16	2	A	3	A	287	11	2	A	3	A
West	Right	12	4	1	A			19	6	2	A			25	6	1	A			29	7	2	A		
Intersection		378		2	A	2	A	692		3	A	3	A	697		3	A	3	A	768		3	A	3	A

Coldstream Rd / Eastern Arterial roundabout

Approach	Movement	07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
		Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
East	Thru	8	2	0	A	1	A	16	3	2	A	2	A	7	2	1	A	2	A	7	1	1	A	2	A
East	Right	7	4	1	A			19	4	2	A			26	6	2	A			26	5	2	A		
South	Left	32	4	2	A	2	A	78	6	2	A	2	A	90	7	2	A	2	A	103	6	2	A	2	A
South	Thru	2	1	0	A			8	2	1	A			11	4	1	A			16	3	1	A		
West	Left	22	4	1	A	1	A	41	5	2	A	2	A	30	6	2	A	2	A	40	6	2	A	2	A
West	Right	6	2	1	A			13	5	2	A			42	5	2	A			46	6	2	A		
Intersection		77		1	A	1	A	176		2	A	2	A	206		2	A	2	A	238		2	A	2	A

High St / Kippenberger Ave / East Belt roundabout

Approach	Movement	07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
		Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	25	12	3	A	4	A	63	43	10	A	9	A	36	38	8	A	8	A	39	36	10	A	10	A
South	Thru	39	12	4	A			91	48	9	A			58	40	8	A			69	44	9	A		
South	Right	75	13	4	A			163	49	9	A			131	41	8	A			134	43	10	A		
East	Left	20	7	1	A	2	A	41	24	4	A	5	A	35	15	3	A	4	A	34	16	3	A	4	A
East	Thru	211	10	2	A			423	33	6	A			400	25	4	A			434	25	4	A		
East	Right	30	7	2	A			60	25	4	A			22	14	4	A			23	18	4	A		
North	Left	59	21	5	A	5	A	98	63	14	B	14	B	133	31	9	A	9	A	141	34	10	B	10	A
North	Thru	28	18	4	A			141	67	14	B			35	29	8	A			52	29	10	A		
North	Right	10	12	5	A			17	49	14	B			26	27	10	A			25	29	9	A		
West	Left	141	9	2	A	2	A	270	32	6	A	6	A	177	13	2	A	3	A	179	15	2	A	3	A
West	Thru	253	10	2	A			430	34	6	A			496	16	3	A			531	16	3	A		
West	Right	40	7	1	A			70	27	6	A			152	13	3	A			166	16	3	A		
Intersection		932		2	A	2	A	1868		7	A	7	A	1701		4	A	4	A	1828		5	A	5	A

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Kippenberger Ave / MacPhail Ave roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left																								
South	Thru	29	12	2	A	2	A	107	29	5	A	5	A	154	30	5	A	5	A	185	26	5	A	5	A
South	Right	3	5	2	A			6	13	4	A			10	12	4	A			10	10	3	A		
West	Left	50	6	2	A			101	14	3	A			142	20	4	A			152	19	4	A		
West	Thru	224	9	2	A	2	A	394	15	3	A	3	A	374	22	4	A	4	A	408	20	4	A	4	A
West	Right	15	4	1	A			23	10	3	A			28	14	4	A			26	15	4	A		
North	Left	9	7	2	A			17	19	5	A			10	14	4	A			8	11	4	A		
North	Thru	134	14	2	A	2	A	169	24	5	A	5	A	81	20	4	A	4	A	95	20	3	A	4	A
North	Right	56	14	2	A			127	22	4	A			77	20	4	A			73	20	4	A		
East	Left	12	8	3	A			12	14	4	A			8	7	2	A			7	6	2	A		
East	Thru	177	12	3	A	3	A	309	22	4	A	4	A	327	13	3	A	3	A	353	13	3	A	3	A
East	Right	2	2	1	A			12	9	3	A			15	7	3	A			17	7	2	A		
Intersection		710		2	A	2	A	1278		4	A	4	A	1226		4	A	4	A	1336		4	A	4	A

Kippenberger Ave / Devlin Rd roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	26	8	1	A			43	14	2	A			23	8	1	A			24	11	2	A		
North	Thru	10	5	1	A	2	A	21	8	1	A	3	A	13	10	2	A	2	A	13	10	2	A	3	A
North	Right	18	10	4	A			33	13	4	A			17	10	4	A			22	12	4	A		
East	Left	5	1	0	A			9	2	0	A			23	6	2	A			23	5	1	A		
East	Thru	167	9	3	A	3	A	286	15	4	A	3	A	321	13	4	A	4	A	344	11	3	A	3	A
East	Right	7	3	1	A			19	5	1	A			32	8	2	A			36	9	3	A		
South	Left	7	7	2	A			15	9	3	A			12	10	3	A			11	11	4	A		
South	Thru	7	5	2	A	2	A	30	11	3	A	3	A	22	11	4	A	3	A	24	12	4	A	4	A
South	Right	7	6	1	A			14	8	2	A			10	11	3	A			9	7	2	A		
West	Left	11	4	1	A			23	9	2	A			40	10	3	A			43	11	3	A		
West	Thru	212	9	2	A	2	A	372	11	3	A	3	A	317	11	3	A	3	A	346	12	3	A	3	A
West	Right	7	3	1	A			22	6	2	A			33	8	2	A			38	11	3	A		
Intersection		484		2	A	2	A	887		3	A	3	A	860		3	A	3	A	934		3	A	3	A

Rangiora-Woodend Rd / Boys Rd / Tuahiwi Rd priority intersections

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Rangiora-Woodend Rd N	Rangiora-Woodend Rd S	233	8	1	A			419	10	1	A			278	9	1	A			312	8	1	A		
Rangiora-Woodend Rd N	Tuahiwi Rd	15	27	6	A	1	A	26	64	14	B	2	A	37	67	14	B	3	A	39	62	14	B	3	A
Rangiora-Woodend Rd N	Boys Rd	11	14	4	A			17	46	10	B			14	43	15	B			16	59	20	C		
Rangiora-Woodend Rd S	Tuahiwi Rd																								
Rangiora-Woodend Rd S	Boys Rd	112	5	1	A	1	A	186	5	1	A	1	A	195	4	1	A	1	A	207	4	1	A	1	A
Rangiora-Woodend Rd S	Rangiora-Woodend Rd N	135	5	1	A			224	6	1	A			350	6	1	A			365	7	1	A		
Tuahiwi Rd	Boys Rd	20	9	2	A			34	70	10	B			20	28	4	A			18	26	5	A		
Tuahiwi Rd	Rangiora-Woodend Rd N	21	37	9	A	5	A	37	129	44	E	28	D	29	80	22	C	15	B	32	74	24	C	17	C
Tuahiwi Rd	Rangiora-Woodend Rd S																								
Boys Rd	Rangiora-Woodend Rd N	9	20	8	A			14	86	30	D			16	50	16	C			15	48	17	C		
Boys Rd	Rangiora-Woodend Rd S	147	29	7	A	6	A	255	104	30	D	28	D	170	65	17	C	15	C	192	73	20	C	17	C
Boys Rd	Tuahiwi Rd	10	6	1	A			22	33	6	A			26	17	4	A			33	15	4	A		
Intersection		712		9	A	9	A	1235		44	E	44	E	1134		22	C	22	C	1229		24	C	24	C

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Ivory St / Northbrook Rd priority intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
North	Left	62	4	1	A	1	A	143	16	1	A	1	A	230	5	1	A	1	A	242	6	1	A	1	A
North	Right	305	7	1	A			511	28	1	A			254	4	1	A			260	5	1	A		
East	Left	168	27	3	A	5	A	307	50	7	A	12	B	211	21	2	A	9	A	217	29	2	A	9	A
East	Right	53	44	9	A			90	119	26	D			108	80	21	C			112	91	23	C		
West	Left	308	2	0	A	2	A	384	10	0	A	7	A	410	3	0	A	5	A	437	7	0	A	6	A
West	Right	132	35	7	A			235	92	18	C			232	57	13	B			256	70	15	C		
Intersection		1026		9	A	5	A	1670		26	D	12	B	1445		21	C	9	A	437		23	C	9	A

Northbrook Rd / MacPhail Ave roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	22	7	2	A	2	A	34	16	3	A	3	A	50	15	3	A	4	A	55	16	3	A	4	A
South	Thru	26	9	2	A			81	19	3	A			206	20	4	A			232	22	4	A		
South	Right	4	2	1	A			12	13	3	A			74	19	4	A			93	16	4	A		
West	Left	12	3	1	A	2	A	34	9	2	A	3	A	27	15	4	A	4	A	36	15	4	A	4	A
West	Thru	66	7	2	A			110	11	2	A			139	18	4	A			139	17	4	A		
West	Right	53	7	2	A			100	11	3	A			85	16	4	A			87	19	4	A		
North	Left	4	3	2	A	3	A	12	11	3	A	4	A	13	11	3	A	4	A	13	13	4	A	4	A
North	Thru	223	14	3	A			232	18	4	A			141	18	5	A			158	20	4	A		
North	Right	17	9	2	A			43	14	3	A			18	12	4	A			23	13	4	A		
East	Left	36	10	3	A	2	A	34	14	3	A	3	A	27	9	2	A	2	A	27	9	3	A	3	A
East	Thru	59	10	2	A			102	16	3	A			116	13	2	A			118	13	3	A		
East	Right	7	6	2	A			22	14	4	A			10	8	3	A			9	8	3	A		
Intersection		527		2	A	2	A	815		3	A	3	A	907		4	A	4	A	989		4	A	4	A

Boys Rd / Eastern Arterial roundabout

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
South	Left	2	4	2	A	2	A	2	2	1	A	3	A	48	20	5	A	5	A	57	25	5	A	5	A
South	Thru	26	12	2	A			49	18	4	A			351	36	6	A			384	38	6	A		
South	Right	10	7	1	A			15	8	2	A			40	12	3	A			39	12	3	A		
West	Left	35	4	1	A	1	A	102	9	2	A	2	A	78	15	3	A	3	A	90	18	3	A	4	A
West	Thru	99	6	1	A			187	12	2	A			126	20	4	A			142	21	4	A		
West	Right	20	3	0	A			19	6	1	A			11	6	2	A			11	8	2	A		
North	Left					2	A					3	A					2	A					2	A
North	Thru	322	13	2	A			310	18	3	A			195	12	2	A			211	15	2	A		
North	Right	20	7	2	A			46	14	4	A			22	9	2	A			26	10	3	A		
East	Left	46	13	3	A	4	A	86	18	4	A	4	A	32	11	3	A	3	A	32	11	3	A	3	A
East	Thru	127	18	4	A			182	20	4	A			135	10	3	A			148	14	3	A		
East	Right																								
Intersection		706		2	A	2	A	999		3	A	3	A	1039		4	A	4	A	1141		4	A	4	A

Appendix E

Road 2 / Kippenberger Avenue Operational Intersection

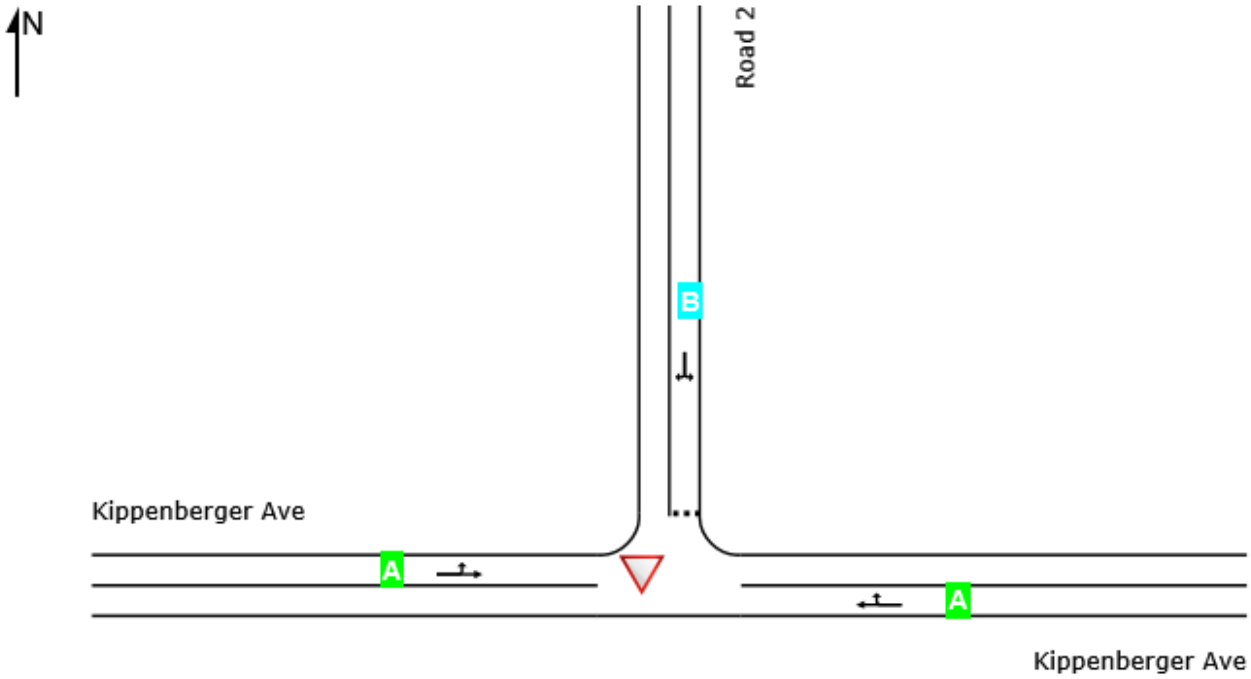
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Road 2 with no Road 1 REV B 100% AM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	B	NA	NA



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).

MOVEMENT SUMMARY

Site: 101 [Road 2 with no Road 1 REV B 100% AM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Kippenberger Ave														
5	T1	610	0.0	610	0.0	0.380	0.9	LOS A	1.2	8.5	0.19	0.06	0.24	58.4
6	R2	61	0.0	61	0.0	0.380	9.9	LOS A	1.2	8.5	0.19	0.06	0.24	56.2
Approach		671	0.0	671	0.0	0.380	1.7	NA	1.2	8.5	0.19	0.06	0.24	58.2
North: Road 2														
7	L2	162	0.0	162	0.0	0.493	9.4	LOS A	2.6	17.9	0.62	0.92	0.98	48.0
9	R2	113	0.0	113	0.0	0.493	19.5	LOS C	2.6	17.9	0.62	0.92	0.98	47.5
Approach		275	0.0	275	0.0	0.493	13.6	LOS B	2.6	17.9	0.62	0.92	0.98	47.8
West: Kippenberger Ave														
10	L2	220	0.0	220	0.0	0.324	5.6	LOS A	0.0	0.0	0.00	0.21	0.00	56.4
11	T1	400	0.0	400	0.0	0.324	0.1	LOS A	0.0	0.0	0.00	0.21	0.00	57.9
Approach		620	0.0	620	0.0	0.324	2.1	NA	0.0	0.0	0.00	0.21	0.00	57.4
All Vehicles		1566	0.0	1566	0.0	0.493	3.9	NA	2.6	17.9	0.19	0.27	0.28	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 101 [Road 2 with no Road 1 REV B 100% AM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Kippenberger Ave													
Lane 1	671	0.0	1764	0.380	100	1.7	LOS A	1.2	8.5	Full	500	0.0	0.0
Approach	671	0.0		0.380		1.7	NA	1.2	8.5				
North: Road 2													
Lane 1	275	0.0	557	0.493	100	13.6	LOS B	2.6	17.9	Full	500	0.0	0.0
Approach	275	0.0		0.493		13.6	LOS B	2.6	17.9				
West: Kippenberger Ave													
Lane 1	620	0.0	1916	0.324	100	2.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	620	0.0		0.324		2.1	NA	0.0	0.0				
Intersection	1566	0.0		0.493		3.9	NA	2.6	17.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

East: Kippenberger Ave

Mov. From E To Exit:	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	610	61	671	0.0	1764	0.380	100	NA	NA
Approach	610	61	671	0.0		0.380			

North: Road 2

Mov. From N To Exit:	L2 E	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	162	113	275	0.0	557	0.493	100	NA	NA
Approach	162	113	275	0.0		0.493			

West: Kippenberger Ave

Mov. From W To Exit:	L2 N	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	220	400	620	0.0	1916	0.324	100	NA	NA
Approach	220	400	620	0.0		0.324			

	Total	%HV	Deg.Satn (v/c)

Intersection	1566	0.0	0.493

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Kippenberger Ave Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Road 2 Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Kippenberger Ave Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

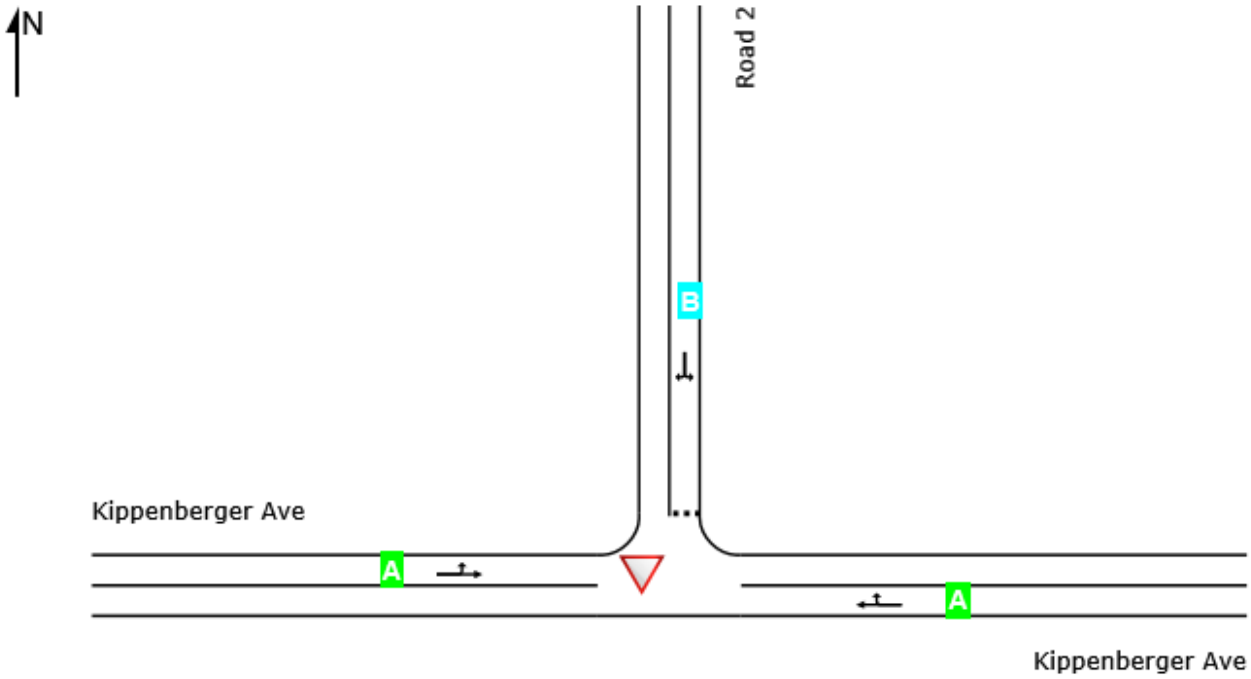
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [Road 2 with no Road 1 REV B 100% PM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

	Approaches			Intersection
	East	North	West	
LOS	NA	B	NA	NA



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).

MOVEMENT SUMMARY

Site: 101 [Road 2 with no Road 1 REV B 100% PM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Kippenberger Ave														
5	T1	355	0.0	355	0.0	0.264	1.6	LOS A	1.1	7.9	0.30	0.11	0.34	57.2
6	R2	60	0.0	60	0.0	0.264	10.7	LOS B	1.1	7.9	0.30	0.11	0.34	55.2
Approach		415	0.0	415	0.0	0.264	2.9	NA	1.1	7.9	0.30	0.11	0.34	56.9
North: Road 2														
7	L2	162	0.0	162	0.0	0.414	8.5	LOS A	2.0	14.2	0.59	0.87	0.82	49.5
9	R2	113	0.0	113	0.0	0.414	15.0	LOS B	2.0	14.2	0.59	0.87	0.82	49.1
Approach		275	0.0	275	0.0	0.414	11.1	LOS B	2.0	14.2	0.59	0.87	0.82	49.3
West: Kippenberger Ave														
10	L2	344	0.0	344	0.0	0.400	5.7	LOS A	0.0	0.0	0.00	0.27	0.00	55.9
11	T1	418	0.0	418	0.0	0.400	0.1	LOS A	0.0	0.0	0.00	0.27	0.00	57.4
Approach		762	0.0	762	0.0	0.400	2.6	NA	0.0	0.0	0.00	0.27	0.00	56.7
All Vehicles		1452	0.0	1452	0.0	0.414	4.3	NA	2.0	14.2	0.20	0.34	0.25	55.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 101 [Road 2 with no Road 1 REV B 100% PM Peak Hr (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Kippenberger Ave													
Lane 1	415	0.0	1572	0.264	100	2.9	LOS A	1.1	7.9	Full	500	0.0	0.0
Approach	415	0.0		0.264		2.9	NA	1.1	7.9				
North: Road 2													
Lane 1	275	0.0	664	0.414	100	11.1	LOS B	2.0	14.2	Full	500	0.0	0.0
Approach	275	0.0		0.414		11.1	LOS B	2.0	14.2				
West: Kippenberger Ave													
Lane 1	762	0.0	1907	0.400	100	2.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	762	0.0		0.400		2.6	NA	0.0	0.0				
Intersection	1452	0.0		0.414		4.3	NA	2.0	14.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

East: Kippenberger Ave

Mov. From E To Exit:	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	355	60	415	0.0	1572	0.264	100	NA	NA
Approach	355	60	415	0.0		0.264			

North: Road 2

Mov. From N To Exit:	L2 E	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	162	113	275	0.0	664	0.414	100	NA	NA
Approach	162	113	275	0.0		0.414			

West: Kippenberger Ave

Mov. From W To Exit:	L2 N	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	344	418	762	0.0	1907	0.400	100	NA	NA
Approach	344	418	762	0.0		0.400			

	Total	%HV	Deg.Satn (v/c)

Intersection	1452	0.0	0.414

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Kippenberger Ave Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Road 2 Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Kippenberger Ave Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Appendix F

Road Design Attributes

	Arterial Road				Collector Road					Local Road									Cul-de-sac				
	WDP		pWDP	Stage 1 Roads	WDP		pWDP	Stage 1 Roads		WDP		pWDP	Stage 1 Roads						WDP		pWDP(No cul-de-sac rule. Assumed Same as local road)	Stage 1 Roads	
	Rural	Residential & Business		Kippenberger Avenue	Rural	Residential & Business		1	2	Rural	Residential & Business		3	4	5	8	9	10	Rural	Residential & Business		6	7
Min. road width (m)	20	20	24	22.5	20	20	23	23	22	20	16	18	18	18	18	18	18	10	20	16	18	16	16
Min. lane width (m)	3.7	3.3	3.5	3.3	3.5	3.3	3.3	3.5	3.3	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	2.5	3.0	3.0	4.0	4	4
Parking lane width (m)	-	2.5	Outside carriageway	2.5	-	2.5	Indented parking bays (outside carriageway)	2.5	2.5	-	2	2.0 within carriageway	2.5	2	2.5	2	2.5	2.1	-	2	2.0 within carriageway	-	-
Min. no. of parking lanes	-	2	2	1	-	2	2	2	2	-	1	1	1	2	1	2	1	1	-	1	1	-	-
Min. footpath width (m)	-	1.5	2	1.5	-	1.5	1.8	1.8	1.8	-	1.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	-	1.5	1.8	1.8	1.8
Min. no. of footpaths	-	2	1	1	-	2	1	1	2	-	1	2	1	2	1	2	1	1	-	1	2	1	1
Min. cycle lane width (m)	-	-	1.8	1.8	-	-	1.8	-	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Min. no. of cycle lanes	-	-	2	2	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Min. shared use path width (m)	-	-	2.5	2.5	-	-	2.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Min. no. of shared use path	-	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix G

Austroads Guide to Road Design Part 4

The location of an intersection is primarily determined by land use and the transport (including roads) networks required to serve the activity associated with various land uses (Guide to Road Transport Planning (Austroads 2009b) and Guide to Traffic Management Part 4: Network Management (Austroads 2016b)). However, the location of an intersection can also be influenced by environmental and road design considerations. In terms of road design the broad considerations associated with choosing a preferred general alignment for a new road may tend to dictate the location of intersections, but designers should always consider the implications for intersections when establishing an alignment for a new road or for the deviation of an existing road (AGRD Part 3 (Austroads 2016c)).

In urban situations, the choice of location of the intersection is usually limited by the layout of streets and the constraints of property development. In rural areas, the choice of location is also influenced by the existing road network and the absence of development and other constraints may result in a greater choice of location. The location and spacing of intersections and property access can affect the safety and operation of a road, and road agencies may determine the appropriate degree of access according to a roads classification through the application of access management categories (Guide to Traffic Management Part 5: Link Management (AGTM Part 5) (Austroads 2020)).

Considerations that may affect the location of intersections are summarised in below.

Road design is also an iterative process and designers should expect road design alignments and intersection locations and layouts to be modified as the design progresses from conceptual to final drawings.

Context	Considerations
Transport	New intersections are created through a need to provide: ■ a new road link within the network to overcome a network operational deficiency (e.g. new urban or rural freeway/motorway) ■ a deviation of an existing road to overcome a safety or operational issue ■ access to a major or minor land development In urban areas the location of new intersections is often constrained by the availability of land or the cost to acquire property The location of interchanges on new urban freeways/motorways is usually determined by the existing road network with which it must interact and the level of service required on both the road in question and for community access On new rural freeways/motorways or duplicated roads there may be greater scope to choose the location of interchanges or intersections, a key factor being the development of existing or new local roads for freeway access or the creation of frontage (i.e. service) roads
Environment	The location of an intersection may be influenced by a range of environmental factors including: ■ topography ■ watercourses (rivers, streams) and waterways (lakes, inlets) ■ railways ■ environmentally sensitive areas (swampland, habitats) ■ heritage buildings and sites

Road design	Intersections must be located so that required driver and pedestrian sight distances are met It is also desirable that T-intersections are located on straight and generally flat sections of road. Provided that the approach gradients are moderate the best site for an intersection is in a sag vertical curve, with a straight alignment on each approach leg. Where this is not possible it is desirable that the horizontal alignment for the major movements should be as constant as possible (i.e. a generous and constant curve through the intersection). This is particularly important at wide intersections to maintain good lane discipline It is important to consider the approach speeds to the intersection as reducing the approach speeds can reduce the impacts of a crash, if one occurs. This particularly applies on the minor leg approaches where driver alertness or awareness may be low as these approaches have been shown to have twice the crash rate as low-speed approaches (Arndt 2004) Due to potential problems with sight distances, operational issues and safety issues, wherever practicable the following sites should be avoided in locating intersections: ■ Near crests: if an intersection must be located within a crest vertical curve, it should be on the top of the crest (not either side) and preferably on a straight horizontal alignment ■ Horizontal curves - on the inside of small radius horizontal curves as this can make it difficult to achieve adequate horizontal safe intersection sight distance and minimum gap sight distance, and produce difficult observation angles for drivers - on the outside of smaller radii horizontal curves as this can make it difficult to provide approach sight distance to the pavement and road markings within the intersection because of the superelevation (unless the side road is on a downgrade to the intersection), and may result in oncoming major road vehicles being obscured to an entering driver by the vehicles travelling in the opposite direction on the major road ■ Steep gradients - a steep upgrade combined with a vertical curve on the approach to an intersection can adversely affect approach sight distance - a steep upgrade on the immediate approach from a side road can adversely affect heavy vehicles starting up to enter the major road - a steep downgrade on the approach to a stop or give-way line makes it more difficult for heavy vehicles to stop - a steep downgrade within an intersection results in adverse crossfall for turning movements and this can be a safety issue for heavy vehicles (truck roll-over) ■ In cuttings: large volumes of additional excavation can result if adequate sight distance is to be provided for through and entering traffic ■ On high embankments: large quantities of fill may be required to obtain the required geometry and to provide sight lines past crash barriers and signs

Appendix H

Christchurch City Council Infrastructure Design Standard Part 8

Section 8.11.3 of Christchurch City Council Infrastructure Design Standard Part 8: Roading is reproduced below.

Locate intersections sufficiently far apart to separate their traffic movements and provide drivers with sufficient lead-time for decision making. The minimum spacing requirements must be the greater of those listed in the table below or the spacing necessary to meet the requirements of the Guide to Road Design, Part 4: Intersections and Crossings - General. Discuss spacings for arterial – arterial intersections with the Council before the Design Report is submitted.

Classification	Minimum Spacing (m)
Arterial – Collector	150
Arterial – Local	150
Collector – Collector	150
Collector – Local	150
Local – Local	40

Appendix I

WDC Approval of Non-compliance

From: Shane Binder <shane.binder@wmk.govt.nz>
Sent: Monday, 12 July 2021 4:44 pm
To: Derek Watson <Derek.Watson@aurecongroup.com>
Cc: Kelly LaValley <kelly.lavalley@wmk.govt.nz>; Innes Duncan <Innes.Duncan@aurecongroup.com>
Subject: RE: Bellgrove Civil Works

Thanks for meeting this (frosty) afternoon to talk through Bellgrove roading.
The draft urban road standards from the proposed District Plan are:

Table TRAN-2: Design standards for new roads where the posted speed limit is 50km/hr or less

Design element					
Road type	Low Volume Local Road	Local Road	Collector Road	Arterial Road	Strategic Road
Typical design AADT	<150	150-500	500-1,000	1,000-3,000	>3,000
Maximum length (m)	150				
Maximum number of residential units served	20				
Road reserve width (m) [2]	16.0	18.0	23.0	24.0	25.0
Footpath (m)	2 x 1.8	2 x 1.8	1 x 1.8 (one side)	1 x 2.0 (one side)	1 x 2.0 (one side)
Shared use path (m) [3]			1 x 2.5 (one side)	1 x 2.5 (one side)	1 x 2.5 (one side)
Parking (m) [4]	2.5 (within carriageway, one side only)	2.0 (within carriageway, each side)	Indented parking bays (outside carriageway, each side)	Indented parking bays (outside carriageway, each side)	Indented parking bays (outside carriageway, each side)
Cycle lane (m) [1]			2 x 1.8	2 x 1.8	2 x 1.8
Traffic lane (m)	4.0 minimum	4.0 minimum	2 x 3.3	2 x 3.5	2 x 3.5
Median (m)				2.0	2.0
Minimum carriageway width (m)	6.5	8.0	10.2	12.6	12.6

1. Where cycle lanes are required these shall be permanently marked.
2. The balance of the road reserve not occupied by the carriageway, indented parking bays, footpaths and shared use paths, may be used for landscaping and installation of services. Services should not be installed under footpaths or shared use paths.
3. Consultation should be undertaken with the District Council to confirm location of shared use paths.
4. Parking design standards are shown in Transport standard TRAN-S7, Table TRAN-9.

As we discussed, we would not expect on-street cycle lanes on the west-side collector, but a 2.5m shared-use path on the west side and 1.8m footpath on the east side. For the secondary north-south road in the middle of phase 1, a 22m road reserve should be sufficient to include 1.8m footpaths on both sides and on-street cycle lanes.

Let me know if you have any other questions.
Cheers,
Shane

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