Transportation Assessment of Options

Rangiora Eastern Link

Prepared for:
Waimakariri District Council

21 March 2025

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Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
A	7 March 2025	Draft Report	Martin Peat	Chris Rossiter	Sam Rudge	Matt Soper
B	21 March 2025	Final Report	Martin Peat	Sam Rudge	Sam Rudge	Matt Soper

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Table of Contents

List of Appendices

1 Introduction

The Rangiora Eastern Link (REL) is a significant infrastructure project for Waimakariri District Council (WDC), consulted on as part of the Long-Term Plan 2024-34. Stantec was engaged by Council to prepare an options assessment, economic evaluation and transportation analysis to quantify the impact of the project on the transport system. This assessment takes a step back to reassess alternatives and confirm the preferred option from a transport perspective and thereby inform the business case. Strategic options have been developed in collaboration with WDC staff.

1.1 Background

The Rangiora Eastern Link (as well as southern and western routes) were originally proposed in the Rangiora Transport Study (Beca, 2001) and a subsequent Scheme Assessment Report (Opus, 2005) developed alignment options for study and provided preliminary details for the selected alignment.

This early work identified a need to establish connections to the east, south and west which:

- Provide alternative routes into Rangiora
- Reduce congestion on the Rangiora north-to-south strategic route (Ashley Road to Southbrook Road corridor)
- Service the expected household growth to the east and west of the town and, industrial development to the south

> *"The Outline Development Plan includes provision for significant residential development to the east of Rangiora. This development is likely to put increasing pressure on the Percival Street, Southbrook Road route south. A link from Northbrook Road to Lineside Road is proposed to ease the pressure on the Percival Street, Southbrook Road route."*
>
> Scheme Assessment Report (Opus 2005)

With the continued growth in Rangiora and in support of the District Plan, Waimakariri District Council has been actively working on this project including the preparation of a Notice of Requirement (NOR) in 2021 for the new road designation. Developer contribution policy advice (WSP, 2022) included traffic modelling of the route designation. Recent work completed in 2024 included intersection modelling and design to determine the location and form of the southern intersection with Lineside Road and the relationship with railway crossing.

The current REL designation in Figure 1-1 is ~3 km new road between Lineside Road and Northbrook Road aligned west of the wastewater treatment plant.

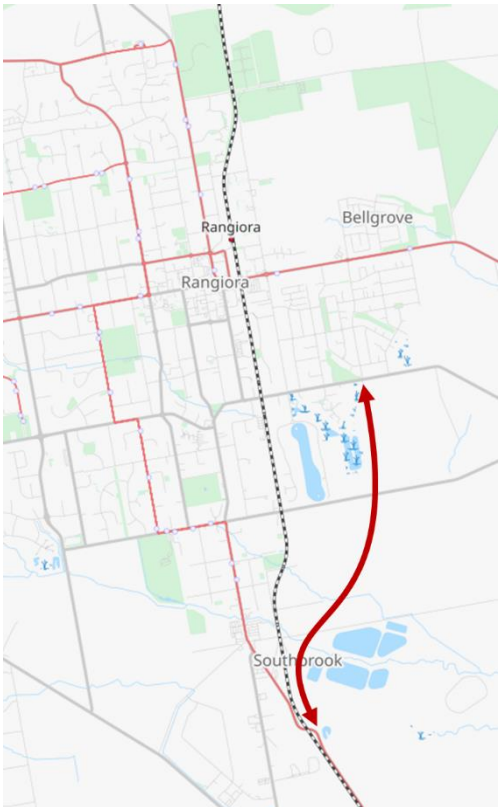


Figure 1-1 Existing REL designation

Figure 1-2 provides local area context of the key roads referenced in this report.

Figure 1-2 Rangiora map identifying key roads references in this report

1.2 Project Description

The proposed project connects Northbrook Road in the north and Lineside Road in the south via a new greenfields road. At the northern end, it connects with new roads through previous and current development areas, which continue across Kippenberger Ave to Coldstream Road at the northeastern edge of Rangiora. Road segments north of Northbrook Road will be built as residential development progresses, connecting the route through to Coldstream Road. At the southern end, a new roundabout is planned to link the new road to Southbrook Road (and the Southbrook Industrial area) to the west and Lineside Road (State Highway 71) to the south.

This new route is expected to reduce congestion through Southbrook, provide an alternative route to State Highway 1, and support the planned housing and business growth to the east of Rangiora.

1.3 Purpose of the Report

This transportation assessment of options for the Rangiora Eastern Link has been prepared to identify and evaluate options and assess their impact on the transport system. This report is provided to support the business case being prepared by Council.

2 Summary of Headline Results

The “headline results” from the analysis are presented within Table 2-1.

Table 2-1 Transport Assessment of Options – Headlines

Capacity/economic prosperity		
Impact on system reliability	Travel time reliability – motor vehicles	Travel time reliability benefits are expected with the reduction in congestion during the peak periods.
	Travel time delay	Delays encountered at key intersections along the Southbrook Road route are reduced by 1.5 to 3.5 min in 2038. Delays also decrease on the minor road (priority) approaches to Southbrook Road.
Impact on network productivity and utilisation	Access to key economic destinations (all modes)	By improving travel time reliability, reducing delays and increasing north-south capacity, the options make it faster and more efficient for goods and people from around Rangiora to reach SH1 and economic hubs in Christchurch City. However, freight from the Southbrook industrial area will face increased travel times to reach SH1 due to the increase in traffic using Lineside Road.
Access/reliability		
Impact on user experience of the transport system	Traffic – throughput	Short list options attract up to +3,000 additional vehicles per day to Lineside Road in 2028, increasing to around +4,500 vehicles per day in 2038. Southbrook Road has a forecast two-way volume of approximately 23,400 vehicles in 2028, increasing to 28,000 vehicles per day with four laning. The eastern link alignment will carry approximately 10,000 vehicles per day. SH71 Lineside Road has a two-way daily volume of approximately 17,000 vehicles which increases to around 20,000 vehicles per day.
	Travel time	Both options will improve travel times by around 1 to 1.5 minutes in the peak direction on Southbrook Road in 2028 and by 1.5 to 3.5 min in 2038. They also enable more traffic to reach Lineside Road meaning travel times increase in the order of 30 to 80 seconds, decreasing the net benefit. For access to eastern Rangiora, travel times to SH1 improve by up to 2.5 minutes with four laning and up to 3.5 minutes with the new road.
Resilience		
Impacts on system vulnerabilities and redundancies	Availability of a viable alternative to a high-risk and high-impact route	Four laning of Southbrook Road provides an extra lane in each direction in the event of an incident on this route. Route resilience is provided by REL as an additional route from the Ashley River to SH71 Lineside Road which detours around the town centre.
Safety		
Impact on social cost of deaths and serious injuries	Crashes by severity Deaths and serious injuries	REL will improve safety in two ways: (1) it will be designed as an arterial road, making travel safer; (2) it will attract traffic away from Southbrook Road, Rangiora-Woodend Road and other local roads, consequently providing a safety benefit on those roads. Four laning Southbrook Road will increase traffic volumes on this corridor leading to increased severance and exposure for vulnerable users and making it more difficult to access the corridor.

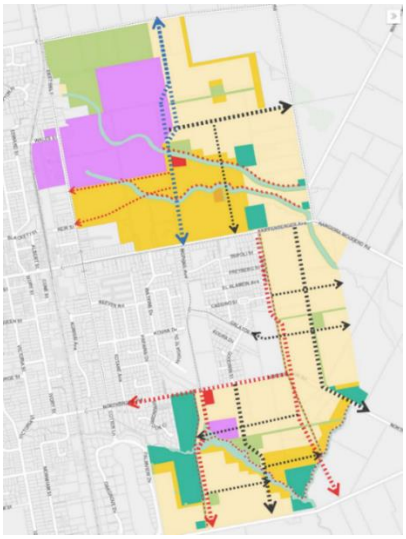
3 Growth and Development

Rangiora has a population of about 20,000 and is expected to grow to about 30,000 people by 2048. Future residential growth directions are proposed to the east (predominantly) and west of the current town.

Figure 3-1 Rangiora Residential Growth Areas[1]

Greenfield development yields in Rangiora have been sourced from WDC's summary of residential rezoning recommendations[2]. Most of these areas are depicted in the operative Waimakariri District Plan Outline Development Plan (ODP) accompanying Table 3-1. This table includes a breakdown of the planned development and staging agreed with WDC to calculate future year vehicle trip generation in the transport models.

Table 3-1 Eastern development areas and assumed staging as number of lots (by forecast year)



Development Area	2028	2038	2048
School farm	-	-	840
Sparks A	275	550	550
Sparks B	-	480	480
South East Rangiora	-	625	625
South East Rangiora (additional lots)	-	155	155
Belgrove (south)	-	720	720
Belgrove (main)	1040	1300	1300
Small holdings	-	133	265
Golf links	-	357	357
Greg Kelley	-	27	27
Belgrove (additional lots)	-	94	94
Total	**1,315**	**4,441**	**5,413**

[1] Rangiora Town Centre Strategy Blueprint 2030.pdf
[2] https://www.waimakariri.govt.nz/__data/assets/excel_doc/0035/166598/s42A-Residential-Rezonings-Summary-Table-FINAL.xlsx

4 Modelling Methodology

Transport modelling has been used to assess the impacts of the options. This section outlines the assumptions regarding road network and land use that are inherent in this modelling.

The basis of the traffic modelling is the Christchurch Assignment and Simulation Traffic (CAST) Model version 23a which sits under the higher-level Christchurch Transport Model (CTM). The CAST model includes Greater Christchurch and is designed for high-level analysis, such as the impacts of major infrastructure or land use changes over a large area.

The limitations of Saturn are its relative ability to estimate operational outcomes, such as at an intersection level, compared to more specialised microsimulation tools. Such tools are more applicable for use in design and operational planning compared to route identification. Therefore, Saturn represents the most appropriate existing tool to assess large-scale changes to the transport network.

A full validation and calibration of the CAST model was completed in 2021 (version 21a) which updated the 2018-year base model and provided a high-level check of the updated 2021-year model. Version 23a uses the same traffic demands as v21a and includes incremental network updates. Validation of the model included 6 screenlines of counts in the Waimakariri District.

Transport modelling for the previous transport assessment was completed in 2021 using CAST v18. The modelling used to inform development contributions in 2022 was derived from CAST v21a and provided a check of the validation criteria of CAST base model which concluded the overall validation appeared be sound and suitable for use. The performance of Lineside Road (SH71) was noted in WSP's reporting, suggesting the CAST model under-estimates traffic flows travelling south from Rangiora by around one quarter to one half, likely decreasing the probability of over estimating forecast trip making on the Eastern Link consideration.

Appendix A includes a check of the validation on Southbrook Road and routes to/from SH1.

4.1.1 Model Years and Time Periods

The CAST model covers three time periods as follows:

- AM peak period: 07:00 to 09:00 with a peak hour starting at 08:00
- Inter peak period: average hour between 09:00 and 16:00
- PM peak period: 16:00 to 18:00 with a peak hour starting at 16:30

The base year of the model remains as 2018 with a 2021 model most closely representing current conditions. Future year models for 2028, 2038 and 2048 are available for option testing and the results are reported upon.

Daily traffic volumes (AWT, average weekday totals) are reported herein which have been calculated using the standard CAST model method in Equation 4-1.

Equation 4-1 Calculation of Daily traffic volumes from the CAST model

$$Daily = (AM_{LV} \times 2 + IP_{LV} \times 7 \times 0.931 + IP_{LV} \times 2) \times 1.303 + (AM_{HCV} \times 2 + IP_{HCV} \times 7 \times 0.964 + IP_{HCV} \times 2) \times 1.185$$

where:

* Light vehicle (LV) and Heavy vehicle (HCV) flows are for the AM, IP, PM
* AM and PM are average hour volumes from the two hour peak

4.1.2 Development Trip Generation

Development in eastern Rangiora, outlined in Table 3-1, is represented in the model across 12 zones. Forecast trip generation is estimated using the following process:

- Determine model zone based on development area
- Estimate the number of residential lots in each zone using the s42A-Residential-Rezonings
- Calculate the trip rate for each zone using an estimated Medium Density Residential[3] daily trip rate of 7 trips per household and a peak hour rate of 0.8 trips
- Estimation the distribution of trips per day across time slices for each model period using CAST daily factors
- Calculate inbound / outbound proportions and origins/destinations based on similar adjacent 'donor' zones
- Assimilate development zone demands into the CAST model demand matrices.

The full development of the Eastern Development of some 5,400 households equates to additional 37,900 daily vehicle trips and 4,300 peak hour vehicle trips.

The models future years already includes additional population growth and therefore these calculations are in addition to this of that growth. Consequently, the growth in western Rangiora seen in Figure 3-1 has not also been added to the model as to not overestimate growth.

[3] NZ Transport Agency Research Report 453 – Trips and parking related to land use (2011)

5 Impact of Do Minimum

The Do Minimum is equivalent to Do Nothing for this project and forms a baseline for comparing options. It is comprised of committed projects (outlined below) and known development areas (as covered in the previous section).

5.1 Do Minimum Assumptions

The suite of CAST models contains an agreed set of projects and network changes represented in the model. A full list of the network assumptions is contained in **Appendix B**. On reviewing these with WDC, the following additional network assumptions were included in the Do Minimum models.

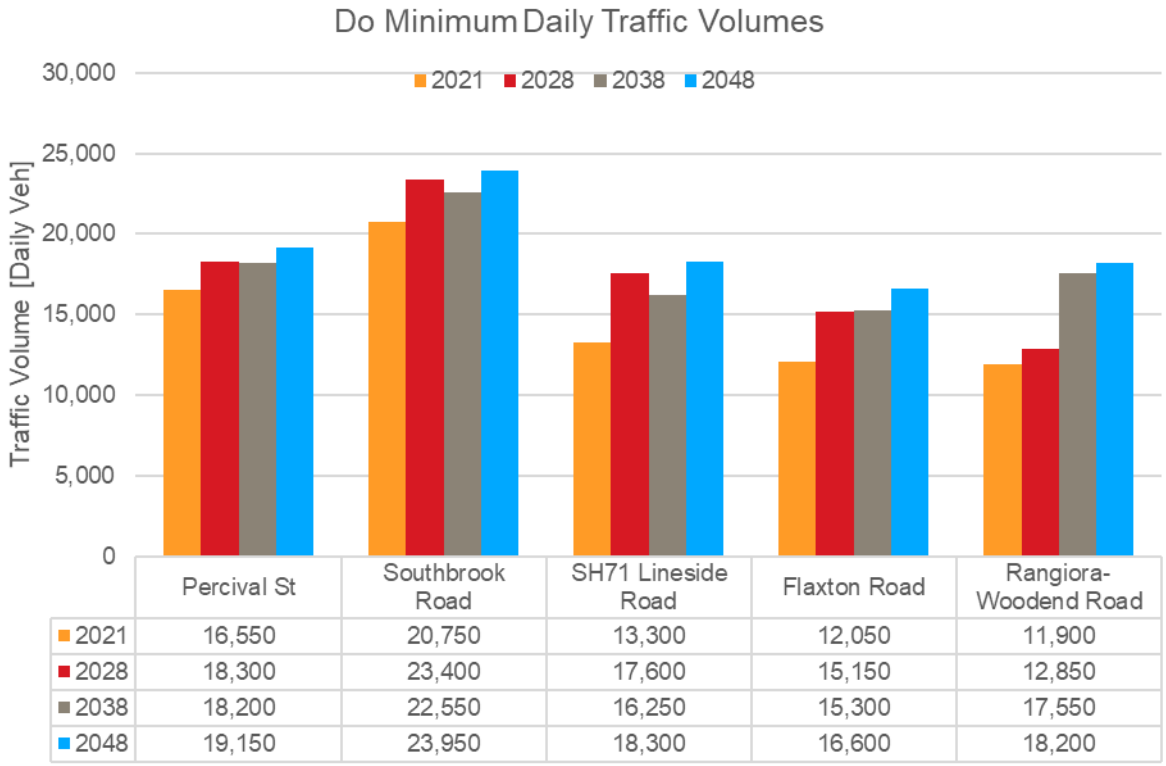
Table 5-1 Do Minimum network assumptions for future year models

Scheme / Project	Detail	2028	2038	2048
Fernside Road rail crossing	Left in/left out in all years	✓	✓	✓
Mulcocks Road rail crossing	Close in all years	✓	✓	✓
Blackett St - Keir St extension	Remove project in all years	✕	✕	✕
Woodend bypass	Bring forward to 2038	✕	✓	✓
NE Rangiora N-S Collector	MacPhail / Kippenberger to Coldstream	✕	✓	✓
Rangiora Eastern Link (this project)	Removed from CAST base models	✕	✕	✕
Eastern growth area	Local road network to support growth	✓	✓	✓
Western growth area	Local road network to support growth	✓	✓	✓

5.2 Analysis of Future Traffic Conditions

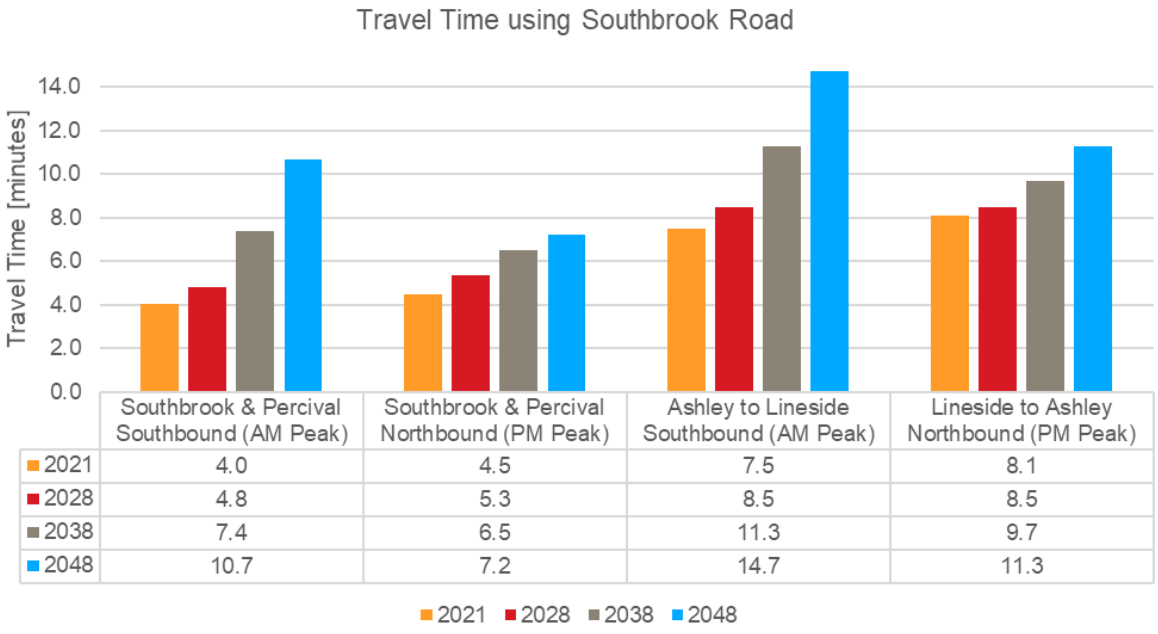
The Do Minimum models demonstrate that traffic volumes are set to increase and, as congestion increases, it will take longer to drive along Southbrook Road and travel across Rangiora.

Figure 5-1 shows that traffic volumes on Southbrook Road, Lineside Road and Flaxton Road plateau as Southbrook Road is at or near capacity. This is reinforced by the travel times presented in Figure 5-2. As development progresses in the eastern growth areas, this also leads to an increase in traffic on the Rangiora-Woodend Road.



	Percival St	Southbrook Road	SH71 Lineside Road	Flaxton Road	Rangiora-Woodend Road
2021	16,550	20,750	13,300	12,050	11,900
2028	18,300	23,400	17,600	15,150	12,850
2038	18,200	22,550	16,250	15,300	17,550
2048	19,150	23,950	18,300	16,600	18,200

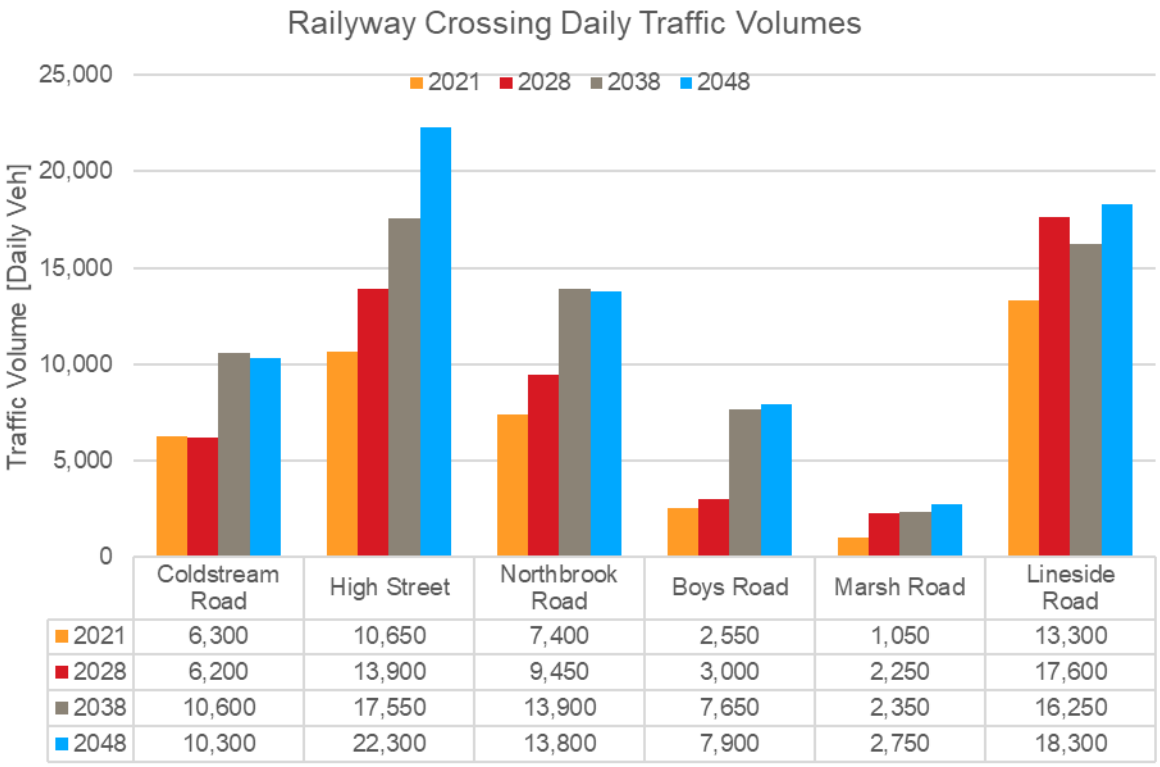
Figure 5-1 Forecast daily traffic volumes on select corridors (veh/day)



	Southbrook & Percival Southbound (AM Peak)	Southbrook & Percival Northbound (PM Peak)	Ashley to Lineside Southbound (AM Peak)	Lineside to Ashley Northbound (PM Peak)
2021	4.0	4.5	7.5	8.1
2028	4.8	5.3	8.5	8.5
2038	7.4	6.5	11.3	9.7
2048	10.7	7.2	14.7	11.3

Figure 5-2 Forecast travel times on Southbrook Road routes (in minutes)

Daily traffic volumes travelling east-west across the level crossings are also set to increase. The exception is the railway crossing on Lineside Road where the upstream effects of Southbrook Road somewhat limit the daily traffic increase past 2028. This is demonstrated in Figure 5-3.



	Coldstream Road	High Street	Northbrook Road	Boys Road	Marsh Road	Lineside Road
2021	6,300	10,650	7,400	2,550	1,050	13,300
2028	6,200	13,900	9,450	3,000	2,250	17,600
2038	10,600	17,550	13,900	7,650	2,350	16,250
2048	10,300	22,300	13,800	7,900	2,750	18,300

Figure 5-3 Forecast daily traffic volumes at railway crossings (veh/day)

5.2.1 Intersection Performance

The efficiency of the intersections along the north-south route from Ashley Street to Lineside Road were assessed using the CAST model to provide an indication of the Level of Service (LOS). The CAST model is a network-wide modelling tool and does not represent the same level of detail as a micro-simulation model. In general, as the amount of traffic increases, the level of service decreases if no improvements are made to the network.

Intersection LOS for the AM peak (Table 5-2) and PM peak (Table 5-3) show degrading levels of service through to 2048. A weighted average of delay is presented for signalised intersections and roundabouts, and the worst movement at priority intersections, to best demonstrate the changing traffic conditions between forecast years.

- Along Southbrook Road, the CAST model is known to show more delay than recent observations at the South Belt intersection and less delay at the Torlesse Street and supermarket intersections.
- Priority intersections along Percival Street and Southbrook Road, with minor approaches consistently at LOS E/F, show increasing levels of delay meaning it is more difficult to access the north-south corridor.
- The intersection of Ivory Street and Northbrook Road is the southernmost access to the eastern development areas without an eastern link in place. Here the LOS degraded with the uptake of residential development.
- Similarly, an increase in traffic volumes and a corresponding increase in delay at the Coldstream Road intersection coincides with the completion of the Kippenberger Ave to Coldstream Road connection and development through this area.

Table 5-2 Intersection LOS for AM Peak in the Do Minimum networks

Intersection LOS for AM Peak	2028 Do Minimum			2038 Do Minimum			2048 Do Minimum		
	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS
Ashley Street / Coldstream Road	857	**11**	B	1,058	**13**	B	1,304	**24**	C
Ashley Street / High Street	1,333	**25**	C	1,472	**27**	C	1,641	**30**	C
Ivory Street / Northbrook Road	1,309	**23**	C	1,566	**91**	F	1,601	**141**	F
Percival Street / Victoria Street	1,535	**38**	E	1,609	**50**	E	1,632	**62**	F
Percival Street / Johns Road	1,657	**42**	E	1,784	**57**	F	1,807	**73**	F
Percival Street / Charles Street	1,505	**36**	E	1,831	**127**	F	1,871	**179**	F
Southbrook Road / South Belt / Percival Street / Boys Road	2,045	**46**	D	2,066	**56**	E	1,953	**24**	C
Southbrook Road / Torlesse Street	1,873	**7**	A	1,944	**31**	C	1,912	**27**	C
Southbrook Road / Pak 'n Save supermarket	1,972	**7**	A	1,952	**7**	A	1,914	**7**	A
Lineside Road / Todds Road	1,866	**79**	F	1,828	**113**	F	1,810	**243**	F
Lineside Road / Flaxton Road	1,866	**38**	E	1,805	**36**	E	1,777	**39**	E
Kippenberger Ave / MacPhail Ave	781	**11**	B	1,156	**12**	B	1,422	**13**	B
Northbrook Road / MacPhail Ave	287	**6**	A	954	**12**	B	1,030	**12**	B

Table 5-3 Intersection LOS for PM Peak Do Minimum networks (average intersection delay)

Intersection LOS for PM Peak	2028 Do Minimum			2038 Do Minimum			2048 Do Minimum		
	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS
Ashley Street / Coldstream Road	1,115	**17**	C	1,422	**45**	E	1,952	**195**	F
Ashley Street / High Street	1,707	**29**	C	2,075	**36**	D	2,345	**51**	D
Ivory Street / Northbrook Road	1,672	**40**	E	1,955	**98**	F	2,020	**130**	F
Percival Street / Victoria Street	1,787	**73**	F	1,927	**107**	F	1,950	**127**	F
Percival Street / Johns Road	1,908	**64**	F	2,053	**83**	F	2,018	**97**	F
Percival Street / Charles Street	1,850	**74**	F	1,987	**139**	F	2,063	**156**	F
Southbrook Road / South Belt / Percival Street / Boys Road	2,312	**45**	D	2,753	**61**	E	2,978	**66**	E
Southbrook Road / Torlesse Street	2,100	**11**	B	2,306	**14**	B	2,520	**18**	B
Southbrook Road / Pak 'n Save supermarket	2,280	**24**	C	2,361	**32**	C	2,437	**39**	D
Lineside Road / Todds Road	2,146	**127**	F	2,174	**148**	F	2,230	**163**	F
Lineside Road / Flaxton Road	2,107	**74**	F	2,125	**95**	F	2,173	**110**	F
Kippenberger Ave / MacPhail Ave	1,048	**11**	B	1,712	**13**	B	1,824	**14**	B
Northbrook Road / MacPhail Ave	356	**6**	A	996	**11**	B	1,022	**12**	B

6 Options and Alternatives

Optioneering has considered the alternatives for achieving the project objectives. Through the business case to support the REL project, WDC identified investment objectives that focus on:

- Unlocking land for housing
- Reducing travel times
- Improving safety

A range of options and alternatives was developed in collaboration with WDC covering a suite of intervention types. This included optioneering how to make best use of the existing infrastructure through changes to lane configuration or technology, and a review of alternative alignments for REL. The alignment west of the wastewater treatment plants was proposed in 2005 and so this was a chance to explore the connection to Lineside Road and options further east with a fresh lens. These infrastructure options are shown in the Figure 6-1 map, where alternate alignments aim to:

- Increasing the separation between REL and the railway
- Unlock additional rural land east of the treatment ponds
- Create an eastern boundary road

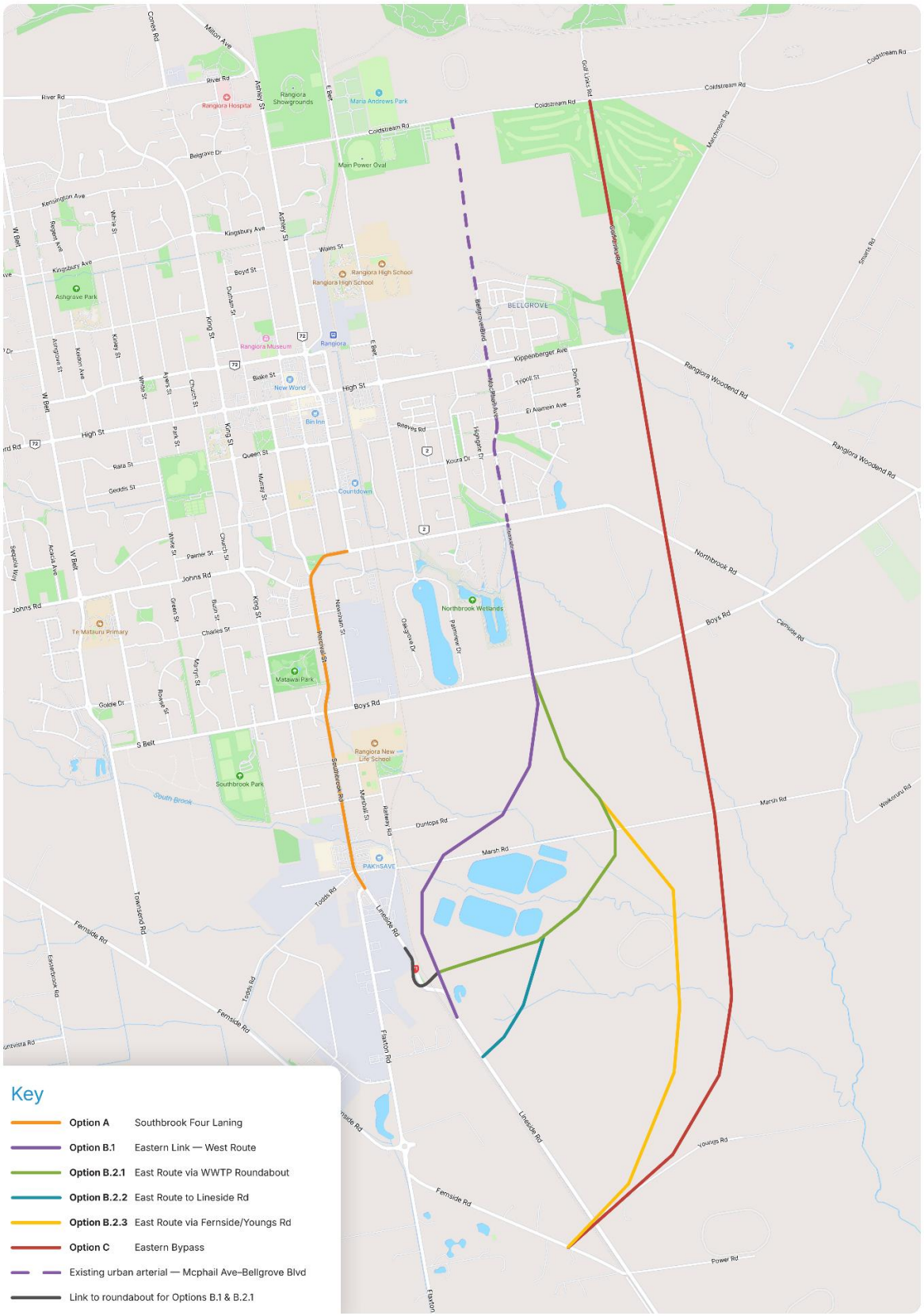


Figure 6-1 Infrastructure long list options for Rangiora Eastern Link where the Option B.1 follows the existing route designation

The Early Assessment Sifting Tool was used for an initial coarse screening to quickly and robustly filter alternatives and options (Table 6-1). **Appendix C** contains this assessment. Eight (8) options were progressed to the subsequent multi-criteria analysis, focusing on criteria that correspond to the key project risks.

Table 6-1 Initial screening of options and alternatives

Intervention Type	Alternative / Option	Early Assessment
Integrated planning	Aligning development pattern with existing network	Discontinue
Manage demand	Time of Use Charging	Progress
	Congestion Charging	Discontinue
Best use of the existing system	Tidal laning (2+1)	Progress
	Four lane Southbrook Road within existing road reserve	Progress
	Increase PT frequency	Discontinue
	Upgrade western route	Discontinue
New infrastructure	Construct REL to Northbrook (West of WWTP) *this is the existing route designation*	Progress
	Construct REL to Northbrook (East of WWTP)	Progress
	Construct REL Lineside (further south) to Northbrook	Progress
	Park and Ride upgrade	Discontinue
	Rapid transit	Discontinue
	New western bypass	Discontinue
	New eastern bypass - Fernside to Coldstream Road	Progress
	Widen and four lane Southbrook Road	Progress

6.1 Long List MCA against key risks

The MCA criteria are provided within Table 6-2. These are a consolidated set of the standard NZ Transport Agency criteria and focus on the differentiation of options. A -3 to +3 scoring scale was adopted where a score of zero has generally been taken as being ‘as per the status quo’, but with consideration that the network is experiencing rapid growth and other network changes are currently progressing. The scoring for specific criteria was owned by the project team and scores were presented back to the WDC project steering group where the short list was agreed.

Table 6-2 MCA Criteria

Theme	Criteria
Investment Objectives	Unlocks land for housing
	Reduces travel times
	Improves safety
Critical success factors	Affordability
	Risk to delivery
	Value for money
	Resilience
Opportunities and Impacts	Environment and Cultural
	Social and Landscape
	People & Property

A breakdown of the individual scores for each option is provided in Table 6-3. From the long list MCA included in Appendix C, four (4) options were progressed to the short list for traffic modelling and economic analysis:

- A.1 – Four laning of Southbrook corridor within the existing road reserve
- B.1 – Eastern Link – alignment west of WWTP
- B.2.1 – Eastern Link – alignment east of WWTP
- B.2.2 – Eastern Link – alignment east of WWTP to Lineside Road

Option A.1 is progressed as the most likely Southbrook Road option, together with variants of Option B.

Table 6-3 Long List MCA – Scoring Overview

		Investment			Critical success factors				Opportunities		
		Unlocks land for housing	Reduces travel times	Improves safety	Affordability	Risk to delivery	Value for money	Resilience	Environment and Cultural	Social and Landscape	People & Property
Southbrook Road											
A.1	Southbrook four laning – existing road reserve	0	1	-3	-1	-2	1	1	0	-2	-3
A.2	Southbrook four laning – within wider road reserve	0	1	-1	-2	-3	1	1	0	-2	-3
A.3	Southbrook three laning – tidal flow 2+1	0	1	-3	-1	-3	1	1	0	-2	-2
Managing Demand											
A.4	Congestion charging / Time of Use	0	1	-1	-2	-3	-3	0	0	-3	-1
Eastern Alignments											
B.1	Eastern Link – west route	3	3	3	-2	3	3	3	-2	0	-1
B.2.1	Eastern Link – east route to WWTP roundabout	3	3	3	-2	2	3	3	-2	0	-1
B.2.2	Eastern Link – east route to Lineside Rd	3	3	1	-2	-1	2	3	-2	0	-2
C	Eastern Bypass	2	2	2	-2	-3	-1	3	-3	-3	-3

Commentary associated with the scoring of the long list included:

- Southbrook Road options provide additional capacity that will assist travel time improvements but are also likely to induce traffic into the corridor
- Additional traffic volumes on Southbrook Road, and more traffic lanes will increase severance across the route. This is compounded by the removal of parking and cycle facilities.
- Southbrook road options are likely to induce more traffic on railway crossings
- The lower cost options are on Southbrook Road, but they are also likely to have a lower range of benefits.
- In general, options outside the existing designation present a risk to delivery. Southbrook Road options will require comprehensive community and stakeholder engagement
- Eastern alignment options bisect the future development area, supporting growth, and provide a more resilient network as an additional north-south route.
- Eastern alignments provide an alternate route to Southbrook Road and are expected to reduce traffic volumes and travel times through Southbrook.

- Option B variants include an upgrade of the Lineside Road railway crossing, benefitting safety and active modes.
- Eastern alignments connecting further south on Lineside Road are untested for technical feasibility and community engagement.
- The Eastern Bypass (Option C) is furthest from existing residential areas and at the outer limits of future urban growth. This diverts traffic further from local social and employment destinations and may degrade community connections.
- Alignments east of WWTP overlap with silent file area SF011 at Tuahiwi.
- Adding an additional lane to Southbrook Road is likely to compromise the cross section, including removal of parking and cycle lanes.

The eastern alignments of Option B variants score highest in the MCA and test the core differences to the existing route designation so on this basis are taken forward in preference to Option C. Four laning of Southbrook Road (Option A.1) considered to have the least risk to delivery of the remaining long list and is taken forward (along with the Do Minimum) as an alternative to constructing a new route.

7 Short List Options

The four options carried forward to the short list are described in Table 7-1.

Table 7-1 Short List Options

Option	Name	Outline details
A.1	Southbrook Four laning – within existing road reserve	• Widening from 12-13m sealed carriageway to 14.4m. • No parking or cycleways. • Rebuild kerbs and widened pavement. • Additional traffic signals at intersections with Northbrook Road, Todds Road and Flaxton Road • Railway Road cycleway route plus allowance for King St to High Street cycleway on road
B.1	Eastern Link - west route	• Designation route. • Shared use path, and rural to urban arterial • Dual lane roundabout at Lineside Road with rail crossing.
B.2.1	Eastern Link – east route to WWTP roundabout	• Route to east of WWTP • Shared use path, arterial and rural to urban arterial • Dual lane roundabout at Lineside Road with rail crossing.
B.2.2	Eastern Link – east route to Lineside Road	• Variation to Option B.2.1 • With a connection to a new roundabout on Lineside Road c400m from rail crossing • Retaining existing Lineside Road rail crossing.

An additional Option B.1a is included as a variation of Option B.1 but with the Marsh Road level crossing closed.

7.1 Provision for Active Modes

The project will provide a north-south route for cycling, connecting to the Passchendaele cycleway in the south.

- Option A.1 provides a cycleway route on Railway Road, parallel to Southbrook Road
- Option B variants provide a shared use path on the western side of the new road and connect to the Passchendaele cycleway with a new pedestrian level crossing (and road crossing) at Lineside Road

7.2 Model Assumptions

Four alignment options are modelled for 2028, 2038 and 2048.

Option	Name	2028	2038	2048
DN	Do Minimum	✓	✓	✓
A	Southbrook Road four laning	✓	✓	✓
B.1	Eastern Link - west route	✓	✓	✓
B.2.1	Eastern Link – east route to WWTP roundabout	✓	✓	✓
B.2.2	Eastern Link – east route to Lineside Road	✓	✓	✓

All options (but not Do Minimum) include the Spark Lane connection to Northbrook Road. Posted speed limits modelled are:

- REL north of Northbrook Road: 50kph
- REL between Lineside Road and Northbrook Road: 60kph

8 Short List Analysis

The short list options are modelled in future years 2028 (circa opening year), 2038 (+10 years) and 2048. The assessment of options focusses on 2038, with analysis of 2028 and 2048 provided for context.

This section assesses the transport effects of the options against the Do Minimum network. It focusses on the key outputs from the traffic modelling with extended analysis in **Appendix D**.

8.1 Transport Effects – Traffic Volumes

The REL project will provide a capacity improvement, either in the form of four-laning, or a new arterial road. Capacity improvements by nature will attract additional traffic to the corridor. Table 8-1 and Table 8-2 provide the forecast daily traffic volumes for various sections of Southbrook Road, the REL alignment and other local roads for the 2028, 2038 and 2048 years.

Table 8-1 Forecast daily traffic volumes on key roads for future years in all options

		Do Min	Opt A	Opt B.1a	Opt B.1a	Opt B.2.1	Opt B.2.2
2028							
Ivory Street	north of Northbrook Road	12,100	16,450	11,550	11,450	11,700	11,350
Percival St	north of South Belt	18,300	23,400	15,900	15,850	16,250	15,850
Southbrook Road	north of Station Road	23,400	28,050	20,400	20,300	20,750	20,150
Southbrook Road	at level crossing	17,600	20,550	15,250	12,700	14,550	13,350
SH71 Lineside Road	south of REL roundabout	17,600	20,550	19,250	18,800	18,800	18,150
Rangiora-Woodend Road	east of Golf Links Road	12,850	10,600	11,900	12,300	12,000	12,450
Fernside Road	south of Townsend Road	11,700	10,450	11,000	10,750	11,350	11,100
Flaxton Road	south of Lineside Road	6,800	7,950	7,250	7,850	7,400	7,950
2038							
Ivory Street	north of Northbrook Road	13,450	18,150	12,800	12,650	13,000	12,700
Percival St	north of South Belt	18,200	24,800	15,500	15,300	16,000	15,650
Southbrook Road	north of Station Road	22,550	28,900	19,800	19,400	20,050	19,600
Southbrook Road	at level crossing	16,250	20,800	14,700	11,250	13,650	12,650
SH71 Lineside Road	south of REL roundabout	16,250	20,800	20,700	18,550	20,050	19,800
Rangiora-Woodend Road	east of Golf Links Road	17,550	14,600	16,150	18,050	16,400	16,500
Fernside Road	south of Townsend Road	12,450	11,500	11,750	10,900	11,950	11,900
Flaxton Road	south of Lineside Road	6,700	8,350	8,000	8,750	8,150	8,500
2048							
Ivory Street	north of Northbrook Road	16,150	18,900	14,050	14,050	14,250	13,950
Percival St	north of South Belt	19,150	25,800	16,200	16,300	16,500	16,400
Southbrook Road	north of Station Road	23,950	30,300	20,450	20,300	20,400	20,100
Southbrook Road	at level crossing	18,300	21,600	15,200	12,700	14,200	13,100
SH71 Lineside Road	south of REL roundabout	18,300	21,600	21,550	21,300	20,900	20,750
Rangiora-Woodend Road	east of Golf Links Road	18,200	16,450	18,050	18,050	18,600	18,550
Fernside Road	south of Townsend Road	14,200	12,300	12,850	13,000	13,150	13,050
Flaxton Road	south of Lineside Road	6,700	8,800	8,250	8,550	8,150	8,600

The traffic modelling shows:

- Option A induces additional traffic to the Ivory Street – Percival Street – Southbrook Road corridor in all forecast years. Variations of Option B reduce traffic in the corridor.
- Overall - the unlocking of the capacity constraints on Southbrook Road by providing additional north-south capacity allows more traffic to access SH71 Lineside Road.
- Option A, followed by Option B.1a, have the largest reduction in traffic volumes on Rangiora-Woodend Road and Fernside Road (two parallel routes towards SH1)
- Option A has the most traffic using the Lineside Road level crossing (more than the Do Minimum in all forecast years). Option B reduces these volumes relative to the Do Minimum.

Table 8-2 Forecast daily traffic volumes on Eastern Link route for future years in all options

		Do Min	Opt A	Opt B.1a	Opt B.1a	Opt B.2.1	Opt B.2.2
2028							
Eastern Link	south of Coldstream Road	-	-	-	-	-	-
Eastern Link	south of Kippenberger Ave	1,700	1,550	3,000	3,000	2,650	3,000
Eastern Link	south of Northbrook Road	-	-	6,550	6,550	5,850	6,300
Eastern Link	south of Boys Road	-	-	5,750	6,550	5,150	5,650
Eastern Link	south of Marsh Road	-	-	6,250	6,100	4,300	4,800
2038							
Eastern Link	south of Coldstream Road	1,600	1,550	2,450	2,150	2,150	2,300
Eastern Link	south of Kippenberger Ave	3,150	2,850	5,150	4,550	4,650	5,000
Eastern Link	south of Northbrook Road	-	-	12,250	11,700	11,600	11,950
Eastern Link	south of Boys Road	-	-	9,150	9,500	8,600	9,150
Eastern Link	south of Marsh Road	-	-	9,400	7,350	6,550	7,100
2048							
Eastern Link	south of Coldstream Road	1,850	1,750	2,500	2,450	2,300	2,450
Eastern Link	south of Kippenberger Ave	3,950	3,700	5,950	6,200	5,550	5,800
Eastern Link	south of Northbrook Road	-	-	12,600	12,900	12,050	12,300
Eastern Link	south of Boys Road	-	-	9,750	11,550	9,500	9,950
Eastern Link	south of Marsh Road	-	-	10,200	8,700	7,150	7,650

Specifically related to traffic volumes in Table 8-2:

- Traffic volumes between Coldstream Road and Northbrook Road (along MacPhail Ave and the new connector road) increase in all Option B variants

8.1.1 Flow Difference Plots

Flow difference plots show the difference between Option A (Figure 8-1) and Option B1a (Figure 8-2) when each are compared against the Do Minimum.

Figure 8-1 demonstrates that Option A draws additional traffic into the Southbrook Road corridor, some of which was using alternate routes such as:

- To the west destined for the Ashley River via Easterbrook Road and Lehmans Road
- A diversion around Southbrook Road encompassing Fernside Road, Townsend Road and South Belt
- Rangiora-Woodend Road to access the east of Rangiora

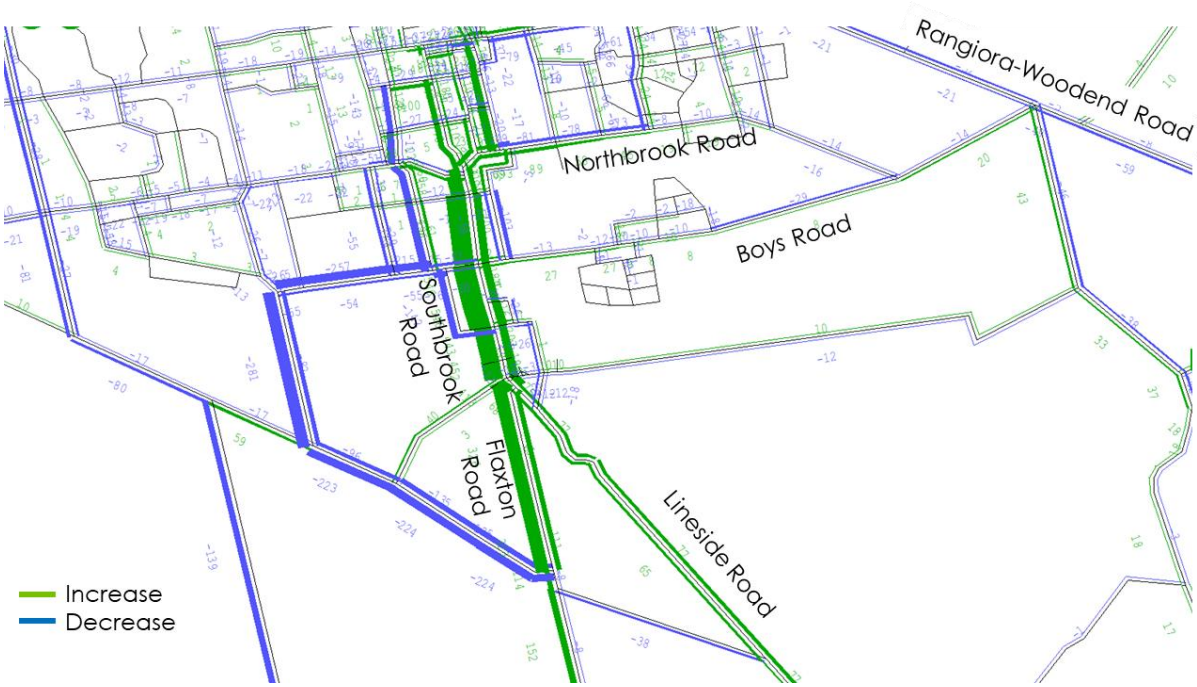


Figure 8-1 Flow difference plot comparing Option A with Do Minimum (2038 PM peak)

In general, Figure 8-2 shows that Option B1a has similar wider network changes in traffic patterns, such as decreases in traffic on Fernside Road, Townsend Road and South Belt; and an increase on Flaxton Road and Lineside Road.

The reduction in traffic shown on Southbrook Road in Option B1a is replaced by traffic on the new route (which is not shown as a difference in this image). The model also shows likely rat-running through residential streets such as East Belt and Koura Drive to access REL.

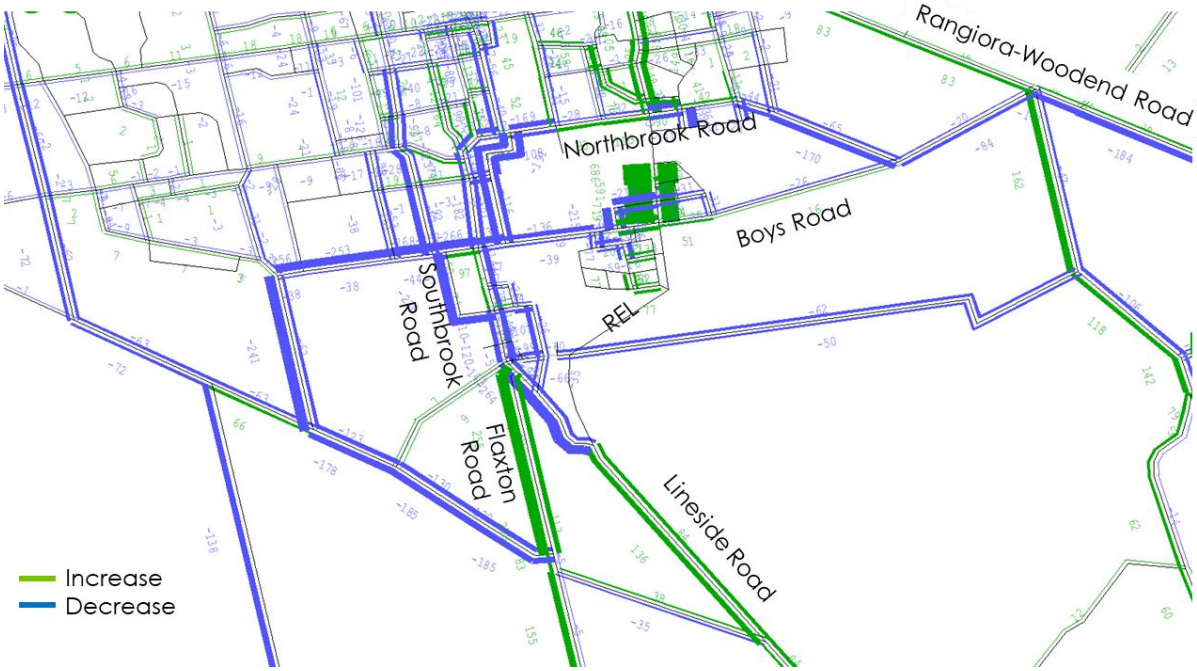


Figure 8-2 Flow difference plot comparing Option B.1a with Do Minimum (2038 PM peak)

8.1.2 Route Analysis Through Rangiora

The following model outputs (taken from the 2038 PM peak) demonstrate how the network is being used by way of 'select link' plots which capture vehicles traversing through points on the network. These show who uses:

- Lineside Road south of REL roundabout (Figure 8-3 and Figure 8-4)
    - » Of the traffic on Lineside Road, more traffic uses Southbrook Road than REL and Southbrook Road remains the dominant route to the centre of Rangiora.

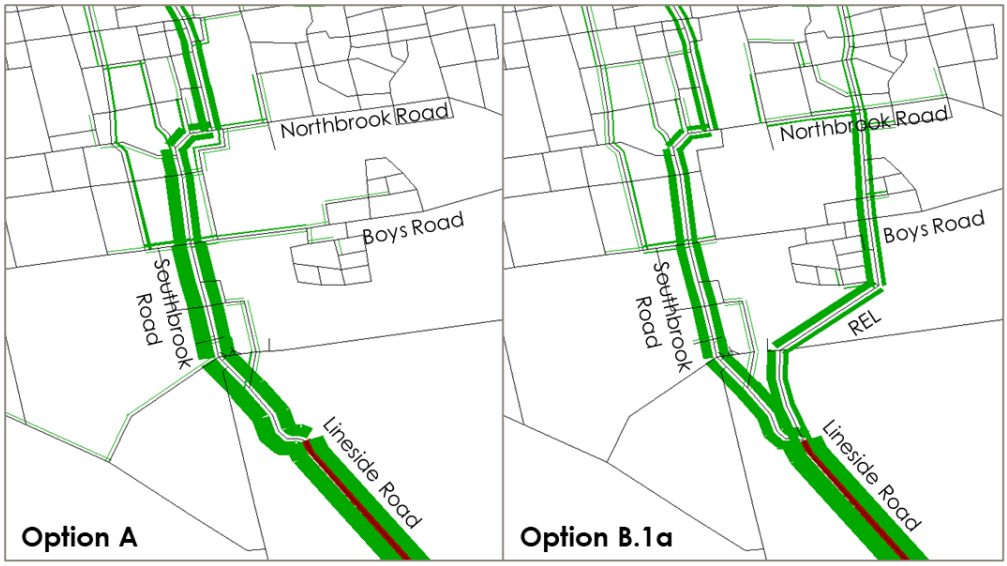


Figure 8-3 'Select Link' showing users of Lineside Road south of REL (from 2038 PM models)

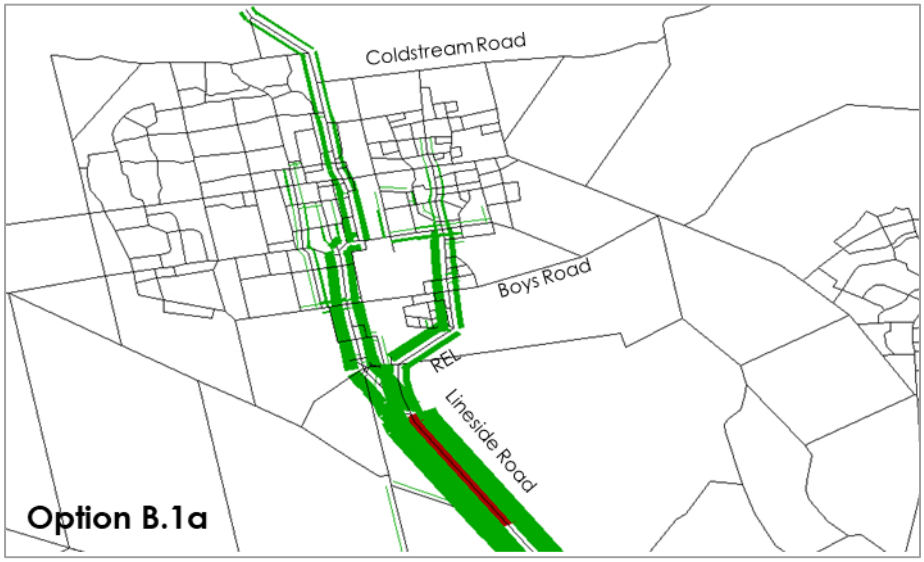


Figure 8-4 A wider 'Select Link' showing users of Lineside Road south of REL (from 2038 PM models)

- REL alignment between Marsh Road and Boys Road (Figure 8-5)
    - » Most traffic on the middle segment of REL is accessing the residential areas and using Lineside Road

» Right turn delays further north at Coldstream Road / Ashley Road may be contributing to less traffic using REL as a bypass of the town centre.

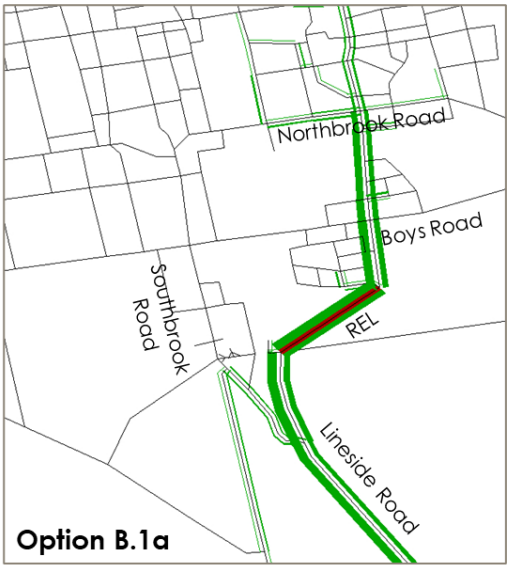


Figure 8-5 'Select Link' showing users of REL between Marsh Road and Boys Road (from 2038 PM Option B.1a)

8.1.3 Effect on Railway Crossings

Daily traffic volumes forecast for each option in 2028, 2038 and 2048 are set out in Table 8-3. The key takeaways from this are:

- Once the Coldstream Road to Kippenberger Ave connection is completed (post 2028), there is a notable increase in traffic using Coldstream Road in 2038 and 2048.
- Option A reduces the traffic volumes on Coldstream Road compared to the Do Minimum.
- Option A increases traffic volumes on the High Street crossing in 2028 and 2038. There is minimal change on the High Street crossing for Option B variants in 2028 and 2038 and a decrease in usage in 2048.
- Traffic volumes across the Marsh Road, Boys Road and Lineside Road level crossings are somewhat balanced in the Option B variants. Hence the closure of the Marsh Road crossing means more traffic uses Boys Road and Lineside Road level crossings in Option B.1a
- Less traffic uses the level crossing on Fernside Road in all options compared to the Do Minimum.
- Option A has the most traffic using the Lineside Road level crossing (more than the Do Minimum in all forecast years). Option B reduces these volumes relative to the Do Minimum.

These trends are presented visually in Figure 8-6.

Table 8-3 Forecast daily traffic volumes on railway crossings (2-way)

2028	Do Min	Opt A	Opt B.1a	Opt B.1	Opt B.2.1	Opt B.2.2
Coldstream Road	6,200	4,400	6,150	6,500	6,650	6,450
High Street	13,900	15,350	13,350	13,300	13,500	13,100
Northbrook Road	9,450	7,150	7,250	7,050	7,100	6,900
Boys Road	3,000	3,400	2,900	1,400	1,450	1,400
Marsh Road	2,250	2,100	0	4,400	4,400	4,250
Lineside Road	17,600	20,550	15,250	12,700	12,650	12,400
Fernside Road	1,400	1,000	1,200	1,100	1,100	1,100
2038						
Coldstream Road	10,600	7,250	10,000	11,400	11,300	10,900
High Street	17,550	19,450	17,150	17,000	16,950	16,350
Northbrook Road	13,900	11,600	10,700	10,950	10,900	10,500
Boys Road	7,650	8,200	6,050	3,650	3,500	3,350
Marsh Road	2,350	2,250	0	6,000	5,900	5,650
Lineside Road	16,250	20,800	14,700	11,250	11,350	11,200
Fernside Road	1,600	1,100	1,200	1,150	1,200	1,150
2048						
Coldstream Road	10,300	8,700	11,100	11,150	11,100	10,750
High Street	22,300	22,300	20,600	20,650	20,550	19,850
Northbrook Road	13,800	12,950	11,350	11,350	11,250	10,850
Boys Road	7,900	8,250	6,700	4,300	4,150	3,950
Marsh Road	2,750	2,600	0	6,650	6,600	6,350
Lineside Road	18,300	21,600	15,200	12,700	12,800	12,700
Fernside Road	1,350	1,150	1,300	1,100	1,150	1,150

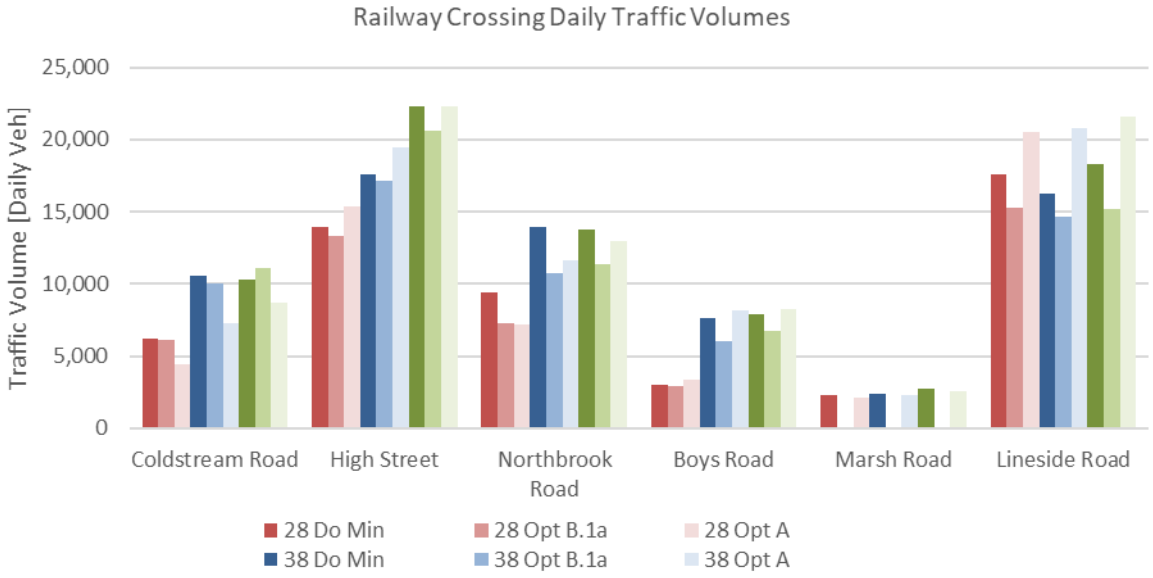


Figure 8-6 Forecast daily traffic volumes on railway crossings (2-way) for select options

8.1.3.2 Marsh Road Level Crossing

Marsh Road is an unsealed rural road with an ADT of around 200 vehicles and provides access to the wastewater treatment plant. An early question to answer with the traffic modelling is the status of the Marsh Road level crossing immediately west of the REL designation.

Traffic model volumes demonstrate that a route alignment near the level crossing incentivises local trips to/from Southbrook to use the level crossing and this would necessitate upgrading the level crossing and Station Road intersection. This is demonstrated in Figure 8-7 which shows that, when closed, traffic to/from the northern segments of REL would either use Boys Road or the Lineside Road crossing.

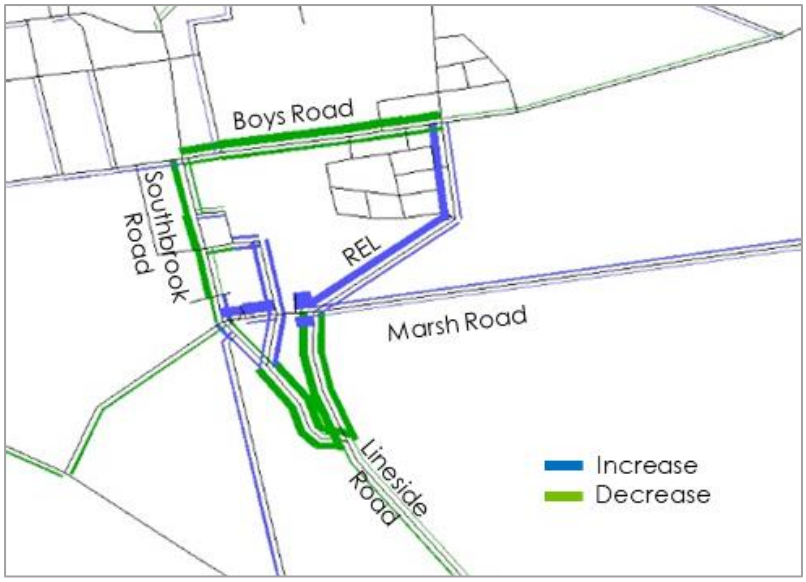


Figure 8-7 Change in traffic pattern when Marsh Road level crossing is closed

As a result of the induced traffic at the crossing, and the resulting mitigation required, WDC prefer to close the level crossing. This is captured in the reporting of Option B.1a.

8.2 Transport Effects – Travel Times

A core set of travel time routes are reported to capture the effects on:

- Southbrook Road (and Percival Street) from Northbrook Road to Lineside Road
- Lineside Road from the railway crossing to SH1 interchange
- Rangiora-Woodend Road from the town centre (Ivory Street) to SH1

Table 8-4 provides a summary of the travel times for these routes, for each option and each forecast year. This demonstrates negligible differences in travel times between the variants of Option B.

Table 8-4 Travel times comparison on key routes (in minutes)

Route	AM Peak					PM Peak				
2028	DM	OptA	OptB1a	OptB21	OptB22	DM	OptA	OptB1a	OptB21	OptB22
Northbrook to Lineside SBD	4.8	3.5	4.0	4.0	4.0	4.3	3.3	4.0	4.0	4.0
Lineside to Northbrook NBD	4.1	3.2	3.7	3.7	3.7	5.3	3.7	4.6	4.7	4.6
Lineside Road SBD	6.2	6.5	6.6	6.6	6.7	5.7	6.0	6.0	6.0	6.1
Lineside Road NBD	5.2	5.4	5.5	5.4	5.6	7.3	8.6	8.0	7.9	7.9
Rangiora-Woodend EBD	8.3	8.3	8.3	8.3	8.3	8.4	8.5	8.5	8.4	8.4
Rangiora-Woodend WBD	8.6	8.6	8.6	8.6	8.6	8.9	8.8	8.8	8.8	8.8
Eastern Link SBD			6.1	6.3	6.5			6.0	6.3	6.5
Eastern Link NBD			5.8	6.1	6.2			5.9	6.2	6.4
2038										
Northbrook to Lineside SBD	7.4	3.8	4.0	4.1	4.0	4.3	3.3	3.9	3.9	3.9
Lineside to Northbrook NBD	4.2	3.4	3.7	3.8	3.7	6.5	4.7	5.0	4.9	4.8
Lineside Road SBD	6.8	7.6	8.6	8.5	8.6	5.7	5.9	6.1	6.0	6.2
Lineside Road NBD	5.2	5.4	5.5	5.5	5.7	7.8	8.4	9.0	8.7	8.8
Rangiora-Woodend EBD	11.6	9.4	8.8	8.8	8.8	8.8	8.9	8.8	8.8	8.8
Rangiora-Woodend WBD	9.0	8.9	8.8	8.8	8.8	10.2	9.7	9.7	9.6	9.6
Eastern Link SBD			7.0	7.0	7.4			6.5	6.7	6.9
Eastern Link NBD			6.1	6.4	6.6			6.4	6.7	6.9
2048										
Northbrook to Lineside SBD	10.7	4.3	4.2	4.3	4.2	4.5	3.4	3.9	3.9	3.8
Lineside to Northbrook NBD	4.4	3.4	3.9	3.9	3.8	7.2	5.9	5.5	5.2	5.2
Lineside Road SBD	6.9	9.0	11.0	10.4	10.7	5.9	6.1	6.5	6.3	6.5
Lineside Road NBD	5.2	5.5	5.6	5.5	5.7	9.2	10.0	10.8	10.1	10.3
Rangiora-Woodend EBD	14.9	12.0	10.9	10.4	10.5	9.1	9.1	9.1	9.1	9.1
Rangiora-Woodend WBD	9.4	9.4	9.1	9.0	9.0	12.5	11.9	11.5	10.7	10.7
Eastern Link SBD			7.2	7.2	7.5			6.8	6.9	7.1
Eastern Link NBD			6.1	6.4	6.6			6.5	6.7	6.9

The travel times for the Do Minimum, Option A and Option B1a are presented visually in Figure 8-8 and Figure 8-9, showing:

- Increasing travel times in the peak direction on Southbrook Road and Rangiora-Woodend Road if nothing is done
- Both Option A and Option B variants reduce congestion on Southbrook Road
- Increasing travel times on Lineside Road and Rangiora-Woodend Road in the peak direction in the Do Minimum scenario for all years.
- Travel times increase on Lineside Road in both Option A and Option B variants due to the increase in traffic induced by the provision of additional capacity north-south through Rangiora.
- These disbenefits on Lineside Road could be offset by benefits that are gained by travel time improvements on Southbrook Road.

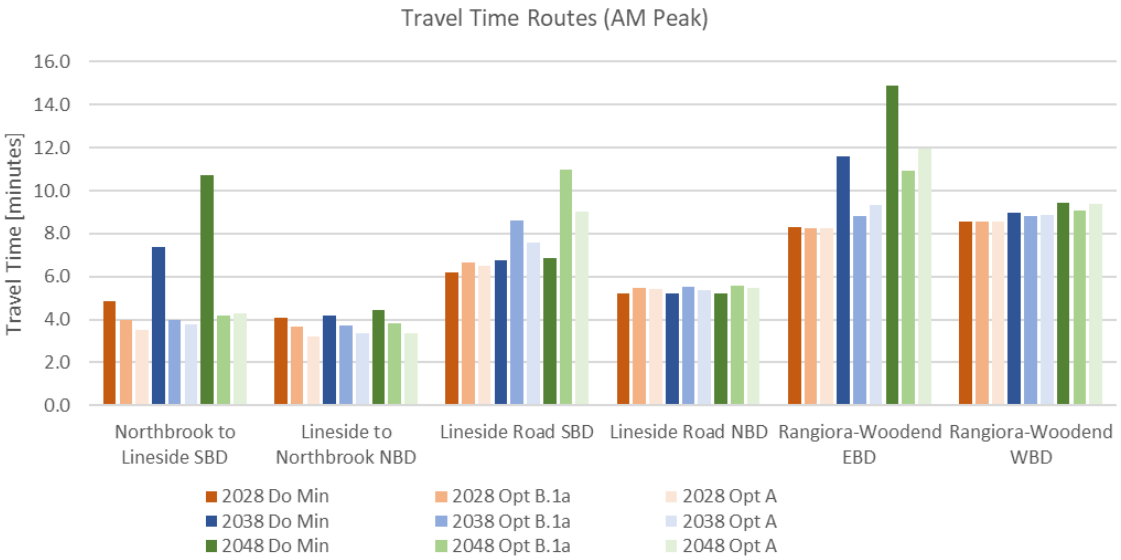


Figure 8-8 Travel times on key routes for select options – AM Peak (in minutes)

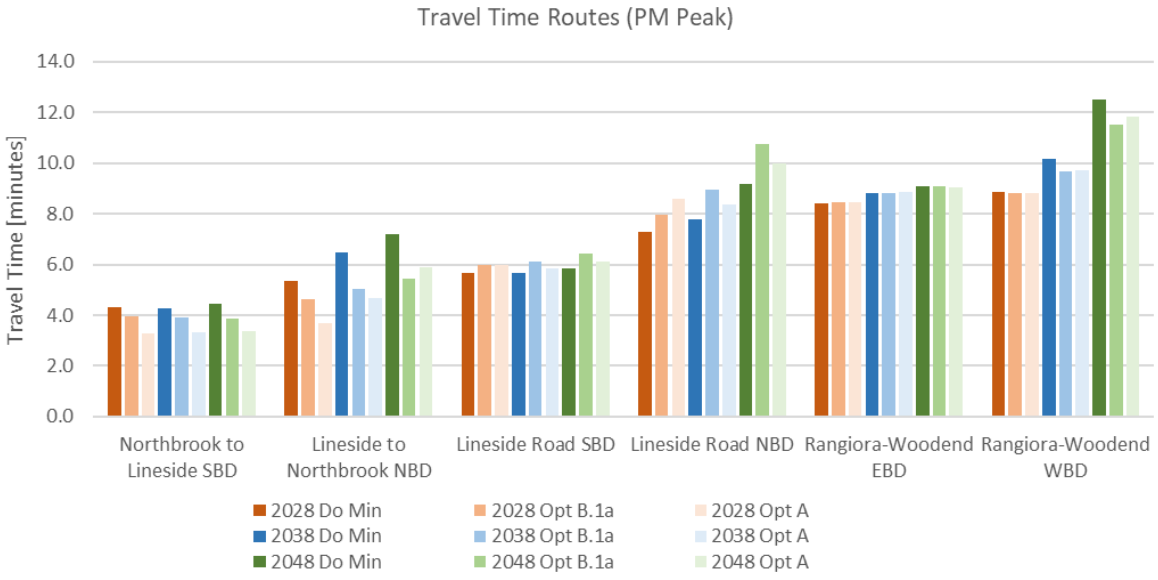


Figure 8-9 Travel times on key routes for select options – PM Peak (in minutes)

8.2.1 Travel Times to/from SH1

To assess the overall benefit (or disbenefit) on travel times, travel times from each zone in the traffic model were skimmed for both the Do Minimum and Options to/from SH1. As a proxy for the SH1 Lineside Road interchange, these times are to/from the zone representing Hakarau Road on the eastern side of the interchange (as times are extracted between two zones). Travel times are between origin-destination zones and do not infer the route taken.

The maps presented in Figure 8-10 to Figure 8-13 show the change in travel times in the peak direction. This method combines the reduced congestion on Southbrook Road with increased travel times on Lineside Road and demonstrates which parts of Rangiora are impacted by either four-laning of Southbrook Road (Option A) or an eastern link alignment (Option B1a is presented). Of note:

- Locations south of South Belt have an increase in travel time due to the increased traffic volumes on Lineside Road
- Travel time benefits are highest in central and eastern Rangiora
- There is generally a positive benefit across Rangiora zones for travel times in Option A
- The largest travel time benefits are seen in Option B where eastern zones have more direct connectivity to the south
- Option B shows low level disbenefits in western zones due to the changes in traffic volumes on Lineside Road.

Average travel times between zones in the East Rangiora ODA and SH1 in Table 8-5 are weighted by the forecast population in each zone. These demonstrate the improved access to development areas provided by Option B variants of REL compared to Option A; and that all options are an improvement on the Do Minimum.

Table 8-5 Weighted average travel times between East Rangiora ODA zones and SH1 (2038)

to SH1	**DM**	**OptA**	**OptB1a**	**OptB2.1**	**OptB2.2**
AM Peak	16.6	15.1	13.5	13.4	13.3
diff to DM		*-1.6*	*-3.2*	*-3.2*	*-3.3*
PM Peak	11.6	11.3	10.4	10.4	10.3
diff to DM		-0.3	-1.2	-1.2	-1.2
from SH1	**DM**	**A**	**B1a**	**B2.1**	**B2.2**
AM Peak	11.6	11.4	10.8	10.9	10.9
diff to DM		*-0.2*	*-0.8*	*-0.7*	*-0.7*
PM Peak	15.6	15.3	14.3	13.9	13.9
diff to DM		*-0.3*	*-1.3*	*-1.7*	*-1.8*

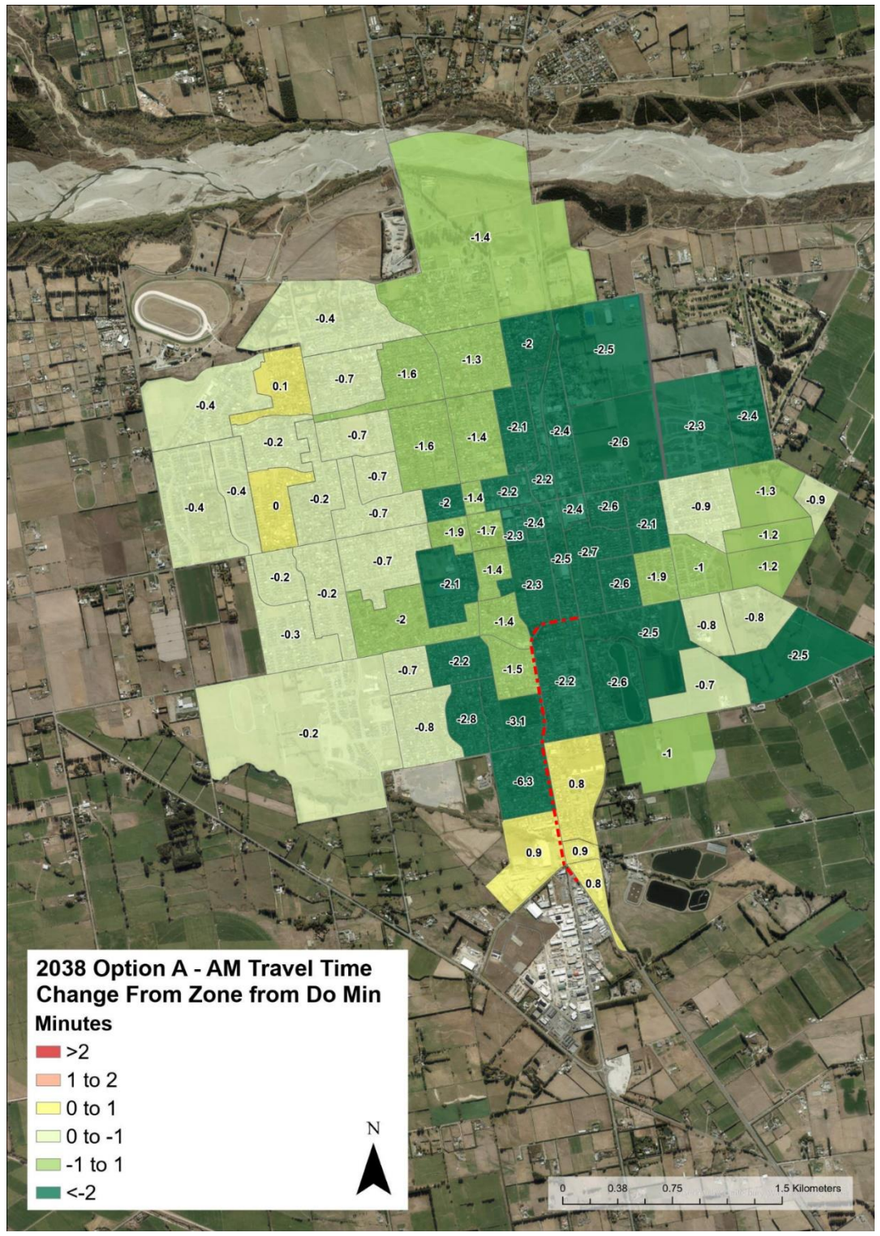


Figure 8-10 Change in travel time (in minutes) from Rangiora to SH1 in 2038, AM peak comparing Option A to the Do Minimum

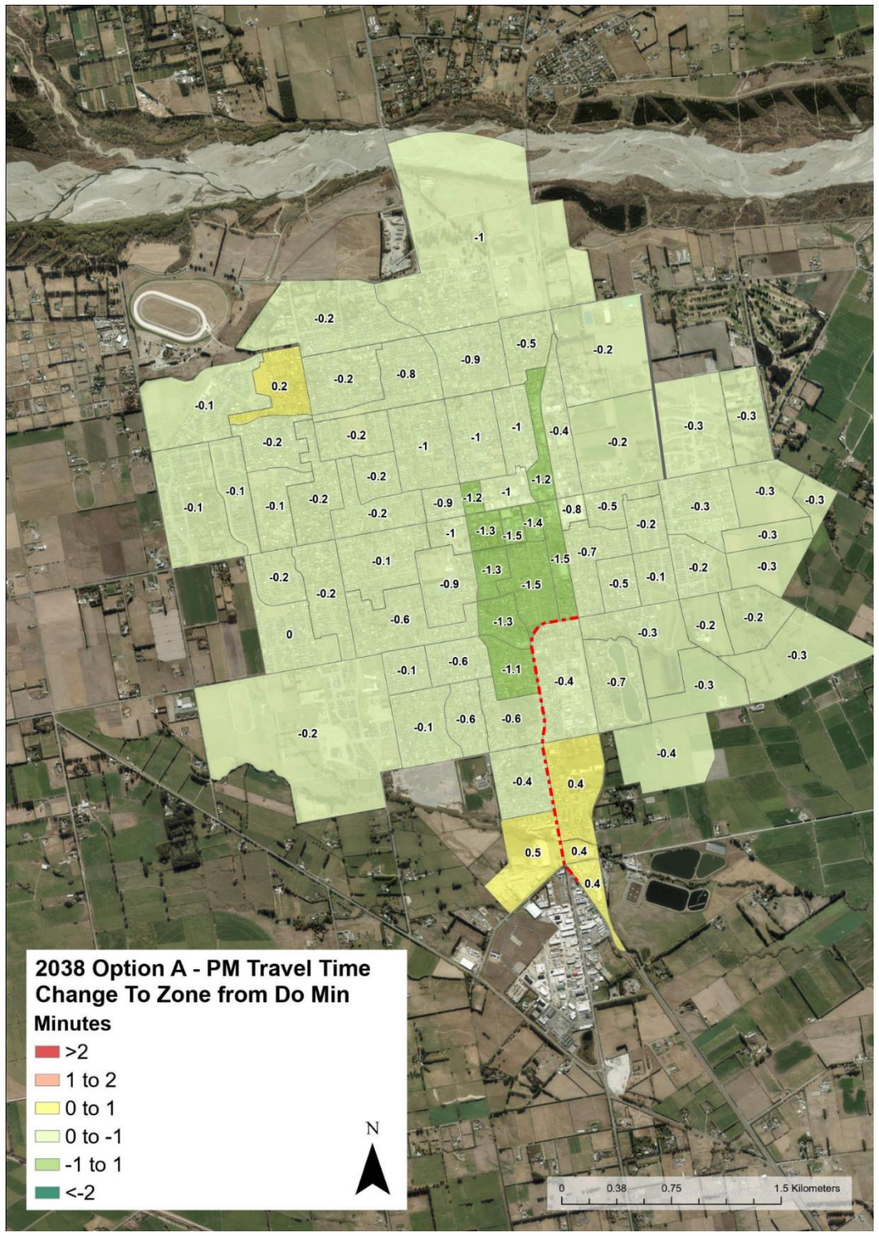


Figure 8-11 Change in travel time (in minutes) from SH1 to Rangiora in 2038, PM peak comparing Option A to the Do Minimum

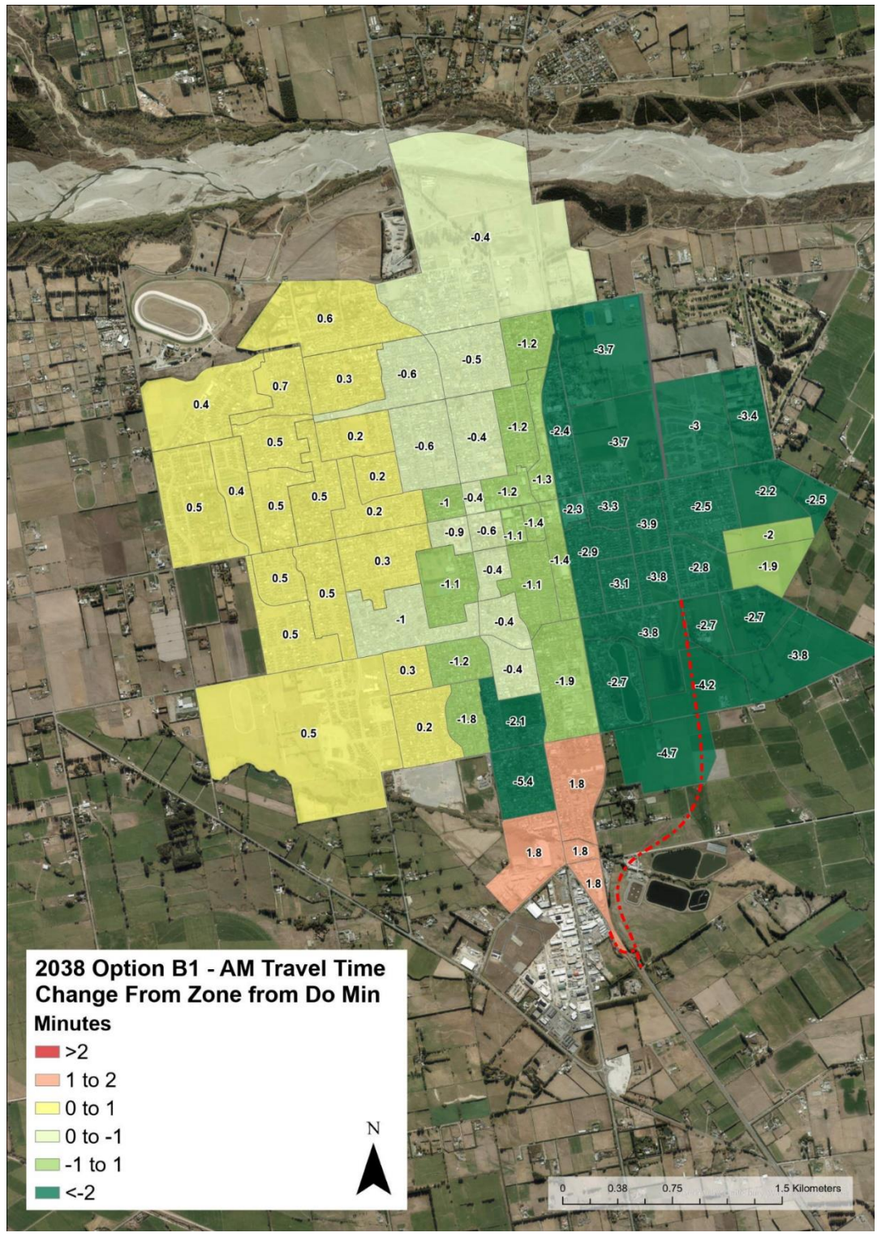


Figure 8-12 Change in travel time (in minutes) from Rangiora to SH1 in 2038, AM peak comparing Option B1a to the Do Minimum

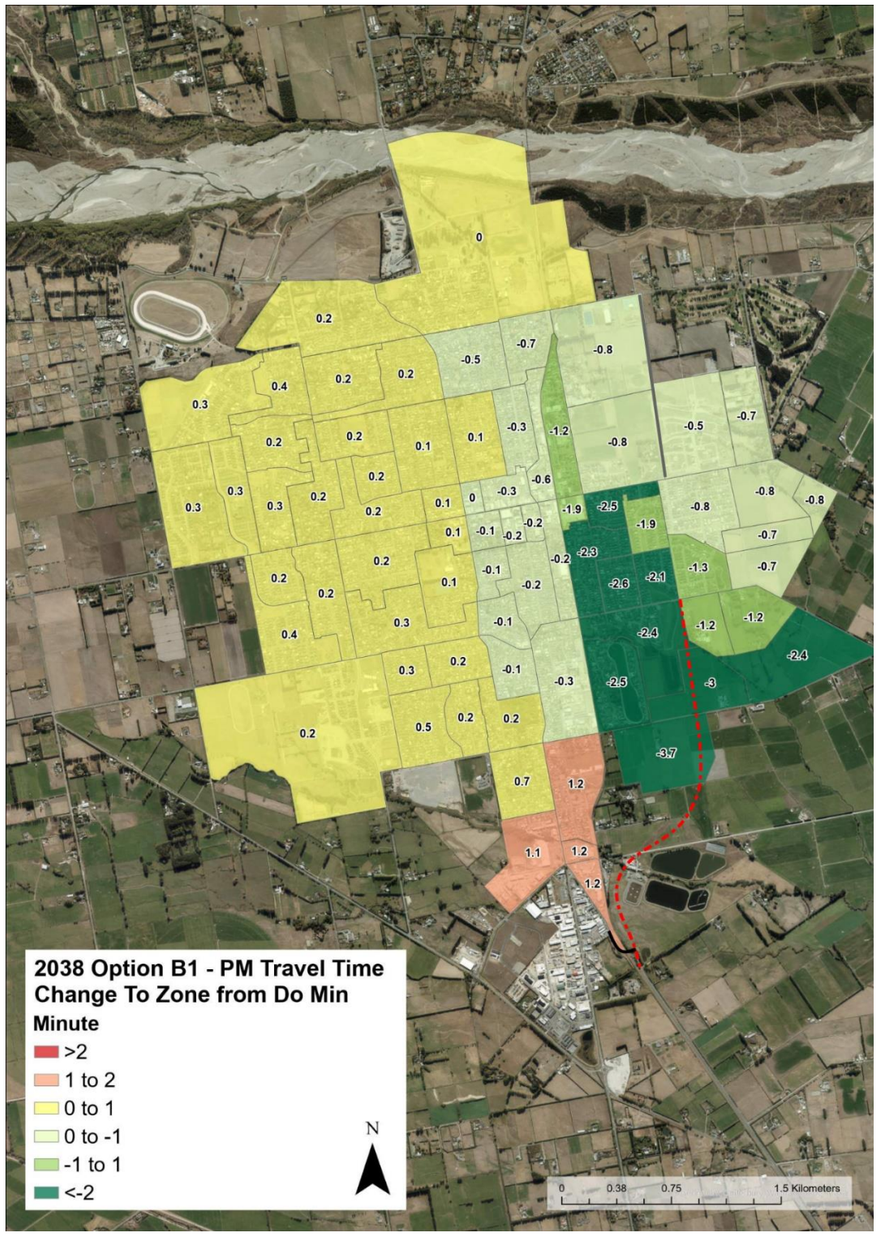


Figure 8-13 Change in travel time (in minutes) from SH1 to Rangiora in 2038, PM peak comparing Option A to the Do Minimum

8.3 Transport Effects – Intersection Performance

This section provides an overview of intersection Level of Service (LOS) for the AM and PM peak periods for the Do Minimum, Option A and Option B1. The LOS results for variants of Option B do not differentiate between options.

Table 8-6 provides a summary of the AM peak results. Delays are reported in seconds for either the weighted average (signals or roundabout) or the worst movement (priority intersections) to provide a concise summary. A full set of results are provided within **Appendix D** by approach for each option. Volumes represent the peak hour 08:00 to 09:00.

Similarly, Table 8-7 provides the corresponding PM peak results for 16:30 to 17:30.

The following trends and observations are drawn from the LOS tables:

- Delays at Coldstream Road increase with all options in the PM peak from 2038 by when the connection through to Kippenberger Avenue is established. This is caused by the right turn onto Ashley Street.
- The performance of the Ivory Street / Northbrook Road intersection improves substantially with the introduction of traffic signals in Option A. Option B also shows reduced delays at this intersection but typically has a similar LOS to the Do Minimum.
- The traffic signals on Southbrook Road operate with reduced average delay and better LOS in all options.
- Option B variants improve the LOS on minor road (priority) approaches to Percival Street.
- Intersections along the Option B alignments operate at LOS B/C from 2038.
- Traffic signals at the Lineside Road intersections of Todds Road and Flaxton Road improve intersection operation from LOS F (in Do Minimum and Option B) to LOS A/B in Option A.

Table 8-6 Intersection LOS – AM Peak Hour (08:00 to 09:00)

Intersection LOS for AM Peak	2028															2038														2048													
	Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2			Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2			Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2		
	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS
Ashley Street / Coldstream Road	857	**11**	B	972	**13**	B	933	**11**	B	932	**11**	B	926	**11**	B	1,058	**13**	B	1,133	**15**	B	1,169	**11**	B	1,122	**12**	B	1,120	**11**	B	1,304	**24**	C	1,324	**25**	C	1,302	**19**	C	1,291	**19**	C	1,290	**20**	C
Ashley Street / High Street	1,333	**25**	C	1,543	**28**	C	1,311	**25**	C	1,322	**25**	C	1,321	**25**	C	1,472	**27**	C	1,688	**30**	C	1,345	**26**	C	1,380	**26**	C	1,382	**26**	C	1,641	**30**	C	1,852	**33**	C	1,568	**29**	C	1,592	**28**	C	1,590	**28**	C
Ivory Street / Northbrook Road	1,309	**23**	C	1,528	**14**	B	1,158	**16**	C	1,162	**16**	C	1,161	**16**	C	1,566	**91**	F	1,686	**24**	C	1,392	**29**	D	1,421	**30**	D	1,424	**29**	D	1,601	**141**	F	1,816	**34**	C	1,554	**47**	E	1,533	**47**	E	1,541	**41**	E
Percival Street / Victoria Street	1,535	**38**	E	1,872	**46**	E	1,383	**29**	D	1,388	**29**	D	1,387	**29**	D	1,609	**50**	E	1,967	**54**	F	1,473	**36**	E	1,502	**37**	E	1,504	**34**	D	1,632	**62**	F	2,109	**68**	F	1,549	**42**	E	1,592	**45**	E	1,596	**43**	E
Percival Street / Johns Road	1,657	**42**	E	1,997	**52**	F	1,527	**37**	E	1,526	**37**	E	1,524	**36**	E	1,784	**57**	F	2,131	**57**	F	1,611	**39**	E	1,642	**39**	E	1,647	**38**	E	1,807	**73**	F	2,248	**74**	F	1,637	**42**	E	1,702	**42**	E	1,700	**41**	E
Percival Street / Charles Street	1,505	**36**	E	1,927	**56**	F	1,359	**25**	C	1,376	**25**	C	1,374	**25**	C	1,831	**127**	F	2,203	**79**	F	1,397	**36**	E	1,451	**35**	D	1,453	**33**	D	1,871	**179**	F	2,375	**115**	F	1,459	**45**	E	1,492	**48**	E	1,489	**43**	E
Southbrook Road / South Belt / Percival Street /	2,045	**46**	D	2,405	**22**	C	1,819	**29**	C	1,770	**30**	C	1,772	**28**	C	2,066	**56**	E	2,837	**44**	D	2,007	**30**	C	2,016	**30**	C	2,016	**28**	C	1,953	**24**	C	3,008	**50**	D	2,082	**34**	C	2,099	**35**	C	2,098	**33**	C
Southbrook Road / Torlesse Street	1,873	**7**	A	2,170	**5**	A	1,603	**6**	A	1,596	**5**	A	1,599	**5**	A	1,944	**31**	C	2,424	**6**	A	1,631	**6**	A	1,611	**6**	A	1,615	**6**	A	1,912	**27**	C	2,656	**7**	A	1,653	**6**	A	1,639	**6**	A	1,637	**6**	A
Southbrook Road / Pak 'n Save supermarket	1,972	**7**	A	2,265	**5**	A	1,735	**6**	A	1,655	**6**	A	1,660	**6**	A	1,952	**7**	A	2,462	**5**	A	1,736	**6**	A	1,686	**6**	A	1,688	**6**	A	1,914	**7**	A	2,649	**5**	A	1,747	**6**	A	1,734	**6**	A	1,731	**6**	A
Lineside Road / Todds Road	1,866	**79**	F	2,118	**9**	A	1,540	**41**	E	1,548	**46**	E	1,554	**43**	E	1,828	**113**	F	2,282	**10**	A	1,499	**41**	E	1,587	**48**	E	1,589	**44**	E	1,810	**243**	F	2,492	**11**	B	1,508	**45**	E	1,641	**56**	F	1,638	**51**	F
Lineside Road / Flaxton Road	1,866	**38**	E	2,101	**11**	B	1,614	**24**	C	1,590	**24**	C	1,596	**22**	C	1,805	**36**	E	2,271	**13**	B	1,656	**23**	C	1,699	**24**	C	1,700	**22**	C	1,777	**39**	E	2,389	**15**	B	1,667	**25**	C	1,746	**26**	D	1,743	**23**	C
Coldstream Road / REL	366			303			428			417			411			583	**8**	A	549	**8**	A	762	**10**	A	685	**9**	A	681	**10**	A	771	**10**	A	669	**9**	A	851	**11**	B	775	**11**	B	776	**11**	B
Kippenberger Ave / MacPhail Ave	781	**11**	B	787	**11**	B	992	**11**	B	985	**11**	B	982	**11**	B	1,156	**12**	B	1,245	**12**	B	1,519	**13**	B	1,419	**13**	B	1,420	**13**	B	1,422	**13**	B	1,278	**12**	B	1,627	**15**	B	1,615	**15**	B	1,595	**15**	B
Northbrook Road / MacPhail Ave	287	**6**	A	219	**5**	A	750	**10**	A	697	**10**	A	693	**10**	A	954	**12**	B	811	**10**	A	1,490	**12**	B	1,171	**11**	B	1,173	**12**	B	1,030	**12**	B	1,047	**13**	B	1,646	**14**	B	1,289	**12**	B	1,291	**13**	B
REL / Boys Road	98	**11**	B	146	**11**	B	767	**10**	A	645	**10**	A	642	**10**	A	96	**11**	B	154	**11**	B	1,293	**12**	B	1,037	**11**	B	1,037	**12**	B	106	**11**	B	138	**11**	B	1,327	**12**	B	1,127	**12**	B	1,122	**12**	B
REL / Marsh Road	137			128			590	**9**	A	766	**8**	A	758	**8**	A	156			144			1,015	**16**	C	1,090	**13**	B	1,088	**16**	C	197			208			1,085	**19**	C	1,171	**15**	B	1,169	**17**	C
Lineside Road / REL	1,391			1,545			1,636	**13**	B	1,507	**13**	B	1,506	**13**	B	1,367			1,615			1,941	**14**	B	1,703	**13**	B	1,707	**13**	B	1,413			1,716			2,000	**14**	B	1,756	**13**	B	1,750	**13**	B

Table 8-7 Intersection LOS – PM Peak Hour (16:30 to 17:30)

Intersection LOS for PM Peak	2028															2038														2048													
	Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2			Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2			Do Minimum			Option A			Option B.1a			Option B.2.1			Option B.2.2		
	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS	Veh	Delay	LOS
Ashley Street / Coldstream Road	1,115	**17**	C	1,156	**20**	C	1,158	**19**	C	1,148	**19**	C	1,140	**19**	C	1,422	**45**	E	1,503	**68**	F	1,525	**68**	F	1,501	**65**	F	1,513	**72**	F	1,952	**195**	F	1,986	**254**	F	2,056	**210**	F	1,997	**244**	F	2,009	**250**	F
Ashley Street / High Street	1,707	**29**	C	2,012	**36**	D	1,638	**28**	C	1,675	**28**	C	1,680	**28**	C	2,075	**36**	D	2,282	**46**	D	2,006	**33**	C	2,002	**33**	C	2,000	**33**	C	2,345	**51**	D	2,487	**71**	E	2,310	**46**	D	2,268	**49**	D	2,271	**48**	D
Ivory Street / Northbrook Road	1,672	**40**	E	1,952	**18**	B	1,504	**23**	C	1,546	**24**	C	1,549	**23**	C	1,955	**98**	F	2,123	**24**	C	1,839	**65**	F	1,837	**64**	F	1,839	**64**	F	2,020	**130**	F	2,155	**27**	C	1,885	**92**	F	1,916	**119**	F	1,913	**116**	F
Percival Street / Victoria Street	1,787	**73**	F	2,308	**98**	F	1,701	**73**	F	1,722	**77**	F	1,722	**73**	F	1,927	**107**	F	2,297	**108**	F	1,807	**84**	F	1,833	**83**	F	1,833	**83**	F	1,950	**127**	F	2,350	**118**	F	1,806	**92**	F	1,842	**94**	F	1,836	**95**	F
Percival Street / Johns Road	1,908	**64**	F	2,549	**73**	F	1,883	**53**	F	1,887	**54**	F	1,889	**53**	F	2,053	**83**	F	2,489	**94**	F	1,960	**61**	F	1,988	**61**	F	1,988	**61**	F	2,018	**97**	F	2,506	**91**	F	1,937	**67**	F	1,972	**71**	F	1,970	**70**	F
Percival Street / Charles Street	1,850	**74**	F	2,462	**90**	F	1,712	**61**	F	1,726	**63**	F	1,730	**61**	F	1,987	**139**	F	2,549	**123**	F	1,769	**84**	F	1,804	**83**	F	1,804	**82**	F	2,063	**156**	F	2,701	**128**	F	1,809	**97**	F	1,832	**123**	F	1,835	**121**	F
Southbrook Road / South Belt / Percival Street /	2,312	**45**	D	3,031	**21**	C	2,081	**34**	C	2,031	**36**	D	2,032	**34**	C	2,753	**61**	E	3,443	**55**	D	2,391	**34**	C	2,371	**34**	C	2,372	**33**	C	2,978	**66**	E	3,719	**30**	C	2,511	**41**	D	2,495	**37**	D	2,477	**37**	D
Southbrook Road / Torlesse Street	2,100	**11**	B	2,808	**5**	A	1,915	**10**	A	1,864	**9**	A	1,877	**9**	A	2,306	**14**	B	2,947	**6**	A	2,027	**13**	B	1,982	**12**	B	1,984	**12**	B	2,520	**18**	B	3,254	**8**	A	2,045	**14**	B	2,017	**13**	B	2,008	**14**	B
Southbrook Road / Pak 'n Save supermarket	2,280	**24**	C	2,934	**12**	B	2,061	**19**	B	1,966	**19**	B	1,970	**19**	B	2,361	**32**	C	3,002	**12**	B	2,100	**20**	B	2,054	**20**	B	2,046	**19**	B	2,437	**39**	D	3,193	**12**	B	2,123	**22**	C	2,047	**20**	B	2,043	**20**	B
Lineside Road / Todds Road	2,146	**127**	F	2,767	**4**	A	1,896	**90**	F	1,890	**103**	F	1,891	**95**	F	2,174	**148**	F	2,813	**5**	A	1,884	**97**	F	1,952	**112**	F	1,943	**104**	F	2,230	**163**	F	3,006	**6**	A	1,939	**110**	F	2,005	**128**	F	2,003	**119**	F
Lineside Road / Flaxton Road	2,107	**74**	F	2,722	**16**	B	1,985	**59**	F	1,888	**39**	E	1,892	**37**	E	2,125	**95**	F	2,728	**17**	B	2,013	**84**	F	2,015	**66**	F	2,011	**58**	F	2,173	**110**	F	2,915	**19**	B	2,068	**127**	F	2,044	**123**	F	2,036	**104**	F
Coldstream Road / REL	678			534			742			701			688			840	**10**	A	800	**10**	A	1,015	**13**	B	961	**12**	B	970	**13**	B	953	**12**	B	895	**11**	B	1,069	**14**	B	1,007	**13**	B	1,011	**14**	B
Kippenberger Ave / MacPhail Ave	1,048	**11**	B	983	**10**	A	1,178	**11**	B	1,099	**11**	B	1,100	**11**	B	1,712	**13**	B	1,641	**13**	B	1,874	**15**	B	1,823	**15**	B	1,822	**15**	B	1,824	**14**	B	1,759	**13**	B	2,067	**18**	B	1,994	**17**	B	1,989	**17**	B
Northbrook Road / MacPhail Ave	356	**6**	A	291	**6**	A	961	**10**	A	826	**10**	A	823	**10**	A	996	**11**	B	965	**12**	B	1,588	**12**	B	1,246	**12**	B	1,246	**12**	B	1,022	**12**	B	1,050	**12**	B	1,617	**13**	B	1,317	**12**	B	1,316	**13**	B
REL / Boys Road	135	**11**	B	177	**11**	B	894	**10**	A	688	**10**	A	688	**10**	A	213	**11**	B	210	**11**	B	1,413	**11**	B	1,011	**11**	B	1,009	**11**	B	230	**11**	B	245	**11**	B	1,613	**12**	B	1,108	**12**	B	1,114	**12**	B
REL / Marsh Road	168			146			762	**10**	A	960	**9**	A	962	**9**	A	201			200			1,070	**15**	B	1,197	**12**	B	1,205	**14**	B	286			307			1,308	**21**	C	1,332	**18**	C	1,334	**23**	C
Lineside Road / REL	1,680			1,984			2,010	**16**	B	1,812	**15**	B	1,817	**15**	B	1,815			1,958			2,260	**19**	B	1,955	**17**	B	1,957	**17**	B	1,927			2,052			2,480	**24**	C	2,135	**19**	B	2,136	**19**	B

8.4 Access to key economic destinations

As a proxy for access to key economic destinations, the Rangiora population living within 10 minutes of Southbrook has been calculated using a skim of AM Peak travel times from the 2038 project CAST model and weighted by the forecast population. A similar calculation demonstrates access to SH1 in Table 8-8. Both measures show that the options provide a similar level of access to Southbrook and SH1.

Table 8-8 Population catchment of key destinations

	Do Min	Opt A	Opt B1a	Opt B2.1	Opt B2.2
Within 10 minutes of Southbrook					
Population	27,650	37,900	37,900	37,900	37,900
% Population	73%	100%	100%	100%	100%
Within 15 minutes of SH1 (Lineside Road interchange)					
Population	5,850	20,800	21,700	21,700	21,700
% Population	15%	55%	57%	57%	57%

8.5 Network Statistics

Network statistics for vehicle kilometres travelled and vehicle hours travelled are used for the economic analysis of options in conjunction with value of time and vehicle operating costs. The change in these metrics is presented in Table 8-9.

- In 2028, Option A has the largest reduction in distance travelled. This is likely due to the increase in capacity on the Southbrook Road corridor combined with the central location being accessible to both the east and west sides of Rangiora.
- 2028 has less development growth in eastern Rangiora than the 2038- and 2048-year forecasts and in subsequent years the change in VKT is more comparable between options.
- In all years, Option A has higher vehicle hour travelled than Option B variants.

Table 8-9 Change in network statistics between options and Do Minimum (daily)

	VKT (km.veh)			Veh.Hr		
Option	**2028**	**2038**	**2048**	**2028**	**2038**	**2048**
Option A	-7,339	-8,819	-11,117	-121	-205	-82
Option B.1a	-1,179	-7,141	-10,077	-167	-323	-589
Option B.2.1	-1,283	-6,721	-9,400	-210	-479	-522
Option B.2.2	-1,660	-8,166	-11,335	-76	-441	-555

8.6 Safety

Quantifying safety benefits has proven challenging as the benefits are spread across the wider Rangiora network so the simplified procedures do not identify the significant number of areas with improved safety outcomes.

The CAST modelling shows reductions in network VKT are expected and with road safety being a function of exposure – the less VKT, the lower the expected crashes and improved safety outcomes. To quantify this further, a detailed network safety model would need to be developed during the next stage of the project. This model needs to extend beyond key routes to effectively capture the network wide safety outcomes.

Option A increases severance through four laning of Southbrook Rd, materially increasing the risk to users and increasing the number of conflicts. Traffic volumes over Lineside Rd level crossing increase and while an upgrade is not scoped as part of this option, this will need to be mitigated. Increased severance is combined with reduced accessibility and higher risk for pedestrians – particularly children crossing the road.

Option B1a and B2.1 reduce the volume of traffic along Southbrook Road (reduce severance and number of conflicts) as well as over the level crossings. The upgrade of the Lineside Road level crossing improves safety here. Option B2.2 is similar to Option B1a but does not include the Lineside Road level crossing upgrade.

8.7 Resilience

While Option A improves local access by reducing congestion, there is no additional resilience provided beyond an extra lane.

Option B alignments improve local road connectivity by providing an arterial road alternative to Percival Street and Southbrook Road. When completed it also enables an additional north-south route from the Ashley River to SH71 Lineside Road. This alternative road provides route resilience.

8.8 Public Transport

Public transport routes to/from Rangiora use Lineside Road, Southbrook Road and Rangiora-Woodend Road. Bus services will be impacted by increasing congestion on these routes in future years (in the Do Minimum). Route 91 will be particularly affected by increasing delays at the Southbrook Road / South Belt signalised intersection.

The reductions in general traffic travel times on Southbrook Road and Rangiora-Woodend Road will benefit public transport on these roads, improving bus travel times. This is partially offset by the increase in travel time forecast on Lineside Road. Existing bus routes primarily serve the western side of Rangiora so with the introduction of a new arterial in Option B, and with continued residential development in the east, there is an opportunity to review public transport routes to increase access.

The residential development in eastern Rangiora will increase patronage on Route 97.

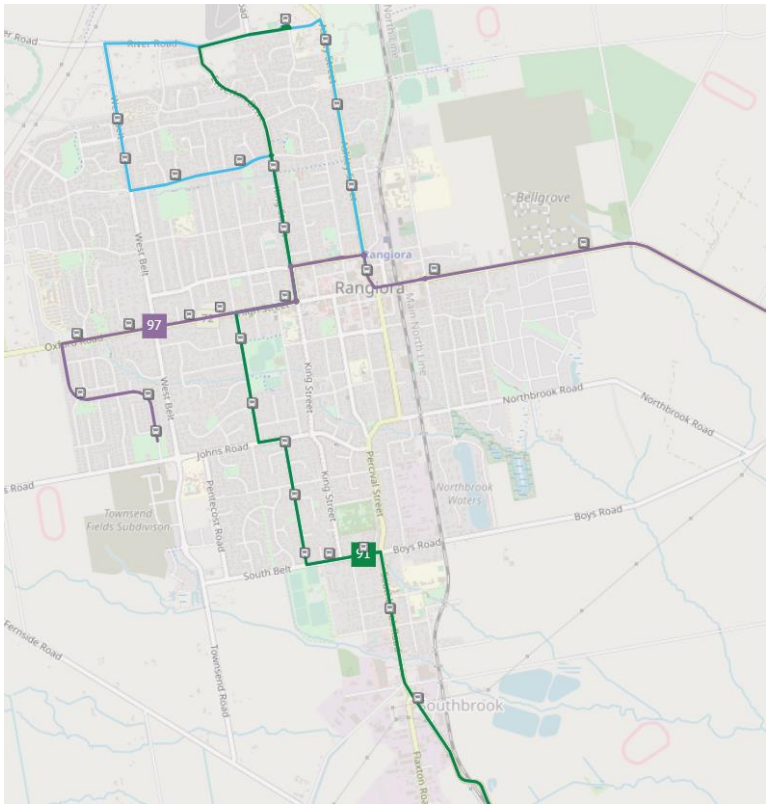


Figure 8-14 Bus routes in Rangiora at March 2025

9 Economic Analysis

The economic analysis undertaken for the short list options aligns with the guidelines and procedures outlined in the Monetised Benefits and Cost Manual (MBCM, November 2024) and the General Circular 25/01 (discount rates, January 2025).

Rough Order Costs in Table 9-1 were provided by WDC for economic analysis. For the economics, a risk adjustment allowing a further 50% contingency has been added to account for the preliminary phase of investigations.

Table 9-1 Rough Order Costs for short list options

	Option A (4-laning)	Option B1a (REL West)	Option B2.1 (REL East)	Option B2.2 (Lineside Rd)
Expected Estimate (P50)	$21.5M	$34.9M	$35.7M	$32.9M
P95 Estimate	$31.0M	$52.4M	$53.6M	$49.4M

Table 9-2 provides a summary of the benefits streams, BCRn, BCRg and FYRR for each of the options assessed.

Table 9-2 Options BCR summary

Component	Option A (4-laning)	Option B1a (REL West)	Option B2.1 (REL East)	Option B2.2 (Lineside Rd)
TT Savings	$26.5	$227.7	$201.4	$218.0
VOC Savings	$39.9	$50.7	$48.5	$53.6
Active Modes	$3.8	$3.7	$4.1	$4.3
Safety	-	-	-	-
Total PV Benefits	$70.2	$282.0	$254.0	$276.0
Total PV Costs	$35.6	$58.2	$59.4	$54.8
Developer Contribution PV Costs	$7.5	$24.7	$25.2	$23.2
BCR (National)	2.0	4.8	4.3	5.0
BCR (Government)	2.2	7.7	6.7	8.0
FYRR	6%	5%	6%	3%

Key findings include:

- Travel time benefits for the options are significant and account for 40-80% of the total benefits, followed by vehicle operating costs. Active modes benefits are minor and account for less than 5% of the total benefits.
- As Option A includes 4-laning an existing road corridor, the travel time benefits are significantly lower at $27M compared to over $200M benefits for the other Option B variants. This is because Option A fails to provide sufficient capacity in the 2048 model year, leading to travel time disbenefits.
- The Option B variants have the highest National BCRs (BCRn) ranging from 4.3-5.0, while Option A has a BCR of 2.0, reflecting the higher travel time and vehicle operating benefits of the Option B variants
- Incremental analysis demonstrates that the incremental benefits of Option B1a offset the higher costs of this option when compared to Option A and B2.2, with an incremental BCR of 11 and 2, respectively.
- Considering developer contributions, the Government BCRs (BCRg) increase, with Option B1a increasing to 7.7. Option A sees the smallest increase in BCR as the developer contributions are only 25% compared to the 50% applied to the other Option B variants.
- The sensitivity testing shows that the BCR remains above 1.0 under a range of scenarios demonstrating the project provides value for money. The BCR is most sensitive to the analysis period, discount rate, cost estimates and congested time values and ranges from 1.3 (8% discount rate) to 9.4 (WDC ROC Base Estimate).

10 Summary

The optioneering and subsequent technical assessment of options, narrowed focus to the Do Minimum, four-laning of Southbrook Road and four variations of the existing REL route designation.

- The Do Minimum shows increasing traffic volumes and congestion on Southbrook Road leading traffic to take routes which are further and wider – for example, increasing traffic volumes on Rangiora-Woodend Road and Flaxton Road.
- Four laning of Southbrook Road provides additional north-south capacity and reduces travel times on this route. This leads to induced traffic, increasing severance which is compounded by the loss of parking and cycle facilities.
- Four variants of the REL alignment were assessed. While there are subtle differences in localised routing around Southbrook and the connection to Lineside Road, there is minimal difference between these options, and all appear to function at a similar level. Rephrased that, from a transportation perspective, none of the alternative REL alignments perform notable better than the designated alignment.
- Option A has a BCR of 2.0 compared to BCRs of >4 for the variants of REL alignments.
- Incremental analysis demonstrates that the incremental benefits of Option B1a offset the higher costs of this option when compared to Option A and B2.2.
- The base BCR of 4.8 for Option B1a would result in a 'Medium' efficiency rating under the NZTA Investment Prioritisation Method (IPM[4]).

[4] https://www.nzta.govt.nz/assets/P-and-I-Knowledge-Base/docs/2024-27-IPM.pdf

Appendices

Appendix A Review of CAST Model

As part of this work, we have undertaken a high-level review of the CAST model performance in current (2021) and future years. This has included checks on Southbrook Road, routes to/from SH1 and growth forecasts provides. The objective of these checks is to an understand the representation of future conditions and the level of confidence when assessing options. Revalidation or rebasing the CAST model is outside the scope of this analysis.

A.1 Southbrook Road

Traffic counts recorded on Percival Street and Southbrook Road in 2022[5] are compared against CAST v23a model volumes for 2021. This shows a reasonable level of model validation on the Southbrook north-south route, noting that Southbrook Road northbound in the AM peak is underestimated.

Table 10-1 Check of traffic volumes on Percival St & Southbrook Road (2022 count vs 2021 model)

			AM Peak 08:00-09:00				PM Peak 16:30-17:30			
Road	**Location**	**Direction**	**Cnt**	**Mod**	**Diff**	**GEH**	**Cnt**	**Mod**	**Diff**	**GEH**
PERCIVAL ST	north of South Belt	NBD	615	588	-27	1	764	848	84	3
PERCIVAL ST	north of South Belt	SBD	547	543	-4	0	497	576	80	3
SOUTHBROOK RD	south of Denchs Rd	NBD	767	615	-152	6	1,034	1,001	-32	1
SOUTHBROOK RD	south of Denchs Rd	SBD	957	922	-35	1	784	794	10	0

A similar check was applied using traffic counts from November 2024 on Southbrook Road, showing a level of similar underestimation.

Table 10-2 Check of traffic volumes on Southbrook Road (2024 count vs 2021 model)

			AM Peak 08:00-09:00				PM Peak 16:30-17:30			
Road	**Location**	**Direction**	**Cnt**	**Mod**	**Diff**	**GEH**	**Cnt**	**Mod**	**Diff**	**GEH**
SOUTHBROOK RD	south of Denchs Rd	NBD	757	615	-141	5	968	1,001	34	1
SOUTHBROOK RD	south of Denchs Rd	SBD	922	922	0	0	932	794	-138	5

Travel times in both directions on Southbrook Road between Northbrook Road and Flaxton Road are within the range of observed travel times, when comparing the 2021-year model with August 2024 observed TomTom data. The AM peak in both directions sits at the 65th percentile and PM Peak northbound around the 50th percentile. In general, the model overestimates median travel times on Southbrook Road.

[5] As half hour time steps not available for the counts, the PM peak count (16:30-17:30 is approximated from two one-hour counts (16:00-17:00 & 17:00-18:00)

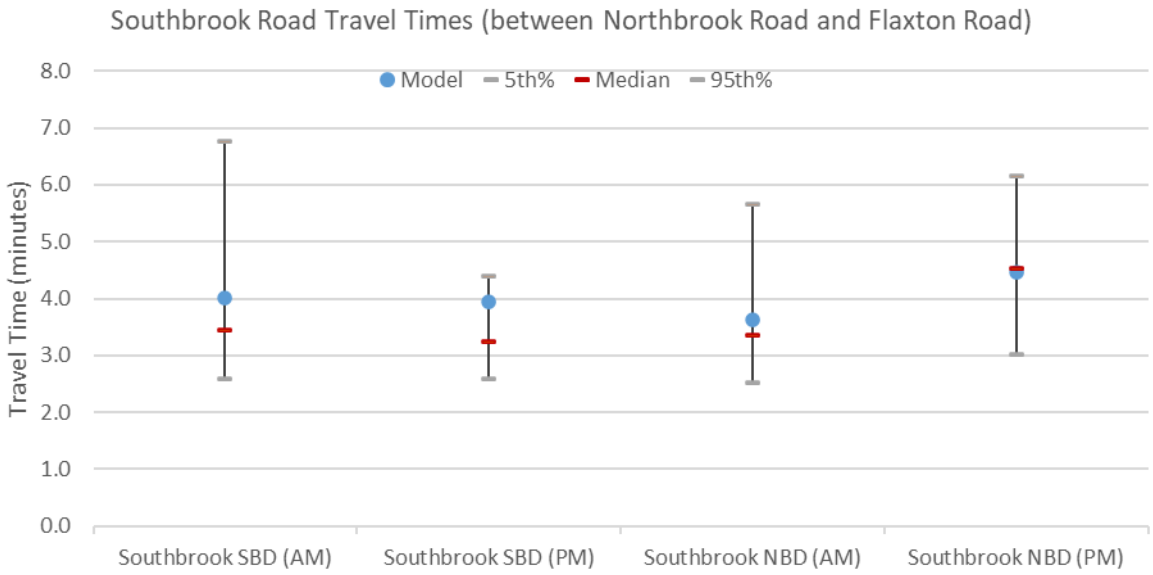


Figure 10-1 Graph of Southbrook Road observed vs modelled travel times

Table 10-3 Comparison of Southbrook Road observed vs modelled travel times

Route	TomTom Observed (August 2024)			CAST Model Year 2021		
Time Period	**5th%**	**Median**	**95th%**	**Model**	**Difference to Median**	
Southbrook Route – Southbound (Northbrook Road to Flaxton Road)						
AM Peak	2.6	3.4	6.8	4.0	+0.6	17%
PM Peak	2.6	3.2	4.4	4.0	+0.7	22%
Southbrook Route – Northbound (Flaxton Road to Northbrook Road)						
AM Peak	2.5	3.4	5.7	3.6	+0.3	8%
PM Peak	3.0	4.5	6.2	4.5	-0.1	-2%

Cumulative travel time along the route is presented as time against distance graphs in Figure 10-2 to Figure 10-5. These show that the traffic model represents most of the delay along the route at the Southbrook Road / Boys Road / South Belt signals.

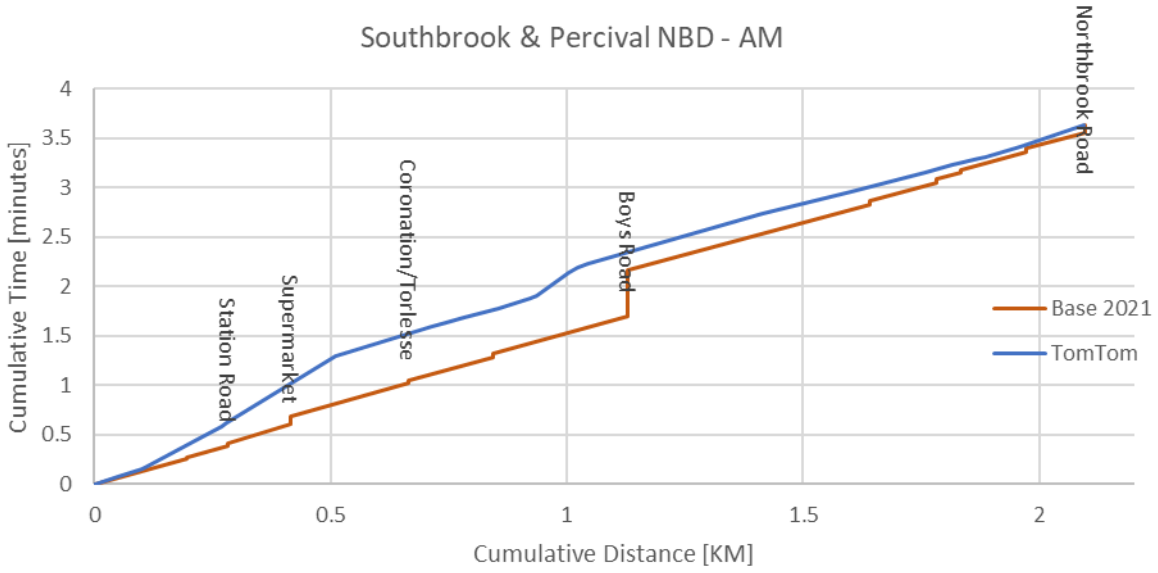


Figure 10-2 Cumulative travel time on Southbrook Road, northbound, in AM Peak (2021 model)

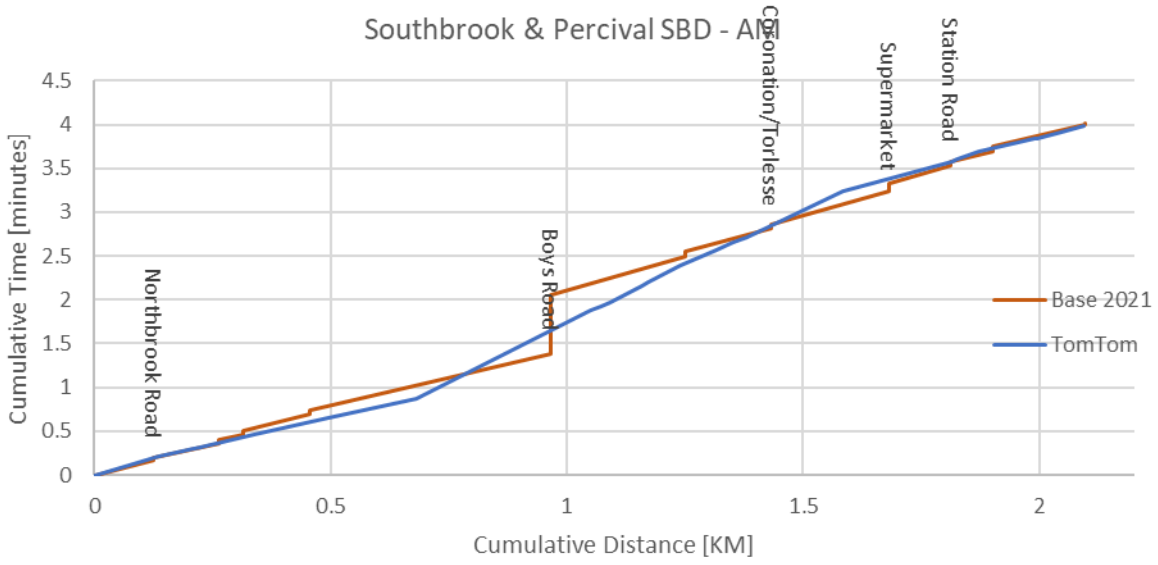


Figure 10-3Cumulative travel time on Southbrook Road, southbound, in AM Peak (2021 model)

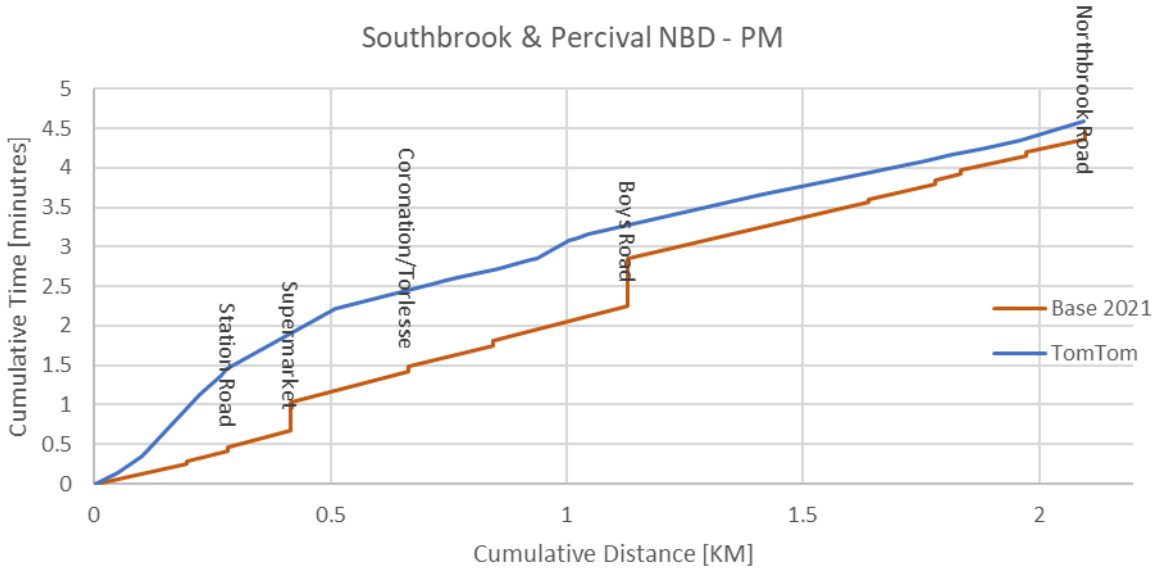


Figure 10-4 Cumulative travel time on Southbrook Road, northbound, in PM Peak (2021 model)

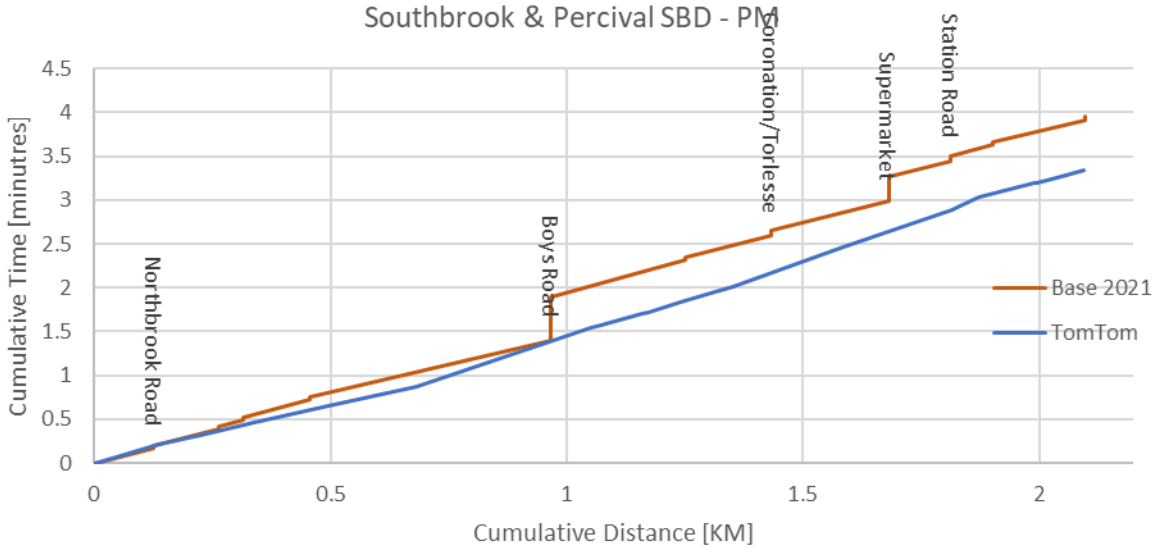


Figure 10-5 Cumulative travel time on Southbrook Road, southbound, in PM Peak (2021 model)

A.2 Routes to/from SH1

A further check reviewed traffic volumes on routes between SH1 and Rangiora as future year models suggested high traffic volumes on Greens Road.

The CAST model includes a series of validation screenlines in Figure 10-6 capturing traffic to/from Rangiora (“W5”), between Rangiora and SH1 (“W3”), and to the south (“W2”). These are understood to have achieved model validated criteria in the model update.

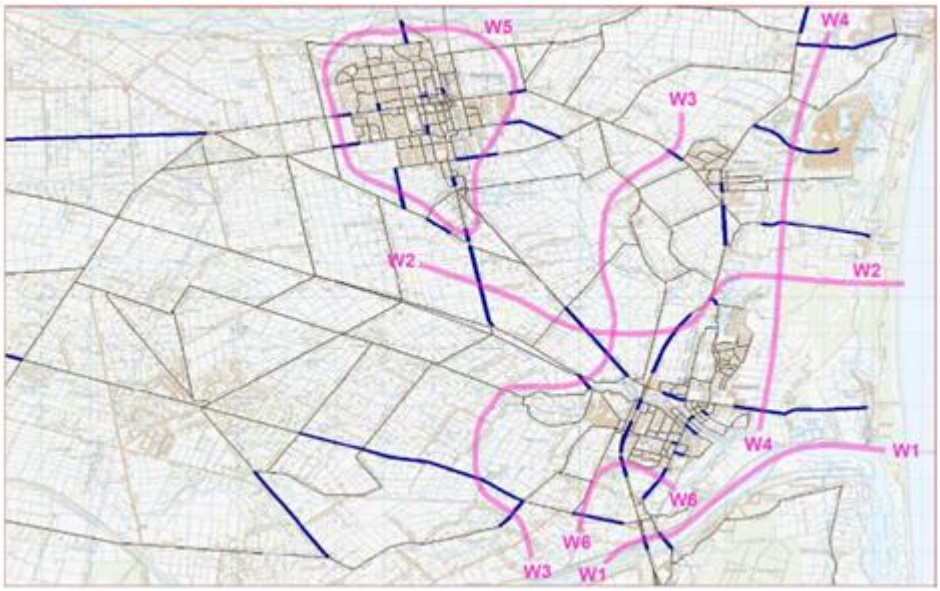


Figure 10-6 Screenlines used for CAST model validation

One notable omission from screenline “W3” is Tuahiwi Road and Greens Road meaning that there is a gap. The blue lines in the image below show where counts used for model validation are located. Revells Road is also missing from screenline “W2” capturing north/south traffic.

Council have provided traffic counts from 2021 which do not appear to have been used in the CAST model update. This completes a screenline in Figure 10-7 similar to “W3” and captures a route following Tuahiwi Road - Greens Road – Church Bush Road – Revells Road that traffic is using in the model.

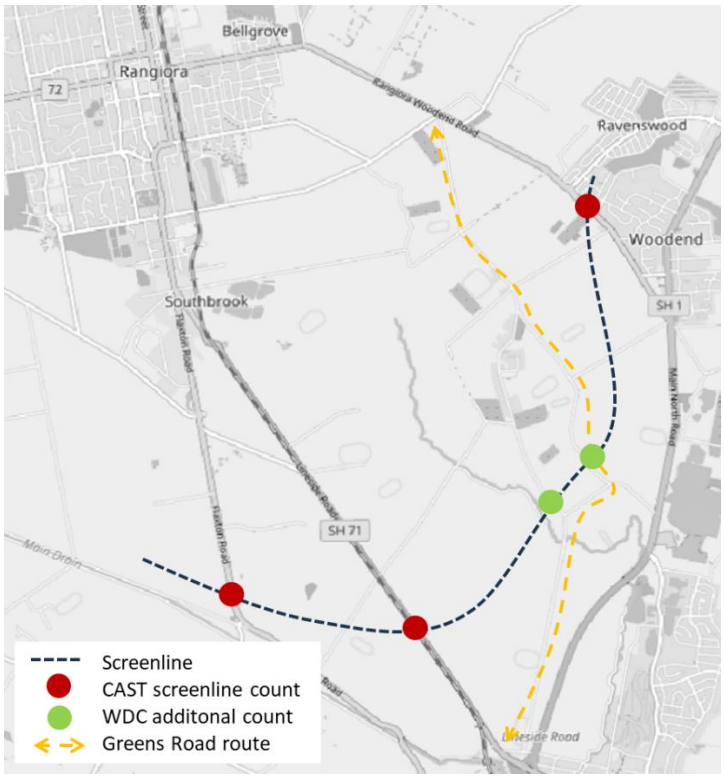


Figure 10-7 Screenline and count location

Comparing the traffic volumes across this screenline in Table 10-4 demonstrates:

- Lineside Road traffic volumes are low and Flaxton Road volumes are high, but both have acceptable GEH values
- Greens Road has significantly higher traffic volumes modelled than actual, in both peaks and both directions. Tuahiwi Road through the settlement is underutilised which account for a small part of the difference.
- Generally, more traffic is shown on these routes to & from Rangiora (except morning peak to Rangiora) which stems from the broader CAST model demands.

Table 10-4 Traffic volumes on screenline Rangiora to/from SH1 (2021 & 2022 counts vs 2021 model)

			AM Peak 08:00-09:00				PM Peak 16:30-17:30			
Road	**Location**	**Direction**	**Cnt**	**Mod**	**Diff**	**GEH**	**Cnt**	**Mod**	**Diff**	**GEH**
Flaxton Rd	South Fernside	NBD	330	373	43	2	691	827	136	5
Flaxton Rd	South Fernside	SBD	448	494	46	2	388	432	44	2
Lineside Rd	West Revells	NBD	603	530	-73	3	915	856	-59	2
Lineside Rd	West Revells	SBD	662	636	-26	1	713	694	-19	1
TUAHIWI RD	north of Cox Rd	NBD	67	26	-41	6	67	37	-30	4
TUAHIWI RD	north of Cox Rd	SBD	73	24	-49	7	33	17	-16	3
GREENS RD	north of Church Bush Rd	NBD	34	153	119	12	80	495	415	24
GREENS RD	north of Church Bush Rd	SBD	32	349	317	23	27	214	187	17
Rangiora Woodend Rd	400m N Chinnerys Rd	NBD	325	198	-127	8	339	340	1	0
Rangiora Woodend Rd	400m N Chinnerys Rd	SBD	204	271	67	4	320	341	21	1
from Rangiora / to SH1		**SBD**	**1419**	**1774**	**355**	**9**	**1481**	**1698**	**218**	**5**
to Rangiora / from SH1		**NBD**	**1359**	**1278**	**-80**	**2**	**2092**	**2554**	**463**	**10**

A.3 Growth forecasts

The transport model is built on land use forecasts prepared by Waimakariri District Council and the Greater Christchurch Partnership, overseen by the Model Management Group. The forecasts are broadly consistent with Statistics NZ (sub-national) population forecasts released in 2017 when applying the Medium-High projection to Waimakariri District.

The previous and transport assessment showed growth of about 2,500 households in eastern rangiora compared to around 5,780 additional lots currently signalled for the area. In reviewing the traffic demands from CAST v23a models, there is a notable drop in demand for zones representing the eastern growth areas from 2021 to 2028 before they increase again to 2028 and 2038. These trends are not reflective of growth from ~400 existing houses to 5000+ houses.

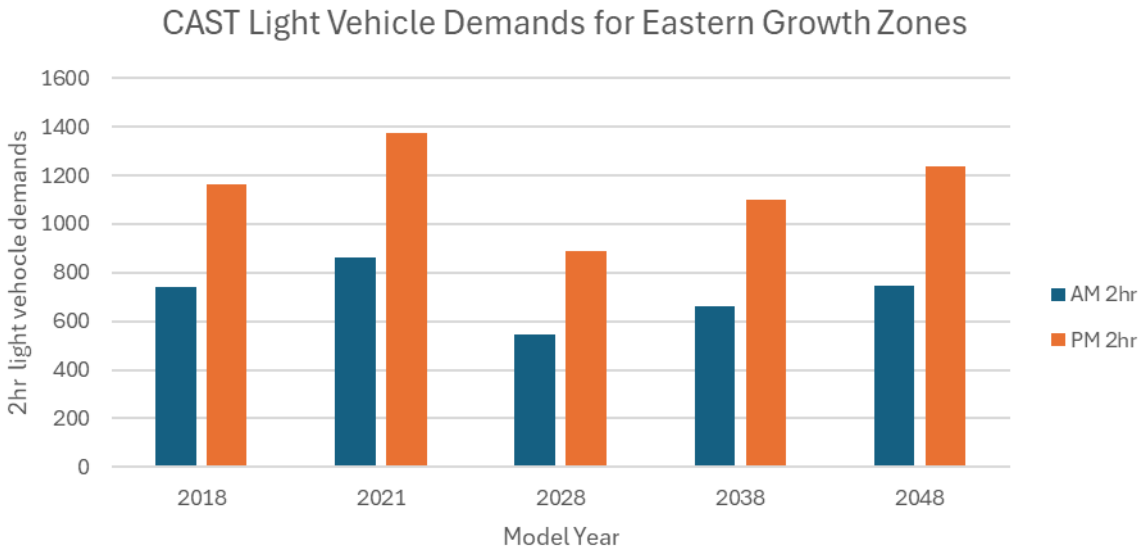


Figure 10-8 Future projections of traffic demand for eastern growth areas from CAST model v23a

Reviewing changes in population forecast in the CTM, Figure 10-9 shows the population in eastern rangiora (CTM zone 9) decreasing while growth is concentrated in the west (CTM zone 23 & 5) and centre of Rangiora (CTM zones 3, 6) There is no change in population forecast in CTM zone 8 where the Bellgrove subdivisions are underway.

To progress the modelling, the growth planned for eastern Rangiora (outlined in Table 3-1) has been applied to the CAST model demands for the forecast years. No changes are made to zones in the western growth areas given the model already represents development occurring there. This is the same approach that was used for assessing developer contributions (WSP, 2022).

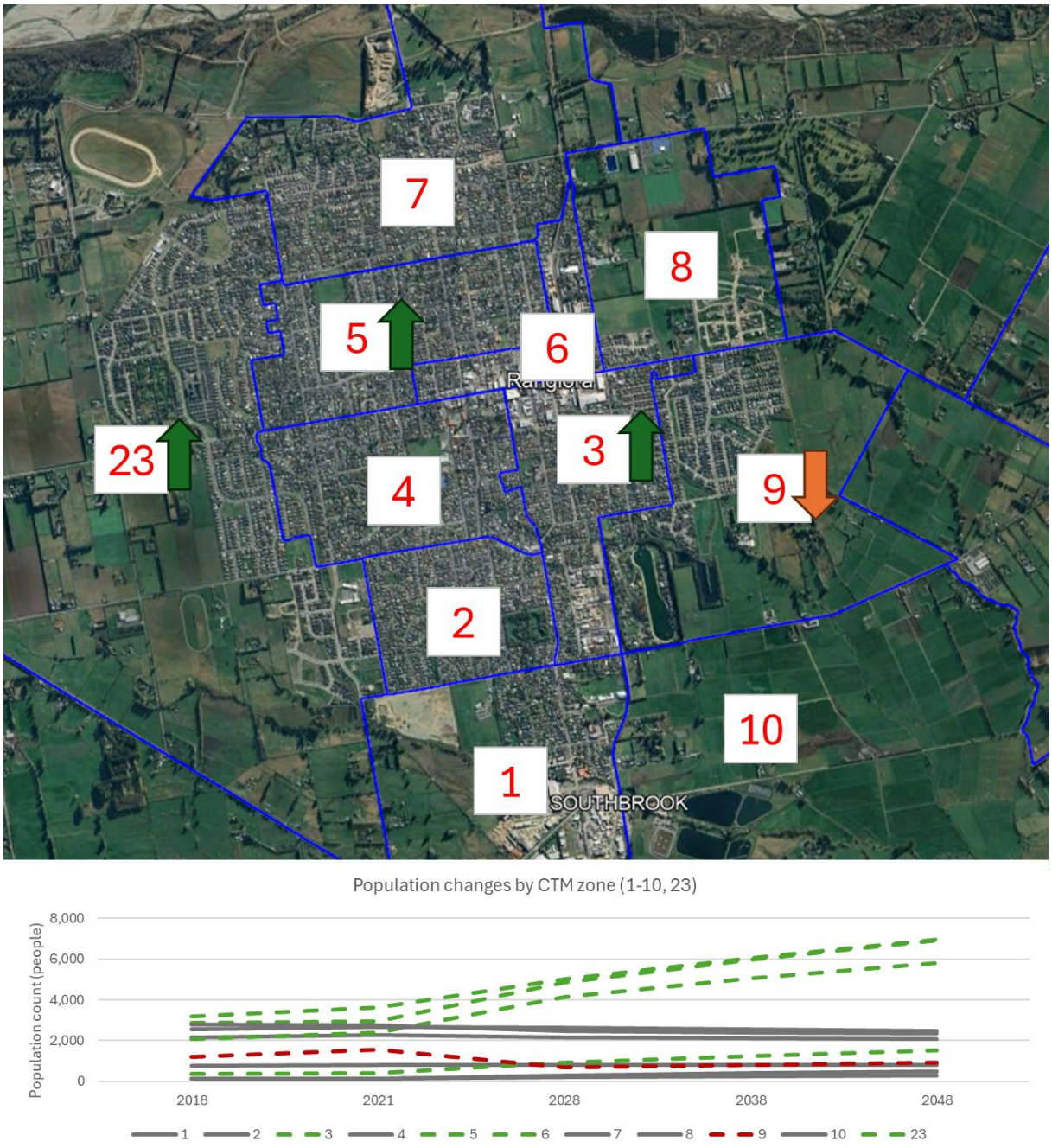


Figure 10-9 Change in population forecast in the CTM model for model zone numbers

Appendix B Model Network Assumptions

CTMs v21 Network Schemes

ID	Scheme Name	RCA	Opening Date	Workshop Model Yr	Modelled Year	CAST	CTM	Type	Location
301	Airport Southern Development Network	CCC	2016	2018	2018	Y	Y	Local Network	West
524	Fulton Hogan Development Network (CSW4)	CCC	2016	2018	2018	Y	Y	Local Network	South-West
2001	Intersection Improvement: Awatea /Wigram	CCC	2016	2018	2018	N	N	Signalised Intersection	South-West
162	Islington Park Drive Development	CCC	2016	2018	2018	Y	Y	Local Network	West
154	Marshland Rd Speed Reduction to 70kph (Prestons Rd to Belfast Rd)	CCC	2016	2018	2018	Y	Y	Speed Change	North-East
302	Pound Road (Resa) Deviation	CCC	2016	2018	2018	Y	Y	Deviation	West
728	Prestons Rd Signals at NW and NE Entrances to Prestons	CCC	2016	2018	2018	Y	Y	Signalised Intersection	North
184	Wigram Development Network (CSW1)	CCC	2016	2018	2018	Y	Y	Local Network	South-West
25	Wigram Magdala link (Overbridge)	CCC	2016	2018	2018	Y	Y	Network Improvements	South-West
610	Wigram Rd Speed Changes	CCC	2016	2018	2018	Y	Y	Speed Change	South-West
9999	CBD Speed Changes (AAC)	CCC	2016	2018	2018	Y	Y	Speed Change	CBD
612	Sparks Road Speed Changes	CCC	2017	2018	2018	Y	Y	Speed Change	South-West
501	Deans Ave/Riccarton Rd Signals	CCC	2018	2018	2018	Y	Y	Signalised Intersection	West
519	Frankleigh Ave/Lyttelton St/Sparks Rd Signals	CCC	2018	2018	2018	Y	Y	Signalised Intersection	South-West
719	Halswell / Augustine 4-Way Signals	CCC	2018	2018	2018	Y	Y	Signalised Intersection	South-West
520	Hoon Hay Rd/Sparks Rd Signals	CCC	2018	2018	2018	Y	Y	Signalised Intersection	South-West
709	Belfast /Main North	CCC	2019	2018	2018	Y	Y	Signalised Intersection	North
801	Pegasus Rbt	NZTA	2015	2018	2018	Y	Y	Roundabout	Waimakariri
174	Pound Road Deviation to SH1 (Close Barters Rd)	NZTA	2017	2018	2018	Y	Y	Deviation	West
79	Western Corridor - Groynes to Sawyers	NZTA	2017	2018	2018	Y	Y	Widening	West
305	Airport Southern Access Interchange	NZTA	2018	2018	2018	Y	Y	Network Improvements	West
304	Memorial Russley Interchange	NZTA	2018	2018	2018	Y	Y	Network Improvements	West
1111	Norwich Quay, Lyttelton Ped signals.	NZTA	2018	2018	2018	N	N	Ped signals (E Sutton Quay)	Lyttelton
298	Western Belfast Bypass	NZTA	2018	2018	2018	Y	Y	Network Improvements	North
35	Western Corridor - Sawyers to Memorial	NZTA	2018	2018	2018	Y	Y	Widening	West
408	Brougham/Collins/Simeon LILO Signals & Cycle/Ped Crossing	NZTA/CCC	2015	2018	2018	Y	Y	Signals	West
810	Agricultural Park Access (Templetons/Halswell/Augustine)	NZTA/CCC	2018	2018	2018	Y	Y	Network Improvements	South-West
201	Rolleston Development Network (Dynes Rd and Rolleston Drive-SH1	SDC	2016	2018	2018	Y	Y	Local Network	Selwyn
480	Tennyson/Kidman Roundabout	SDC	2016	2018	2018	Y	Y	Roundabout	Selwyn
482	Traffic Signals at Masefield Dr/Rolleston Dr	SDC	2018	2018	2018	Y	Y	Signalised Intersections	Selwyn
1111	Traffic Signals Hoskyns/Jones Rd Intersection Upgrade	SDC/NZTA	2016	2018	2018	Y	Y	Signalised Intersection	Selwyn
4002	Traffic Signals at Hoskyns/Jones Rd	SDC/NZTA	2018	2018	2018	Y	Y	Signalised Intersection	Selwyn
450	Ashley/High/Ivory Intersection (Red Lion corner)	WDC	2015	2018	2018	Y	Y	Signalised Intersection	Waimakariri
3001	Flaxton / Lineside Intersection Realignment	WDC	2015	2018	2018	Y	Y	Deviation	Waimakariri
450	High Street / Ashley Street Reconfiguration	WDC	2015	2018	2018	Y	Y	Signalised Intersection	Waimakariri
451	High Street/Eastbelt Roundabout	WDC	2015	2018	2018	Y	Y	Roundabout	Waimakariri
515	Ohoka Rd/Island Rd (W Ohoka offramp)	WDC	2015	2018	2018	Y	Y	Network Improvement	Waimakariri
3002	Southbrook Road Traffic Signals (pak'n'save)	WDC	2016	2018	2018	Y	N	Signalised Intersection	Waimakariri
452	Southbrook Road/South Belt Intersection Upgrade	WDC	2016	2018	2018	Y	Y	Signalised Intersection	Waimakariri
3003	Bayliss Drive Extension to Lees Rd	WDC	2018	2018	2018	Y	N	New Link	Waimakariri
3004	Beach / Smith / Williams Rbt	WDC	2018	2018	2018	Y	Y	Roundabout	Waimakariri
3003	Rangiora NW Bypass (Silverstream)	WDC	2018	2018	2018	Y	Y	New Link	Waimakariri
3333	Replacement of Ashley River Bridge	WDC/NZTA	2015	2018	2018	N	N	Bridge Upgrade	Waimakariri
2004	Disused Christchurch Red Zone Roads		2016	2018	2018	Y	Y	Road Stopping	East
2002	CBD 30kph Speed Limit Extension	CCC	2019	2021	2021	Y	Y	Speed Change	CBD
715	Sparks / Hendersons Signalised 4-Way	CCC	2019	2021	2021	Y	Y	Signalised Intersection	South-West
525	Prestons Development Network	CCC	2020	2021	2021	Y	Y	Local Network	North-East
169	Belfast Industrial Development Network (CB1)	CCC	2021	2028	2021	Y	Y	Local Network	North
210	Cranford St 4 Laning - NAE to Innes	CCC	2021	2028	2021	Y	Y	Widening	North
999	Hereford St (Manchester-Cambridge)	CCC	2021	2028	2021	Y	Y	AAC Improvements	CBD
410	Intersection Safety: Barrington/ Lincoln/ Whiteleigh	CCC	2021	2028	2021	Y	Y	Signalised Intersection	South-West
999	Victoria St	CCC	2021	2028	2021	Y	Y	AAC Improvements	CBD
1001	Perimeter Rd / Ron Guthrey Rd Signals	CIAL	2019	2028	2021	Y	Y	Signalised Intersection	West
1111	Pineacres Intersection Upgrade	NZTA	2019	2028	2021	N	N	Saftey Improvement	Waimakariri
739	Broughs Rd Extension	NZTA	2019	2028	2021	Y	Y	Deviation	West
94	Christchurch Southern Motorway (CSM1 and CSM2)	NZTA	2019	2028	2021	Y	Y	Network Improvements	South-West
95	Main South Rd Four-Laning (MSRFL) inc Weedons Ross Interchange	NZTA	2019	2028	2021	Y	Y	Network Improvements	South-West
527	Marshes Rd/Shands Rd Signals	NZTA	2019	2028	2021	Y	Y	Signalised Intersection	South-West
611	Halswell Road Speed Changes	NZTA	2021	2028	2021	Y	Y	Speed Change	South-West
8	Northern Arterial Belfast South Facing Ramps	NZTA	2021	2028	2021	Y	Y	Network Improvements	North
7	QE II 4 Laning - Main North Rd to Innes Rd	NZTA	2021	2028	2021	Y	Y	Widening	North
403	Waimak Bridge 3N 2S + HOV	NZTA	2021	2028	2021	Y	Y	Widening	Waimakariri
1002	Woodend Corridor Improvements (Ped Safety)	NZTA	2021	2028	2021	Y	Y	Network Improvements	Waimakariri
6	Northern Arterial with Extension (QEII Dr to Cranford St)	NZTA/CCC	2021	2028	2021	Y	Y	Network Improvements	North
6	Northern Arterial with Extension (QEII Dr to Cranford St)	NZTA/CCC	2021	2028	2021	Y	Y	Network Improvements	North
483	Traffic Signals Lowes/Dunns/Goulds/Spring Rolleston	SDC	2019	2028	2021	Y	Y	Close Goulds Road & Signalise Int	Selwyn
490	Shands/Blakes Rd Roundabout	SDC	2021	2028	2021	Y	Y	Roundabout	Selwyn
484	Traffic Signals at Rolleston Dr/Tennyson St	SDC	2021	2028	2021	Y	Y	Signalised Intersections	Selwyn
4005	Markham Way Traffic Calming	SDC	2022	2028	2021	Y	N	Traffic Calming	Selwyn
492	Springs/Marshs Rd Roundabout	SDC	2021	2028	2021	Y	Y	Roundabout	Selwyn
603	Weedons (Ross) / Jones and Levi intersections upgrades	SDC	2021	2021	2021	Y	Y	intersection	Selwyn
SDC_N-6	Traffic signals at Rolleston/Dryden	SDC	2028	2028	2021	Y	N	Signals	Selwyn
ther SH1 PBC (	Park'n Ride	SDC / WK / Ecan	2026	2021	2021	N	Y	Park'n Ride	Selwyn
602	SH1/Tennyson St/Brookside Rd Intersection Modifications	SDC/NZTA	2019	2028	2021	Y	Y	Intersections (Left in, Left Out)	Selwyn

CTMs v21 Network Schemes

ID	Scheme Name	RCA	Opening Date	Workshop Model Yr	Modelled Year	CAST	CTM	Type	Location
602	SH1/Tennyson St/Brookside Rd Intersection Upgrade	SDC/NZTA	2022	2028	2021	Y	Y	Intersections (Left in, Left Out)	Selwyn
3005	Townsend Rd - West Belt Link Road	WDC	2020	2021	2021	Y	Y	New Link	Waimakariri
WDC_N-C	SH1 & Woodend School (Ped Traffic Signal)	WDC	2021	2021	2021	Y	N	Traffic Signal	Waimakariri
WDC_N-D	Main Nth Rd & Tram Rd (Traffic Signal)	WDC	2021	2021	2021	Y	Y	Traffic Signal	Waimakariri
WDC_N-E	Flaxton Rd (upgraded collector)	WDC	2021	2021	2021	Y	N	Capacity improvement?	Waimakariri
WDC_N-H	Ivory Street, High to Buckham (Upgraded collector)	WDC	2020	2021	2021	Y	N	Capacity improvement?	Waimakariri
WDC_N-J	Flaxton Rd (upgraded collector)	WDC	2021	2021	2021	N	N		Waimakariri
46	Belfast Village Development Network (CN1 Applefields)	CCC	2019	2028	2028	Y	Y	Local Network	North
2222	Colombo Street (Bealey-Kilmore)	CCC	2020	2028	2028	Y	Y	AAC Improvements	CBD
725	HJR Extension	CCC	2023	2028	2028	Y	Y	Deviation	South-West
402	Intersection Improvement: Cashmere/ Hoon Hay/Worsleys	CCC	2022	2028	2028	Y	Y	Signalised Intersection	South
503	Marshland Rd/Hawkins Rd/Lower Styx Rd Signals	CCC	2023	2028	2028	Y	Y	Signalised Intersection	North-East
731	Orchard / Wairakei Priority Converted to Rbt	CCC	2028	2028	2028	Y	Y	Roundabout	West
999	High Street (Hereford-Manchester)	CCC	2022	2028	2028	Y	Y	AAC Improvements	CBD
999	High Street (Manchester-St Asaph)	CCC	2025	2028	2028	Y	Y	AAC Improvements	CBD
712	Main North/Marshland/Spencerville	CCC	2022	2028	2028	N	N	Signalised Intersection	North-East
2003	Route Improvement: Stanleys Road	CCC	2022	2028	2028	Y	N	Intersection Improvement	North-West
531	Grimseys Rd/Prestons Rd Signals	CCC	2026	2028	2028	Y	Y	Signalised Intersection	North
999	Lichfield Stg2	CCC	2023	2028	2028	Y	Y	AAC Improvements	CBD
26	Lincoln Road 4 Laning - Curletts Rd to Wrights Rd	CCC	2023	2028	2028	Y	Y	Widening	South-West
1111-E	New Brighton Improvements	CCC	2023	2028	2028	Y	N	Network Improvements	East
999	Tuam stg2	CCC	2023	2028	2028	Y	Y	AAC Improvements	CBD
51	Northwood Blvd/Johns/Groynes Intersection	CCC	2024	2028	2028	Y	Y	Signalised Intersection	North
526	Harewood Cycle Project - Nunweek Blvd to Highstead Rd	CCC	2026	2028	2028	Y	Y	Network Improvements	West
720	PC68 Local Road Network Changes	CCC	2024	2028	2028	Y	Y	Local Network	South-West
732	Pound / Ryans Priority Converted to Rbt	CCC	2024	2028	2028	Y	Y	Roundabout	West
4	Greers/Northcote/Sawyers Arms Signals	CCC	2027	2028	2028	Y	Y	Signalised Intersection	North
733	Hawkins / Prestons Signals	CCC	2028	2028	2028	Y	Y	Signalised Intersection	North
3	Northcote Road 4 Laning - Sawyers Arms Rd to Main North Rd	CCC	2031	2028	2028	Y	Y	Widening	North
530	Amyes/Springs Intersection	CCC	2027	2028	2028	Y	Y	Signalised Intersection	South-West
517	Awatea Rd/Springs Rd Signals	CCC	2027	2028	2028	Y	Y	Signalised Intersection	South-West
529	Burwood Rd/Mairehau Rd Signals	CCC	2024	2028	2028	Y	Y	Signalised Intersection	North
722	CB7 Spine Rd Option 5	CCC	2028	2028	2028	Y	Y	Local Network	South-West
741	Collector Rd Through CSW6 (Southerlands / Cashmere Rd area)	CCC	2028	2028	2028	Y	Y	Local Network	South-West
721	Milns / Sparks / Sutherlands Signalised Ts	CCC	2028	2028	2028	Y	Y	Signalised Intersection	South-West
187	Symes Rd Closure	CCC	2028	2028	2028	N	N	Road Stopping	South-West
186	Symes Rd Extension to Havard Ave	CCC	2028	2028	2028	N	N	Local Network	South-West
710	Highstead/ Sawyers Arms	CCC	2030	2028	2028	N	N	Signalised Intersection	North
723	CB7 Spine Rd Option 6 (incremental to Opt 5)	CCC	2028	2028	2028	Y	Y	Local Network	South-West
738	Collector Road Through CSW7	CCC	2024	2028	2028	Y	Y	Local Network	South-West
523	Highfield Park Development Network (CN5 & CN6)	CCC	2028	2028	2028	Y	Y	Local Network	North
407	New Links : Candys to Quaifes	CCC	2028	2028	2028	Y	Y	Deviation	South-West
734	Revised Belfast Area Plan Spine Rd (CB1)	CCC	2031	2028	2028	Y	Y	Local Network	North
716	Sparks / CAP Extension Signalised T	CCC	2031	2028	2028	Y	Y	Signalised Intersection	South-West
CCC_N-2	Prestons/Main North Improvement	CCC	2026	2028	2028	Y	Y	Priority Intersection	North
CCC_N-9	Lincoln Road PT priority - Whiteleigh to Wrights (also RLTP)	CCC	2025	2028	2028	Y	Y	Bus Lanes	West-Inner
CCC_N-15	Sockburn Roundabout & Lowther Intersection Improvement	CCC	2026	2028	2028	Y	Y	Signalise Lowther	West
CCC_N-16	Annex, Birmingham & Wrights Corridor Improvement	CCC	2023	2028	2028	N	N	Corridor Improvement	West
CCC_N-34	Clyde, Riccarton & Wharenui Intersection Improvements	CCC	2027	2028	2028	Y	Y	Signalised Intersection	West Inner
CCC_N-35	Dickeys & Main North Road Intersection Improvement	CCC	2028	2028	2028	Y	Y	Signalised Intersection	North
CCC_N-37	Disraeli, Harman & Selwyn Intersection Improvement	CCC	2028	2028	2028	Y	Y	Roundabout	South-Central
CCC_N-39	Moorhouse/Stewart Signals	CCC	2025	2028	2028	Y	N	Signalised Intersection	South-Central
CCC_N-40	Main North QEII & Pak'N Save Signals	CCC	2028	2028	2028	Y	Y	Signalised Intersection	North
523*	Highfield Commercial	CCC	2028	2028	2028	Y	Y	Local Network	North
CCC_N-41	Area behind Ara (St Asaph 1way) 30kph Fitz to Madras.	CCC	2028	2028	2028	Y	Y	Speed Change	Central
CCC_N-42	Riccarton/Ilam/Wharenui Intersection Improvement.	CCC	2022	2028	2028	Y	Y	Signalised Intersection	West Inner
CCC_N-43	Eastgate PT hub staged ped crossing and bus gate	CCC	2028	2028	2028	Y	N	Ped Signals	East
CCC_S-1	Safety - Harewood Road & Greers Road	CCC	2024		2028	Y	N	Signals safety change	North-West
CCC_S-2	Safety - Shirley Rd & Marshland Rd	CCC	2024		2028	Y	N	Signals safety change	North-East
CCC_S-3	Safety - Ferry Road & Aldwins Road	CCC	2024		2028	Y	N	Signals safety change	South-East
CCC_S-4	Safety - Moorhouse Avenue & Blenheim Road	CCC	2024		2028	Y	N	Signals safety change	Central
CCC_S-5	Safety - Selwyn Street & Moorhouse Avenue	CCC	2024		2028	Y	N	Signals safety change	Central
CCC_S-6	Safety - Moorhouse Avenue & Durham Street South	CCC	2024		2028	Y	N	Signals safety change	Central
CCC_S-7	Safety - Moorhouse Avenue & Manchester Street	CCC	2024		2028	Y	N	Signals safety change	Central
CCC_S-8	Safety - Gasson Street & Wordsworth Street	CCC	2024		2028	N	N	Signals safety change	South
CCC_S-9	Safety - Aldwins Rd - Ferry Rd to 100m N of Newcastle St	CCC	2024		2028	Y	Y	Speed reduction	East
CCC_S-10	Safety - Blenheim Rd Deans Ave to Main South Rd	CCC	2024		2028	Y	Y	Speed reduction	West
CCC_S-11	Safety - Bridge Street - SH74 to 310m E of SH74	CCC	2024		2028	Y	Y	Speed reduction	East
CCC_S-12	Safety - Buckleys Rd - Rhona St to McGregors Rd	CCC	2024		2028	Y	Y	Speed reduction	East
CCC_S-13	Safety - Ensors Rd - Opawa Rd to MacKenzie Ave	CCC	2024		2028	Y	Y	Speed reduction	East
CCC_S-14	Safety - Linwood Ave Jollie St to SH74	CCC	2024		2028	Y	Y	Speed reduction	East
CCC_S-15	Safety - Mills Rd Prestons Rd SNP	CCC	2024		2028	Y	Y	Speed reduction	North-East
CCC_S-16	Safety - Mt Pleasant Rd Summit Rd - UpperMajorHornbrook Rd	CCC	2024		2028	Y	Y	Speed reduction	South-East
CCC_S-17	Safety - Pound Rd Ryans Rd - Yaldhurst Rd SNP	CCC	2024		2028	Y	Y	Speed reduction	West

CTMs v21 Network Schemes

ID	Scheme Name	RCA	Opening Date	Workshop Model Yr	Modelled Year	CAST	CTM	Type	Location
CCC_S-18	Safety - Wigram Road - Platinum to Hayton	CCC	2024		2028	Y	Y	Speed reduction	South-West
CCC_N-38	Programme - Intersection Upgrade (Brougham & Moorhouse Area)	CCC/WK	2028	2028	2028	N	Y	?	South-Central
WK_N-1	NZUP -SH75 Halswell Rd Buslanes (Dunbars to Curletts)	NZTA	2025	2028	2028	Y	Y	Bus Lanes	South-West
WK_N-2	NZUP - SH76 Brougham Street Improvements	NZTA	2025	2028	2028	N	N	?	South-Central
4003	Wordsworth St Extension	SDC	2021	2028	2028	Y	N	Network Improvements	Selwyn
4001	Rolleston LURP Business NE Zone Network	SDC	2019	2028	2028	Y	Y	Network Improvements	Selwyn
4004	Markham Way Extension	SDC	2020	2028	2028	Y	N	Network Improvements	Selwyn
4006	Moore St Extension	SDC	2026	2028	2028	Y	N	Network Improvements	Selwyn
4007	Moore/Markham/Norman Kirk Intersection	SDC	2026	2028	2028	Y	N	Realignment	Selwyn
4008	Tennyson/Moore Roundabout	SDC	2026	2028	2028	Y	N	Roundabout	Selwyn
488	Shands/Hamptons Rd Roundabout	SDC	2022	2028	2028	Y	Y	Roundabout	Selwyn
487	Springs/Hamptons Rd Roundabout	SDC	2022	2028	2028	Y	Y	Roundabout	Selwyn
489	Shands/Trents Rd Roundabout	SDC	2022	2028	2028	Y	Y	Roundabout	Selwyn
4009	Traffic Signals Gerald St/West Belt	SDC	2027	2028	2028	Y	N	Signalised Intersection	Selwyn
4444	Gerald Street Upgrade (Eastern End)	SDC	2027	2028	2028	N	N	?	Selwyn
481	Lowes/Levi/Masefield Roundabout Upgrade	SDC	2024	2028	2028	Y	Y	Roundabout	Selwyn
493	Ellesmere Road Upgrade (Trices-Sabeys)	SDC	2025	2028	2028	Y	Y	Network Improvements	Selwyn
4010	Gerald Street/Vernon Drive Signals	SDC	2029	2028	2028	Y	N	Signalised Intersection	Selwyn
4444	Gerald Street Upgrade (Transitional Zone)	SDC	2029	2028	2028	N	N	?	Selwyn
4444	Gerald Street Upgrade (Western End)	SDC	2031	2028	2028	N	N	?	Selwyn
SDC_N-1	Springs/Tosswill	SDC	2026	2028	2028	Y	Y	Signals	Selwyn
SDC_N-2	Selwyn/Weedons Road	SDC	2027	2028	2028	Y	Y	Priority Intersection	Selwyn
SDC_N-3	Goulds/East Maddisons Road	SDC	2029	2028	2028	Y	Y	Roundabout	Selwyn
SDC_N-14	Springs Road Speed Reduction	SDC	2021	2021	2028	Y	Y	Speed Change	Selwyn
601	SH1 Flyover Rolleston Dr to Hoskyns Rd (remove signals)	SDC/NZTA	2023	2028	2028	Y	Y	Network Improvements	Selwyn
1004	SH1 Hoskyns Rd Slip Lane Izone Access	SDC/NZTA	2023	2028	2028	Y	Y	Slip Lane	Selwyn
1006	SH1/Rolleston Dr South Roundabout	SDC/NZTA	2038	2038	2028	Y	Y	Roundabout	Selwyn
1006	SH1/Rolleston Dr South Right Turn Prevention	SDC/NZTA	2041	2038	2028	Y	Y	Intersections (Left in, Left Out)	Selwyn
SDC_N-4	Burnham School/Dunns Crossing Road traffic signals	SDC/WK	2031	2028	2028	Y	N	Signals	Selwyn
SDC_N-5	Lowes/Dunns Crossing Road roundabout	SDC/WK	2031	2028	2028	Y	Y	Roundabout	Selwyn
SDC_N-7	Walkers/Two Chain Roundabout	SDC/WK	2028		2028	Y	N	Roundabout	Selwyn
SDC_N-8	Brookside/Burnham School Rd Roundabout	SDC/WK	?		2028	Y	N	Roundabout	Selwyn
SDC_N-9	Rolleston Dr/Brookside Roundabout	SDC/WK	2025		2028	Y	N	Roundabout	Selwyn
SDC_N-10	Rolleston Dr Sth/SH1 2L Roundabout	SDC/WK	?		2028	Y	Y	Roundabout	Selwyn
SDC_N-11	Dunns Crossing/Walkers/SH1 2L Roundabout	SDC/WK	?		2028	Y	Y	Roundabout	Selwyn
SDC_N-12	SH1/Burnham/Aylesbury 2L Roundabout	SDC/WK	?		2028	Y	Y	Roundabout	Selwyn
SDC_N-13	Weedons IC metering	SDC/WK	2028	2028	2028	N	N	Signalise Roundabout approach	Selwyn
3012	Spark Lane (Kippenberger to Northbrook) and Connections	WDC	2019	2028	2028	Y	N	New Link	Waimakariri
3006	Silverstream Blvd Extension to Adderley Terrace	WDC	2022	2028	2028	Y	Y	New Link	Waimakariri
3333	Skew Bridge alignment/replacement	WDC	2025	2028	2028	N	N	Bridge Upgrade	Waimakariri
3014	Connecting road between River and Lehmans Roads	WDC	2026	2028	2028	Y	N	New Link	Waimakariri
3333	Northern motorway congestion – park 'n' ride infrastructure (Rangiora, Kaiapoi)	WDC	2027	2028	2028	N	Y	PT	Waimakariri
3007	Boys / Harris / Rangiora Woodend / Tuahiwi Upgrade	WDC	2028	2028	2028	Y	Y	Roundabout	Waimakariri
3008	Boys / Gressons / Northbrook Roads Speed Reduction	WDC	2028	2028	2028	Y	Y	Speed Change	Waimakariri
3009	Rangiora Woodend Road Speed Reduction	WDC	2028	2028	2028	Y	Y	Speed Change	Waimakariri
454	Ravenswood Spine Road	WDC	2021	2028	2028	Y	Y	New Link	Waimakariri
3010	Smith St Signals East of Tunas Street	WDC	2028	2028	2028	Y	N	Signalised Intersection	Waimakariri
3011	Pegasus Road connecting to Gladstone Road	WDC	2031	2028	2028	Y	Y	New Link	Waimakariri
3013	Tuahiwi Rd Speed Reduction	WDC	2028	2028	2028	Y	Y	Speed Change	Waimakariri
3333k	Bradleys / McHughs / Tram	WDC	2025	2028	2028	N	N	New roundabout	Waimakariri
WDC_N-A	Fernside Rd & Flaxton Rd (Roundabout)	WDC	2021	2021	2028	Y	Y	Roundabout	Waimakariri
WDC_N-1	Rangiora-Woodend Rd & SH1 (NZTA)	WDC	2023	2028	2028	Y	Y	Left in/left out only	Waimakariri
WDC_N-3	Southbrook Rd & Torlesse St & Coronation St	WDC	2023	2028	2028	Y	N	New traffic signal	Waimakariri
WDC_N-4	Fernside Rd Level Crossing	WDC	2026	2028	2028	N	N	Railway crossing closure	Waimakariri
WDC_N-5	Mulcocks Rd Level Crossing	WDC	2026	2028	2028	N	N	Railway crossing closure	Waimakariri
WDC_N-10	Kippenberger Ave & MacPhail Ave	WDC	2025	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-11	SH1 & Williams St (NZTA) (Pineacres Int Upgrade)	WDC	2023	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-12	SH1 & Woodend Beach Rd (NZTA)	WDC	2023	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-13	SH1 & Woodend Rd (NZTA)	WDC	2023	2028	2028	Y	Y	New traffic signal	Waimakariri
WDC_N-14	Oxford Rd & Lehmans Rd	WDC	2027	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-16	Ohoka Rd & Island Rd	WDC	2023	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-17	Oxford Rd & Charles Upham Dr	WDC	2025	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-18	Todds Rd & Fernside Rd	WDC	2024	2028	2028	Y	N	New right turn bay	Waimakariri
WDC_N-19	Charles Upham Dr, Valour Dr to Huntingdon	WDC	2022	2028	2028	Y	N	New collector	Waimakariri
WDC_N-24	Fernside Rd & Townsend Rd	WDC	2028	2028	2028	Y	Y	New roundabout	Waimakariri
WDC_N-26	Lehmans Rd & Fernside Rd	WDC	2029	2028	2028	Y	N	Intersection realignment	Waimakariri
WDC_N-29	Tram Road Interchage Western Signals	WDC	2021	2028	2028	Y	Y	new traffic signals	Waimakariri
485	Traffic Signals Springs/Gerald/Ellesmere Junction Rd	SDC	2031	2031	2031	Y	Y	Signalised Intersection	Selwyn
504	Belfast Rd/Marshland Rd Signals	CCC	2031	2038	2038	Y	Y	Signalised Intersection	North-East
999	Salisbury Street and Kilmore Street	CCC	2031	2038	2038	Y	Y	AAC Improvements	CBD
999	Gloucester Street (Madras-Manchester)	CCC	2030	2038	2038	Y	Y	AAC Improvements	CBD
406	NWRA Area 2 Collector Road	CCC	2031	2038	2038	Y	Y	Network Improvements	West
22	Ferry Rd 4 Laning - Aldwins Rd to Fitzgerald Ave	CCC	2038	2038	2038	Y	Y	Widening	East
726	Shands Rd 4-laning CSM2 - HJR	CCC	2031	2038	2038	N	N	Network Improvements	West

CTMs v21 Network Schemes

ID	Scheme Name	RCA	Opening Date	Workshop Model Yr	Modelled Year	CAST	CTM	Type	Location
704	Wairakei/Woolridge	CCC	2036	2038	2038	N	N	Signalised Intersection	West
516	Cashmere Rd/Centaurus Ave/Colombo St/Dyers Pass Signals	CCC	2039	2038	2038	N	N	Signalised Intersection	South
CCC_N-3	Cathedral Square Improvements	CCC	2031	2038	2038	Y	N	Network Improvements	Central
CCC_N-23	Cranford Street Intersection Improvement	CCC	2026	2038	2038	N	N	?	North
CCC_N-26	Cranford Street New Signalised Intersection	CCC	2029	2038	2038	N	N	?	North
CCC_N-30	Hawkins & Radcliffe Intersection Improvement	CCC	2031	2038	2038	Y	N	Signalised Intersection	North
CCC_N-31	Main North Road Corridor Improvement	CCC	2031	2038	2038	N	N	?	North
486	Gerald/James/Edward St Roundabout	SDC	2031	2031	2038	Y	Y	Roundabout	Selwyn
3012	New eastern arterial in Rangiora	WDC	2036	2038	2038	Y	Y	New Link	Waimakariri
WDC_N-2	NE Rangiora N-S Collector (MacgPhail / Kippenberger to Coldstream)	WDC	2035	2038	2038	Y	Y	New collector	Waimakariri
WDC_N-8	Blackett St-Keir St Collector	WDC	2031	2038	2038	Y	N	New collector	Waimakariri
WDC_N-9	Blackett St & Ashley St	WDC	2032	2038	2038	Y	Y	Traffic Signal	Waimakariri
WDC_N-25	Lehmans Rd & Johns Rd	WDC	2030	2038	2038	Y	N	New roundabout	Waimakariri
WDC_N-27	Fernside Rd & Easterbrook Rd	WDC	2032	2038	2038	Y	N	New right turn bay	Waimakariri
WDC_N-28	Tram Rd & Whites Rd	WDC	2031	2038	2038	N	N	New left turn bays	Waimakariri
453	Woodend Bypass	WK	2041	2048	2048	Y	Y	Network Improvement	Waimakariri

Appendix C Option Evaluation

C.1 Early Assessment Sifting Tool

C.2 Long List Multi-Criteria Assessment

Early Assessment Sifting Tool - Rangiora Eastern Link

Early Assessment Sifting Tool: Excel template

The Early Assessment Sifting Tool (EAST) supports an initial coarse screening of alternatives and options. The EAST is designed to quickly and robustly rule out alternatives and options, allowing for a more manageable subsequent multi-criteria analysis exercise.

Project overview

Date:	19/12/2024	**Business case**	Single stage business case	**Do-minimum:**	Current scope of Long Term Plan projects
Project name:	Rangiora Eastern Link	**Problem/oppo**	Enabling free movement of goods and people in South and East Rangiora		

Investment objective:	Reduce congestion along Southbrook Road and improve travel time reliability
Investment objective:	Provide transport connections to enable development of 5,000 lots in East Rangiora
Investment objective:	Improve safety of network to IRR rating of medium or better

Note: Please copy the row above to add an additional investment objective.

Alternative or option details			Investment objective			Practical feasibility			Scheduling/ programming	Cost	Key risks and uncertainties	Impacts on te ao Māori	Environmental and social responsibility		Fatal flaws	Other impacts	Summary of decision made
Intervention types sourced from the intervention hierarchy	Unique identifier	Name of alternative/option	Congestion & Travel Time	Enabling Growth	Safety	Technical	Safety and design	Consentability					Identify	Mitigation Can these be avoided, remedied or mitigated?			Summary of decision made
Integrated planning	1	Change development pattern to align with existing network	1. Low	3	1. Low	5. Red (difficult/complex)	1. Green	5. Red (difficult/complex)	5+ years	$5-$50 million	Partially achieved. Ten years to next PDP	Note Greater ChCh partnership agreements	Urban form forced by existing network	User to describe...	Decisions already made. Mostly supports existing corridors now	User to describe...	Discontinue
Manage demand	2	Time of Use Charging	3	1. Low	2	5. Red (difficult/complex)	2.Amber/green	3.Amber	5+ years	$5-$50 million	Social licence and implementation	unknown	Impact on low income travellers	Alternative longer route	New technology in s small town appears inappropriate	User to describe...	Progress
Manage demand	3	Congestion Charging	3	1. Low	2	5. Red (difficult/complex)	2.Amber/green	4.Red/amber	5+ years	$5-$50 million	Social licence and implementation	unknown	Impact on low income travellers	Alternative longer route	New technology in s small town appears inappropriate	User to describe...	Discontinue
Best use of the existing system	4	Tidal laning (2+1)	3	3	1. Low	3.Amber	4.Red/amber	3.Amber	2-5 years	$5-$50 million	Social licence and implementation	unknown	Nil material			User to describe...	Progress
Best use of the existing system	5	Four lane Southbrook Rd within existing road reserve	5. High	3	2	1. Green	4.Red/amber	2.Amber/green	2-5 years	$5-$50 million	Community adverse response	unknown	Nil material			User to describe...	Progress
Best use of the existing system	6	Increase PT frequency	2	2	1. Low	1. Green	1. Green	1. Green	5+ years	$1-$5 million	Funding	unknown	Nil material		Unlikely to be effective in changing patterns	User to describe...	Discontinue
Best use of the existing system	7	Upgrade western route	1. Low	1. Low	1. Low	1. Green	2.Amber/green	1. Green	2-5 years	$5-$50 million	Limited risk	unknown	Nil material		Does not meet objective for East Rangiora growth	User to describe...	Discontinue
New infrastructure	8	Construct REL Sbk to Northbrook (West of WWTP)	5. High	5. High	4	2.Amber/green	1. Green	2.Amber/green	2-5 years	$5-$50 million	Normal risk profile. Land acquisition	High value water resources	Waterways	Good design and restoration		User to describe...	Progress
New infrastructure	9	Construct REL Sbk to Northbrook (East of WWTP)	5. High	5. High	4	2.Amber/green	1. Green	2.Amber/green	2-5 years	$5-$50 million	Normal risk profile. Land acquisition	High value water resources	Waterways	Good design and restoration		User to describe...	Progress
New infrastructure	10	Construct REL Lineside to Northbrook	5. High	5. High	4	2.Amber/green	1. Green	2.Amber/green	2-5 years	$5-$50 million	Normal risk profile. Land acquisition	High value water resources	Waterways	Good design and restoration		User to describe...	Progress
New infrastructure	11	Park and Ride upgrade	1. Low	1. Low	1. Low	2.Amber/green	1. Green	2.Amber/green	2-5 years	$1-$5 million	Effectiveness	Unknown	Nil material		Unlikely to be effective in changing patterns	User to describe...	Discontinue
New infrastructure	12	Mass rapid transit	2	2	1. Low	5. Red (difficult/complex)	4.Red/amber	3.Amber	5+ years	$50+ million	Funding and delivery	Unknown	Unknown		Unlikely to be effective in changing patterns sufficiently	User to describe...	Discontinue
New infrastructure	13	New western bypass	2	1. Low	1. Low	1. Green	2.Amber/green	2.Amber/green	5+ years	$50+ million	Landowner and funding	High value water resources	Waterways	Good design and restoration	Does not meet objective for East Rangiora growth	User to describe...	Discontinue
New infrastructure	14	New eastern bypass - Fernside to Coldtream Rd	4	5. High	4	1. Green	1. Green	2.Amber/green	5+ years	$5-$50 million	Landowner and funding	High value water resources	Waterways	Good design and restoration		User to describe...	Progress
New infrastructure	15	Widen and four lane Southbrook Rd	5. High	5. High	4	1. Green	4.Red/amber	3.Amber	5+ years	$5-$50 million	Community adverse response	unknown	Private impact	Purpose of built and improved private land		User to describe...	Progress

Criteria		Likely Investment Objectives						Critical success factors								Opportunities and Impacts					
Options		Unlocks land for housing		Reduces travel times		Improves safety		Affordability		Risk to delivery		Value for money		Resilience		Environment and Cultural		Social and Landscape		People & Property	
DM	Do Minimum	0						0													
Southbrook Road																					
A.1	Southbrook Four laning – within existing road reserve	1	no additional routes but provides additional capacity	1	additional capacity will assist travel time improvements but also likely to induce traffic	-3	additional traffic volumes and removal of parking and cycle facilities. Southbrook road options put more traffic across level crossings	-1	$21.5 M	-2	community and stakeholder engagement a risk to programme	1	Lower cost but limited benefits	1	provides additional road width	0		-2	Impact on schools and accesibility of social destinations	-3	Impact from widening - loss of parking
A.2	Southbrook Four laning – within wider road reserve	1		1		-1	Additional traffic volumes. Southbrook road options put more traffic across level crossings	-2	$38.9 M	-3	community and stakeholder engagement and property acquisition a risk to programme	1	Lower cost but limited benefits	1	provides additional road width	0		-2		-3	Impact from widening - land take
A.3	Southbrook three laning – tidal flow 2+1 within existing road reserve	1		1		-3	additional traffic volumes and removal of parking and cycle facilities. Southbrook road options put more traffic across level crossings. Would require removal of many right turn bays. 30% additional crashes forecast	-1	Not calculated but very expensice due to installation of gantrys and other warning/information systems plus movable median barrier	-3	community and stakeholder engagement a risk to programme. Technically difficult to implement with number of intersections	1	Lower cost but limited benefits	1	provides additional road width	0		-2		-2	less impact than 4 laning
A.4	Congestion charging / Time of Use	0		1	reduction in vehicle volumes will improve travel times	-1	assumes same cross section as existing. Southbrook road options put more traffic across level crossings	-2	high implementation costs and ongoing operational cost	-3	Untested and not done previously in a town of similar size	-3	unlikely to sustain operational costs	0		0		-3	Social impact of costs	-1	infrastructure needed to support
Eastern Alignments																					
B.1	Eastern Link - west route	3	bisects future development area	3	provides an additional route	3	SUP and arterial. New rail crossing at Lineside Road	-2	$34.9M	3	alignment is on designation	3	short routes and closest to both existing residential and future growth	3	additional route provided	-2	Springs and waterways in area. Mana whenua concern on impacts	0	Limited impact (minor impact so not positive score)	-1	Some noise issues at Northbrook Rd
B.2.1	Eastern Link – east route to WWTP roundabout	3	bisects future development area	3	provides an additional route	3		-2	$35.7M	2	largely on designation	3		3		-2		0	Overlap east of WWTP with silent file area SF011 at Tuahiwi	-1	similar to existing designation
B.2.2	Eastern Link – east route to Lineside Rd	3	bisects future development area	3	provides an additional route	1	SUP and arterial but with existing rail crossing at Lineside Road	-2	$32.9M	-1	largely on designation	2	doesn't get upgraded level crossing (safety) and cycle connection	3		-2		0	Overlap east of WWTP with silent file area SF011 at Tuahiwi. Diverts traffic further from local social and employment destinations leading to degraded community connection	-2	more property impact than designation
B.2.3	Eastern Link – east route to Fernside/Youngs	3	bisects future development area	2	additional route but longer distance travelling to south end of Rangiora	3	SUP and arterial but with existing rail crossing at Lineside Road. New level crossing at Fernside	-2	$40.9M	-2	route at southern end is untested (engagement, technical feasibility)	1	longer route than similar variants	3		-3	more greenfield area than alternates	-3		-2	more property impact than designation
C	Eastern Bypass	2	on edge of infrastructure boundary	2	additional route but longer distance travelling to south end of Rangiora. Query on traffic volumes using road	2	SUP and arterial but with existing rail crossing at Lineside Road. New level crossing at Fernside. Query on traffic volumes using road	-2	$44.6M	-3	untested route (engagement, technical feasibility)	-1	longest route and furthest to both existing residential and future growth. WDC likely to own more of Lineside Road in this option	3		-3	additional impact on Cam River	-3		-3	significant property impact and away from designation

Appendix D Economic Analysis

Memo

To:	Waimakariri District Council	From:	Steven Jiang and Dhimantha Ranatunga Stantec NZ
Project/File:	310206347	Date:	12 March 2025

Reference: Rangiora Eastern Link - Economics Memorandum (version 2)

Purpose

The purpose of this memo is to summarise the economic analysis undertaken for the Rangiora Eastern Link (REL) assessment, aligning with the guidelines and procedures outlined in the Monetised Benefits and Cost Manual (MBCM, November 2024) and the Crash Estimation Compendium (CEC).

This memo should be read in conjunction with the Rangiora Eastern Link Transportation Assessment of Options[1] (Transport Assessment).

It is important to note that this is only an initial evaluation, and the final BCR would be subject to change based on more detailed and robust inputs for each option (e.g., scheme level designs and detailed cost estimates).

Do-Minimum

The Do-Minimum is comprised of projects that are already committed and known development areas. The Do-Minimum road network and land use assumptions and model outputs are detailed in Section 5 of the Transport Assessment.

Options

A initial transport assessment for REL was conducted in 2021[2] for the route designation which identified the benefits of the REL project being increased capacity, reduced travel times and improved consistency of travel times.

Further long list options assessment undertaken as part of the 2025 Transport Assessment, refer Figure 1 below, has led to the following short-listed options for economic analysis:

- Option A1: Southbrook 4-laning
- Option B1a: REL – West Alignment
- Option B2.1: REL – East Alignment
- Option B2.2: REL – Connection to Lineside Road

[1] Rangiora Eastern Link Transportation Assessment of Options (Stantec, 2025)
[2] Rangiora Eastern Road Connection: Technical Assessment – Transportation (WSP, 2021)

Reference: **Rangiora Eastern Link (REL) - Economics Memorandum**

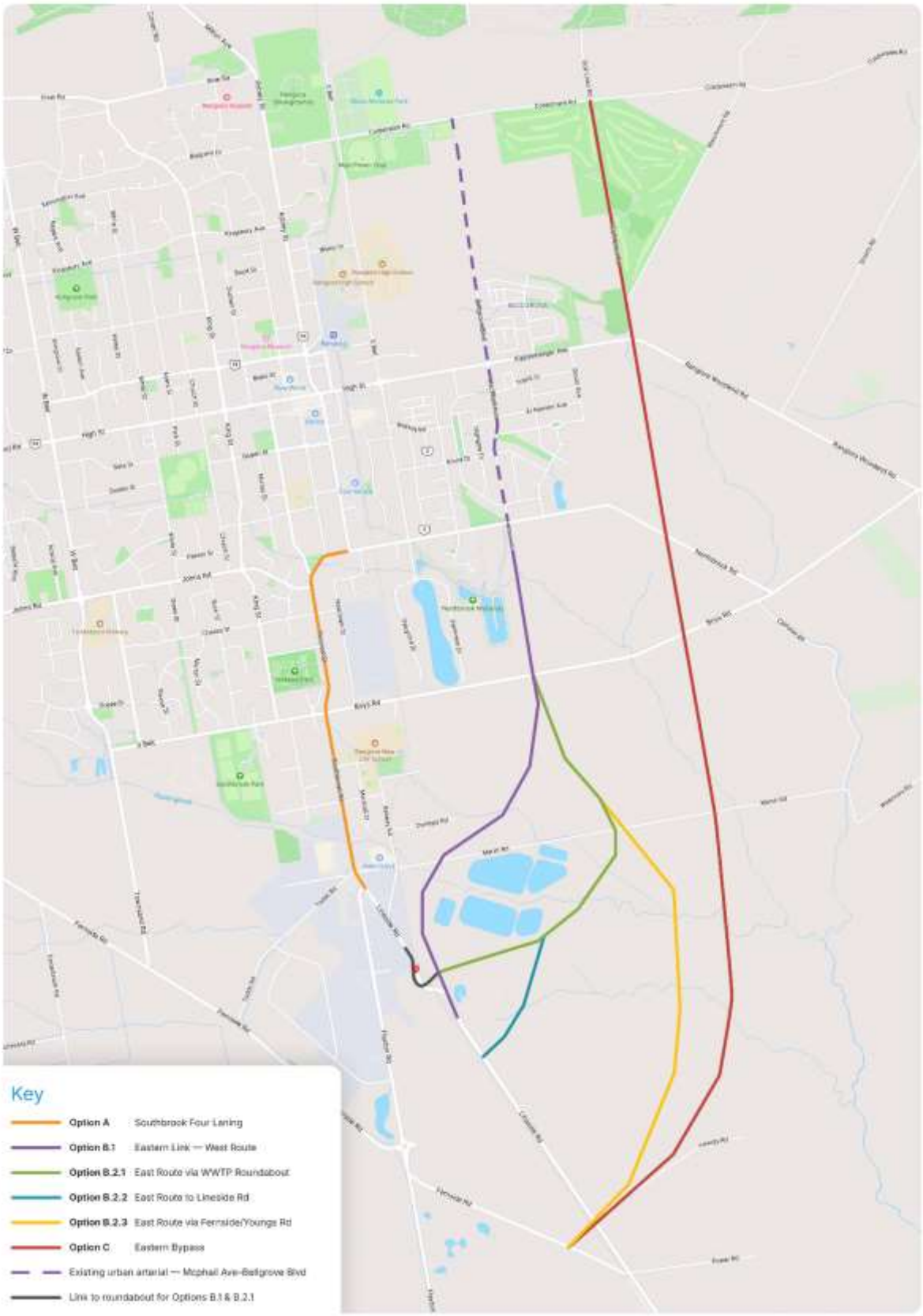


Figure 1. Infrastructure long list options for Rangiora Eastern Link

Inputs and Assumptions

The key inputs assumptions are summarised in Table 1.

Table 1. Summary of Inputs and Assumptions

Summary of Assumptions	
Element	Assumption
Analysis Period and Discount Rates	• 60-year analysis period with a variable 2% discount rate for the first 30 years and 1.5% discount rate from year 31 onwards. Sensitivity testing has also been undertaken for a shorter 40-year analysis period and different discount rates.
Timing	• Pre-implementation phases has been estimated to be spread over 24 months – this includes the property phase from 2026-2027 • Construction duration has been estimated at 24 months from 2028 to 2029. • Benefits realisation is expected to occur from 2030 onwards.
Traffic and Modelling Inputs	• The traffic volumes and forecasts have been sourced from the CAST model for year 2028, 2038 and 2048. • All benefits have been capped / flat-lined post the 2048 future year. • Annualisation factors have been based on CAST values, with 245 weekdays and 120 weekends/holidays.
Travel Time Costs (TTC) and Vehicle Operating Costs (VOC)	• TTC and VOC costs have been calculated based on CAST network statistics on vehicle kilometres travelled (VKT) and vehicle hours travelled (VHT). • Travel time costs have been adopted for Urban Arterial values of time for the AM, IP, PM and weekend. Congested value of time has been applied to the modelled vehicle delayed hours for the AM and PM peaks at 50% of the maximum CRV. • Vehicle operating costs adopted the Urban Arterial base running costs based on the modelled VKT and network average speed, by peak period.
Safety	• Based on CAST model outputs, slight reductions in network VKT are expected for most options. • As road safety is a function of exposure – the less VKT, the lower the expected crashes and improved safety outcomes. • A neutral safety benefit has been adopted as the impacts are spread widely across the Rangiora network. A detailed network safety model could be developed as part of the next phase.
Active Modes	• SP11 has been used to estimate the active mode benefits. • WDC estimates from the Passchendaele cycle route nearby have been used to inform the REL expected uplift. • The SP11 new and existing cyclist estimates have been heavily reduced due to existing count information and expected uplift. • A cycling growth rate of 1.3% per annum has been adopted based on forecast population growth from the CTM model
Other Benefits	• Resilience benefits have not been assessed, however due to the abundance of local roads within the vicinity, resilience benefits are likely to be minimal as alternate route distances are low. • Amenity benefits have not been assessed and could be explored in the next phases of investigation (e.g. amenity benefits from lower traffic volumes through sections of Rangiora) • Emissions benefits have not been assessed and could be explored in the next phases of investigation (e.g. emissions benefits from VKT reduction).
Costs – Do Minimum	• No costs associated with the Do-Minimum

Reference: Rangiora Eastern Link (REL) - Economics Memorandum

Summary of Assumptions	
Element	Assumption

Costs – Option A1	• Rough Order Cost (ROC) estimates have been provided by WDC for the base, expected and 95th tile. The expected estimates are as follows:
	• Capital Costs
	  ○ Property purchase in Year 1 with costs of $0 as works are within the existing Southbrook Road corridor
	  ○ Pre-implementation in Year 1 and Year 2 with costs of $1.9M spread evenly over both years
	  ○ Construction costs occur over a 24-month period from Year 3-4 with costs of $19.5M spread evenly across both years.
	  ○ Assumed developer contributions of 25%
	• Maintenance Costs
	  ○ Annual maintenance costs, covering both periodic and on-going maintenance, has been estimated as 0.5% of the total capital costs, this equates to $0.1M p.a.

Costs – Option B1a	• Rough Order Cost (ROC) estimates have been provided by WDC for the base, expected and 95th tile. The expected estimates are as follows:
	• Capital Costs
	  ○ Property purchase in Year 1 with costs of $4.6M
	  ○ Pre-implementation in Year 1 and Year 2 with costs of $2.8M spread evenly over both years
	  ○ Construction costs occur over a 24-month period from Year 3-4 with costs of $27.6M spread evenly across both years.
	  ○ Assumed developer contributions of 50%
	• Maintenance Costs
	  ○ Annual maintenance costs, covering both periodic and on-going maintenance, has been estimated as 0.5% of the total capital costs, this equates to $0.2M

Costs – Option B2.1	• Rough Order Cost (ROC) estimates have been provided by WDC for the base, expected and 95th tile. The expected estimates are as follows:
	• Capital Costs
	  ○ Property purchase in Year 1 with costs of $4.5M
	  ○ Pre-implementation in Year 1 and Year 2 with costs of $2.8M spread evenly over both years
	  ○ Construction costs occur over a 24-month period from Year 3-4 with costs of $28.4M spread evenly across both years.
	  ○ Assumed developer contributions of 50%
	• Maintenance Costs
	  ○ Annual maintenance costs, covering both periodic and on-going maintenance, has been estimated as 0.5% of the total capital costs, this equates to $0.2M

Costs – Option B2.2	• Rough Order Cost (ROC) estimates have been provided by WDC for the base, expected and 95th tile. The expected estimates are as follows:
	• Capital Costs
	  ○ Property purchase in Year 1 with costs of $4.0M
	  ○ Pre-implementation in Year 1 and Year 2 with costs of $2.6M spread evenly over both years
	  ○ Construction costs occur over a 24-month period from Year 3-4 with costs of $26.3M spread evenly across both years.
	  ○ Assumed developer contributions of 50%
	• Maintenance Costs
	  ○ Annual maintenance costs, covering both periodic and on-going maintenance, has been estimated as 0.5% of the total capital costs, this equates to $0.2M

Benefit Cost Ratio

A breakdown of the 60-year present value (PV) benefits and overall benefit cost ratio is provided in Table 2, with further discussion provided in the sections below.

Table 2. Breakdown of Costs and Benefits

Component	Option A (4-laning)	Option B1a (REL West)	Option B2.1 (REL East)	Option B2.2 (Lineside Rd)
TT Savings	$26.5	$227.7	$201.4	$218.0
VOC Savings	$39.9	$50.7	$48.5	$53.6
Active Modes	$3.8	$3.7	$4.1	$4.3
Safety	-	-	-	-
Total PV Benefits	$70.2	$282.0	$254.0	$276.0
Total PV Costs	$35.6	$58.2	$59.4	$54.8
Developer Contribution	$7.5	$24.7	$25.2	$23.2
BCR (National)	2.0	4.8	4.3	5.0
BCR (Government)	2.2	7.7	6.7	8.0
First Year Rate of Return (FYRR)	6%	5%	6%	3%

The results show:

- The TTC benefits vary significantly between Option A and the remaining options:
    - As Option A includes 4-laning an existing road corridor, the travel time benefits are significantly lower at $27M compared to over $200M benefits of the remaining options. This is because the Option A fails to provide sufficient capacity in the 2048 model year, leading to travel time disbenefits.
    - Option B1a provides the highest TTC benefits at $228M as this option provides additional connectivity between Lineside Road and the eastern side of Rangiora.
    - Option B2.2 provides a similar TTC benefit to Option B1a at $218m, with the slight difference being that B2.2 joins Lineside Road further south, increasing the distance travelled in B2.2 to reach Southbrook from REL. In addition, B2.2 retains the Marsh Road level crossing open. .
- The VOC benefits demonstrate a small level of variability between all options, with Option A providing the lowest benefit due to capacity issues in the long term.
- The active modes benefit between all options assessed were relatively similar, at approximately $4M, due to there being a limited expected uptake of new cyclists within the network and similarities between options with respect to cycling provisions.
- A safety benefit analysis was undertaken which demonstrated disbenefits within the network. The extent of the network used for safety benefits was too small to consider the wide range of traffic reassignment benefits from shifting travel from rural roads to new, safer urban roads. Based on CAST model outputs, slight reductions in network VKT are expected for most options which would reduce crash risk. Therefore, a neutral safety benefit has been adopted as the impacts are expected to be low.
- Option B2.2 has the highest National BCR (BCRn) at 5.0 and similar to Option B1a at 4.8; while Option A has a BCR of 2.0, reflecting the higher travel time and vehicle operating benefits of all other Option B variants

- An incremental analysis was undertaken and demonstrated that the incremental benefits of Option B2.2 offset the higher costs when compared to Option A, with an incremental BCR of 11.
- A further level of testing between Option B2.2 and Option B1a demonstrated that that the slightly higher cost (increase in costs of $3.5M) of Option B1a was offset by further increase in benefits observed (increase in benefits of $6.1M) showing value for money in the additional investment. Further discussion will be focused on Option B1a as this provides the highest incremental BCR.
- Considering developer contributions, the Government BCRs (BCRg) increase, with Option B1a increasing to 7.7. Option A sees the smallest increase in BCR as the developer contributions are only 25% compared to the 50% applied to all other Option B variants.
- All options demonstrated a similar level of First Year Rate of Return (FYRR), except for Option B2.2, with this option showing the lowest at 3%. Option B2.2 performs better in the longer term, resulting in a higher BCR but lower FYRR.

Sensitivity Testing

The following sensitivity tests have been applied to Option B1a and subsequent BCRs are summarised in Table 3 and Table 4 below.

Table 3: Sensitivity Testing Scenarios

Summary of Sensitivity Testing Scenarios			
Sensitivity	Low	Base	High
Analysis Period	40 year	60 year	-
Discount Rate	8%	2% / 1.5%	1.5%
Cost Estimate (Risk Adjustment)[3]	1.5x WDC P95	1.5x WDC P50	1.5x WDC Base
Rough Order Cost (WDC)	WDC P95	WDC P50	WDC Base
Maintenance (% Capital Costs)	0.25%	0.5%	0.75%
SP11 Uptake (Active Modes)	5% SP11	10% SP11	15% SP11
Cyclist Hazardous Benefit	-	Exclude	Include
Congested Time (CRV)	0% CRV	25% CRV AM and PM Peak, 10% CRV IP	100% CRV

[3] The risk adjusted cost estimates allow a further 50% contingency over the WDC Rough Order Costs to account for the preliminary phase of investigation.

Table 4: Sensitivity Testing BCRs

Summary of Sensitivity Testing BCRs - Option B1a				
Sensitivity	**Cost Estimate**	**Low**	**Base**	**High**
Analysis Period	Risk Adjusted Cost Estimate	3.3	4.8	-
Discount Rate		1.3		5.0
Cost Estimate (Risk Adjustment)		4.0		6.3
Maintenance (% Capital Costs)		4.5		5.2
SP11 Uptake (Active Modes)		4.8		4.9
Cyclist Hazardous Benefit		-		4.9
Congested Time (CRV)		4.3		6.0
Rough Order Cost (WDC)		6.1	7.3	9.4

The sensitivity testing has showed:

- The BCR is most sensitive to the analysis period, discount rate, cost estimates and congested time values and ranges from 1.3 (8% discount rate) to 9.4 (WDC ROC Base Estimate).
- The sensitivity testing shows that the BCR remains above 1.0 under a range of scenarios demonstrating the project provides value for money.
- Particularly for Option B1a and B2.2, a significant portion of TTC and VOC benefits occur beyond the 2048 model year, indicating the increased effectiveness of these options in the longer term. This is reflected in the sensitivity testing as the BCR of Option B1a increased from 3.3 to 4.8 with a 40-year to 60-year analysis period comparison.
- The NZTA guidance recommends applying an 8% discount rate as a sensitivity test, which the results have shown a significant decrease in the BCR from 4.8 to 1.3. Testing against a 1.5% discount rate has shown minor differences in the BCR. This demonstrates that the BCR is highly dependent on the strategic-level inputs from NZTA.
- Rough Order Cost (ROC) estimates have been provided by WDC. It is acknowledged that there are typically significant uncertainties regarding cost estimates particularly during the planning and investigation phases of projects. Applying the WDC ROC estimates, the BCR ranges from 6.1 – 9.4. A conservative risk adjustment of 1.5 times the WDC estimates have been applied, which results in a lower BCR range of 4.0 (P95) – 6.3 (Base). Whilst this adjustment increases the costs, the BCRs are still well above 1.0.
- The CAST model has provided vehicle hour network travel times, including the proportion of travel times which are comprised of delayed time. It is difficult to determine what proportion of this delayed time is associated with congestion, for which this sensitivity test has been undertaken. The BCRs range from 4.3 – 6.0 and demonstrate that depending on the assumed level of congestion, there are significant changes to the BCR, especially since the TTC benefits comprise most of the observed benefits.

Summary

This memo provides a summary of the economic analysis undertaken for the REL assessment, aligning with the guidelines and procedures outlined in the MBCM and the CEC. Table 5 provides a summary of the benefits streams, BCRn, BCRg and FYRR for each of the options assessed.

Table 5. Options BCR summary

Component	Option A (4-laning)	Option B1a (REL West)	Option B2.1 (REL East)	Option B2.2 (Lineside Rd)
TT Savings	$26.5	$227.7	$201.4	$218.0
VOC Savings	$39.9	$50.7	$48.5	$53.6
Active Modes	$3.8	$3.7	$4.1	$4.3
Safety	-	-	-	-
Total PV Benefits	$70.2	$282.0	$254.0	$276.0
Total PV Costs	$35.6	$58.2	$59.4	$54.8
Developer Contribution PV Costs	$7.5	$24.7	$25.2	$23.2
BCR (National)	2.0	4.8	4.3	5.0
BCR (Government)	2.2	7.7	6.7	8.0
FYRR	6%	5%	6%	3%

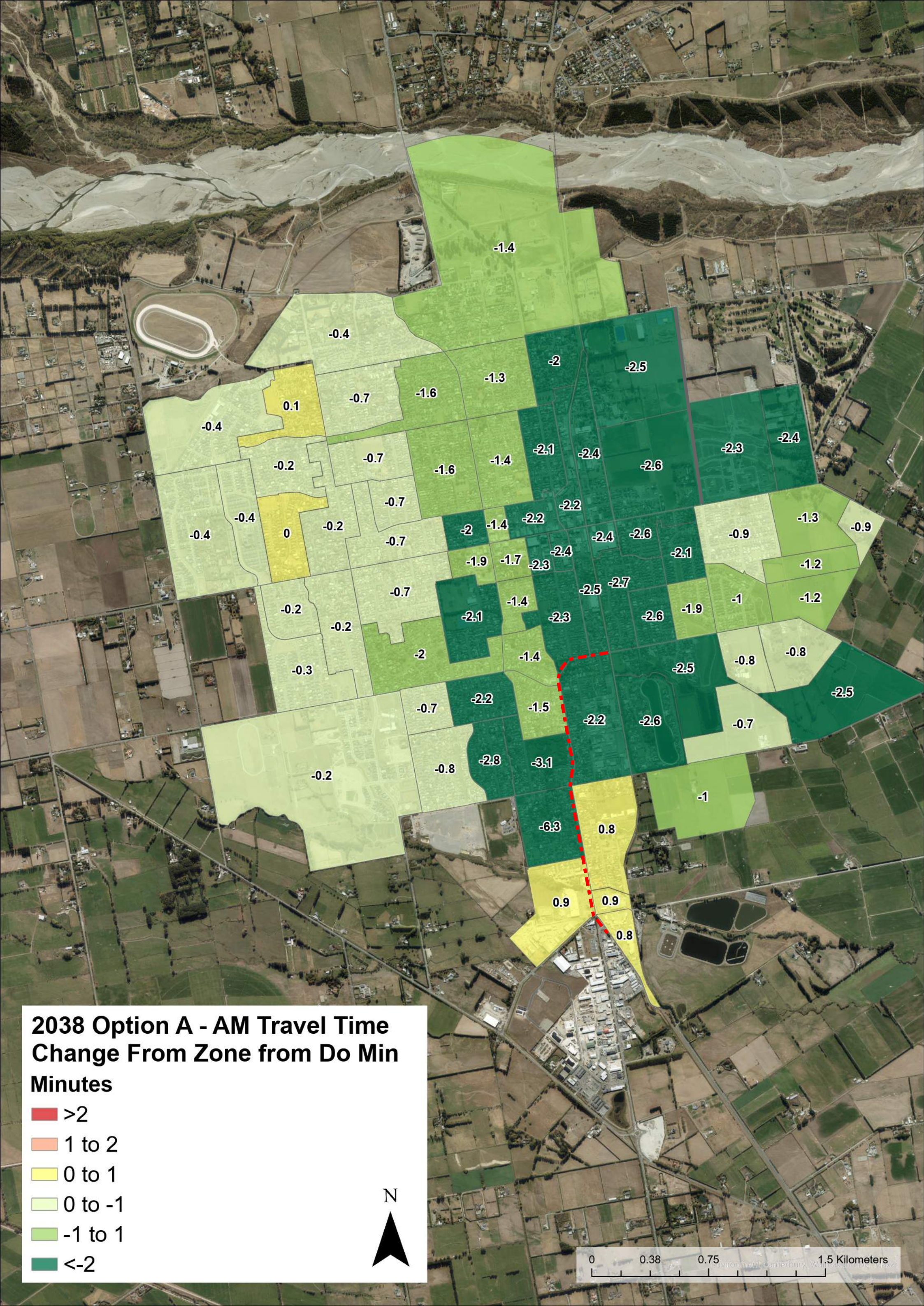
Key findings include:

- Travel time benefits for the options are significant and account for 40-80% of the total benefits, followed by vehicle operating costs. Active modes benefits are minor and account for less than 5% of the total benefits.
- As Option A includes 4-laning an existing road corridor, the travel time benefits are significantly lower at $27M compared to over $200M benefits for the other Option B variants. This is because Option A fails to provide sufficient capacity in the 2048 model year, leading to travel time disbenefits.
- The Option B variants have the highest National BCRs (BCRn) ranging from 4.3-5.0, while Option A has a BCR of 2.0, reflecting the higher travel time and vehicle operating benefits of the Option B variants
- Incremental analysis demonstrates that the incremental benefits of Option B1a offset the higher costs of this option when compared to Option A and B2.2, with an incremental BCR of 11 and 2, respectively.
- Considering developer contributions, the Government BCRs (BCRg) increase, with Option B1a increasing to 7.7. Option A sees the smallest increase in BCR as the developer contributions are only 25% compared to the 50% applied to the other Option B variants.
- The sensitivity testing shows that the BCR remains above 1.0 under a range of scenarios demonstrating the project provides value for money. The BCR is most sensitive to the analysis period, discount rate, cost estimates and congested time values and ranges from 1.3 (8% discount rate) to 9.4 (WDC ROC Base Estimate).

Appendix E Additional Model Outputs

E.1 Maps of travel time changes to/from SH1

E.2 Intersection level of service tables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2038 Option A - AM Travel Time
Change From Zone from Do Min
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1 to 2
0 to 1
0 to -1
-1 to 1
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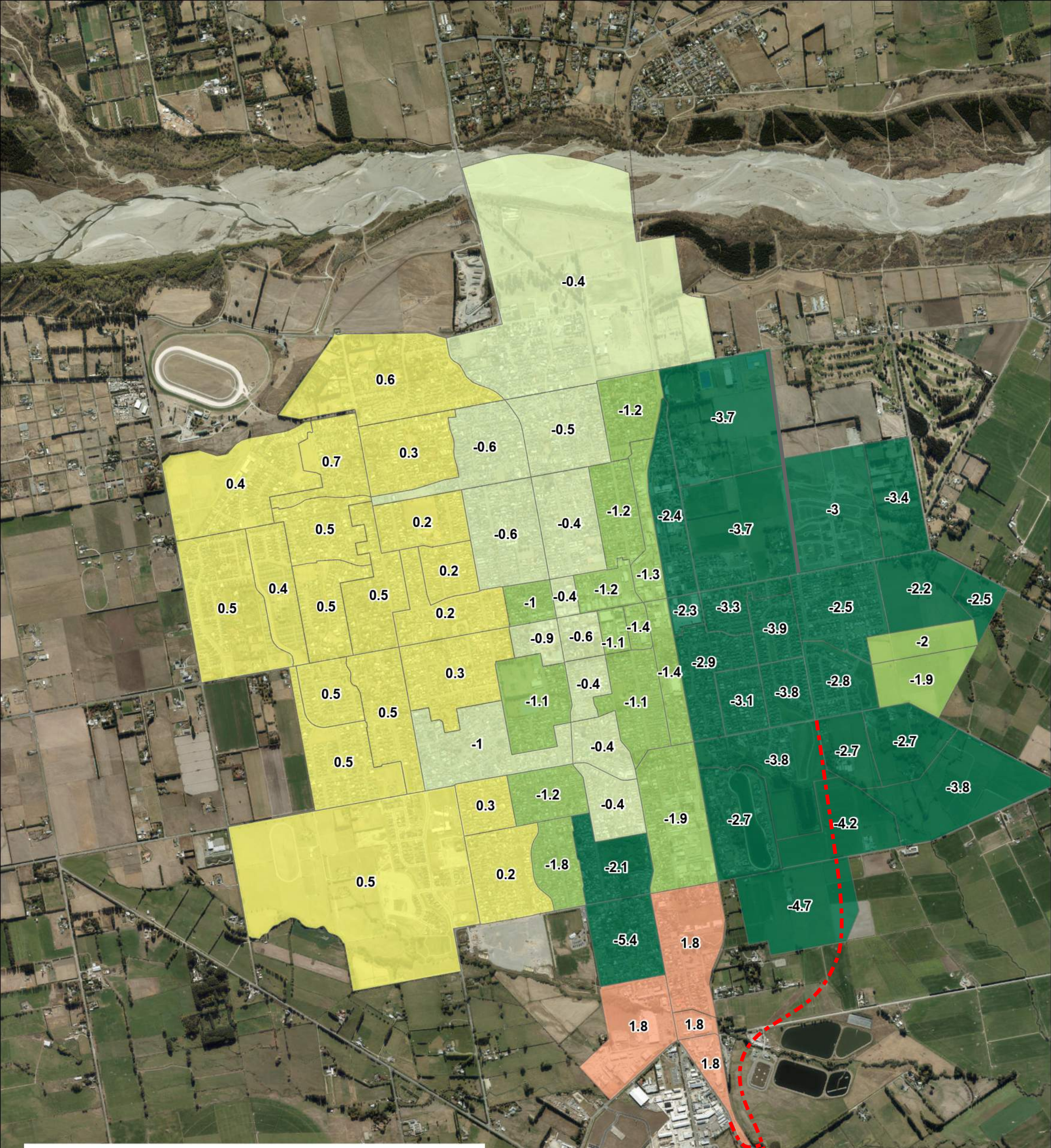
1.5 Kilometers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-5.4
1.8
1.8
1.8
1.8
2038 Option B1 - AM Travel Time
Change From Zone from Do Min
Minutes
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1 to 2
0 to 1
0 to -1
-1 to 1
<-2
N
0
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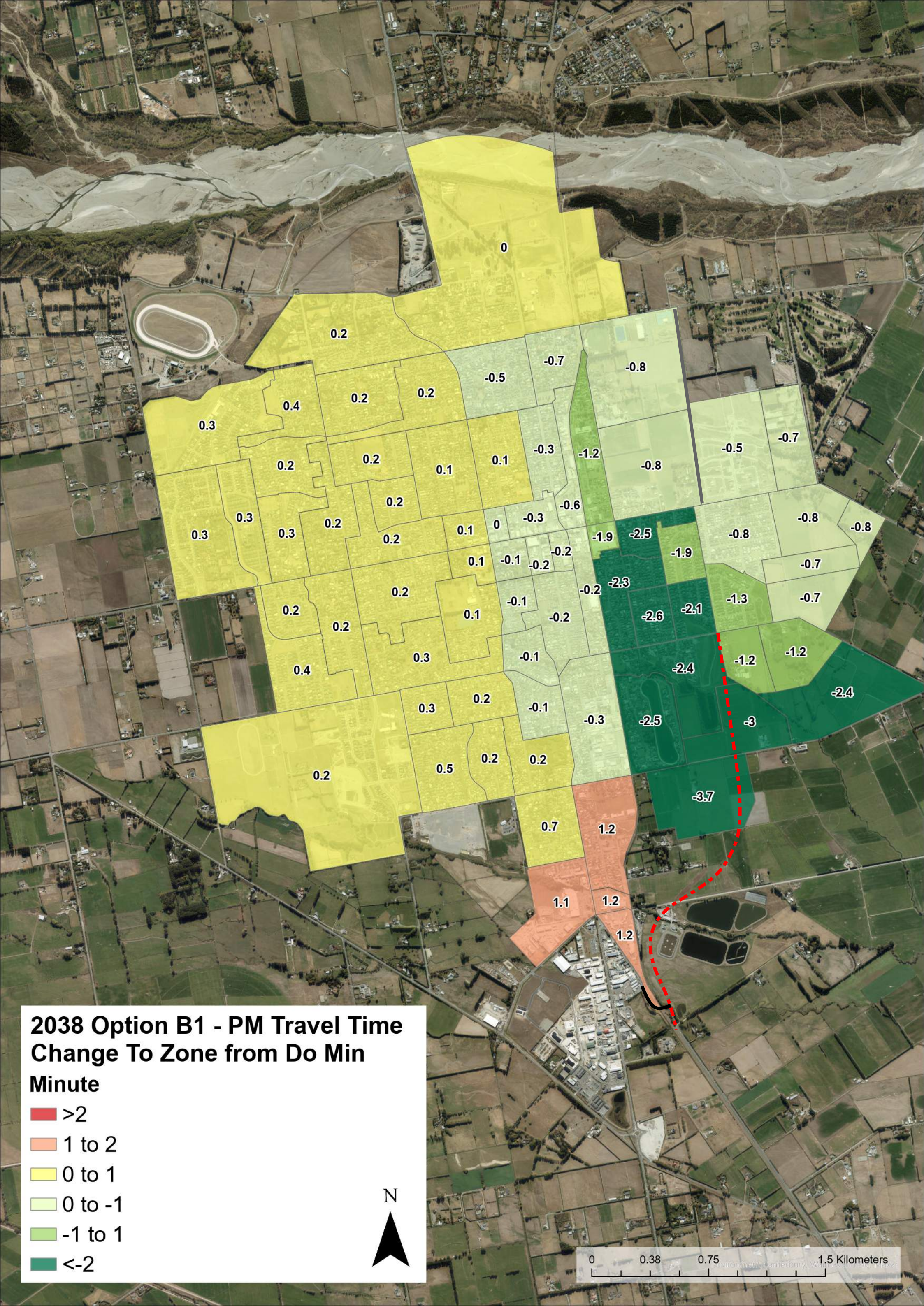
0.75
1.5 Kilometers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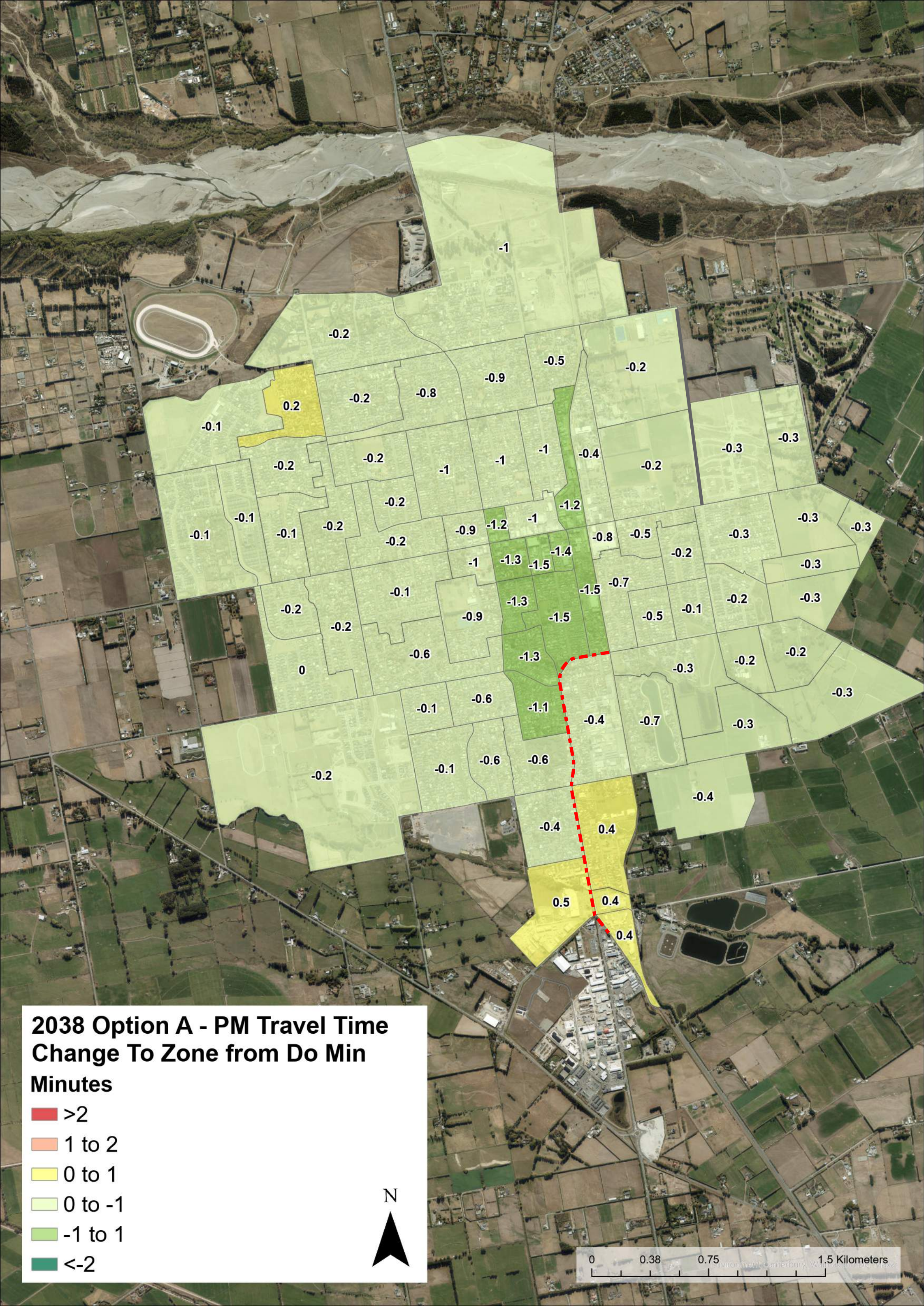
-3.7
0.7
1.2
1.1
1.2
1.2
2038 Option B1 - PM Travel Time
Change To Zone from Do Min
Minute
>2
1 to 2
0 to 1
0 to -1
-1 to 1
<-2
N
0
0.38
0.75
1.5 Kilometers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-0.2
-0.1
-0.6
-0.6
-0.4
-0.4
0.4
0.5
0.4
0.4
2038 Option A - PM Travel Time
Change To Zone from Do Min
Minutes
>2
1 to 2
0 to 1
0 to -1
-1 to 1
<-2
N
0
0.38
0.75
1.5 Kilometers

PM 2028 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	174	1	A	147	2	A	197	2	A	195	2	A	194	2	A	200	2	A
		Through	166	1	A	218	2	A	167	2	A	166	2	A	166	2	A	167	2	A
		Approach	**340**	**1**	**A**	**365**	**2**	**A**	**364**	**2**	**A**	**361**	**2**	**A**	**360**	**2**	**A**	**366**	**2**	**A**
	South	Right	79	6	A	78	6	A	76	6	A	75	6	A	75	6	A	75	6	A
		Through	275	1	A	355	2	A	267	1	A	283	1	A	283	1	A	269	1	A
		Approach	**354**	**6**	**A**	**434**	**6**	**A**	**343**	**6**	**A**	**357**	**6**	**A**	**358**	**6**	**A**	**344**	**6**	**A**
	East	Right	355	17	C	288	20	C	384	19	C	363	19	C	355	19	C	377	18	C
		Left	67	5	A	69	6	A	66	5	A	66	5	A	67	5	A	64	5	A
		Approach	**421**	**17**	**C**	**358**	**20**	**C**	**450**	**19**	**C**	**429**	**19**	**C**	**422**	**19**	**C**	**442**	**18**	**C**
	Intersection		**1,115**	**17**	**C**	**1,156**	**20**	**C**	**1,158**	**19**	**C**	**1,148**	**19**	**C**	**1,140**	**19**	**C**	**1,152**	**18**	**C**
Ashley Street / High Street	North	Left	103	29	C	99	31	C	103	28	C	103	28	C	103	28	C	103	28	C
		Through	374	29	C	410	31	C	357	28	C	368	28	C	368	28	C	357	28	C
		Right	44	16	B	44	20	B	44	16	B	44	16	B	44	16	B	44	16	B
		Approach	**521**	**27**	**C**	**553**	**30**	**C**	**504**	**27**	**C**	**515**	**27**	**C**	**515**	**27**	**C**	**504**	**27**	**C**
	South	Left	0	40	-	0	60	-	0	40	-	0	40	-	0	40	-	0	40	-
		Through	439	32	C	554	49	D	445	32	C	456	32	C	459	33	C	449	33	C
		Right	281	27	C	261	27	C	247	23	C	253	24	C	252	23	C	249	23	C
		Approach	**720**	**30**	**C**	**815**	**42**	**D**	**691**	**29**	**C**	**709**	**29**	**C**	**711**	**29**	**C**	**698**	**29**	**C**
	East	Left	60	29	C	71	30	C	59	29	C	59	29	C	59	29	C	59	29	C
		Through	140	26	C	142	27	C	132	26	C	130	26	C	131	26	C	130	26	C
		Right	51	33	C	42	47	D	57	32	C	53	32	C	53	32	C	53	33	C
		Approach	**251**	**28**	**C**	**255**	**31**	**C**	**248**	**28**	**C**	**242**	**28**	**C**	**243**	**28**	**C**	**242**	**28**	**C**
	West	Left	51	29	C	73	37	D	46	28	C	61	28	C	63	28	C	53	29	C
		Through	165	26	C	313	35	C	150	26	C	148	26	C	148	26	C	144	26	C
		Right	0	30	-	1	31	C	0	30	-	0	30	-	0	30	-	0	30	-
		Approach	**215**	**27**	**C**	**388**	**35**	**C**	**195**	**26**	**C**	**209**	**26**	**C**	**211**	**26**	**C**	**197**	**27**	**C**
	Intersection		**1,707**	**29**	**C**	**2,012**	**36**	**D**	**1,638**	**28**	**C**	**1,675**	**28**	**C**	**1,680**	**28**	**C**	**1,641**	**28**	**C**
Ivory Street / Northbrook Road	North	Left	105	2	A	75	16	B	142	2	A	137	2	A	136	2	A	134	2	A
		Through	619	2	A	690	16	B	486	2	A	510	2	A	511	2	A	487	2	A
		Approach	**724**	**2**	**A**	**766**	**16**	**B**	**628**	**2**	**A**	**646**	**2**	**A**	**647**	**2**	**A**	**621**	**2**	**A**
	East	Left	119	32	D	210	34	C	182	17	C	168	18	C	167	17	C	175	17	C
		Right	64	40	E	44	44	D	74	23	C	72	24	C	72	23	C	72	22	C
		Approach	**183**	**40**	**E**	**254**	**36**	**D**	**256**	**23**	**C**	**240**	**24**	**C**	**239**	**23**	**C**	**247**	**22**	**C**
	West	Through	404	2	A	741	4	A	367	2	A	407	2	A	411	2	A	382	2	A
		Right	361	22	C	192	51	D	252	11	B	252	12	B	252	11	B	236	11	B
		Approach	**765**	**22**	**C**	**933**	**14**	**B**	**619**	**11**	**B**	**659**	**12**	**B**	**663**	**11**	**B**	**618**	**11**	**B**
	Intersection		**1,672**	**40**	**E**	**1,952**	**18**	**B**	**1,504**	**23**	**C**	**1,546**	**24**	**C**	**1,549**	**23**	**C**	**1,486**	**22**	**C**
Percival Street / Victoria Street	North	Left	15	16	C	22	16	C	19	12	B	21	12	B	21	12	B	24	12	B
		Right	19	73	F	53	98	F	66	73	F	63	77	F	62	73	F	67	71	F
		Approach	**34**	**73**	**F**	**75**	**98**	**F**	**85**	**73**	**F**	**83**	**77**	**F**	**83**	**73**	**F**	**91**	**71**	**F**
	South	Through	81	3	A	222	1	A	147	3	A	129	3	A	128	3	A	150	3	A
		Right	907	3	A	1,077	1	A	753	3	A	791	3	A	794	3	A	749	3	A
		Approach	**989**	**3**	**A**	**1,298**	**1**	**A**	**900**	**3**	**A**	**920**	**3**	**A**	**922**	**3**	**A**	**899**	**3**	**A**
	East	Left	765	2	A	934	1	A	715	2	A	718	2	A	717	2	A	713	2	A
		Right	0	15	-	0	21	-	0	12	-	0	12	-	0	12	-	0	12	-
		Approach	**765**	**15**	**B**	**934**	**21**	**C**	**715**	**12**	**B**	**718**	**12**	**B**	**717**	**12**	**B**	**713**	**12**	**B**
	Intersection		**1,787**	**73**	**F**	**2,308**	**98**	**F**	**1,701**	**73**	**F**	**1,722**	**77**	**F**	**1,722**	**73**	**F**	**1,702**	**71**	**F**
Percival Street / Johns Road	North	Through	682	2	A	921	1	A	654	2	A	666	2	A	666	2	A	655	2	A
		Right	102	19	C	67	25	C	127	17	C	114	17	C	113	17	C	125	17	C
		Approach	**783**	**19**	**C**	**988**	**25**	**C**	**782**	**17**	**C**	**781**	**17**	**C**	**779**	**17**	**C**	**780**	**17**	**C**
	South	Left	112	3	A	231	1	A	167	3	A	154	3	A	156	3	A	161	3	A
		Through	864	3	A	1,183	1	A	763	3	A	785	3	A	787	3	A	761	3	A
		Approach	**976**	**3**	**A**	**1,415**	**1**	**A**	**930**	**3**	**A**	**939**	**3**	**A**	**943**	**3**	**A**	**922**	**3**	**A**
	West	Left	124	20	C	115	22	C	137	16	C	136	16	C	136	16	C	138	16	C
		Right	25	64	F	32	73	F	34	53	F	32	54	F	31	53	F	35	53	F
		Approach	**149**	**64**	**F**	**147**	**73**	**F**	**171**	**53**	**F**	**167**	**54**	**F**	**167**	**53**	**F**	**173**	**53**	**F**
	Intersection		**1,908**	**64**	**F**	**2,549**	**73**	**F**	**1,883**	**53**	**F**	**1,887**	**54**	**F**	**1,889**	**53**	**F**	**1,875**	**53**	**F**
Percival Street / Charles Street	North	Left	144	2	A	144	1	A	117	2	A	113	2	A	113	2	A	117	2	A
		Through	514	2	A	762	1	A	525	2	A	538	2	A	537	2	A	525	2	A
		Right	49	17	C	47	22	C	47	16	C	47	16	C	47	16	C	47	16	C
		Approach	**706**	**17**	**C**	**953**	**22**	**C**	**689**	**16**	**C**	**698**	**16**	**C**	**697**	**16**	**C**	**690**	**16**	**C**
	South	Left	28	3	A	35	1	A	34	3	A	31	3	A	31	3	A	34	3	A
		Through	871	3	A	1,301	1	A	804	3	A	813	3	A	817	3	A	796	3	A
		Right	0	8	A	0	17	-	0	8	-	0	8	-	0	8	-	0	8	-
		Approach	**899**	**8**	**A**	**1,336**	**17**	**C**	**838**	**8**	**A**	**844**	**8**	**A**	**848**	**8**	**A**	**830**	**8**	**A**
	East	Left	84	9	A	0	10	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	5	74	F	3	90	F	5	60	F	5	63	F	5	61	F	5	59	F
		Right	88	74	F	96	90	F	98	61	F	97	63	F	97	61	F	98	59	F
		Approach	**178**	**74**	**F**	**99**	**90**	**F**	**103**	**61**	**F**	**102**	**63**	**F**	**102**	**61**	**F**	**103**	**59**	**F**
	West	Left	16	42	E	17	49	E	29	32	D	29	33	D	29	32	D	28	32	D
		Through	51	49	E	55	56	F	48	38	E	52	39	E	52	38	E	47	38	E
		Right	0	48	E	1	55	F	6	38	E	2	38	E	2	37	E	8	37	E
		Approach	**67**	**49**	**E**	**74**	**56**	**F**	**83**	**38**	**E**	**82**	**39**	**E**	**82**	**38**	**E**	**84**	**38**	**E**
	Intersection		**1,850**	**74**	**F**	**2,462**	**90**	**F**	**1,712**	**61**	**F**	**1,726**	**63**	**F**	**1,730**	**61**	**F**	**1,706**	**59**	**F**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	49	-	0	18	-	0	37	-	0	38	-	0	38	-	0	38	-
		Through	596	36	D	749	18	B	522	27	C	533	28	C	532	28	C	526	28	C
		Right	1	54	D	15	31	C	9	46	D	7	48	D	7	47	D	8	47	D
		Approach	**598**	**36**	**D**	**764**	**19**	**B**	**531**	**28**	**C**	**540**	**28**	**C**	**539**	**28**	**C**	**534**	**28**	**C**
	South	Left	106	59	E	82	20	B	98	40	D	107	44	D	100	41	D	111	37	D
		Through	823	59	E	1,286	20	B	818	40	D	832	44	D	841	41	D	817	37	D
		Right	148	67	E	307	21	C	168	38	D	113	43	D	112	39	D	110	35	C
		Approach	**1,076**	**60**	**E**	**1,675**	**20**	**B**	**1,084**	**39**	**D**	**1,053**	**44**	**D**	**1,053**	**40**	**D**	**1,039**	**37**	**D**
	East	Left	100	39	D	107	40	D	98	39	D	70	37	D	70	37	D	72	36	D
		Through	70	39	D	76	40	D	52	39	D	50	37	D	50	37	D	49	36	D
		Right	42	36	D	36	37	D	7	36	D	0	35	C	0	35	C	0	34	-
		Approach	**211**	**39**	**D**	**220**	**40**	**D**	**157**	**39**	**D**	**121**	**37**	**D**	**121**	**37**	**D**	**121**	**36**	**D**
	West	Left	35	19	B	14	19	B	13	18	B	13	18	B	13	18	B	12	18	B
		Through	128	19	B	87	19	B	69	18	B	64	18	B	64	18	B	57	18	B
		Right	264	22	C	270	22	C	226	21	C	241	21	C	241	21	C	229	21	C
		Approach	**426**	**21**	**C**	**372**	**21**	**C**	**308**	**20**	**B**	**318**	**21**	**C**	**319**	**20**	**B**	**299**	**20**	**B**
	Intersection		**2,312**	**45**	**D**	**3,031**	**21**	**C**	**2,081**	**34**	**C**	**2,031**	**36**	**D**	**2,032**	**34**	**C**	**1,992**	**32**	**C**
Southbrook Road / Torlesse Street	North	Left	0	6	A	21	3	A	3	5	A	104	5	A	111	5	A	0	5	A
		Through	881	9	A	1,046	4	A	769	7	A	648	7	A	646	7	A	756	7	A
		Right	0	12	-	0	5	-	0	12	-	0	11	-	0	11	-	0	11	-
		Approach	**881**	**9**	**A**	**1,068**	**4**	**A**	**772**	**7**	**A**	**752**	**7**	**A**	**757**	**7**	**A**	**756**	**7**	**A**
	South	Left	137	7	A	43	3	A	44	6	A	57	6	A	62	6	A	43	6	A
		Through	979	10	A	1,568	3	A	993	10	A	967	10	A	969	10	A	953	9	A
		Right	18	10	A	26	4	A	24	8	A	21	8	A	21	8	A	23	7	A
		Approach	**1,133**	**10**	**A**	**1,638**	**3**	**A**	**1,061**	**10**	**A**	**1,045**	**10**	**A**	**1,052**	**9**	**A**	**1,019**	**9**	**A**
	East	Left	16	40	D	28	40	D	15	39	D	15	39	D	15	39	D	15	39	D
		Through	14	40	D	5	40	D	2	39	D	5	39	D	6	39	D	5	39	D
		Right	30	38	D	44	38	D	42	38	D	22	38	D	22	37	D	23	37	D
		Approach	**60**	**39**	**D**	**77**	**39**	**D**	**58**	**38**	**D**	**42**	**38**	**D**	**43**	**38**	**D**	**43**	**38**	**D**
	West	Left	0	18	-	0	22	-	0	20	-	0	19	-	0	19	-	0	18	-
		Through	3	33	C	3	33	C	1	33	C	3	33	C	3	33	C	3	33	C
		Right	22	34	C	22	35	C	23	34	C	21	34	C	21	34	C	22	34	C
		Approach	**25**	**34**	**C**	**25**	**34**	**C**	**24**	**34**	**C**	**24**	**34**	**C**	**24**	**34**	**C**	**25**	**34**	**C**
	Intersection		**2,100**	**11**	**B**	**2,808**	**5**	**A**	**1,915**	**10**	**A**	**1,864**	**9**	**A**	**1,877**	**9**	**A**	**1,843**	**9**	**A**
Southbrook Road / Pak 'n Save supermarket	North	Left	28	11	B	28	10	A	31	9	A	25	9	A	25	9	A	25	9	A
		Through	843	17	B	1,014	13	B	725	14	B	612	15	B	610	14	B	721	14	B
		Right	49	26	C	54	21	C	50	18	B	47	18	B	47	17	B	47	17	B
		Approach	**920**	**17**	**B**	**1,096**	**14**	**B**	**806**	**14**	**B**	**684**	**15**	**B**	**683**	**14**	**B**	**793**	**14**	**B**
	South	Left	52	9	A	47	6	A	51	9	A	53	9	A	53	9	A	53	9	A
		Through	986	28	C	1,457	7	A	882	19	B	905	19	B	911	19	B	873	19	B
		Right	0	14	B	11	7	A	0	11	B	0	12	B	0	11	B	1	11	B
		Approach	**1,038**	**28**	**C**	**1,515**	**7**	**A**	**933**	**19**	**B**	**959**	**19**	**B**	**964**	**18**	**B**	**927**	**18**	**B**
	East	Left	72	35	C	58	34	C	63	35	C	78	35	C	77	35	C	76	35	C
		Through	1	35	C	1	34	C	1	35	C	1	35	C	1	35	C	1	35	C
		Right	60	33	C	74	33	C	69	33	C	54	33	C	55	33	C	56	33	C
		Approach	**133**	**34**	**C**	**133**	**34**	**C**	**133**	**34**	**C**	**133**	**34**	**C**	**133**	**34**	**C**	**133**	**34**	**C**
	West	Left	87	21	C	107	20	B	111	19	B	86	18	B	87	18	B	90	17	B
		Through	1	33	C	1	32	C	1	32	C	1	33	C	1	33	C	1	32	C
		Right	101	34	C	81	33	C	77	33	C	102	33	C	101	33	C	98	34	C
		Approach	**189**	**28**	**C**	**189**	**26**	**C**	**189**	**24**	**C**	**189**	**26**	**C**	**189**	**26**	**C**	**189**	**26**	**C**
	Intersection		**2,280**	**24**	**C**	**2,934**	**12**	**B**	**2,061**	**19**	**B**	**1,966**	**19**	**B**	**1,970**	**19**	**B**	**2,043**	**18**	**B**

PM 2028 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	34	4	A	26	3	A	1	3	A	50	3	A	50	3	A	53	3	A
		Through	943	4	A	1,104	3	A	837	3	A	710	3	A	708	3	A	820	3	A
		Right	38	22	C	23	11	B	27	16	C	31	16	C	30	16	C	22	15	B
		Approach	**1,015**	**22**	**C**	**1,153**	**3**	**A**	**865**	**16**	**C**	**792**	**16**	**C**	**788**	**16**	**C**	**895**	**15**	**B**
	South	Left	9	4	A	1	4	A	36	3	A	23	4	A	23	4	A	18	4	A
		Through	1,035	4	A	1,507	4	A	930	3	A	956	4	A	962	4	A	923	4	A
		Right	66	19	C	45	10	A	34	12	B	84	14	B	83	14	B	109	14	B
		Approach	**1,110**	**19**	**C**	**1,553**	**4**	**A**	**1,000**	**12**	**B**	**1,063**	**14**	**B**	**1,068**	**14**	**B**	**1,050**	**14**	**B**
	West	Left	2	116	F	8	46	D	3	80	F	3	92	F	3	83	F	4	91	F
		Through	8	127	F	16	46	D	2	90	F	12	103	F	11	95	F	12	103	F
		Right	11	127	F	36	46	D	27	90	F	21	103	F	21	95	F	16	103	F
		Approach	**21**	**127**	**F**	**61**	**46**	**D**	**32**	**90**	**F**	**35**	**103**	**F**	**35**	**95**	**F**	**32**	**103**	**F**
	Intersection		**2,146**	**127**	**F**	**2,767**	**4**	**A**	**1,896**	**90**	**F**	**1,890**	**103**	**F**	**1,891**	**95**	**F**	**1,977**	**103**	**F**
Lineside Road / Flaxton Road	North	Through	720	3	A	820	4	A	592	3	A	478	3	A	477	3	A	577	3	A
		Right	234	25	C	321	19	B	272	14	B	253	14	B	252	15	B	258	14	B
		Approach	**954**	**25**	**C**	**1,141**	**8**	**A**	**864**	**14**	**B**	**731**	**14**	**B**	**729**	**15**	**B**	**836**	**14**	**B**
	South	Left	22	2	A	15	13	B	50	2	A	52	2	A	52	2	A	52	2	A
		Through	831	2	A	1,035	17	B	629	2	A	683	2	A	686	2	A	642	2	A
		Approach	**853**	**2**	**A**	**1,050**	**17**	**B**	**679**	**2**	**A**	**735**	**2**	**A**	**738**	**2**	**A**	**694**	**2**	**A**
	West	Left	278	56	F	516	32	C	369	25	C	380	37	E	380	34	D	408	38	E
		Right	22	74	F	15	42	D	72	59	F	43	39	E	44	37	E	38	41	E
		Approach	**300**	**74**	**F**	**532**	**32**	**C**	**441**	**59**	**F**	**423**	**39**	**E**	**425**	**37**	**E**	**446**	**41**	**E**
	Intersection		**2,107**	**74**	**F**	**2,722**	**16**	**B**	**1,985**	**59**	**F**	**1,888**	**39**	**E**	**1,892**	**37**	**E**	**1,975**	**41**	**E**
Coldstream Road / REL	South	Left	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Right	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**
	East	Left	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Through	422	0	A	306	0	A	466	0	A	429	0	A	417	0	A	455	0	A
		Approach	**422**	**0**	**A**	**306**	**0**	**A**	**466**	**0**	**A**	**429**	**0**	**A**	**417**	**0**	**A**	**455**	**0**	**A**
	West	Through	256	0	A	227	0	A	276	0	A	272	0	A	271	0	A	278	0	A
		Right	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Approach	**256**	**0**	**A**	**227**	**0**	**A**	**276**	**0**	**A**	**272**	**0**	**A**	**271**	**0**	**A**	**278**	**0**	**A**
	Intersection		**678**	**0**	**A**	**534**	**0**	**A**	**742**	**0**	**A**	**701**	**0**	**A**	**688**	**0**	**A**	**733**	**0**	**A**
Kippenberger Ave / MacPhail Ave	North	Left	6	9	A	6	9	A	3	10	A	3	10	A	3	10	A	3	10	A
		Through	19	12	B	11	12	B	29	12	B	40	12	B	39	12	B	26	12	B
		Right	26	14	B	10	14	B	8	15	B	24	15	B	22	15	B	6	15	B
		Approach	**51**	**13**	**B**	**27**	**12**	**B**	**40**	**12**	**B**	**67**	**13**	**B**	**65**	**13**	**B**	**36**	**12**	**B**
	South	Left	11	9	A	11	8	A	11	9	A	12	9	A	12	9	A	11	9	A
		Through	21	11	B	10	11	B	64	11	B	47	11	B	48	11	B	61	11	B
		Right	79	14	B	55	13	B	145	14	B	86	14	B	84	14	B	149	14	B
		Approach	**111**	**13**	**B**	**76**	**12**	**B**	**220**	**13**	**B**	**145**	**12**	**B**	**144**	**12**	**B**	**221**	**13**	**B**
	East	Left	42	8	A	52	8	A	78	8	A	61	8	A	62	8	A	82	8	A
		Through	356	10	A	338	10	A	355	10	A	340	10	A	343	10	A	353	10	A
		Right	9	13	B	8	13	B	4	13	B	4	13	B	4	13	B	4	13	B
		Approach	**407**	**10**	**A**	**398**	**10**	**A**	**436**	**10**	**A**	**405**	**10**	**A**	**409**	**10**	**A**	**439**	**10**	**A**
	West	Left	26	8	A	14	8	A	27	9	A	24	9	A	26	9	A	26	9	A
		Through	438	11	B	453	11	B	439	11	B	443	11	B	441	11	B	438	11	B
		Right	15	13	B	15	13	B	15	14	B	15	14	B	15	14	B	15	14	B
		Approach	**479**	**11**	**B**	**482**	**11**	**B**	**481**	**11**	**B**	**482**	**11**	**B**	**482**	**11**	**B**	**479**	**11**	**B**
	Intersection		**1,048**	**11**	**B**	**983**	**10**	**A**	**1,178**	**11**	**B**	**1,099**	**11**	**B**	**1,100**	**11**	**B**	**1,174**	**11**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	1	5	A	1	5	A	0	8	A	0	8	A	0	8	A	0	8	A
		Through	0	0	-	0	0	-	164	10	A	164	10	A	164	10	A	159	10	A
		Right	50	6	A	54	6	A	34	13	B	34	13	B	33	13	B	36	13	B
		Approach	**51**	**6**	**A**	**54**	**6**	**A**	**198**	**11**	**B**	**198**	**11**	**B**	**197**	**11**	**B**	**195**	**11**	**B**
	South	Left	0	0	-	0	0	-	257	8	A	235	8	A	234	8	A	272	8	A
		Through	0	0	-	0	0	-	181	11	B	102	10	A	101	11	B	182	11	B
		Right	0	0	-	0	0	-	2	13	B	0	13	-	0	13	-	2	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**439**	**9**	**A**	**337**	**9**	**A**	**335**	**9**	**A**	**457**	**9**	**A**
	East	Left	0	0	-	0	0	-	1	8	A	1	8	A	1	8	A	1	8	A
		Through	99	1	A	72	1	A	80	11	B	72	10	A	72	10	A	76	10	A
		Right	1	5	A	1	5	A	0	13	-	0	13	-	0	13	-	0	13	-
		Approach	**100**	**5**	**A**	**74**	**5**	**A**	**81**	**10**	**A**	**73**	**10**	**A**	**72**	**10**	**A**	**76**	**10**	**A**
	West	Left	97	2	A	65	1	A	48	8	A	49	8	A	49	8	A	47	8	A
		Through	107	2	A	98	1	A	89	10	A	89	10	A	89	10	A	89	10	A
		Right	0	0	-	0	0	-	106	13	B	80	13	B	80	13	B	107	13	B
		Approach	**204**	**2**	**A**	**163**	**1**	**A**	**243**	**11**	**B**	**218**	**11**	**B**	**218**	**11**	**B**	**243**	**11**	**B**
	Intersection		**356**	**6**	**A**	**291**	**6**	**A**	**961**	**10**	**A**	**826**	**10**	**A**	**823**	**10**	**A**	**972**	**10**	**A**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	8	-	0	7	-	0	7	-	0	8	-
		Through	0	0	-	0	0	-	203	10	A	191	10	A	191	10	A	206	10	A
		Right	0	11	-	0	11	-	22	13	B	0	12	-	0	12	-	15	13	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**224**	**10**	**A**	**191**	**10**	**A**	**191**	**10**	**A**	**221**	**10**	**A**
	South	Left	0	0	-	0	0	-	12	8	A	1	8	A	2	8	A	0	8	A
		Through	0	0	-	0	0	-	394	11	B	324	10	A	321	10	A	441	11	B
		Right	0	0	-	0	0	-	25	13	B	33	13	B	33	13	B	44	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**431**	**11**	**B**	**357**	**11**	**B**	**357**	**11**	**B**	**485**	**11**	**B**
	East	Left	0	0	-	0	0	-	17	8	A	25	8	A	25	8	A	25	8	A
		Through	82	8	A	101	8	A	83	10	A	60	10	A	60	10	A	59	10	A
		Right	0	11	-	0	11	-	0	13	-	0	13	-	0	13	-	0	13	-
		Approach	**82**	**11**	**B**	**101**	**11**	**B**	**100**	**10**	**A**	**85**	**9**	**A**	**85**	**9**	**A**	**84**	**9**	**A**
	West	Left	0	8	-	0	8	-	45	9	A	4	8	A	5	9	A	16	9	A
		Through	53	11	B	76	11	B	90	11	B	50	11	B	50	11	B	49	11	B
		Right	0	0	-	0	0	-	4	14	B	0	13	-	0	14	-	0	14	-
		Approach	**53**	**11**	**B**	**76**	**11**	**B**	**139**	**11**	**B**	**55**	**11**	**B**	**55**	**11**	**B**	**64**	**11**	**B**
	Intersection		**135**	**11**	**B**	**177**	**11**	**B**	**894**	**10**	**A**	**688**	**10**	**A**	**688**	**10**	**A**	**854**	**11**	**B**
Lineside Road / REL	North	Through	0	0	-	0	0	-	189	11	B	339	10	A	341	10	A	228	10	A
		Right	0	0	-	0	0	-	65	16	B	0	16	-	0	16	-	0	16	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**254**	**12**	**B**	**339**	**10**	**A**	**341**	**10**	**A**	**228**	**10**	**A**
	South	Left	897	0	A	1,101	0	A	657	15	B	654	14	B	658	14	B	618	14	B
		Through	0	0	-	0	0	-	390	20	B	326	19	B	326	19	B	416	20	B
		Approach	**897**	**0**	**A**	**1,101**	**0**	**A**	**1,047**	**17**	**B**	**980**	**16**	**B**	**984**	**16**	**B**	**1,034**	**16**	**B**
	West	Left	0	0	-	0	0	-	77	11	B	0	11	-	0	10	-	0	11	-
		Right	783	0	A	883	0	A	632	16	B	493	16	B	492	16	B	592	16	B
		Approach	**783**	**0**	**A**	**883**	**0**	**A**	**709**	**15**	**B**	**493**	**16**	**B**	**492**	**16**	**B**	**592**	**16**	**B**
	Intersection		**1,680**	**0**	**A**	**1,984**	**0**	**A**	**2,010**	**16**	**B**	**1,812**	**15**	**B**	**1,817**	**15**	**B**	**1,855**	**15**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	0	1	-	0	1	-	0	1	-	0	1	-
		Through	0	0	-	0	0	-	212	1	A	165	1	A	165	1	A	177	1	A
		Right	0	0	-	0	0	-	12	6	A	51	6	A	51	6	A	54	6	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**224**	**6**	**A**	**215**	**6**	**A**	**216**	**6**	**A**	**231**	**6**	**A**
	South	Left	0	0	-	0	0	-	13	2	A	73	1	A	73	1	A	70	2	A
		Through	0	0	-	0	0	-	407	2	A	254	1	A	254	1	A	346	2	A
		Right	0	0	-	0	0	-	46	5	A	0	5	A	0	5	-	0	5	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**467**	**5**	**A**	**326**	**5**	**A**	**326**	**5**	**A**	**416**	**5**	**A**
	East	Left	0	0	-	0	0	-	21	6	A	0	5	-	0	6	-	0	6	-
		Through	47	0	A	42	0	A	1	9	A	50	8	A	50	8	A	47	9	A
		Right	0	0	-	0	0	-	0	10	-	0	9	-	0	9	-	0	10	-
		Approach	**47**	**0**	**A**	**42**	**0**	**A**	**22**	**10**	**A**	**50**	**9**	**A**	**50**	**9**	**A**	**47**	**10**	**A**
	West	Left	0	0	-	0	0	-	24	7	A	104	7	A	103	7	A	139	8	A
		Through	122	0	A	104	0	A	4	9	A	91	8	A	90	9	A	82	9	A
		Right	0	0	-	0	0	-	21	10	A	174	8	A	176	9	A	52	9	A
		Approach	**122**	**0**	**A**	**104**	**0**	**A**	**50**	**10**	**A**	**369**	**8**	**A**	**370**	**9**	**A**	**272**	**9**	**A**
	Intersection		**168**	**0**	**A**	**146**	**0**	**A**	**762**	**10**	**A**	**960**	**9**	**A**	**962**	**9**	**A**	**967**	**10**	**A**

AM 2028 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	130	2	A	119	2	A	206	2	A	203	2	A	198	2	A	207	2	A
		Through	330	2	A	453	2	A	331	2	A	333	2	A	332	2	A	332	2	A
		Approach	**460**	**2**	**A**	**572**	**2**	**A**	**537**	**2**	**A**	**536**	**2**	**A**	**530**	**2**	**A**	**539**	**2**	**A**
	South	Right	46	7	A	47	8	A	45	7	A	46	7	A	46	7	A	45	7	A
		Through	179	1	A	231	1	A	193	1	A	201	1	A	202	1	A	198	1	A
		Approach	**225**	**7**	**A**	**278**	**8**	**A**	**239**	**7**	**A**	**247**	**7**	**A**	**247**	**7**	**A**	**243**	**7**	**A**
	East	Right	126	11	B	74	13	B	113	11	B	105	11	B	104	11	B	108	11	B
		Left	45	7	A	49	8	A	44	7	A	44	7	A	44	7	A	44	7	A
		Approach	**171**	**11**	**B**	**122**	**13**	**B**	**158**	**11**	**B**	**150**	**11**	**B**	**149**	**11**	**B**	**152**	**11**	**B**
	Intersection		**857**	11	**B**	**972**	13	**B**	**933**	11	**B**	**932**	11	**B**	**926**	11	**B**	**935**	11	**B**
Ashley Street / High Street	North	Left	32	26	C	6	31	C	30	26	C	25	26	C	25	26	C	25	26	C
		Through	469	26	C	585	30	C	457	26	C	464	26	C	461	26	C	457	26	C
		Right	71	15	B	69	17	B	71	15	B	71	15	B	71	14	B	71	15	B
		Approach	**573**	**25**	**C**	**659**	**29**	**C**	**559**	**24**	**C**	**560**	**24**	**C**	**558**	**24**	**C**	**554**	**24**	**C**
	South	Left	0	26	-	0	30	-	0	27	-	0	27	-	0	26	-	0	27	-
		Through	259	23	C	317	25	C	271	24	C	277	24	C	277	23	C	275	24	C
		Right	123	23	C	157	31	C	107	22	C	109	22	C	109	22	C	108	21	C
		Approach	**382**	**23**	**C**	**474**	**27**	**C**	**378**	**23**	**C**	**386**	**23**	**C**	**387**	**23**	**C**	**383**	**23**	**C**
	East	Left	86	32	C	90	32	C	87	32	C	86	32	C	86	32	C	86	32	C
		Through	65	28	C	69	29	C	65	28	C	65	28	C	65	28	C	65	28	C
		Right	70	31	C	82	32	C	69	31	C	69	31	C	69	31	C	69	31	C
		Approach	**221**	**31**	**C**	**241**	**31**	**C**	**221**	**30**	**C**	**220**	**30**	**C**	**220**	**30**	**C**	**220**	**30**	**C**
	West	Left	0	27	-	0	27	-	0	27	-	0	27	-	0	27	-	0	27	-
		Through	157	23	C	169	24	C	153	23	C	156	23	C	156	23	C	152	23	C
		Right	0	32	-	0	33	-	0	33	-	0	32	-	0	32	-	0	32	-
		Approach	**157**	**23**	**C**	**169**	**24**	**C**	**153**	**23**	**C**	**156**	**23**	**C**	**156**	**23**	**C**	**152**	**23**	**C**
	Intersection		**1,333**	25	**C**	**1,543**	28	**C**	**1,311**	25	**C**	**1,322**	25	**C**	**1,321**	25	**C**	**1,308**	25	**C**
Ivory Street / Northbrook Road	North	Left	21	2	A	16	11	B	28	2	A	25	2	A	25	2	A	24	2	A
		Through	455	2	A	591	11	B	400	2	A	408	2	A	406	2	A	403	2	A
		Approach	**476**	**2**	**A**	**608**	**11**	**B**	**428**	**2**	**A**	**434**	**2**	**A**	**432**	**2**	**A**	**427**	**2**	**A**
	East	Left	176	18	C	253	32	C	145	12	B	135	12	B	134	12	B	136	12	B
		Right	84	23	C	28	39	D	70	16	C	74	16	C	74	16	C	70	16	C
		Approach	**259**	**23**	**C**	**281**	**33**	**C**	**215**	**16**	**C**	**209**	**16**	**C**	**208**	**16**	**C**	**207**	**16**	**C**
	West	Through	272	2	A	506	2	A	307	2	A	309	2	A	310	2	A	311	2	A
		Right	302	10	A	135	34	C	207	8	A	211	8	A	211	8	A	204	8	A
		Approach	**574**	**10**	**A**	**640**	**9**	**A**	**514**	**8**	**A**	**520**	**8**	**A**	**521**	**8**	**A**	**516**	**8**	**A**
	Intersection		**1,309**	23	**C**	**1,528**	14	**B**	**1,158**	16	**C**	**1,162**	16	**C**	**1,161**	16	**C**	**1,149**	16	**C**
Percival Street / Victoria Street	North	Left	5	11	B	5	11	B	5	10	A	5	10	A	5	10	A	5	10	A
		Right	26	38	E	53	46	E	41	29	D	40	29	D	40	29	D	40	29	D
		Approach	**31**	**38**	**E**	**57**	**46**	**E**	**46**	**29**	**D**	**45**	**29**	**D**	**45**	**29**	**D**	**46**	**29**	**D**
	South	Through	139	3	A	152	1	A	135	2	A	135	2	A	135	2	A	135	2	A
		Right	683	3	A	760	1	A	616	2	A	623	2	A	624	2	A	618	2	A
		Approach	**822**	**3**	**A**	**912**	**1**	**A**	**750**	**2**	**A**	**758**	**2**	**A**	**759**	**2**	**A**	**753**	**2**	**A**
	East	Left	681	2	A	903	1	A	586	2	A	585	2	A	583	2	A	581	2	A
		Right	0	11	-	0	12	-	0	10	-	0	10	-	0	10	-	0	10	-
		Approach	**681**	**11**	**B**	**903**	**12**	**B**	**586**	**10**	**A**	**585**	**10**	**A**	**583**	**10**	**A**	**581**	**10**	**A**
	Intersection		**1,535**	38	**E**	**1,872**	46	**E**	**1,383**	29	**D**	**1,388**	29	**D**	**1,387**	29	**D**	**1,379**	29	**D**
Percival Street / Johns Road	North	Through	633	2	A	917	1	A	547	2	A	553	2	A	551	2	A	545	2	A
		Right	75	13	B	39	15	B	80	12	B	71	12	B	72	11	B	76	12	B
		Approach	**708**	**13**	**B**	**956**	**15**	**B**	**627**	**12**	**B**	**624**	**12**	**B**	**622**	**11**	**B**	**621**	**12**	**B**
	South	Left	85	2	A	83	1	A	71	2	A	68	2	A	69	2	A	71	2	A
		Through	695	2	A	826	1	A	627	2	A	644	2	A	645	2	A	630	2	A
		Approach	**780**	**2**	**A**	**909**	**1**	**A**	**698**	**2**	**A**	**712**	**2**	**A**	**713**	**2**	**A**	**702**	**2**	**A**
	West	Left	128	14	B	86	13	B	124	12	B	114	13	B	114	12	B	122	12	B
		Right	42	42	E	46	52	F	78	37	E	75	37	E	74	36	E	77	37	E
		Approach	**170**	**42**	**E**	**132**	**52**	**F**	**201**	**37**	**E**	**189**	**37**	**E**	**189**	**36**	**E**	**200**	**37**	**E**
	Intersection		**1,657**	42	**E**	**1,997**	52	**F**	**1,527**	37	**E**	**1,526**	37	**E**	**1,524**	36	**E**	**1,522**	37	**E**
Percival Street / Charles Street	North	Left	110	2	A	112	1	A	124	2	A	121	2	A	120	2	A	123	2	A
		Through	544	2	A	839	1	A	488	2	A	495	2	A	492	2	A	487	2	A
		Right	21	12	B	12	13	B	12	10	A	12	10	A	12	10	A	12	10	A
		Approach	**676**	**12**	**B**	**963**	**13**	**B**	**625**	**10**	**A**	**628**	**10**	**A**	**625**	**10**	**A**	**623**	**10**	**A**
	South	Left	7	2	A	8	1	A	7	2	A	7	2	A	7	2	A	7	2	A
		Through	655	2	A	797	1	A	575	2	A	598	2	A	598	2	A	581	2	A
		Right	0	9	A	0	17	-	0	8	-	0	8	A	0	8	A	0	8	A
		Approach	**663**	**9**	**A**	**805**	**17**	**C**	**582**	**8**	**A**	**605**	**8**	**A**	**606**	**8**	**A**	**588**	**8**	**A**
	East	Left	3	9	A	0	12	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	3	36	E	1	56	F	2	25	C	2	25	C	2	25	C	1	25	C
		Right	85	36	E	75	56	F	76	25	C	68	25	C	68	25	C	73	25	C
		Approach	**91**	**36**	**E**	**76**	**56**	**F**	**77**	**25**	**C**	**70**	**25**	**C**	**70**	**25**	**C**	**74**	**25**	**C**
	West	Left	39	17	C	37	27	D	48	13	B	47	14	B	47	13	B	48	13	B
		Through	33	27	D	22	35	D	4	23	C	3	24	C	3	23	C	3	23	C
		Right	3	26	D	23	34	D	23	21	C	23	22	C	23	21	C	23	21	C
		Approach	**75**	**27**	**D**	**82**	**35**	**D**	**74**	**23**	**C**	**73**	**24**	**C**	**73**	**23**	**C**	**74**	**23**	**C**
	Intersection		**1,505**	36	**E**	**1,927**	56	**F**	**1,359**	25	**C**	**1,376**	25	**C**	**1,374**	25	**C**	**1,359**	25	**C**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	79	-	0	32	-	0	50	-	0	52	-	0	50	-	0	51	-
		Through	552	66	E	855	25	C	508	38	D	517	40	D	515	38	D	509	39	D
		Right	0	77	E	8	25	C	3	46	D	0	49	D	0	45	D	1	47	D
		Approach	**552**	**66**	**E**	**863**	**25**	**C**	**511**	**38**	**D**	**518**	**40**	**D**	**515**	**38**	**D**	**510**	**39**	**D**
	South	Left	25	45	D	25	18	B	24	29	C	25	31	C	25	27	C	25	30	C
		Through	638	44	D	733	16	B	568	28	C	589	30	C	589	26	C	574	29	C
		Right	56	49	D	62	18	B	87	27	C	43	29	C	43	26	C	40	28	C
		Approach	**719**	**44**	**D**	**820**	**16**	**B**	**679**	**28**	**C**	**656**	**30**	**C**	**657**	**26**	**C**	**638**	**29**	**C**
	East	Left	226	47	D	140	35	C	123	35	C	89	34	C	90	33	C	74	32	C
		Through	24	40	D	31	28	C	28	28	C	29	27	C	30	26	C	29	26	C
		Right	8	38	D	56	33	C	0	31	-	0	31	-	0	31	-	0	30	-
		Approach	**258**	**46**	**D**	**226**	**33**	**C**	**151**	**33**	**C**	**119**	**32**	**C**	**119**	**32**	**C**	**103**	**31**	**C**
	West	Left	17	17	B	16	15	B	14	15	B	16	15	B	16	15	B	14	15	B
		Through	77	17	B	99	15	B	106	14	B	82	14	B	83	14	B	83	14	B
		Right	423	29	C	380	21	C	357	20	B	379	21	C	382	20	B	378	20	B
		Approach	**517**	**27**	**C**	**496**	**20**	**B**	**478**	**19**	**B**	**477**	**19**	**B**	**481**	**19**	**B**	**476**	**19**	**B**
	Intersection		**2,045**	46	**D**	**2,405**	22	**C**	**1,819**	29	**C**	**1,770**	30	**C**	**1,772**	28	**C**	**1,728**	29	**C**
Southbrook Road / Torlesse Street	North	Left	1	4	A	29	3	A	5	3	A	59	3	A	54	3	A	21	3	A
		Through	1,097	6	A	1,268	5	A	898	5	A	855	5	A	860	5	A	885	5	A
		Right	0	6	A	0	9	-	0	5	-	0	5	A	0	4	A	0	4	A
		Approach	**1,098**	**6**	**A**	**1,297**	**5**	**A**	**903**	**5**	**A**	**914**	**5**	**A**	**914**	**5**	**A**	**906**	**5**	**A**
	South	Left	13	3	A	13	2	A	13	3	A	13	3	A	13	3	A	13	3	A
		Through	673	4	A	771	1	A	630	4	A	615	4	A	616	4	A	599	4	A
		Right	18	16	B	44	8	A	20	10	A	20	10	A	20	10	A	20	10	A
		Approach	**704**	**4**	**A**	**828**	**2**	**A**	**663**	**4**	**A**	**648**	**4**	**A**	**649**	**4**	**A**	**631**	**4**	**A**
	East	Left	9	64	E	3	61	E	3	61	E	0	61	E	0	60	E	1	59	E
		Through	1	64	E	1	61	E	0	61	E	1	61	E	1	60	E	1	59	E
		Right	28	52	D	11	49	D	7	49	D	5	49	D	6	50	D	0	48	D
		Approach	**38**	**55**	**D**	**16**	**53**	**D**	**11**	**53**	**D**	**6**	**52**	**D**	**7**	**51**	**D**	**2**	**56**	**E**
	West	Left	0	9	A	0	8	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	6	40	D	5	39	D	2	39	D	4	39	D	4	39	D	4	39	D
		Right	27	40	D	24	39	D	25	39	D	24	39	D	24	39	D	24	39	D
		Approach	**33**	**40**	**D**	**29**	**39**	**D**	**27**	**39**	**D**	**28**	**39**	**D**	**28**	**39**	**D**	**28**	**39**	**D**
	Intersection		**1,873**	7	**A**	**2,170**	5	**A**	**1,603**	6	**A**	**1,596**	5	**A**	**1,599**	5	**A**	**1,567**	5	**A**
Southbrook Road / Pak 'n Save supermarket	North	Left	62	4	A	63	2	A	70	3	A	53	3	A	53	3	A	51	3	A
		Through	979	5	A	1,140	4	A	763	3	A	735	3	A	740	3	A	768	3	A
		Right	91	8	A	93	5	A	93	7	A	91	7	A	91	7	A	90	7	A
		Approach	**1,133**	**5**	**A**	**1,295**	**4**	**A**	**926**	**4**	**A**	**880**	**4**	**A**	**884**	**4**	**A**	**909**	**3**	**A**
	South	Left	64	5	A	63	3	A	63	4	A	64	4	A	64	4	A	66	4	A
		Through	663	6	A	786	3	A	617	6	A	609	6	A	610	6	A	597	6	A
		Right	26	17	B	35	4	A	44	10	A	17	10	A	17	10	A	17	8	A
		Approach	**754**	**6**	**A**	**885**	**3**	**A**	**724**	**6**	**A**	**690**	**6**	**A**	**691**	**6**	**A**	**680**	**6**	**A**
	East	Left	17	44	D	16	44	D	15	44	D	19	44	D	19	44	D	19	45	D
		Through	1	44	D	1	44	D	1	44	D	1	44	D	1	44	D	1	45	D
		Right	16	40	D	16	40	D	17	40	D	13	40	D	13	40	D	13	40	D
		Approach	**33**	**42**	**D**	**33**	**42**	**D**	**33**	**42**	**D**	**33**	**42**	**D**	**33**	**42**	**D**	**33**	**43**	**D**
	West	Left	25	9	A	26	8	A	28	8	A	25	8	A	25	8	A	21	8	A
		Through	1	36	D	1	35	C	1	35	C	1	35	C	1	35	C	1	36	D
		Right	26	36	D	25	35	C	22	36	D	26	36	D	26	36	D	30	36	D
		Approach	**52**	**23**	**C**	**52**	**22**	**C**	**52**	**21**	**C**	**52**	**22**	**C**	**52**	**22**	**C**	**52**	**25**	**C**
	Intersection		**1,972**	7	**A**	**2,265**	5	**A**	**1,735**	6	**A**	**1,655**	6	**A**	**1,660**	6	**A**	**1,674**	6	**A**

AM 2028 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	8	4	A	7	11	B	0	3	A	10	3	A	10	3	A	15	3	A
		Through	1,049	4	A	1,164	11	B	792	3	A	764	3	A	769	3	A	797	3	A
		Right	4	11	B	10	16	B	9	10	A	6	10	A	5	10	A	6	9	A
		Approach	**1,061**	**11**	**B**	**1,181**	**11**	**B**	**801**	**10**	**A**	**780**	**10**	**A**	**784**	**10**	**A**	**817**	**9**	**A**
	South	Left	9	2	A	9	5	A	6	2	A	14	2	A	14	2	A	14	2	A
		Through	748	2	A	876	5	A	710	2	A	678	2	A	679	2	A	668	2	A
		Right	14	23	C	9	13	B	1	13	B	34	14	B	34	14	B	37	14	B
		Approach	**771**	**23**	**C**	**894**	**5**	**A**	**717**	**13**	**B**	**726**	**14**	**B**	**727**	**14**	**B**	**719**	**14**	**B**
	West	Left	6	65	F	9	42	D	14	13	B	12	23	C	12	21	C	12	20	C
		Through	25	79	F	30	42	D	1	39	E	27	43	E	27	40	E	25	41	E
		Right	3	79	F	4	42	D	8	41	E	3	46	E	3	43	E	3	44	E
		Approach	**34**	**79**	**F**	**43**	**42**	**D**	**23**	**41**	**E**	**42**	**46**	**E**	**42**	**43**	**E**	**40**	**44**	**E**
	Intersection		**1,866**	**79**	**F**	**2,118**	**9**	**A**	**1,540**	**41**	**E**	**1,548**	**46**	**E**	**1,554**	**43**	**E**	**1,577**	**44**	**E**
Lineside Road / Flaxton Road	North	Through	825	4	A	893	4	A	592	3	A	555	3	A	560	3	A	585	3	A
		Right	226	10	A	275	14	B	208	9	A	212	9	A	212	9	A	215	9	A
		Approach	**1,051**	**10**	**A**	**1,168**	**7**	**A**	**800**	**9**	**A**	**767**	**9**	**A**	**772**	**9**	**A**	**800**	**9**	**A**
	South	Left	41	2	A	36	5	A	88	2	A	95	2	A	95	2	A	93	2	A
		Through	504	2	A	625	6	A	449	2	A	441	2	A	442	2	A	439	2	A
		Approach	**545**	**2**	**A**	**661**	**6**	**A**	**537**	**2**	**A**	**536**	**2**	**A**	**537**	**2**	**A**	**532**	**2**	**A**
	West	Left	267	11	B	269	44	D	268	10	A	285	10	A	285	10	A	280	10	A
		Right	2	38	E	3	41	D	9	24	C	2	24	C	2	22	C	2	23	C
		Approach	**270**	**38**	**E**	**271**	**44**	**D**	**276**	**24**	**C**	**287**	**24**	**C**	**287**	**22**	**C**	**282**	**23**	**C**
	Intersection		**1,866**	**38**	**E**	**2,101**	**11**	**B**	**1,614**	**24**	**C**	**1,590**	**24**	**C**	**1,596**	**22**	**C**	**1,615**	**23**	**C**
Coldstream Road / REL	South	Left	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Right	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**	**0**	**0**	**-**
	East	Left	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Through	188	0	A	136	0	A	176	0	A	168	0	A	167	0	A	170	0	A
		Approach	**188**	**0**	**A**	**136**	**0**	**A**	**176**	**0**	**A**	**168**	**0**	**A**	**167**	**0**	**A**	**170**	**0**	**A**
	West	Through	177	0	A	167	0	A	252	0	A	249	0	A	244	0	A	253	0	A
		Right	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-
		Approach	**177**	**0**	**A**	**167**	**0**	**A**	**252**	**0**	**A**	**249**	**0**	**A**	**244**	**0**	**A**	**253**	**0**	**A**
	Intersection		**366**	**0**	**A**	**303**	**0**	**A**	**428**	**0**	**A**	**417**	**0**	**A**	**411**	**0**	**A**	**423**	**0**	**A**
Kippenberger Ave / MacPhail Ave	North	Left	7	8	A	5	8	A	3	9	A	3	9	A	3	9	A	3	9	A
		Through	48	11	B	43	11	B	128	11	B	127	11	B	125	11	B	128	11	B
		Right	88	13	B	91	13	B	70	14	B	73	14	B	71	14	B	72	14	B
		Approach	**143**	**12**	**B**	**140**	**12**	**B**	**202**	**12**	**B**	**203**	**12**	**B**	**199**	**12**	**B**	**202**	**12**	**B**
	South	Left	12	8	A	11	8	A	12	8	A	12	8	A	12	8	A	12	8	A
		Through	4	11	B	2	11	B	15	11	B	16	11	B	16	11	B	15	11	B
		Right	54	13	B	50	13	B	60	13	B	52	13	B	52	13	B	62	13	B
		Approach	**70**	**12**	**B**	**63**	**12**	**B**	**87**	**12**	**B**	**80**	**12**	**B**	**80**	**12**	**B**	**88**	**12**	**B**
	East	Left	40	8	A	37	8	A	129	9	A	125	9	A	123	9	A	128	9	A
		Through	263	10	A	275	10	A	290	11	B	289	11	B	291	11	B	287	11	B
		Right	4	13	B	4	13	B	2	14	B	2	14	B	2	14	B	2	14	B
		Approach	**307**	**10**	**A**	**316**	**10**	**A**	**421**	**10**	**A**	**416**	**10**	**A**	**416**	**10**	**A**	**417**	**10**	**A**
	West	Left	0	7	-	0	7	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	254	10	A	261	10	A	275	10	A	279	10	A	279	10	A	274	10	A
		Right	7	12	B	7	12	B	7	13	B	7	13	B	7	13	B	7	13	B
		Approach	**261**	**10**	**A**	**268**	**10**	**A**	**282**	**10**	**A**	**286**	**10**	**A**	**286**	**10**	**A**	**281**	**10**	**A**
	Intersection		**781**	**11**	**B**	**787**	**11**	**B**	**992**	**11**	**B**	**985**	**11**	**B**	**982**	**11**	**B**	**989**	**11**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	1	5	A	0	5	A	0	8	A	0	8	A	0	8	A	0	8	A
		Through	0	0	-	0	0	-	253	11	B	249	10	A	246	11	B	251	11	B
		Right	90	6	A	84	5	A	31	13	B	28	13	B	28	13	B	31	13	B
		Approach	**91**	**6**	**A**	**85**	**5**	**A**	**284**	**11**	**B**	**277**	**11**	**B**	**274**	**11**	**B**	**282**	**11**	**B**
	South	Left	0	0	-	0	0	-	150	7	A	135	7	A	135	7	A	150	7	A
		Through	0	0	-	0	0	-	51	10	A	38	10	A	38	10	A	52	10	A
		Right	0	0	-	0	0	-	0	12	B	0	12	-	0	12	-	0	12	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**201**	**8**	**A**	**174**	**8**	**A**	**173**	**8**	**A**	**203**	**8**	**A**
	East	Left	0	0	-	0	0	-	2	9	A	0	8	A	0	8	A	2	9	A
		Through	58	1	A	35	1	A	44	11	B	39	11	B	39	11	B	40	11	B
		Right	0	5	A	0	5	A	0	14	-	0	13	-	0	13	-	0	14	-
		Approach	**58**	**5**	**A**	**35**	**5**	**A**	**46**	**11**	**B**	**39**	**11**	**B**	**39**	**11**	**B**	**41**	**11**	**B**
	West	Left	50	1	A	49	1	A	29	7	A	34	7	A	34	7	A	29	7	A
		Through	88	1	A	51	1	A	43	10	A	37	10	A	37	10	A	42	10	A
		Right	0	0	-	0	0	-	147	12	B	136	12	B	136	12	B	145	12	B
		Approach	**138**	**1**	**A**	**99**	**1**	**A**	**219**	**11**	**B**	**207**	**11**	**B**	**207**	**11**	**B**	**216**	**11**	**B**
	Intersection		**287**	**6**	**A**	**219**	**5**	**A**	**750**	**10**	**A**	**697**	**10**	**A**	**693**	**10**	**A**	**743**	**10**	**A**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	0	0	-	0	0	-	374	11	B	374	10	A	371	10	A	395	10	A
		Right	0	11	-	0	11	-	30	13	B	0	13	-	0	13	-	0	13	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**404**	**11**	**B**	**374**	**10**	**A**	**371**	**10**	**A**	**395**	**10**	**A**
	South	Left	0	0	-	0	0	-	2	7	A	0	7	-	0	7	-	0	7	A
		Through	0	0	-	0	0	-	112	10	A	111	10	A	111	10	A	136	10	A
		Right	0	0	-	0	0	-	0	12	B	13	12	B	13	12	B	20	12	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**115**	**10**	**A**	**124**	**10**	**A**	**124**	**10**	**A**	**156**	**10**	**A**
	East	Left	0	0	-	0	0	-	21	9	A	30	8	A	30	8	A	34	8	A
		Through	38	8	A	63	8	A	58	11	B	36	11	B	36	11	B	32	11	B
		Right	0	11	-	0	11	-	0	14	-	0	13	-	0	13	-	0	13	-
		Approach	**38**	**11**	**B**	**63**	**11**	**B**	**78**	**10**	**A**	**66**	**10**	**A**	**66**	**10**	**A**	**67**	**10**	**A**
	West	Left	0	8	-	0	8	-	38	8	A	0	7	-	0	7	-	16	8	A
		Through	60	11	B	83	11	B	121	10	A	81	10	A	81	10	A	80	10	A
		Right	0	0	-	0	0	-	9	13	B	0	12	-	0	12	-	0	13	-
		Approach	**60**	**11**	**B**	**83**	**11**	**B**	**169**	**10**	**A**	**81**	**10**	**A**	**81**	**10**	**A**	**96**	**10**	**A**
	Intersection		**98**	**11**	**B**	**146**	**11**	**B**	**767**	**10**	**A**	**645**	**10**	**A**	**642**	**10**	**A**	**714**	**10**	**A**
Lineside Road / REL	North	Through	0	0	-	0	0	-	327	11	B	384	11	B	377	11	B	353	11	B
		Right	0	0	-	0	0	-	96	16	B	0	16	-	0	16	-	0	16	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**422**	**12**	**B**	**384**	**11**	**B**	**377**	**11**	**B**	**353**	**11**	**B**
	South	Left	533	0	A	619	0	A	462	11	B	420	11	B	421	11	B	416	11	B
		Through	0	0	-	0	0	-	119	16	B	146	16	B	146	16	B	166	16	B
		Approach	**533**	**0**	**A**	**619**	**0**	**A**	**582**	**12**	**B**	**566**	**12**	**B**	**566**	**12**	**B**	**582**	**12**	**B**
	West	Left	0	0	-	0	0	-	16	10	A	0	10	-	0	10	-	0	10	-
		Right	858	0	A	926	0	A	617	16	B	557	15	B	562	15	B	587	16	B
		Approach	**858**	**0**	**A**	**926**	**0**	**A**	**632**	**15**	**B**	**557**	**15**	**B**	**562**	**15**	**B**	**587**	**16**	**B**
	Intersection		**1,391**	**0**	**A**	**1,545**	**0**	**A**	**1,636**	**13**	**B**	**1,507**	**13**	**B**	**1,506**	**13**	**B**	**1,522**	**13**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	0	2	-	0	1	-	0	2	-	0	2	-
		Through	0	0	-	0	0	-	382	2	A	315	1	A	312	2	A	322	2	A
		Right	0	0	-	0	0	-	23	5	A	90	5	A	90	5	A	108	5	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**404**	**5**	**A**	**405**	**5**	**A**	**401**	**5**	**A**	**430**	**5**	**A**
	South	Left	0	0	-	0	0	-	16	1	A	58	1	A	58	1	A	58	1	A
		Through	0	0	-	0	0	-	109	1	A	88	1	A	88	1	A	109	1	A
		Right	0	0	-	0	0	-	10	6	A	0	6	-	0	6	-	0	6	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**135**	**6**	**A**	**146**	**6**	**A**	**146**	**6**	**A**	**166**	**6**	**A**
	East	Left	0	0	-	0	0	-	34	7	A	0	6	-	0	7	-	0	7	A
		Through	84	0	A	73	0	A	4	8	A	62	8	A	62	8	A	62	9	A
		Right	0	0	-	0	0	-	0	8	-	0	8	-	0	8	-	0	9	-
		Approach	**84**	**0**	**A**	**73**	**0**	**A**	**38**	**8**	**A**	**62**	**8**	**A**	**62**	**8**	**A**	**62**	**9**	**A**
	West	Left	0	0	-	0	0	-	5	5	A	36	5	A	36	5	A	48	5	A
		Through	53	0	A	55	0	A	0	8	A	48	8	A	47	8	A	43	8	A
		Right	0	0	-	0	0	-	6	9	A	69	8	A	65	8	A	31	9	A
		Approach	**53**	**0**	**A**	**55**	**0**	**A**	**12**	**9**	**A**	**153**	**8**	**A**	**149**	**8**	**A**	**122**	**9**	**A**
	Intersection		**137**	**0**	**A**	**128**	**0**	**A**	**590**	**9**	**A**	**766**	**8**	**A**	**758**	**8**	**A**	**780**	**9**	**A**

PM 2038 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	231	2	A	217	2	A	309	2	A	290	2	A	293	2	A	307	2	A
		Through	200	2	A	238	2	A	166	2	A	169	2	A	168	2	A	166	2	A
		Approach	**431**	**2**	**A**	**455**	**2**	**A**	**475**	**2**	**A**	**459**	**2**	**A**	**462**	**2**	**A**	**473**	**2**	**A**
	South	Right	82	7	A	82	7	A	83	7	A	82	7	A	82	7	A	82	7	A
		Through	410	2	A	488	2	A	373	2	A	401	2	A	405	2	A	382	2	A
		Approach	**493**	**7**	**A**	**571**	**7**	**A**	**456**	**7**	**A**	**483**	**7**	**A**	**487**	**7**	**A**	**465**	**7**	**A**
	East	Right	346	45	E	307	68	F	411	68	F	390	65	F	397	72	F	407	65	F
		Left	153	6	A	171	6	A	182	6	A	169	6	A	168	6	A	177	6	A
		Approach	**499**	**45**	**E**	**478**	**68**	**F**	**594**	**68**	**F**	**559**	**65**	**F**	**565**	**72**	**F**	**584**	**65**	**F**
	Intersection		**1,422**	**45**	**E**	**1,503**	**68**	**F**	**1,525**	**68**	**F**	**1,501**	**65**	**F**	**1,513**	**72**	**F**	**1,522**	**65**	**F**
Ashley Street / High Street	North	Left	117	31	C	112	38	D	119	30	C	119	30	C	119	30	C	119	30	C
		Through	408	31	C	449	38	D	402	30	C	389	30	C	389	30	C	397	30	C
		Right	42	21	C	41	28	C	41	20	B	41	20	B	41	20	B	41	20	B
		Approach	**567**	**30**	**C**	**601**	**37**	**D**	**563**	**29**	**C**	**550**	**30**	**C**	**550**	**30**	**C**	**558**	**30**	**C**
	South	Left	0	49	-	0	74	-	0	45	-	0	46	-	0	46	-	0	47	-
		Through	500	39	D	573	62	E	473	36	D	497	37	D	498	37	D	488	38	D
		Right	230	27	C	278	37	D	248	28	C	243	27	C	244	28	C	249	28	C
		Approach	**730**	**35**	**C**	**850**	**53**	**D**	**721**	**33**	**C**	**741**	**34**	**C**	**742**	**34**	**C**	**737**	**34**	**C**
	East	Left	87	32	C	82	33	C	81	31	C	81	31	C	80	31	C	81	31	C
		Through	198	30	C	220	31	C	184	29	C	177	29	C	177	29	C	178	29	C
		Right	46	56	E	35	62	E	100	53	D	88	51	D	86	51	D	98	50	D
		Approach	**331**	**35**	**C**	**337**	**35**	**C**	**365**	**36**	**D**	**346**	**35**	**C**	**344**	**35**	**C**	**358**	**35**	**C**
	West	Left	101	45	D	90	56	E	87	35	C	100	35	C	100	35	C	97	35	C
		Through	338	43	D	393	53	D	268	33	C	260	33	C	259	32	C	240	33	C
		Right	9	35	C	10	36	D	2	34	C	6	34	C	5	34	C	0	34	C
		Approach	**448**	**43**	**D**	**493**	**53**	**D**	**357**	**34**	**C**	**366**	**34**	**C**	**364**	**33**	**C**	**338**	**33**	**C**
	Intersection		**2,075**	**36**	**D**	**2,282**	**46**	**D**	**2,006**	**33**	**C**	**2,002**	**33**	**C**	**2,000**	**33**	**C**	**1,990**	**33**	**C**
Ivory Street / Northbrook Road	North	Left	195	3	A	156	19	B	248	2	A	223	2	A	224	2	A	239	2	A
		Through	641	3	A	658	19	B	551	2	A	566	2	A	566	2	A	554	2	A
		Approach	**836**	**3**	**A**	**815**	**19**	**B**	**799**	**2**	**A**	**789**	**2**	**A**	**790**	**2**	**A**	**793**	**2**	**A**
	East	Left	120	90	F	209	48	D	171	55	F	160	54	F	162	54	F	175	49	E
		Right	64	98	F	66	59	E	85	65	F	79	64	F	78	64	F	83	59	F
		Approach	**184**	**98**	**F**	**275**	**51**	**D**	**256**	**65**	**F**	**239**	**64**	**F**	**241**	**64**	**F**	**258**	**59**	**F**
	West	Through	573	3	A	780	4	A	457	2	A	491	2	A	491	2	A	462	2	A
		Right	362	39	E	254	72	E	327	22	C	318	21	C	317	21	C	311	20	C
		Approach	**934**	**39**	**E**	**1,034**	**21**	**C**	**784**	**22**	**C**	**809**	**21**	**C**	**808**	**21**	**C**	**773**	**20**	**C**
	Intersection		**1,955**	**98**	**F**	**2,123**	**24**	**C**	**1,839**	**65**	**F**	**1,837**	**64**	**F**	**1,839**	**64**	**F**	**1,823**	**59**	**F**
Percival Street / Victoria Street	North	Left	46	26	D	44	20	C	68	18	C	61	18	C	61	18	C	73	18	C
		Right	14	107	F	46	108	F	36	84	F	29	83	F	29	83	F	40	84	F
		Approach	**60**	**107**	**F**	**90**	**108**	**F**	**104**	**84**	**F**	**90**	**83**	**F**	**90**	**83**	**F**	**113**	**84**	**F**
	South	Through	63	4	A	188	1	A	90	3	A	90	3	A	90	3	A	94	3	A
		Right	1,037	4	A	1,165	1	A	889	3	A	922	3	A	921	3	A	873	3	A
		Approach	**1,099**	**4**	**A**	**1,353**	**1**	**A**	**979**	**3**	**A**	**1,011**	**3**	**A**	**1,012**	**3**	**A**	**967**	**3**	**A**
	East	Left	768	2	A	854	1	A	724	2	A	731	2	A	731	2	A	727	2	A
		Right	0	20	-	0	25	-	0	15	-	0	15	-	0	15	-	0	14	-
		Approach	**768**	**20**	**C**	**854**	**25**	**C**	**724**	**15**	**B**	**731**	**15**	**B**	**731**	**15**	**B**	**727**	**14**	**B**
	Intersection		**1,927**	**107**	**F**	**2,297**	**108**	**F**	**1,807**	**84**	**F**	**1,833**	**83**	**F**	**1,833**	**83**	**F**	**1,807**	**84**	**F**
Percival Street / Johns Road	North	Through	684	2	A	783	1	A	639	2	A	641	2	A	641	2	A	646	2	A
		Right	98	21	C	117	28	D	121	18	C	119	18	C	119	17	C	121	17	C
		Approach	**782**	**21**	**C**	**900**	**28**	**D**	**760**	**18**	**C**	**760**	**18**	**C**	**760**	**17**	**C**	**766**	**17**	**C**
	South	Left	139	4	A	196	1	A	179	3	A	178	3	A	177	3	A	184	3	A
		Through	897	4	A	1,192	1	A	783	3	A	817	3	A	817	3	A	774	3	A
		Approach	**1,037**	**4**	**A**	**1,388**	**1**	**A**	**962**	**3**	**A**	**995**	**3**	**A**	**994**	**3**	**A**	**958**	**3**	**A**
	West	Left	202	34	D	162	30	D	196	20	C	195	20	C	195	20	C	193	19	C
		Right	32	83	F	39	94	F	42	61	F	38	61	F	40	61	F	43	61	F
		Approach	**234**	**83**	**F**	**201**	**94**	**F**	**238**	**61**	**F**	**233**	**61**	**F**	**234**	**61**	**F**	**236**	**61**	**F**
	Intersection		**2,053**	**83**	**F**	**2,489**	**94**	**F**	**1,960**	**61**	**F**	**1,988**	**61**	**F**	**1,988**	**61**	**F**	**1,960**	**61**	**F**
Percival Street / Charles Street	North	Left	228	2	A	139	1	A	171	2	A	178	2	A	180	2	A	172	2	A
		Through	430	2	A	625	1	A	456	2	A	446	2	A	446	2	A	462	2	A
		Right	58	18	C	58	24	C	54	16	C	54	16	C	54	16	C	54	16	C
		Approach	**716**	**18**	**C**	**822**	**24**	**C**	**681**	**16**	**C**	**679**	**16**	**C**	**681**	**16**	**C**	**689**	**16**	**C**
	South	Left	28	3	A	33	1	A	37	3	A	32	3	A	32	3	A	33	3	A
		Through	926	3	A	1,305	1	A	825	3	A	852	3	A	851	3	A	823	3	A
		Right	1	8	A	103	15	B	0	8	-	0	8	-	0	8	-	0	8	-
		Approach	**954**	**8**	**A**	**1,442**	**15**	**B**	**862**	**8**	**A**	**885**	**8**	**A**	**883**	**8**	**A**	**856**	**8**	**A**
	East	Left	152	8	A	154	11	B	29	8	A	40	8	A	40	8	A	26	8	A
		Through	4	139	F	4	123	F	5	83	F	4	83	F	5	81	F	5	81	F
		Right	101	139	F	81	123	F	110	84	F	107	83	F	107	82	F	107	82	F
		Approach	**258**	**139**	**F**	**238**	**123**	**F**	**145**	**84**	**F**	**151**	**83**	**F**	**152**	**82**	**F**	**138**	**82**	**F**
	West	Left	10	61	F	2	62	F	27	40	E	36	41	E	36	40	E	27	40	E
		Through	50	68	F	45	69	F	54	47	E	53	48	E	52	47	E	53	46	E
		Right	0	67	-	0	69	-	1	46	E	0	46	E	1	46	E	1	45	E
		Approach	**59**	**68**	**F**	**47**	**69**	**F**	**82**	**47**	**E**	**90**	**48**	**E**	**88**	**47**	**E**	**81**	**46**	**E**
	Intersection		**1,987**	**139**	**F**	**2,549**	**123**	**F**	**1,769**	**84**	**F**	**1,804**	**83**	**F**	**1,804**	**82**	**F**	**1,764**	**82**	**F**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	45	-	74	19	B	0	35	-	0	35	-	0	30	-	0	35	-
		Through	564	33	C	691	19	B	479	26	C	482	26	C	482	26	C	484	26	C
		Right	18	52	D	14	42	D	6	44	D	5	45	D	5	44	D	5	45	D
		Approach	**582**	**34**	**C**	**778**	**20**	**B**	**485**	**26**	**C**	**486**	**26**	**C**	**487**	**27**	**C**	**489**	**26**	**C**
	South	Left	31	85	F	40	71	E	141	38	D	173	39	D	176	36	D	167	34	C
		Through	797	85	F	1,257	71	E	772	38	D	775	39	D	772	37	D	771	34	C
		Right	309	99	F	377	118	F	269	38	D	206	38	D	207	35	C	143	31	C
		Approach	**1,137**	**89**	**F**	**1,674**	**82**	**F**	**1,182**	**38**	**D**	**1,153**	**39**	**D**	**1,155**	**36**	**D**	**1,081**	**34**	**C**
	East	Left	124	86	F	140	64	E	114	50	D	74	46	D	74	47	D	79	41	D
		Through	116	86	F	82	64	E	111	50	D	117	46	D	115	47	D	112	41	D
		Right	111	86	F	173	65	E	78	47	D	94	44	D	95	44	D	74	39	D
		Approach	**351**	**86**	**F**	**394**	**64**	**E**	**304**	**49**	**D**	**285**	**45**	**D**	**284**	**46**	**D**	**265**	**40**	**D**
	West	Left	53	24	C	18	21	C	12	19	B	16	19	B	16	19	B	11	19	B
		Through	346	24	C	254	21	C	166	19	B	168	19	B	168	19	B	152	19	B
		Right	283	24	C	324	24	C	242	21	C	262	21	C	262	21	C	246	21	C
		Approach	**683**	**24**	**C**	**597**	**23**	**C**	**419**	**21**	**C**	**447**	**21**	**C**	**447**	**21**	**C**	**410**	**20**	**B**
	Intersection		**2,753**	**61**	**E**	**3,443**	**55**	**D**	**2,391**	**34**	**C**	**2,371**	**34**	**C**	**2,372**	**33**	**C**	**2,244**	**30**	**C**
Southbrook Road / Torlesse Street	North	Left	0	6	-	26	4	A	12	5	A	60	5	A	70	5	A	16	5	A
		Through	879	9	A	1,063	5	A	748	7	A	698	7	A	689	7	A	737	7	A
		Right	0	14	-	0	3	-	0	14	-	0	13	-	0	13	-	0	11	-
		Approach	**879**	**9**	**A**	**1,089**	**5**	**A**	**760**	**7**	**A**	**758**	**7**	**A**	**759**	**7**	**A**	**753**	**7**	**A**
	South	Left	217	10	A	104	3	A	39	7	A	36	7	A	36	7	A	36	6	A
		Through	1,016	13	B	1,547	4	A	1,066	15	B	1,043	13	B	1,045	12	B	975	10	A
		Right	4	10	A	24	4	A	23	8	A	18	8	A	18	8	A	22	7	A
		Approach	**1,237**	**13**	**B**	**1,675**	**4**	**A**	**1,127**	**14**	**B**	**1,097**	**12**	**B**	**1,099**	**12**	**B**	**1,032**	**10**	**A**
	East	Left	23	43	D	38	42	D	14	39	D	14	39	D	15	39	D	14	39	D
		Through	57	43	D	30	42	D	1	39	D	6	39	D	6	39	D	4	39	D
		Right	88	42	D	94	42	D	105	43	D	85	40	D	85	40	D	70	40	D
		Approach	**168**	**43**	**D**	**162**	**42**	**D**	**120**	**42**	**D**	**106**	**40**	**D**	**106**	**40**	**D**	**88**	**40**	**D**
	West	Left	0	20	-	0	23	-	0	24	-	0	22	-	0	22	-	0	19	-
		Through	3	34	C	3	34	C	1	33	C	3	33	C	3	33	C	3	33	C
		Right	18	37	D	18	36	D	19	34	C	18	34	C	18	34	C	18	34	C
		Approach	**21**	**36**	**D**	**21**	**36**	**D**	**20**	**34**	**C**	**21**	**34**	**C**	**21**	**34**	**C**	**21**	**34**	**C**
	Intersection		**2,306**	**14**	**B**	**2,947**	**6**	**A**	**2,027**	**13**	**B**	**1,982**	**12**	**B**	**1,984**	**12**	**B**	**1,895**	**10**	**A**
Southbrook Road / Pak 'n Save supermarket	North	Left	34	11	B	34	9	A	38	9	A	26	9	A	26	9	A	26	9	A
		Through	828	17	B	1,023	12	B	689	14	B	650	14	B	641	14	B	689	14	B
		Right	59	32	C	60	20	B	55	20	B	54	19	B	54	18	B	54	18	B
		Approach	**921**	**18**	**B**	**1,117**	**13**	**B**	**781**	**14**	**B**	**731**	**14**	**B**	**722**	**14**	**B**	**769**	**14**	**B**
	South	Left	41	10	A	41	6	A	46	9	A	46	9	A	46	9	A	46	9	A
		Through	1,043	46	D	1,479	7	A	918	22	C	921	21	C	922	20	B	881	20	B
		Right	0	14	-	11	7	A	0	11	-	1	11	B	1	11	B	6	11	B
		Approach	**1,084**	**44**	**D**	**1,530**	**7**	**A**	**964**	**22**	**C**	**968**	**20**	**B**	**969**	**19**	**B**	**932**	**19**	**B**
	East	Left	69	35	C	69	35	C	63	35	C	94	35	C	93	35	C	90	36	D
		Through	1	35	C	1	35	C	1	35	C	1	35	C	1	35	C	1	36	D
		Right	82	34	C	83	34	C	88	34	C	58	34	C	59	34	C	61	33	C
		Approach	**153**	**34**	**C**	**153**	**34**	**C**	**153**	**34**	**C**	**153**	**34**	**C**	**153**	**34**	**C**	**153**	**35**	**C**
	West	Left	112	24	C	114	21	C	120	21	C	118	19	B	118	19	B	90	18	B
		Through	1	33	C	1	33	C	1	33	C	1	33	C	1	32	C	1	34	C
		Right	89	34	C	87	33	C	81	33	C	83	33	C	83	33	C	111	35	C
		Approach	**202**	**28**	**C**	**202**	**26**	**C**	**202**	**26**	**C**	**202**	**25**	**C**	**202**	**25**	**C**	**202**	**28**	**C**
	Intersection		**2,361**	**32**	**C**	**3,002**	**12**	**B**	**2,100**	**20**	**B**	**2,054**	**20**	**B**	**2,046**	**19**	**B**	**2,057**	**19**	**B**

PM 2038 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	32	4	A	32	3	A	1	3	A	57	3	A	56	3	A	96	3	A
		Through	912	4	A	1,089	3	A	792	3	A	737	3	A	728	3	A	774	3	A
		Right	43	27	D	58	22	C	40	19	C	34	17	C	33	16	C	20	16	C
		Approach	**986**	**27**	**D**	**1,179**	**4**	**A**	**833**	**19**	**C**	**827**	**17**	**C**	**817**	**16**	**C**	**891**	**16**	**C**
	South	Left	16	5	A	3	4	A	27	4	A	22	4	A	22	4	A	22	4	A
		Through	1,082	5	A	1,525	4	A	961	4	A	965	4	A	965	4	A	929	4	A
		Right	68	18	C	46	15	B	34	12	B	106	14	B	106	14	B	131	14	B
		Approach	**1,166**	**18**	**C**	**1,574**	**4**	**A**	**1,022**	**12**	**B**	**1,093**	**14**	**B**	**1,094**	**14**	**B**	**1,082**	**14**	**B**
	West	Left	2	138	F	4	46	D	2	88	F	3	100	F	3	92	F	4	104	F
		Through	9	148	F	19	46	D	2	97	F	11	112	F	11	104	F	12	118	F
		Right	11	148	F	36	46	D	25	97	F	18	112	F	18	104	F	16	117	F
		Approach	**22**	**148**	**F**	**59**	**46**	**D**	**29**	**97**	**F**	**32**	**112**	**F**	**32**	**104**	**F**	**32**	**118**	**F**
	Intersection		**2,174**	**148**	**F**	**2,813**	**5**	**A**	**1,884**	**97**	**F**	**1,952**	**112**	**F**	**1,943**	**104**	**F**	**2,004**	**118**	**F**
Lineside Road / Flaxton Road	North	Through	720	3	A	798	4	A	556	3	A	510	3	A	501	3	A	540	2	A
		Right	203	53	F	328	19	B	261	16	C	245	17	C	245	17	C	249	17	C
		Approach	**923**	**53**	**F**	**1,125**	**8**	**A**	**816**	**16**	**C**	**755**	**17**	**C**	**746**	**17**	**C**	**790**	**17**	**C**
	South	Left	23	2	A	18	13	B	82	2	A	84	2	A	84	2	A	88	2	A
		Through	971	2	A	1,044	18	B	647	2	A	723	2	A	726	2	A	677	2	A
		Approach	**994**	**2**	**A**	**1,062**	**18**	**B**	**729**	**2**	**A**	**807**	**2**	**A**	**810**	**2**	**A**	**765**	**2**	**A**
	West	Left	194	83	F	528	33	C	373	32	D	370	61	F	372	55	F	405	72	F
		Right	15	95	F	13	42	D	94	84	F	83	66	F	82	58	F	86	77	F
		Approach	**209**	**95**	**F**	**541**	**33**	**C**	**467**	**84**	**F**	**453**	**66**	**F**	**455**	**58**	**F**	**491**	**77**	**F**
	Intersection		**2,125**	**95**	**F**	**2,728**	**17**	**B**	**2,013**	**84**	**F**	**2,015**	**66**	**F**	**2,011**	**58**	**F**	**2,046**	**77**	**F**
Coldstream Road / REL	South	Left	116	7	A	113	7	A	117	8	A	128	8	A	129	8	A	119	8	A
		Right	6	10	A	6	10	A	7	13	B	7	12	B	7	13	B	7	12	B
		Approach	**122**	**10**	**A**	**119**	**10**	**A**	**124**	**13**	**B**	**135**	**12**	**B**	**136**	**13**	**B**	**126**	**12**	**B**
	East	Left	6	3	A	6	3	A	8	3	A	8	3	A	8	3	A	8	3	A
		Through	393	3	A	370	3	A	488	3	A	441	3	A	446	3	A	475	3	A
		Approach	**399**	**3**	**A**	**376**	**3**	**A**	**495**	**3**	**A**	**448**	**3**	**A**	**454**	**3**	**A**	**483**	**3**	**A**
	West	Through	266	2	A	251	2	A	306	3	A	305	3	A	308	3	A	310	3	A
		Right	53	6	A	53	6	A	90	7	A	73	7	A	73	7	A	85	7	A
		Approach	**319**	**6**	**A**	**305**	**6**	**A**	**397**	**7**	**A**	**377**	**7**	**A**	**381**	**7**	**A**	**395**	**7**	**A**
	Intersection		**840**	**10**	**A**	**800**	**10**	**A**	**1,015**	**13**	**B**	**961**	**12**	**B**	**970**	**13**	**B**	**1,003**	**12**	**B**
Kippenberger Ave / MacPhail Ave	North	Left	27	13	B	34	12	B	19	15	B	22	14	B	21	15	B	19	15	B
		Through	101	15	B	111	15	B	167	18	B	138	17	B	138	18	B	162	18	B
		Right	123	18	B	97	17	B	106	20	B	111	19	B	114	20	B	107	20	B
		Approach	**251**	**16**	**B**	**242**	**16**	**B**	**292**	**19**	**B**	**270**	**18**	**B**	**272**	**18**	**B**	**288**	**18**	**B**
	South	Left	34	11	B	45	10	A	25	12	B	20	12	B	20	12	B	30	12	B
		Through	151	14	B	113	12	B	203	14	B	178	14	B	178	14	B	199	14	B
		Right	74	16	B	46	15	B	78	17	B	76	17	B	76	17	B	77	17	B
		Approach	**258**	**14**	**B**	**205**	**12**	**B**	**306**	**15**	**B**	**274**	**15**	**B**	**274**	**15**	**B**	**306**	**15**	**B**
	East	Left	19	9	A	30	9	A	35	10	A	23	10	A	22	10	A	35	10	A
		Through	428	12	B	382	11	B	438	13	B	435	12	B	432	13	B	435	13	B
		Right	45	14	B	46	14	B	42	15	B	60	15	B	60	15	B	46	15	B
		Approach	**492**	**12**	**B**	**459**	**12**	**B**	**515**	**13**	**B**	**518**	**13**	**B**	**514**	**13**	**B**	**516**	**13**	**B**
	West	Left	105	11	B	113	11	B	105	13	B	107	13	B	107	13	B	107	13	B
		Through	575	14	B	589	13	B	579	16	B	574	16	B	574	16	B	574	16	B
		Right	31	16	B	33	16	B	77	18	B	79	18	B	80	18	B	82	18	B
		Approach	**712**	**13**	**B**	**736**	**13**	**B**	**761**	**16**	**B**	**760**	**16**	**B**	**761**	**16**	**B**	**763**	**16**	**B**
	Intersection		**1,712**	**13**	**B**	**1,641**	**13**	**B**	**1,874**	**15**	**B**	**1,823**	**15**	**B**	**1,822**	**15**	**B**	**1,873**	**15**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	50	7	A	52	6	A	0	11	B	0	10	A	0	10	A	0	10	A
		Through	0	0	-	0	0	-	302	13	B	218	12	B	220	13	B	301	13	B
		Right	65	11	B	87	12	B	28	16	B	39	15	B	39	15	B	28	15	B
		Approach	**115**	**11**	**B**	**139**	**12**	**B**	**330**	**13**	**B**	**257**	**13**	**B**	**259**	**13**	**B**	**330**	**13**	**B**
	South	Left	0	0	-	0	0	-	271	9	A	277	9	A	277	9	A	275	9	A
		Through	0	0	-	0	0	-	221	12	B	143	11	B	144	12	B	223	12	B
		Right	0	0	-	0	0	-	55	14	B	1	14	B	1	14	B	50	14	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**546**	**11**	**B**	**421**	**10**	**A**	**422**	**10**	**A**	**548**	**11**	**B**
	East	Left	0	0	-	0	0	-	33	11	B	1	10	A	1	11	B	33	11	B
		Through	295	2	A	316	2	A	176	13	B	144	13	B	144	13	B	182	13	B
		Right	55	7	A	52	6	A	0	16	-	0	15	-	0	16	-	0	16	-
		Approach	**350**	**7**	**A**	**368**	**6**	**A**	**209**	**13**	**B**	**145**	**13**	**B**	**144**	**13**	**B**	**214**	**13**	**B**
	West	Left	155	2	A	93	2	A	58	9	A	55	9	A	54	9	A	57	9	A
		Through	375	2	A	365	2	A	166	12	B	165	12	B	166	12	B	168	12	B
		Right	0	0	-	0	0	-	278	14	B	202	14	B	201	14	B	273	14	B
		Approach	**530**	**2**	**A**	**458**	**2**	**A**	**502**	**13**	**B**	**422**	**12**	**B**	**421**	**13**	**B**	**498**	**13**	**B**
	Intersection		**996**	**11**	**B**	**965**	**12**	**B**	**1,588**	**12**	**B**	**1,246**	**12**	**B**	**1,246**	**12**	**B**	**1,590**	**12**	**B**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	8	-	0	8	-	0	8	-	0	8	-
		Through	0	0	-	0	0	-	340	11	B	258	10	A	258	10	A	353	11	B
		Right	0	11	-	0	11	-	78	13	B	39	13	B	39	13	B	62	13	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**418**	**11**	**B**	**297**	**11**	**B**	**297**	**11**	**B**	**414**	**11**	**B**
	South	Left	0	0	-	0	0	-	25	9	A	0	9	-	0	9	-	0	10	-
		Through	0	0	-	0	0	-	522	12	B	475	12	B	474	12	B	633	12	B
		Right	0	0	-	0	0	-	23	14	B	37	14	B	37	14	B	60	15	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**570**	**12**	**B**	**512**	**12**	**B**	**511**	**12**	**B**	**693**	**12**	**B**
	East	Left	0	0	-	0	0	-	20	9	A	30	8	A	29	9	A	34	9	A
		Through	91	8	A	98	8	A	118	11	B	98	11	B	98	11	B	94	11	B
		Right	0	11	-	0	11	-	0	14	-	0	13	-	0	14	-	0	14	-
		Approach	**91**	**11**	**B**	**98**	**11**	**B**	**137**	**11**	**B**	**128**	**10**	**A**	**127**	**11**	**B**	**129**	**11**	**B**
	West	Left	0	8	-	0	8	-	181	11	B	7	10	A	6	11	B	70	12	B
		Through	122	11	B	112	11	B	102	13	B	68	13	B	68	13	B	54	14	B
		Right	0	0	-	0	0	-	4	16	B	0	15	-	0	16	-	0	17	-
		Approach	**122**	**11**	**B**	**112**	**11**	**B**	**287**	**12**	**B**	**74**	**13**	**B**	**74**	**13**	**B**	**124**	**13**	**B**
	Intersection		**213**	**11**	**B**	**210**	**11**	**B**	**1,413**	**11**	**B**	**1,011**	**11**	**B**	**1,009**	**11**	**B**	**1,361**	**12**	**B**
Lineside Road / REL	North	Through	0	0	-	0	0	-	270	11	B	303	11	B	312	10	A	294	11	B
		Right	0	0	-	0	0	-	121	16	B	0	16	-	0	16	-	0	16	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**391**	**12**	**B**	**303**	**11**	**B**	**312**	**10**	**A**	**294**	**11**	**B**
	South	Left	1,040	0	A	1,105	0	A	651	21	C	695	17	B	699	17	B	650	18	B
		Through	0	0	-	0	0	-	524	26	C	436	23	C	435	23	C	498	23	C
		Approach	**1,040**	**0**	**A**	**1,105**	**0**	**A**	**1,175**	**23**	**C**	**1,131**	**20**	**B**	**1,133**	**19**	**B**	**1,148**	**20**	**B**
	West	Left	0	0	-	0	0	-	108	11	B	0	11	-	0	11	-	0	11	-
		Right	775	0	A	852	0	A	587	16	B	521	16	B	512	16	B	552	16	B
		Approach	**775**	**0**	**A**	**852**	**0**	**A**	**695**	**15**	**B**	**521**	**16**	**B**	**512**	**16**	**B**	**552**	**16**	**B**
	Intersection		**1,815**	**0**	**A**	**1,958**	**0**	**A**	**2,260**	**19**	**B**	**1,955**	**17**	**B**	**1,957**	**17**	**B**	**1,994**	**18**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	0	1	-	0	1	-	0	1	-	0	1	-
		Through	0	0	-	0	0	-	329	1	A	218	1	A	218	1	A	252	1	A
		Right	0	0	-	0	0	-	12	7	A	101	6	A	101	7	A	114	7	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**341**	**7**	**A**	**319**	**6**	**A**	**318**	**7**	**A**	**366**	**7**	**A**
	South	Left	0	0	-	0	0	-	12	2	A	65	2	A	65	2	A	62	2	A
		Through	0	0	-	0	0	-	571	2	A	370	2	A	370	2	A	437	2	A
		Right	0	0	-	0	0	-	49	6	A	0	5	-	0	5	-	0	5	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**632**	**6**	**A**	**436**	**5**	**A**	**435**	**5**	**A**	**498**	**5**	**A**
	East	Left	0	0	-	0	0	-	38	6	A	0	6	-	0	6	-	0	6	-
		Through	89	0	A	78	0	A	2	14	B	64	10	A	64	11	B	60	13	B
		Right	0	0	-	0	0	-	2	14	B	1	12	B	2	13	B	2	14	B
		Approach	**89**	**0**	**A**	**78**	**0**	**A**	**43**	**14**	**B**	**65**	**12**	**B**	**66**	**13**	**B**	**62**	**14**	**B**
	West	Left	0	0	-	0	0	-	26	8	A	193	10	A	193	11	B	298	12	B
		Through	112	0	A	122	0	A	4	14	B	98	12	B	98	14	B	75	15	B
		Right	0	0	-	0	0	-	23	15	B	85	10	A	95	11	B	42	13	B
		Approach	**112**	**0**	**A**	**122**	**0**	**A**	**53**	**15**	**B**	**377**	**12**	**B**	**386**	**14**	**B**	**415**	**15**	**B**
	Intersection		**201**	**0**	**A**	**200**	**0**	**A**	**1,070**	**15**	**B**	**1,197**	**12**	**B**	**1,205**	**14**	**B**	**1,341**	**15**	**B**

AM 2038 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	259	2	A	260	2	A	442	2	A	372	2	A	369	2	A	447	2	A
		Through	279	2	A	367	2	A	220	2	A	244	2	A	245	2	A	223	2	A
		Approach	**538**	**2**	**A**	**628**	**2**	**A**	**662**	**2**	**A**	**616**	**2**	**A**	**614**	**2**	**A**	**669**	**2**	**A**
	South	Right	60	8	A	50	9	A	48	9	A	47	9	A	47	9	A	48	9	A
		Through	215	1	A	235	1	A	208	1	A	214	1	A	214	1	A	214	1	A
		Approach	**275**	**8**	**A**	**286**	**9**	**A**	**256**	**9**	**A**	**262**	**9**	**A**	**261**	**9**	**A**	**261**	**9**	**A**
	East	Right	188	13	B	168	15	B	195	11	B	189	12	B	189	11	B	189	11	B
		Left	56	6	A	52	7	A	56	6	A	55	6	A	55	6	A	56	6	A
		Approach	**244**	**13**	**B**	**220**	**15**	**B**	**251**	**11**	**B**	**244**	**12**	**B**	**244**	**11**	**B**	**245**	**11**	**B**
	Intersection		**1,058**	**13**	**B**	**1,133**	**15**	**B**	**1,169**	**11**	**B**	**1,122**	**12**	**B**	**1,120**	**11**	**B**	**1,176**	**11**	**B**
Ashley Street / High Street	North	Left	17	26	C	22	32	C	26	27	C	26	28	C	26	27	C	26	27	C
		Through	401	26	C	512	32	C	356	27	C	376	28	C	378	27	C	357	27	C
		Right	65	18	B	39	21	C	64	19	B	56	19	B	58	19	B	64	19	B
		Approach	**483**	**25**	**C**	**574**	**31**	**C**	**446**	**26**	**C**	**458**	**27**	**C**	**462**	**26**	**C**	**447**	**26**	**C**
	South	Left	0	29	-	0	30	-	0	28	-	0	27	-	0	27	-	0	28	-
		Through	314	24	C	341	25	C	285	24	C	300	24	C	300	23	C	296	24	C
		Right	159	21	C	205	36	D	135	19	B	137	19	B	138	19	B	135	19	B
		Approach	**473**	**23**	**C**	**546**	**30**	**C**	**420**	**22**	**C**	**437**	**22**	**C**	**438**	**22**	**C**	**431**	**22**	**C**
	East	Left	140	37	D	134	36	D	121	35	C	121	35	C	121	35	C	121	35	C
		Through	96	34	C	96	34	C	80	32	C	80	32	C	80	32	C	80	32	C
		Right	107	33	C	115	34	C	108	33	C	112	33	C	110	33	C	106	33	C
		Approach	**343**	**35**	**C**	**345**	**35**	**C**	**309**	**33**	**C**	**313**	**33**	**C**	**312**	**33**	**C**	**306**	**33**	**C**
	West	Left	0	27	-	0	28	-	0	27	C	0	27	C	0	27	C	0	27	C
		Through	172	24	C	223	25	C	170	24	C	172	24	C	171	24	C	170	24	C
		Right	0	39	-	0	39	-	0	36	-	0	36	-	0	36	-	0	36	-
		Approach	**172**	**24**	**C**	**223**	**25**	**C**	**170**	**24**	**C**	**172**	**24**	**C**	**171**	**24**	**C**	**170**	**24**	**C**
	Intersection		**1,472**	**27**	**C**	**1,688**	**30**	**C**	**1,345**	**26**	**C**	**1,380**	**26**	**C**	**1,382**	**26**	**C**	**1,355**	**26**	**C**
Ivory Street / Northbrook Road	North	Left	129	2	A	41	20	B	80	2	A	77	2	A	77	2	A	80	2	A
		Through	495	2	A	630	20	B	349	2	A	406	2	A	407	2	A	348	2	A
		Approach	**624**	**2**	**A**	**671**	**20**	**B**	**429**	**2**	**A**	**483**	**2**	**A**	**485**	**2**	**A**	**428**	**2**	**A**
	East	Left	149	89	F	179	55	D	241	21	C	201	22	C	201	21	C	227	20	C
		Right	124	91	F	89	61	E	115	29	D	103	30	D	104	29	D	112	28	D
		Approach	**273**	**91**	**F**	**268**	**57**	**E**	**356**	**29**	**D**	**304**	**30**	**D**	**305**	**29**	**D**	**339**	**28**	**D**
	West	Through	336	2	A	538	4	A	330	2	A	360	2	A	360	2	A	348	2	A
		Right	333	15	B	211	49	D	277	9	A	275	9	A	275	9	A	273	9	A
		Approach	**669**	**15**	**B**	**748**	**17**	**B**	**607**	**9**	**A**	**635**	**9**	**A**	**635**	**9**	**A**	**621**	**9**	**A**
	Intersection		**1,566**	**91**	**F**	**1,686**	**24**	**C**	**1,392**	**29**	**D**	**1,421**	**30**	**D**	**1,424**	**29**	**D**	**1,387**	**28**	**D**
Percival Street / Victoria Street	North	Left	11	13	B	7	12	B	20	11	B	11	12	B	10	11	B	16	12	B
		Right	30	50	E	53	54	F	28	36	E	28	37	E	28	34	D	29	36	E
		Approach	**42**	**50**	**E**	**60**	**54**	**F**	**49**	**36**	**E**	**38**	**37**	**E**	**38**	**34**	**D**	**45**	**36**	**E**
	South	Through	132	3	A	165	1	A	130	3	A	115	3	A	115	3	A	121	3	A
		Right	775	3	A	876	1	A	701	3	A	736	3	A	737	3	A	719	3	A
		Approach	**907**	**3**	**A**	**1,041**	**1**	**A**	**831**	**3**	**A**	**852**	**3**	**A**	**852**	**3**	**A**	**840**	**3**	**A**
	East	Left	661	2	A	860	1	A	593	2	A	612	2	A	615	2	A	576	2	A
		Right	0	13	-	6	14	B	0	11	-	0	12	-	0	11	-	0	12	-
		Approach	**661**	**13**	**B**	**866**	**14**	**B**	**593**	**11**	**B**	**612**	**12**	**B**	**615**	**11**	**B**	**576**	**12**	**B**
	Intersection		**1,609**	**50**	**E**	**1,967**	**54**	**F**	**1,473**	**36**	**E**	**1,502**	**37**	**E**	**1,504**	**34**	**D**	**1,461**	**36**	**E**
Percival Street / Johns Road	North	Through	606	2	A	825	1	A	511	2	A	548	2	A	550	2	A	508	2	A
		Right	85	14	B	88	16	C	110	13	B	92	13	B	92	12	B	96	13	B
		Approach	**691**	**14**	**B**	**913**	**16**	**C**	**621**	**13**	**B**	**640**	**13**	**B**	**642**	**12**	**B**	**605**	**13**	**B**
	South	Left	122	3	A	114	1	A	96	2	A	98	2	A	98	2	A	106	2	A
		Through	723	3	A	855	1	A	657	2	A	687	2	A	687	2	A	663	2	A
		Approach	**845**	**3**	**A**	**970**	**1**	**A**	**753**	**2**	**A**	**785**	**2**	**A**	**785**	**2**	**A**	**769**	**2**	**A**
	West	Left	186	17	C	186	17	C	174	14	B	164	14	B	165	14	B	177	14	B
		Right	62	57	F	62	57	F	63	39	E	53	39	E	55	38	E	67	40	E
		Approach	**248**	**57**	**F**	**248**	**57**	**F**	**237**	**39**	**E**	**217**	**39**	**E**	**219**	**38**	**E**	**244**	**40**	**E**
	Intersection		**1,784**	**57**	**F**	**2,131**	**57**	**F**	**1,611**	**39**	**E**	**1,642**	**39**	**E**	**1,647**	**38**	**E**	**1,618**	**40**	**E**
Percival Street / Charles Street	North	Left	199	2	A	182	1	A	100	2	A	93	2	A	95	2	A	105	2	A
		Through	369	2	A	683	1	A	453	2	A	487	2	A	489	2	A	450	2	A
		Right	100	13	B	23	12	B	21	10	A	21	11	B	21	10	A	21	11	B
		Approach	**668**	**13**	**B**	**888**	**12**	**B**	**574**	**10**	**A**	**600**	**11**	**B**	**605**	**10**	**A**	**576**	**11**	**B**
	South	Left	7	2	A	8	1	A	7	2	A	8	2	A	8	2	A	8	2	A
		Through	643	2	A	848	1	A	585	2	A	649	2	A	649	2	A	629	2	A
		Right	0	8	A	0	15	-	0	8	-	0	8	-	0	8	-	0	8	-
		Approach	**650**	**8**	**A**	**856**	**15**	**B**	**591**	**8**	**A**	**657**	**8**	**A**	**657**	**8**	**A**	**637**	**8**	**A**
	East	Left	196	8	A	292	18	C	0	8	A	0	8	A	0	8	A	0	8	-
		Through	29	127	F	6	79	F	3	35	D	1	35	D	1	33	D	1	33	D
		Right	159	127	F	93	79	F	125	36	E	96	35	D	96	33	D	97	33	D
		Approach	**384**	**127**	**F**	**390**	**79**	**F**	**129**	**36**	**E**	**97**	**35**	**D**	**97**	**33**	**D**	**99**	**33**	**D**
	West	Left	44	33	D	29	32	D	43	19	C	40	20	C	40	18	C	42	20	C
		Through	81	41	E	17	41	E	38	24	C	37	25	C	35	23	C	32	24	C
		Right	5	40	E	22	41	E	21	23	C	19	24	C	19	22	C	22	24	C
		Approach	**130**	**41**	**E**	**69**	**41**	**E**	**103**	**24**	**C**	**97**	**25**	**C**	**94**	**23**	**C**	**96**	**24**	**C**
	Intersection		**1,831**	**127**	**F**	**2,203**	**79**	**F**	**1,397**	**36**	**E**	**1,451**	**35**	**D**	**1,453**	**33**	**D**	**1,408**	**33**	**D**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	223	F	0	34	-	0	48	-	0	50	-	0	47	-	0	47	-
		Through	586	0	A	986	30	C	472	36	D	505	39	D	507	36	D	471	37	D
		Right	0	233	F	11	28	C	2	44	D	1	47	D	1	43	D	1	45	D
		Approach	**586**	**0**	**A**	**997**	**30**	**C**	**475**	**36**	**D**	**506**	**39**	**D**	**508**	**36**	**D**	**472**	**37**	**D**
	South	Left	24	48	D	24	17	B	23	28	C	24	29	C	24	26	C	24	29	C
		Through	635	47	D	705	16	B	558	27	C	578	28	C	579	25	C	565	29	C
		Right	76	54	D	94	21	C	127	27	C	40	28	C	40	26	C	35	27	C
		Approach	**735**	**48**	**D**	**823**	**16**	**B**	**708**	**27**	**C**	**643**	**28**	**C**	**643**	**26**	**C**	**624**	**28**	**C**
	East	Left	257	250	F	231	165	F	201	44	D	136	43	D	137	40	D	146	36	D
		Through	7	241	F	32	156	F	56	36	D	83	36	D	83	32	C	66	29	C
		Right	2	245	F	143	164	F	21	39	D	63	38	D	62	35	C	60	34	C
		Approach	**266**	**250**	**F**	**406**	**164**	**F**	**278**	**42**	**D**	**281**	**40**	**D**	**282**	**37**	**D**	**272**	**34**	**C**
	West	Left	12	17	B	11	19	B	12	16	B	16	16	B	16	16	B	12	16	B
		Through	59	16	B	184	18	B	183	16	B	173	16	B	173	16	B	158	16	B
		Right	407	30	C	416	30	C	352	23	C	398	23	C	395	22	C	377	22	C
		Approach	**479**	**28**	**C**	**611**	**26**	**C**	**546**	**20**	**B**	**586**	**21**	**C**	**583**	**20**	**B**	**547**	**20**	**B**
	Intersection		**2,066**	**56**	**E**	**2,837**	**44**	**D**	**2,007**	**30**	**C**	**2,016**	**30**	**C**	**2,016**	**28**	**C**	**1,915**	**29**	**C**
Southbrook Road / Torlesse Street	North	Left	3	3	A	32	3	A	6	3	A	23	3	A	24	3	A	23	3	A
		Through	1,103	6	A	1,500	6	A	911	5	A	917	5	A	920	5	A	880	5	A
		Right	0	5	A	1	4	A	0	5	A	0	5	A	0	5	A	0	4	A
		Approach	**1,105**	**5**	**A**	**1,532**	**6**	**A**	**917**	**5**	**A**	**940**	**5**	**A**	**944**	**5**	**A**	**904**	**5**	**A**
	South	Left	10	3	A	10	2	A	10	3	A	10	3	A	10	3	A	10	3	A
		Through	678	4	A	764	2	A	649	4	A	601	4	A	602	4	A	584	4	A
		Right	19	15	B	37	10	A	17	11	B	17	11	B	17	10	A	17	10	A
		Approach	**706**	**5**	**A**	**811**	**2**	**A**	**676**	**4**	**A**	**628**	**4**	**A**	**629**	**4**	**A**	**611**	**4**	**A**
	East	Left	7	63	E	7	63	E	3	61	E	6	61	E	6	61	E	1	60	E
		Through	3	63	E	2	62	E	0	61	E	1	61	E	1	61	E	1	60	E
		Right	43	54	D	47	55	D	11	49	D	9	49	D	9	49	D	7	49	D
		Approach	**53**	**56**	**E**	**55**	**56**	**E**	**14**	**52**	**D**	**17**	**54**	**D**	**17**	**54**	**D**	**9**	**51**	**D**
	West	Left	5	949	F	0	8	-	0	9	-	0	8	-	0	8	-	0	8	-
		Through	6	598	F	5	39	D	1	39	D	5	39	D	5	39	D	3	39	D
		Right	68	600	F	21	40	D	22	39	D	21	39	D	21	39	D	21	39	D
		Approach	**79**	**621**	**F**	**26**	**39**	**D**	**23**	**39**	**D**	**26**	**39**	**D**	**26**	**39**	**D**	**24**	**39**	**D**
	Intersection		**1,944**	**31**	**C**	**2,424**	**6**	**A**	**1,631**	**6**	**A**	**1,611**	**6**	**A**	**1,615**	**6**	**A**	**1,548**	**5**	**A**
Southbrook Road / Pak 'n Save supermarket	North	Left	70	4	A	83	2	A	91	3	A	52	3	A	52	3	A	52	3	A
		Through	950	5	A	1,338	4	A	735	4	A	783	4	A	785	4	A	741	3	A
		Right	87	8	A	107	6	A	110	8	A	110	8	A	110	7	A	110	7	A
		Approach	**1,106**	**5**	**A**	**1,528**	**4**	**A**	**936**	**4**	**A**	**945**	**4**	**A**	**948**	**4**	**A**	**903**	**4**	**A**
	South	Left	66	5	A	52	3	A	49	4	A	50	4	A	49	4	A	50	4	A
		Through	664	6	A	763	3	A	625	6	A	587	6	A	588	6	A	579	6	A
		Right	27	16	B	30	5	A	38	10	A	15	11	B	15	10	A	15	8	A
		Approach	**757**	**7**	**A**	**846**	**3**	**A**	**713**	**6**	**A**	**652**	**6**	**A**	**652**	**6**	**A**	**644**	**5**	**A**
	East	Left	19	45	D	16	44	D	15	44	D	22	44	D	22	44	D	22	45	D
		Through	1	45	D	1	44	D	1	44	D	1	44	D	1	44	D	1	45	D
		Right	17	40	D	19	40	D	20	40	D	13	40	D	13	40	D	13	40	D
		Approach	**36**	**42**	**D**	**36**	**42**	**D**	**36**	**42**	**D**	**36**	**43**	**D**	**36**	**43**	**D**	**36**	**43**	**D**
	West	Left	25	9	A	28	8	A	31	9	A	28	9	A	28	8	A	19	8	A
		Through	1	36	D	1	34	C	1	35	C	1	35	C	1	35	C	1	36	D
		Right	26	36	D	23	35	C	20	36	D	24	36	D	24	36	D	32	36	D
		Approach	**52**	**23**	**C**	**52**	**21**	**C**	**52**	**20**	**B**	**52**	**21**	**C**	**52**	**21**	**C**	**52**	**26**	**C**
	Intersection		**1,952**	**7**	**A**	**2,462**	**5**	**A**	**1,736**	**6**	**A**	**1,686**	**6**	**A**	**1,688**	**6**	**A**	**1,634**	**6**	**A**

AM 2038 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	11	4	A	6	12	B	0	3	A	13	3	A	13	3	A	22	3	A
		Through	981	4	A	1,359	12	B	758	3	A	806	3	A	807	3	A	769	3	A
		Right	3	11	B	12	18	B	12	10	A	11	10	A	11	10	A	5	9	A
		Approach	**995**	**11**	**B**	**1,377**	**12**	**B**	**770**	**10**	**A**	**829**	**10**	**A**	**831**	**10**	**A**	**795**	**9**	**A**
	South	Left	11	2	A	9	5	A	5	2	A	10	2	A	10	2	A	17	2	A
		Through	734	2	A	837	5	A	699	2	A	642	2	A	642	2	A	633	2	A
		Right	17	20	C	2	16	B	1	13	B	67	15	B	67	14	B	73	15	B
		Approach	**762**	**20**	**C**	**847**	**5**	**A**	**705**	**13**	**B**	**718**	**15**	**B**	**718**	**14**	**B**	**722**	**15**	**B**
	West	Left	23	98	F	9	44	D	14	13	B	10	25	C	10	21	C	11	21	C
		Through	28	113	F	32	44	D	1	39	E	26	45	E	26	41	E	26	42	E
		Right	20	113	F	16	44	D	10	41	E	3	48	E	4	44	E	3	45	E
		Approach	**71**	**113**	**F**	**58**	**44**	**D**	**24**	**41**	**E**	**40**	**48**	**E**	**39**	**44**	**E**	**40**	**45**	**E**
	Intersection		**1,828**	**113**	**F**	**2,282**	**10**	**A**	**1,499**	**41**	**E**	**1,587**	**48**	**E**	**1,589**	**44**	**E**	**1,557**	**45**	**E**
Lineside Road / Flaxton Road	North	Through	828	4	A	1,016	7	A	508	3	A	583	3	A	587	3	A	507	3	A
		Right	172	9	A	359	17	B	260	11	B	226	11	B	224	11	B	265	11	B
		Approach	**1,000**	**9**	**A**	**1,375**	**9**	**A**	**768**	**11**	**B**	**809**	**11**	**B**	**811**	**11**	**B**	**772**	**11**	**B**
	South	Left	38	2	A	38	5	A	171	2	A	170	2	A	170	2	A	183	2	A
		Through	486	2	A	575	6	A	424	2	A	421	2	A	421	2	A	420	2	A
		Approach	**524**	**2**	**A**	**613**	**6**	**A**	**595**	**2**	**A**	**591**	**2**	**A**	**590**	**2**	**A**	**603**	**2**	**A**
	West	Left	276	11	B	273	45	D	281	10	A	297	10	A	297	9	A	303	10	A
		Right	5	36	E	10	42	D	12	23	C	2	24	C	2	22	C	2	22	C
		Approach	**281**	**36**	**E**	**282**	**45**	**D**	**294**	**23**	**C**	**299**	**24**	**C**	**299**	**22**	**C**	**304**	**22**	**C**
	Intersection		**1,805**	**36**	**E**	**2,271**	**13**	**B**	**1,656**	**23**	**C**	**1,699**	**24**	**C**	**1,700**	**22**	**C**	**1,679**	**22**	**C**
Coldstream Road / REL	South	Left	57	6	A	56	5	A	78	5	A	77	5	A	77	6	A	78	5	A
		Right	5	8	A	3	8	A	8	10	A	7	9	A	7	10	A	8	10	A
		Approach	**62**	**8**	**A**	**59**	**8**	**A**	**86**	**10**	**A**	**84**	**9**	**A**	**84**	**10**	**A**	**86**	**10**	**A**
	East	Left	4	2	A	5	2	A	5	2	A	5	2	A	5	2	A	5	2	A
		Through	195	2	A	174	2	A	181	2	A	174	2	A	174	2	A	174	2	A
		Approach	**199**	**2**	**A**	**178**	**2**	**A**	**186**	**2**	**A**	**179**	**2**	**A**	**179**	**2**	**A**	**180**	**2**	**A**
	West	Through	231	2	A	218	2	A	306	3	A	283	3	A	279	3	A	309	3	A
		Right	91	5	A	93	5	A	184	5	A	139	5	A	139	6	A	185	5	A
		Approach	**322**	**5**	**A**	**312**	**5**	**A**	**490**	**5**	**A**	**421**	**5**	**A**	**418**	**6**	**A**	**494**	**5**	**A**
	Intersection		**583**	**8**	**A**	**549**	**8**	**A**	**762**	**10**	**A**	**685**	**9**	**A**	**681**	**10**	**A**	**760**	**10**	**A**
Kippenberger Ave / MacPhail Ave	North	Left	11	8	A	13	9	A	12	11	B	12	10	A	12	11	B	12	11	B
		Through	72	11	B	84	12	B	286	13	B	204	13	B	204	14	B	311	14	B
		Right	255	13	B	246	14	B	176	16	B	201	15	B	204	16	B	165	16	B
		Approach	**339**	**13**	**B**	**344**	**14**	**B**	**474**	**14**	**B**	**417**	**14**	**B**	**420**	**15**	**B**	**488**	**14**	**B**
	South	Left	9	12	B	9	11	B	33	10	A	33	10	A	33	10	A	30	10	A
		Through	67	14	B	59	13	B	105	13	B	97	13	B	97	13	B	106	13	B
		Right	43	17	B	34	16	B	50	15	B	41	15	B	41	15	B	53	15	B
		Approach	**119**	**15**	**B**	**102**	**14**	**B**	**187**	**13**	**B**	**171**	**13**	**B**	**172**	**13**	**B**	**190**	**13**	**B**
	East	Left	7	10	A	9	9	A	60	12	B	31	11	B	33	12	B	57	12	B
		Through	438	12	B	394	12	B	383	14	B	383	13	B	380	14	B	383	14	B
		Right	14	15	B	14	14	B	12	17	B	12	16	B	12	17	B	12	17	B
		Approach	**458**	**12**	**B**	**417**	**12**	**B**	**455**	**14**	**B**	**426**	**13**	**B**	**426**	**14**	**B**	**452**	**14**	**B**
	West	Left	43	8	A	42	8	A	42	8	A	45	8	A	44	8	A	41	8	A
		Through	190	10	A	334	10	A	355	11	B	352	11	B	352	11	B	356	11	B
		Right	7	13	B	7	13	B	7	13	B	7	13	B	7	13	B	7	13	B
		Approach	**240**	**10**	**A**	**382**	**10**	**A**	**404**	**11**	**B**	**404**	**11**	**B**	**404**	**11**	**B**	**403**	**11**	**B**
	Intersection		**1,156**	**12**	**B**	**1,245**	**12**	**B**	**1,519**	**13**	**B**	**1,419**	**13**	**B**	**1,420**	**13**	**B**	**1,533**	**13**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	52	7	A	46	6	A	0	10	A	8	10	A	8	10	A	0	10	A
		Through	0	0	-	0	0	-	349	13	B	249	12	B	251	13	B	372	13	B
		Right	32	12	B	51	10	A	22	15	B	22	15	B	22	15	B	22	15	B
		Approach	**84**	**12**	**B**	**97**	**10**	**A**	**372**	**13**	**B**	**280**	**12**	**B**	**282**	**13**	**B**	**395**	**13**	**B**
	South	Left	0	0	-	0	0	-	285	8	A	275	8	A	275	8	A	270	8	A
		Through	0	0	-	0	0	-	96	11	B	68	11	B	68	11	B	97	11	B
		Right	0	0	-	0	0	-	28	13	B	12	13	B	12	13	B	28	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**409**	**9**	**A**	**355**	**9**	**A**	**356**	**9**	**A**	**395**	**9**	**A**
	East	Left	0	0	-	0	0	-	111	13	B	88	11	B	88	13	B	108	13	B
		Through	344	2	A	373	2	A	150	15	B	112	14	B	111	16	B	143	16	B
		Right	32	7	A	30	6	A	0	18	-	0	16	-	0	18	-	0	18	-
		Approach	**376**	**7**	**A**	**404**	**6**	**A**	**260**	**14**	**B**	**200**	**13**	**B**	**199**	**14**	**B**	**252**	**15**	**B**
	West	Left	71	2	A	56	2	A	32	8	A	37	8	A	37	8	A	35	8	A
		Through	424	2	A	254	2	A	117	11	B	132	11	B	131	11	B	114	11	B
		Right	0	0	-	0	0	-	301	13	B	168	13	B	168	13	B	294	13	B
		Approach	**495**	**2**	**A**	**311**	**2**	**A**	**449**	**12**	**B**	**337**	**12**	**B**	**336**	**12**	**B**	**443**	**12**	**B**
	Intersection		**954**	**12**	**B**	**811**	**10**	**A**	**1,490**	**12**	**B**	**1,171**	**11**	**B**	**1,173**	**12**	**B**	**1,485**	**12**	**B**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	10	-	0	9	-	0	10	-	0	10	-
		Through	0	0	-	0	0	-	716	13	B	582	12	B	584	12	B	761	13	B
		Right	0	11	-	0	11	-	33	15	B	35	14	B	35	15	B	0	15	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**749**	**13**	**B**	**616**	**12**	**B**	**618**	**13**	**B**	**761**	**13**	**B**
	South	Left	0	0	-	0	0	-	2	8	A	0	7	-	0	7	-	0	8	-
		Through	0	0	-	0	0	-	196	10	A	194	10	A	194	10	A	252	10	A
		Right	0	0	-	0	0	-	11	13	B	29	12	B	29	12	B	33	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**209**	**10**	**A**	**222**	**10**	**A**	**222**	**10**	**A**	**285**	**10**	**A**
	East	Left	0	0	-	0	0	-	20	12	B	31	11	B	30	12	B	32	12	B
		Through	28	8	A	43	8	A	63	15	B	63	13	B	63	14	B	48	15	B
		Right	0	11	-	0	11	-	0	17	-	0	16	-	0	17	-	0	17	-
		Approach	**28**	**11**	**B**	**43**	**11**	**B**	**83**	**14**	**B**	**94**	**12**	**B**	**94**	**14**	**B**	**80**	**14**	**B**
	West	Left	0	8	-	0	8	-	108	8	A	12	8	A	11	8	A	45	8	A
		Through	68	11	B	112	11	B	132	11	B	92	10	A	92	10	A	89	11	B
		Right	0	0	-	0	0	-	12	13	B	0	13	-	0	13	-	0	13	-
		Approach	**68**	**11**	**B**	**112**	**11**	**B**	**252**	**10**	**A**	**104**	**10**	**A**	**103**	**10**	**A**	**134**	**10**	**A**
	Intersection		**96**	**11**	**B**	**154**	**11**	**B**	**1,293**	**12**	**B**	**1,037**	**11**	**B**	**1,037**	**12**	**B**	**1,261**	**12**	**B**
Lineside Road / REL	North	Through	0	0	-	0	0	-	635	12	B	558	11	B	557	11	B	663	11	B
		Right	0	0	-	0	0	-	174	17	B	0	17	B	0	17	B	0	17	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**810**	**13**	**B**	**559**	**11**	**B**	**557**	**11**	**B**	**664**	**11**	**B**
	South	Left	501	0	A	566	0	A	433	11	B	406	11	B	407	11	B	399	11	B
		Through	0	0	-	0	0	-	150	17	B	154	16	B	154	16	B	185	16	B
		Approach	**501**	**0**	**A**	**566**	**0**	**A**	**583**	**13**	**B**	**560**	**12**	**B**	**560**	**12**	**B**	**584**	**12**	**B**
	West	Left	0	0	-	0	0	-	19	10	A	0	10	-	0	10	-	0	10	-
		Right	866	0	A	1,049	0	A	529	15	B	584	15	B	589	15	B	509	15	B
		Approach	**866**	**0**	**A**	**1,049**	**0**	**A**	**548**	**15**	**B**	**584**	**15**	**B**	**589**	**15**	**B**	**509**	**15**	**B**
	Intersection		**1,367**	**0**	**A**	**1,615**	**0**	**A**	**1,941**	**14**	**B**	**1,703**	**13**	**B**	**1,707**	**13**	**B**	**1,756**	**13**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	0	2	-	0	2	-	0	2	-	0	2	-
		Through	0	0	-	0	0	-	768	2	A	525	2	A	527	2	A	636	2	A
		Right	0	0	-	0	0	-	26	5	A	190	5	A	189	5	A	208	5	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**794**	**5**	**A**	**715**	**5**	**A**	**716**	**5**	**A**	**844**	**5**	**A**
	South	Left	0	0	-	0	0	-	15	1	A	49	1	A	49	1	A	49	1	A
		Through	0	0	-	0	0	-	145	1	A	105	1	A	105	1	A	136	1	A
		Right	0	0	-	0	0	-	9	10	A	0	7	-	0	8	-	0	8	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**169**	**10**	**A**	**154**	**7**	**A**	**154**	**8**	**A**	**185**	**8**	**A**
	East	Left	0	0	-	0	0	-	35	12	B	0	10	A	0	11	B	0	11	B
		Through	97	0	A	88	0	A	4	16	C	59	13	B	58	16	C	57	18	C
		Right	0	0	-	0	0	-	0	16	-	0	13	-	0	15	-	0	16	-
		Approach	**97**	**0**	**A**	**88**	**0**	**A**	**39**	**16**	**C**	**59**	**13**	**B**	**58**	**16**	**C**	**57**	**18**	**C**
	West	Left	0	0	-	0	0	-	6	5	A	87	5	A	87	6	A	105	6	A
		Through	59	0	A	57	0	A	0	14	B	43	12	B	43	15	B	39	15	B
		Right	0	0	-	0	0	-	6	16	C	33	13	B	31	15	B	27	17	C
		Approach	**59**	**0**	**A**	**57**	**0**	**A**	**13**	**16**	**C**	**163**	**13**	**B**	**160**	**15**	**B**	**172**	**17**	**C**
	Intersection		**156**	**0**	**A**	**144**	**0**	**A**	**1,015**	**16**	**C**	**1,090**	**13**	**B**	**1,088**	**16**	**C**	**1,258**	**18**	**C**

PM 2048 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	315	2	A	297	2	A	390	2	A	377	2	A	380	2	A	390	2	A
		Through	297	2	A	335	2	A	246	2	A	254	2	A	252	2	A	249	2	A
		Approach	**612**	**2**	**A**	**632**	**2**	**A**	**635**	**2**	**A**	**632**	**2**	**A**	**632**	**2**	**A**	**639**	**2**	**A**
	South	Right	76	8	A	68	8	A	72	9	A	69	9	A	70	9	A	69	9	A
		Through	743	3	A	781	3	A	778	3	A	773	3	A	784	3	A	779	3	A
		Approach	**819**	**8**	**A**	**849**	**8**	**A**	**850**	**9**	**A**	**842**	**9**	**A**	**854**	**9**	**A**	**849**	**9**	**A**
	East	Right	179	195	F	157	254	F	178	210	F	176	244	F	174	250	F	179	206	F
		Left	342	8	A	349	9	A	392	8	A	347	8	A	348	8	A	365	7	A
		Approach	**522**	**195**	**F**	**505**	**254**	**F**	**570**	**210**	**F**	**523**	**244**	**F**	**523**	**250**	**F**	**545**	**206**	**F**
	Intersection		**1,952**	**195**	**F**	**1,986**	**254**	**F**	**2,056**	**210**	**F**	**1,997**	**244**	**F**	**2,009**	**250**	**F**	**2,032**	**206**	**F**
Ashley Street / High Street	North	Left	128	33	C	139	40	D	128	32	C	122	36	D	122	35	C	128	33	C
		Through	413	33	C	414	40	D	429	31	C	432	35	C	432	35	C	438	33	C
		Right	32	26	C	28	48	D	38	25	C	36	30	C	36	29	C	38	26	C
		Approach	**573**	**32**	**C**	**581**	**41**	**D**	**595**	**31**	**C**	**590**	**35**	**C**	**590**	**34**	**C**	**604**	**33**	**C**
	South	Left	0	84	-	0	103	-	0	75	-	0	84	-	0	80	-	0	76	-
		Through	562	71	E	586	103	F	544	63	E	557	71	E	561	66	E	550	64	E
		Right	244	29	C	308	47	D	227	27	C	220	27	C	218	27	C	224	27	C
		Approach	**805**	**59**	**E**	**894**	**84**	**F**	**771**	**52**	**D**	**777**	**59**	**E**	**779**	**55**	**D**	**774**	**53**	**D**
	East	Left	104	39	D	78	39	D	95	38	D	91	37	D	91	37	D	91	36	D
		Through	271	37	D	313	36	D	282	36	D	257	35	C	257	35	C	267	34	C
		Right	55	83	F	67	107	F	71	86	F	61	84	F	60	84	F	69	80	E
		Approach	**430**	**43**	**D**	**458**	**47**	**D**	**448**	**44**	**D**	**408**	**43**	**D**	**407**	**43**	**D**	**427**	**42**	**D**
	West	Left	89	69	E	90	106	F	107	57	E	116	57	E	113	57	E	113	56	E
		Through	420	66	E	428	103	F	378	55	D	365	55	D	370	55	D	366	54	D
		Right	28	44	D	35	46	D	11	42	D	12	42	D	12	41	D	11	40	D
		Approach	**537**	**65**	**E**	**553**	**100**	**F**	**496**	**55**	**D**	**493**	**55**	**D**	**495**	**55**	**D**	**490**	**54**	**D**
	Intersection		**2,345**	**51**	**D**	**2,487**	**71**	**E**	**2,310**	**46**	**D**	**2,268**	**49**	**D**	**2,271**	**48**	**D**	**2,296**	**46**	**D**
Ivory Street / Northbrook Road	North	Left	223	3	A	186	21	C	275	2	A	265	2	A	265	2	A	275	2	A
		Through	614	3	A	632	21	C	514	2	A	532	2	A	528	2	A	525	2	A
		Approach	**837**	**3**	**A**	**818**	**21**	**C**	**790**	**2**	**A**	**797**	**2**	**A**	**793**	**2**	**A**	**801**	**2**	**A**
	East	Left	79	122	F	185	58	E	89	79	F	113	117	F	116	115	F	118	91	F
		Right	61	130	F	72	69	E	95	92	F	83	119	F	83	116	F	90	99	F
		Approach	**140**	**130**	**F**	**258**	**61**	**E**	**184**	**92**	**F**	**196**	**119**	**F**	**198**	**116**	**F**	**209**	**99**	**F**
	West	Through	694	4	A	813	4	A	594	3	A	604	3	A	609	3	A	593	3	A
		Right	349	34	D	266	84	F	317	19	C	319	19	C	313	19	C	309	19	C
		Approach	**1,043**	**34**	**D**	**1,080**	**24**	**C**	**911**	**19**	**C**	**923**	**19**	**C**	**922**	**19**	**C**	**902**	**19**	**C**
	Intersection		**2,020**	**130**	**F**	**2,155**	**27**	**C**	**1,885**	**92**	**F**	**1,916**	**119**	**F**	**1,913**	**116**	**F**	**1,911**	**99**	**F**
Percival Street / Victoria Street	North	Left	52	43	E	60	25	C	76	30	D	76	30	D	76	30	D	82	27	D
		Right	13	127	F	44	118	F	23	92	F	25	94	F	25	95	F	29	94	F
		Approach	**65**	**127**	**F**	**105**	**118**	**F**	**98**	**92**	**F**	**100**	**94**	**F**	**101**	**95**	**F**	**111**	**94**	**F**
	South	Through	38	5	A	183	1	A	48	4	A	78	4	A	80	4	A	71	4	A
		Right	1,140	5	A	1,248	1	A	1,014	4	A	999	4	A	996	4	A	980	4	A
		Approach	**1,177**	**5**	**A**	**1,431**	**1**	**A**	**1,062**	**4**	**A**	**1,077**	**4**	**A**	**1,076**	**4**	**A**	**1,051**	**4**	**A**
	East	Left	707	2	A	814	1	A	646	2	A	664	2	A	660	2	A	667	2	A
		Right	0	28	-	0	28	-	0	20	-	0	20	-	0	20	-	0	19	-
		Approach	**707**	**28**	**D**	**814**	**28**	**D**	**646**	**20**	**C**	**664**	**20**	**C**	**660**	**20**	**C**	**667**	**19**	**C**
	Intersection		**1,950**	**127**	**F**	**2,350**	**118**	**F**	**1,806**	**92**	**F**	**1,842**	**94**	**F**	**1,836**	**95**	**F**	**1,828**	**94**	**F**
Percival Street / Johns Road	North	Through	636	2	A	756	1	A	579	2	A	592	2	A	589	2	A	599	2	A
		Right	84	27	D	103	31	D	90	20	C	96	21	C	96	20	C	97	20	C
		Approach	**720**	**27**	**D**	**859**	**31**	**D**	**669**	**20**	**C**	**689**	**21**	**C**	**685**	**20**	**C**	**696**	**20**	**C**
	South	Left	93	4	A	183	1	A	163	4	A	164	4	A	168	4	A	181	4	A
		Through	1,009	4	A	1,270	1	A	862	4	A	878	4	A	877	4	A	837	4	A
		Approach	**1,102**	**4**	**A**	**1,452**	**1**	**A**	**1,025**	**4**	**A**	**1,043**	**4**	**A**	**1,045**	**4**	**A**	**1,018**	**4**	**A**
	West	Left	169	58	F	161	39	E	201	32	D	199	33	D	199	32	D	214	30	D
		Right	27	97	F	34	91	F	42	67	F	41	71	F	40	70	F	47	70	F
		Approach	**196**	**97**	**F**	**195**	**91**	**F**	**243**	**67**	**F**	**241**	**71**	**F**	**240**	**70**	**F**	**261**	**70**	**F**
	Intersection		**2,018**	**97**	**F**	**2,506**	**91**	**F**	**1,937**	**67**	**F**	**1,972**	**71**	**F**	**1,970**	**70**	**F**	**1,975**	**70**	**F**
Percival Street / Charles Street	North	Left	217	2	A	139	1	A	194	2	A	189	2	A	192	2	A	193	2	A
		Through	394	2	A	592	1	A	376	2	A	391	2	A	383	2	A	399	2	A
		Right	52	21	C	59	26	D	51	18	C	54	18	C	55	18	C	53	18	C
		Approach	**663**	**21**	**C**	**790**	**26**	**D**	**621**	**18**	**C**	**634**	**18**	**C**	**629**	**18**	**C**	**646**	**18**	**C**
	South	Left	20	3	A	30	1	A	29	3	A	29	3	A	29	3	A	29	3	A
		Through	974	3	A	1,381	1	A	881	3	A	905	3	A	908	3	A	881	3	A
		Right	0	8	A	160	16	C	0	7	-	0	8	-	0	7	-	0	8	-
		Approach	**994**	**8**	**A**	**1,571**	**16**	**C**	**910**	**7**	**A**	**934**	**8**	**A**	**937**	**7**	**A**	**910**	**8**	**A**
	East	Left	219	9	A	220	12	B	76	7	A	72	7	A	75	7	A	58	7	A
		Through	9	156	F	10	127	F	3	96	F	2	123	F	3	121	F	3	103	F
		Right	91	155	F	64	128	F	115	97	F	105	123	F	106	121	F	109	104	F
		Approach	**319**	**156**	**F**	**294**	**128**	**F**	**194**	**97**	**F**	**179**	**123**	**F**	**184**	**121**	**F**	**170**	**104**	**F**
	West	Left	37	73	F	7	67	F	29	47	E	33	50	E	32	49	E	29	49	E
		Through	50	80	F	38	74	F	54	52	F	53	56	F	53	54	F	51	55	F
		Right	0	78	-	0	74	F	0	51	F	0	54	F	0	53	F	0	53	F
		Approach	**87**	**80**	**F**	**46**	**74**	**F**	**83**	**52**	**F**	**86**	**56**	**F**	**85**	**54**	**F**	**80**	**55**	**F**
	Intersection		**2,063**	**156**	**F**	**2,701**	**128**	**F**	**1,809**	**97**	**F**	**1,832**	**123**	**F**	**1,835**	**121**	**F**	**1,806**	**104**	**F**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	48	-	63	20	B	0	32	-	0	33	-	0	33	-	0	32	-
		Through	574	35	C	728	20	B	436	24	C	448	25	C	444	25	C	443	25	C
		Right	39	54	D	23	42	D	16	45	D	15	46	D	15	46	D	15	46	D
		Approach	**613**	**36**	**D**	**814**	**20**	**B**	**453**	**25**	**C**	**463**	**26**	**C**	**458**	**26**	**C**	**458**	**25**	**C**
	South	Left	24	101	F	35	123	F	101	50	D	129	43	D	103	44	D	168	77	E
		Through	850	101	F	1,376	0	A	796	50	D	794	43	D	816	44	D	768	77	E
		Right	300	101	F	368	128	F	274	48	D	188	40	D	176	41	D	125	72	E
		Approach	**1,175**	**101**	**F**	**1,779**	**29**	**C**	**1,171**	**50**	**D**	**1,111**	**42**	**D**	**1,095**	**44**	**D**	**1,061**	**76**	**E**
	East	Left	100	93	F	122	61	E	83	61	E	73	67	E	72	61	E	79	48	D
		Through	147	93	F	85	61	E	163	61	E	151	67	E	156	60	E	143	48	D
		Right	93	95	F	204	64	E	105	59	E	88	66	E	81	59	E	97	46	D
		Approach	**340**	**94**	**F**	**411**	**63**	**E**	**351**	**60**	**E**	**312**	**67**	**E**	**309**	**60**	**E**	**319**	**47**	**D**
	West	Left	66	29	C	29	23	C	9	20	B	56	21	C	50	21	C	48	21	C
		Through	437	29	C	306	23	C	216	20	B	260	21	C	271	21	C	217	21	C
		Right	347	28	C	380	26	C	311	23	C	292	23	C	293	23	C	282	23	C
		Approach	**851**	**28**	**C**	**715**	**25**	**C**	**536**	**22**	**C**	**608**	**22**	**C**	**614**	**22**	**C**	**547**	**22**	**C**
	Intersection		**2,978**	**66**	**E**	**3,719**	**30**	**C**	**2,511**	**41**	**D**	**2,495**	**37**	**D**	**2,477**	**37**	**D**	**2,386**	**50**	**D**
Southbrook Road / Torlesse Street	North	Left	0	7	-	28	4	A	11	5	A	31	5	A	30	5	A	21	5	A
		Through	920	12	B	1,140	5	A	743	7	A	716	7	A	713	7	A	728	7	A
		Right	0	15	-	8	7	A	0	14	-	0	13	-	0	13	-	0	10	-
		Approach	**920**	**12**	**B**	**1,177**	**5**	**A**	**755**	**7**	**A**	**747**	**7**	**A**	**742**	**7**	**A**	**749**	**7**	**A**
	South	Left	256	12	B	146	4	A	64	8	A	74	7	A	82	7	A	37	5	A
		Through	998	14	B	1,602	4	A	1,055	16	B	964	13	B	954	14	B	914	9	A
		Right	4	12	B	24	4	A	22	8	A	21	8	A	21	7	A	22	7	A
		Approach	**1,258**	**14**	**B**	**1,772**	**4**	**A**	**1,141**	**15**	**B**	**1,059**	**12**	**B**	**1,056**	**13**	**B**	**972**	**8**	**A**
	East	Left	46	59	E	56	50	D	17	40	D	25	39	D	25	40	D	24	41	D
		Through	115	59	E	70	50	D	8	40	D	36	39	D	41	40	D	18	41	D
		Right	162	51	D	159	50	D	106	43	D	131	40	D	123	41	D	129	45	D
		Approach	**322**	**55**	**D**	**285**	**50**	**D**	**131**	**42**	**D**	**191**	**40**	**D**	**189**	**40**	**D**	**171**	**44**	**D**
	West	Left	0	21	-	0	25	-	0	24	-	0	22	-	0	23	-	0	19	-
		Through	3	35	C	3	35	C	1	34	C	6	33	C	7	33	C	3	33	C
		Right	17	41	D	17	40	D	18	34	C	14	34	C	14	35	C	17	35	C
		Approach	**20**	**40**	**D**	**20**	**39**	**D**	**19**	**34**	**C**	**20**	**34**	**C**	**20**	**34**	**C**	**20**	**35**	**C**
	Intersection		**2,520**	**18**	**B**	**3,254**	**8**	**A**	**2,045**	**14**	**B**	**2,017**	**13**	**B**	**2,008**	**14**	**B**	**1,913**	**11**	**B**
Southbrook Road / Pak 'n Save supermarket	North	Left	37	12	B	37	9	A	40	9	A	27	9	A	27	9	A	27	9	A
		Through	887	19	B	1,116	13	B	687	14	B	667	14	B	664	13	B	682	13	B
		Right	60	33	C	61	23	C	52	22	C	60	19	B	60	20	B	61	17	B
		Approach	**983**	**20**	**B**	**1,213**	**13**	**B**	**778**	**14**	**B**	**754**	**14**	**B**	**751**	**14**	**B**	**770**	**14**	**B**
	South	Left	38	10	A	37	6	A	45	9	A	37	9	A	37	9	A	37	8	A
		Through	1,050	61	E	1,567	7	A	935	26	C	890	22	C	889	22	C	835	18	B
		Right	0	17	-	11	8	A	0	10	-	1	10	A	1	10	A	12	11	B
		Approach	**1,089**	**59**	**E**	**1,615**	**7**	**A**	**980**	**25**	**C**	**928**	**21**	**C**	**927**	**22**	**C**	**883**	**18**	**B**
	East	Left	73	35	C	72	35	C	73	35	C	93	36	D	93	36	D	105	37	D
		Through	1	35	C	1	35	C	1	35	C	1	36	D	1	36	D	1	37	D
		Right	90	34	C	91	34	C	90	34	C	70	34	C	70	34	C	58	33	C
		Approach	**164**	**35**	**C**	**164**	**35**	**C**	**164**	**35**	**C**	**164**	**35**	**C**	**164**	**35**	**C**	**164**	**36**	**D**
	West	Left	118	25	C	115	22	C	117	22	C	99	20	B	98	20	B	80	17	B
		Through	1	33	C	1	33	C	1	33	C	1	33	C	1	34	C	1	31	C
		Right	82	34	C	84	34	C	83	33	C	100	34	C	101	34	C	119	37	D
		Approach	**200**	**28**	**C**	**200**	**27**	**C**	**200**	**27**	**C**	**200**	**27**	**C**	**200**	**27**	**C**	**200**	**29**	**C**
	Intersection		**2,437**	**39**	**D**	**3,193**	**12**	**B**	**2,123**	**22**	**C**	**2,047**	**20**	**B**	**2,043**	**20**	**B**	**2,017**	**19**	**B**

PM 2048 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	30	4	A	31	4	A	1	3	A	71	3	A	71	3	A	105	3	A
		Through	952	4	A	1,165	4	A	797	3	A	749	3	A	747	3	A	764	3	A
		Right	60	32	D	77	29	C	45	22	C	39	18	C	41	18	C	36	16	C
		Approach	**1,041**	**32**	**D**	**1,273**	**5**	**A**	**842**	**22**	**C**	**860**	**18**	**C**	**858**	**18**	**C**	**906**	**16**	**C**
	South	Left	8	5	A	0	4	A	63	4	A	40	4	A	40	4	A	38	4	A
		Through	1,087	5	A	1,611	4	A	977	4	A	925	4	A	923	4	A	879	4	A
		Right	72	21	C	39	19	B	28	11	B	149	13	B	151	12	B	178	15	B
		Approach	**1,167**	**21**	**C**	**1,650**	**4**	**A**	**1,068**	**11**	**B**	**1,114**	**13**	**B**	**1,114**	**12**	**B**	**1,095**	**15**	**B**
	West	Left	2	153	F	4	51	D	2	101	F	4	115	F	4	107	F	4	108	F
		Through	6	163	F	18	51	D	2	110	F	10	128	F	10	119	F	12	124	F
		Right	14	163	F	60	51	D	24	110	F	18	127	F	18	119	F	17	123	F
		Approach	**22**	**163**	**F**	**82**	**51**	**D**	**28**	**110**	**F**	**31**	**128**	**F**	**31**	**119**	**F**	**32**	**124**	**F**
	Intersection		**2,230**	**163**	**F**	**3,006**	**6**	**A**	**1,939**	**110**	**F**	**2,005**	**128**	**F**	**2,003**	**119**	**F**	**2,033**	**124**	**F**
Lineside Road / Flaxton Road	North	Through	769	3	A	847	4	A	549	3	A	541	2	A	541	2	A	529	2	A
		Right	197	74	F	377	23	C	272	26	D	225	34	D	224	31	D	252	32	D
		Approach	**966**	**74**	**F**	**1,225**	**10**	**A**	**821**	**26**	**D**	**767**	**34**	**D**	**765**	**31**	**D**	**781**	**32**	**D**
	South	Left	27	3	A	20	13	B	95	2	A	86	2	A	85	2	A	93	2	A
		Through	984	3	A	1,095	19	B	725	2	A	843	2	A	843	2	A	786	2	A
		Approach	**1,011**	**3**	**A**	**1,115**	**19**	**B**	**820**	**2**	**A**	**929**	**2**	**A**	**928**	**2**	**A**	**879**	**2**	**A**
	West	Left	180	98	F	553	38	D	339	67	F	278	117	F	275	104	F	315	138	F
		Right	16	110	F	22	43	D	89	127	F	71	123	F	69	99	F	84	144	F
		Approach	**196**	**110**	**F**	**575**	**38**	**D**	**427**	**127**	**F**	**348**	**123**	**F**	**344**	**104**	**F**	**399**	**144**	**F**
	Intersection		**2,173**	**110**	**F**	**2,915**	**19**	**B**	**2,068**	**127**	**F**	**2,044**	**123**	**F**	**2,036**	**104**	**F**	**2,060**	**144**	**F**
Coldstream Road / REL	South	Left	102	7	A	96	7	A	99	8	A	94	7	A	94	8	A	89	7	A
		Right	15	12	B	15	11	B	21	14	B	19	13	B	19	14	B	21	14	B
		Approach	**116**	**12**	**B**	**111**	**11**	**B**	**119**	**14**	**B**	**113**	**13**	**B**	**113**	**14**	**B**	**110**	**14**	**B**
	East	Left	19	3	A	18	3	A	17	3	A	18	3	A	18	3	A	17	3	A
		Through	419	3	A	392	3	A	465	3	A	421	3	A	422	3	A	450	3	A
		Approach	**438**	**3**	**A**	**409**	**3**	**A**	**482**	**3**	**A**	**439**	**3**	**A**	**440**	**3**	**A**	**468**	**3**	**A**
	West	Through	338	3	A	313	3	A	336	3	A	348	3	A	350	3	A	328	3	A
		Right	60	7	A	62	6	A	132	7	A	107	7	A	108	7	A	138	7	A
		Approach	**398**	**7**	**A**	**375**	**6**	**A**	**468**	**7**	**A**	**455**	**7**	**A**	**458**	**7**	**A**	**466**	**7**	**A**
	Intersection		**953**	**12**	**B**	**895**	**11**	**B**	**1,069**	**14**	**B**	**1,007**	**13**	**B**	**1,011**	**14**	**B**	**1,043**	**14**	**B**
Kippenberger Ave / MacPhail Ave	North	Left	156	14	B	152	14	B	89	22	C	114	18	B	112	20	B	90	22	C
		Through	158	16	B	164	16	B	250	24	C	248	21	C	247	23	C	255	24	C
		Right	145	19	B	133	19	B	109	27	C	118	23	C	119	25	C	105	27	C
		Approach	**459**	**16**	**B**	**449**	**16**	**B**	**447**	**25**	**C**	**481**	**21**	**C**	**477**	**23**	**C**	**450**	**24**	**C**
	South	Left	68	12	B	59	11	B	75	14	B	81	14	B	83	14	B	75	14	B
		Through	122	15	B	97	14	B	167	17	B	143	17	B	140	16	B	163	16	B
		Right	81	17	B	77	16	B	82	19	B	83	19	B	83	19	B	84	19	B
		Approach	**271**	**15**	**B**	**233**	**14**	**B**	**324**	**17**	**B**	**307**	**17**	**B**	**305**	**16**	**B**	**322**	**16**	**B**
	East	Left	14	10	A	21	10	A	30	13	B	25	12	B	23	12	B	34	13	B
		Through	407	13	B	387	12	B	464	16	B	428	15	B	426	15	B	447	15	B
		Right	89	15	B	92	15	B	99	18	B	117	17	B	118	17	B	109	18	B
		Approach	**510**	**13**	**B**	**500**	**13**	**B**	**593**	**16**	**B**	**570**	**15**	**B**	**567**	**15**	**B**	**590**	**16**	**B**
	West	Left	95	10	A	87	10	A	99	13	B	99	12	B	99	12	B	99	13	B
		Through	454	13	B	464	12	B	550	15	B	505	15	B	506	15	B	546	15	B
		Right	35	15	B	26	15	B	53	18	B	33	17	B	34	17	B	52	18	B
		Approach	**584**	**12**	**B**	**577**	**12**	**B**	**703**	**15**	**B**	**637**	**14**	**B**	**639**	**15**	**B**	**697**	**15**	**B**
	Intersection		**1,824**	**14**	**B**	**1,759**	**13**	**B**	**2,067**	**18**	**B**	**1,994**	**17**	**B**	**1,989**	**17**	**B**	**2,059**	**18**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	57	7	A	62	7	A	0	12	-	0	11	B	0	11	B	0	12	-
		Through	0	0	-	0	0	-	310	14	B	279	13	B	280	14	B	322	14	B
		Right	71	12	B	89	12	B	34	17	B	40	16	B	37	16	B	29	17	B
		Approach	**128**	**12**	**B**	**152**	**12**	**B**	**344**	**14**	**B**	**320**	**14**	**B**	**317**	**14**	**B**	**351**	**15**	**B**
	South	Left	0	0	-	0	0	-	248	9	A	236	9	A	228	9	A	264	9	A
		Through	0	0	-	0	0	-	226	11	B	164	11	B	165	11	B	231	12	B
		Right	0	0	-	0	0	-	47	14	B	8	14	B	12	14	B	48	14	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**521**	**10**	**A**	**408**	**10**	**A**	**405**	**10**	**A**	**543**	**11**	**B**
	East	Left	0	0	-	0	0	-	35	12	B	0	11	-	0	12	-	36	13	B
		Through	317	2	A	358	2	A	157	15	B	161	13	B	167	14	B	173	15	B
		Right	37	7	A	26	7	A	0	17	-	0	16	-	0	17	-	0	18	-
		Approach	**354**	**7**	**A**	**384**	**7**	**A**	**192**	**15**	**B**	**161**	**13**	**B**	**167**	**14**	**B**	**209**	**15**	**B**
	West	Left	153	2	A	139	2	A	61	10	A	37	9	A	34	10	A	61	10	A
		Through	388	2	A	375	2	A	161	12	B	202	12	B	204	12	B	173	12	B
		Right	0	0	-	0	0	-	338	15	B	188	14	B	189	15	B	334	15	B
		Approach	**541**	**2**	**A**	**514**	**2**	**A**	**560**	**14**	**B**	**428**	**13**	**B**	**426**	**13**	**B**	**569**	**14**	**B**
	Intersection		**1,022**	**12**	**B**	**1,050**	**12**	**B**	**1,617**	**13**	**B**	**1,317**	**12**	**B**	**1,316**	**13**	**B**	**1,672**	**13**	**B**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	9	-	0	8	-	0	9	-	0	9	-
		Through	0	0	-	0	0	-	426	11	B	328	11	B	328	11	B	448	11	B
		Right	0	11	-	0	11	-	102	14	B	41	13	B	41	14	B	92	14	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**528**	**12**	**B**	**369**	**11**	**B**	**369**	**11**	**B**	**540**	**12**	**B**
	South	Left	0	0	-	0	0	-	111	10	A	0	10	-	0	10	-	21	10	A
		Through	0	0	-	0	0	-	500	12	B	471	12	B	473	13	B	650	13	B
		Right	0	0	-	0	0	-	20	15	B	37	15	B	36	15	B	39	15	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**631**	**12**	**B**	**508**	**12**	**B**	**509**	**13**	**B**	**710**	**13**	**B**
	East	Left	0	0	-	0	0	-	14	10	A	18	9	A	18	10	A	22	10	A
		Through	81	8	A	94	8	A	106	12	B	98	12	B	97	12	B	96	12	B
		Right	0	11	-	0	11	-	0	15	-	0	14	-	0	15	-	0	15	-
		Approach	**81**	**11**	**B**	**94**	**11**	**B**	**120**	**12**	**B**	**116**	**11**	**B**	**115**	**12**	**B**	**119**	**12**	**B**
	West	Left	0	8	-	0	8	-	210	11	B	32	11	B	37	11	B	85	12	B
		Through	149	11	B	151	11	B	105	13	B	83	13	B	82	14	B	59	14	B
		Right	0	0	-	0	0	-	19	16	B	0	16	B	2	16	B	0	17	-
		Approach	**149**	**11**	**B**	**151**	**11**	**B**	**334**	**12**	**B**	**116**	**13**	**B**	**120**	**13**	**B**	**144**	**13**	**B**
	Intersection		**230**	**11**	**B**	**245**	**11**	**B**	**1,613**	**12**	**B**	**1,108**	**12**	**B**	**1,114**	**12**	**B**	**1,512**	**12**	**B**
Lineside Road / REL	North	Through	0	0	-	0	0	-	356	11	B	341	11	B	341	11	B	380	11	B
		Right	0	0	-	0	0	-	189	16	B	70	16	B	72	16	B	38	16	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**545**	**13**	**B**	**411**	**12**	**B**	**413**	**12**	**B**	**418**	**11**	**B**
	South	Left	1,095	0	A	1,150	0	A	697	32	C	799	22	C	798	22	C	745	23	C
		Through	0	0	-	0	0	-	542	37	D	372	27	C	373	27	C	447	28	C
		Approach	**1,095**	**0**	**A**	**1,150**	**0**	**A**	**1,239**	**34**	**C**	**1,171**	**23**	**C**	**1,172**	**24**	**C**	**1,192**	**25**	**C**
	West	Left	0	0	-	0	0	-	127	11	B	0	10	-	0	10	-	0	10	-
		Right	832	0	A	902	0	A	569	16	B	552	16	B	552	16	B	539	16	B
		Approach	**832**	**0**	**A**	**902**	**0**	**A**	**696**	**15**	**B**	**552**	**16**	**B**	**552**	**16**	**B**	**539**	**16**	**B**
	Intersection		**1,927**	**0**	**A**	**2,052**	**0**	**A**	**2,480**	**24**	**C**	**2,135**	**19**	**B**	**2,136**	**19**	**B**	**2,149**	**20**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	1	2	A	1	2	A	1	2	A	0	2	-
		Through	0	0	-	0	0	-	427	2	A	336	2	A	339	2	A	359	2	A
		Right	0	0	-	0	0	-	12	8	A	41	6	A	40	6	A	94	7	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**440**	**8**	**A**	**378**	**6**	**A**	**380**	**6**	**A**	**453**	**7**	**A**
	South	Left	0	0	-	0	0	-	11	2	A	57	1	A	56	2	A	54	2	A
		Through	0	0	-	0	0	-	602	2	A	315	1	A	317	2	A	393	2	A
		Right	0	0	-	0	0	-	56	7	A	0	6	A	0	6	A	0	6	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**669**	**7**	**A**	**372**	**6**	**A**	**373**	**6**	**A**	**447**	**6**	**A**
	East	Left	0	0	-	0	0	-	96	8	A	18	7	A	18	8	A	18	12	B
		Through	177	0	A	186	0	A	3	18	C	152	10	A	153	13	B	135	17	C
		Right	0	0	-	0	0	-	49	21	C	5	18	C	5	23	C	20	17	C
		Approach	**177**	**0**	**A**	**186**	**0**	**A**	**147**	**21**	**C**	**176**	**18**	**C**	**176**	**23**	**C**	**173**	**17**	**C**
	West	Left	0	0	-	0	0	-	24	9	A	242	11	B	242	14	B	347	15	B
		Through	110	0	A	121	0	A	6	17	C	107	14	B	107	18	C	98	21	C
		Right	0	0	-	0	0	-	23	20	C	57	11	B	56	13	B	41	15	B
		Approach	**110**	**0**	**A**	**121**	**0**	**A**	**53**	**20**	**C**	**406**	**14**	**B**	**405**	**18**	**C**	**486**	**21**	**C**
	Intersection		**286**	**0**	**A**	**307**	**0**	**A**	**1,308**	**21**	**C**	**1,332**	**18**	**C**	**1,334**	**23**	**C**	**1,559**	**21**	**C**

AM 2048 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Ashley Street / Coldstream Road	North	Left	316	2	A	309	2	A	418	2	A	371	2	A	371	2	A	426	2	A
		Through	352	2	A	391	2	A	276	2	A	315	2	A	314	2	A	277	2	A
		Approach	**668**	**2**	**A**	**700**	**2**	**A**	**695**	**2**	**A**	**686**	**2**	**A**	**685**	**2**	**A**	**703**	**2**	**A**
	South	Right	85	9	A	68	10	A	61	10	A	61	10	A	61	10	A	59	10	A
		Through	241	1	A	306	2	A	222	1	A	247	1	A	246	1	A	234	1	A
		Approach	**326**	**9**	**A**	**374**	**10**	**A**	**283**	**10**	**A**	**308**	**10**	**A**	**307**	**10**	**A**	**293**	**10**	**A**
	East	Right	245	24	C	188	25	C	271	19	C	240	19	C	242	20	C	259	19	C
		Left	65	7	A	62	8	A	54	7	A	57	7	A	56	7	A	54	7	A
		Approach	**310**	**24**	**C**	**250**	**25**	**C**	**325**	**19**	**C**	**297**	**19**	**C**	**298**	**20**	**C**	**313**	**19**	**C**
	Intersection		**1,304**	**24**	**C**	**1,324**	**25**	**C**	**1,302**	**19**	**C**	**1,291**	**19**	**C**	**1,290**	**20**	**C**	**1,309**	**19**	**C**
Ashley Street / High Street	North	Left	21	27	C	18	33	C	22	28	C	27	27	C	23	28	C	26	28	C
		Through	421	27	C	502	33	C	433	28	C	432	28	C	433	28	C	411	28	C
		Right	69	18	B	44	22	C	64	19	B	64	19	B	64	19	B	64	19	B
		Approach	**510**	**25**	**C**	**564**	**32**	**C**	**519**	**27**	**C**	**522**	**26**	**C**	**520**	**27**	**C**	**501**	**27**	**C**
	South	Left	0	28	-	0	34	-	0	28	-	0	29	-	0	28	-	0	29	-
		Through	284	24	C	380	28	C	275	24	C	307	24	C	305	24	C	292	24	C
		Right	200	26	C	208	40	D	175	26	C	159	22	C	161	22	C	152	22	C
		Approach	**483**	**25**	**C**	**588**	**32**	**C**	**449**	**25**	**C**	**466**	**24**	**C**	**467**	**23**	**C**	**443**	**24**	**C**
	East	Left	187	46	D	159	44	D	155	40	D	155	39	D	155	39	D	148	39	D
		Through	119	44	D	151	41	D	115	37	D	115	37	D	115	37	D	114	36	D
		Right	119	34	C	94	38	D	127	35	C	127	34	C	127	34	C	124	34	C
		Approach	**426**	**42**	**D**	**404**	**42**	**D**	**396**	**37**	**D**	**398**	**37**	**D**	**398**	**37**	**D**	**386**	**37**	**D**
	West	Left	0	28	C	0	30	C	0	28	C	0	28	C	0	28	C	0	28	C
		Through	221	25	C	295	27	C	203	24	C	206	24	C	206	24	C	203	24	C
		Right	0	46	-	0	44	-	0	41	-	0	41	-	0	41	-	0	41	-
		Approach	**221**	**25**	**C**	**296**	**27**	**C**	**203**	**24**	**C**	**206**	**24**	**C**	**206**	**24**	**C**	**203**	**24**	**C**
	Intersection		**1,641**	**30**	**C**	**1,852**	**33**	**C**	**1,568**	**29**	**C**	**1,592**	**28**	**C**	**1,590**	**28**	**C**	**1,533**	**28**	**C**
Ivory Street / Northbrook Road	North	Left	140	2	A	41	27	C	146	2	A	90	2	A	96	2	A	111	2	A
		Through	558	2	A	696	27	C	429	2	A	481	2	A	479	2	A	422	2	A
		Approach	**697**	**2**	**A**	**738**	**27**	**C**	**575**	**2**	**A**	**571**	**2**	**A**	**575**	**2**	**A**	**533**	**2**	**A**
	East	Left	127	139	F	173	96	F	186	36	E	160	37	E	160	32	D	184	30	D
		Right	112	141	F	108	102	F	101	47	E	96	47	E	95	41	E	98	40	E
		Approach	**239**	**141**	**F**	**282**	**98**	**F**	**286**	**47**	**E**	**255**	**47**	**E**	**254**	**41**	**E**	**282**	**40**	**E**
	West	Through	340	2	A	577	4	A	376	2	A	395	2	A	397	2	A	373	2	A
		Right	325	19	C	220	52	D	317	12	B	311	11	B	315	11	B	306	11	B
		Approach	**665**	**19**	**C**	**797**	**17**	**B**	**693**	**12**	**B**	**706**	**11**	**B**	**712**	**11**	**B**	**679**	**11**	**B**
	Intersection		**1,601**	**141**	**F**	**1,816**	**34**	**C**	**1,554**	**47**	**E**	**1,533**	**47**	**E**	**1,541**	**41**	**E**	**1,494**	**40**	**E**
Percival Street / Victoria Street	North	Left	8	13	B	27	14	B	79	14	B	55	14	B	62	13	B	58	13	B
		Right	36	62	F	57	68	F	28	42	E	28	45	E	28	43	E	28	42	E
		Approach	**44**	**62**	**F**	**84**	**68**	**F**	**107**	**42**	**E**	**83**	**45**	**E**	**90**	**43**	**E**	**86**	**42**	**E**
	South	Through	120	3	A	165	1	A	111	3	A	103	3	A	105	3	A	109	3	A
		Right	759	3	A	911	1	A	730	3	A	766	3	A	765	3	A	738	3	A
		Approach	**879**	**3**	**A**	**1,076**	**1**	**A**	**841**	**3**	**A**	**870**	**3**	**A**	**870**	**3**	**A**	**846**	**3**	**A**
	East	Left	709	2	A	933	1	A	601	2	A	639	2	A	637	2	A	591	2	A
		Right	0	13	-	17	15	B	0	12	-	0	12	-	0	12	-	0	12	-
		Approach	**709**	**13**	**B**	**949**	**15**	**B**	**601**	**12**	**B**	**639**	**12**	**B**	**637**	**12**	**B**	**591**	**12**	**B**
	Intersection		**1,632**	**62**	**F**	**2,109**	**68**	**F**	**1,549**	**42**	**E**	**1,592**	**45**	**E**	**1,596**	**43**	**E**	**1,524**	**42**	**E**
Percival Street / Johns Road	North	Through	673	2	A	903	1	A	528	2	A	578	2	A	575	2	A	522	2	A
		Right	71	13	B	86	17	C	102	13	B	90	14	B	89	13	B	97	13	B
		Approach	**744**	**13**	**B**	**990**	**17**	**C**	**629**	**13**	**B**	**667**	**14**	**B**	**665**	**13**	**B**	**619**	**13**	**B**
	South	Left	111	2	A	115	1	A	113	2	A	121	3	A	121	2	A	116	2	A
		Through	662	2	A	884	1	A	659	2	A	689	3	A	689	2	A	664	2	A
		Approach	**773**	**2**	**A**	**999**	**1**	**A**	**773**	**2**	**A**	**810**	**3**	**A**	**810**	**2**	**A**	**780**	**2**	**A**
	West	Left	218	17	C	192	19	C	182	15	B	181	16	C	181	15	B	182	15	B
		Right	72	73	F	67	74	F	54	42	E	43	42	E	44	41	E	55	42	E
		Approach	**290**	**73**	**F**	**260**	**74**	**F**	**235**	**42**	**E**	**224**	**42**	**E**	**225**	**41**	**E**	**237**	**42**	**E**
	Intersection		**1,807**	**73**	**F**	**2,248**	**74**	**F**	**1,637**	**42**	**E**	**1,702**	**42**	**E**	**1,700**	**41**	**E**	**1,637**	**42**	**E**
Percival Street / Charles Street	North	Left	222	2	A	178	1	A	97	2	A	94	2	A	93	2	A	96	2	A
		Through	348	2	A	774	1	A	459	2	A	499	2	A	498	2	A	459	2	A
		Right	175	15	B	18	13	B	26	11	B	28	11	B	28	11	B	22	11	B
		Approach	**745**	**15**	**B**	**970**	**13**	**B**	**582**	**11**	**B**	**621**	**11**	**B**	**619**	**11**	**B**	**577**	**11**	**B**
	South	Left	6	2	A	10	1	A	7	2	A	8	2	A	8	2	A	7	2	A
		Through	619	2	A	895	1	A	615	2	A	664	2	A	664	2	A	632	2	A
		Right	0	8	-	0	18	-	0	8	-	0	8	-	0	8	-	0	8	-
		Approach	**625**	**8**	**A**	**904**	**18**	**C**	**622**	**8**	**A**	**672**	**8**	**A**	**673**	**8**	**A**	**639**	**8**	**A**
	East	Left	223	8	A	355	44	E	40	8	A	1	8	A	1	8	A	8	8	A
		Through	29	179	F	4	115	F	4	45	E	2	48	E	2	42	E	1	42	E
		Right	141	178	F	79	115	F	116	45	E	107	48	E	107	43	E	107	42	E
		Approach	**393**	**179**	**F**	**439**	**115**	**F**	**160**	**45**	**E**	**110**	**48**	**E**	**109**	**43**	**E**	**117**	**42**	**E**
	West	Left	13	47	E	25	44	E	42	22	C	39	22	C	39	21	C	41	22	C
		Through	94	59	F	25	57	F	51	27	D	49	27	D	48	26	D	38	27	D
		Right	1	58	F	11	57	F	2	26	D	1	27	D	1	26	D	16	27	D
		Approach	**108**	**59**	**F**	**61**	**57**	**F**	**95**	**27**	**D**	**89**	**27**	**D**	**88**	**26**	**D**	**96**	**27**	**D**
	Intersection		**1,871**	**179**	**F**	**2,375**	**115**	**F**	**1,459**	**45**	**E**	**1,492**	**48**	**E**	**1,489**	**43**	**E**	**1,429**	**42**	**E**
Southbrook Road / South Belt / Percival Street / Boys Road	North	Left	0	427	-	0	64	-	0	58	-	0	61	-	0	59	-	0	54	-
		Through	619	0	A	1,131	51	D	500	46	D	501	48	D	500	46	D	483	42	D
		Right	0	437	F	10	51	D	1	54	D	0	58	E	0	53	D	1	51	D
		Approach	**619**	**0**	**A**	**1,140**	**51**	**D**	**501**	**46**	**D**	**501**	**48**	**D**	**500**	**46**	**D**	**483**	**42**	**D**
	South	Left	21	58	E	25	18	B	23	30	C	23	34	C	23	29	C	23	31	C
		Through	625	58	E	753	16	B	554	29	C	582	33	C	581	28	C	558	30	C
		Right	74	65	E	104	23	C	123	30	C	42	32	C	43	29	C	35	29	C
		Approach	**720**	**58**	**E**	**881**	**17**	**B**	**700**	**29**	**C**	**648**	**33**	**C**	**647**	**28**	**C**	**616**	**30**	**C**
	East	Left	278	0	A	230	156	F	200	54	D	184	46	D	184	45	D	177	42	D
		Through	1	448	F	32	147	F	62	46	D	76	39	D	75	39	D	74	34	C
		Right	0	449	F	146	155	F	56	45	D	77	42	D	78	41	D	68	38	D
		Approach	**280**	**2**	**A**	**407**	**155**	**F**	**318**	**51**	**D**	**337**	**43**	**D**	**338**	**42**	**D**	**318**	**39**	**D**
	West	Left	1	359	F	9	18	B	12	17	B	13	17	B	13	17	B	13	16	B
		Through	9	356	F	160	18	B	196	16	B	188	17	B	188	16	B	176	16	B
		Right	324	0	A	411	30	C	355	23	C	412	25	C	413	23	C	365	22	C
		Approach	**334**	**10**	**A**	**579**	**26**	**C**	**563**	**20**	**B**	**613**	**23**	**C**	**614**	**21**	**C**	**554**	**20**	**B**
	Intersection		**1,953**	**24**	**C**	**3,008**	**50**	**D**	**2,082**	**34**	**C**	**2,099**	**35**	**C**	**2,098**	**33**	**C**	**1,972**	**32**	**C**
Southbrook Road / Torlesse Street	North	Left	8	3	A	56	3	A	5	3	A	3	3	A	5	3	A	24	3	A
		Through	1,011	5	A	1,616	6	A	931	5	A	958	5	A	955	5	A	898	5	A
		Right	0	5	A	0	5	A	0	5	A	0	5	A	0	5	A	0	5	A
		Approach	**1,019**	**5**	**A**	**1,672**	**6**	**A**	**936**	**5**	**A**	**961**	**5**	**A**	**960**	**5**	**A**	**923**	**5**	**A**
	South	Left	9	3	A	9	2	A	9	3	A	9	3	A	9	3	A	9	3	A
		Through	661	4	A	816	2	A	640	4	A	605	4	A	604	4	A	576	4	A
		Right	20	13	B	37	13	B	18	12	B	18	12	B	18	12	B	18	11	B
		Approach	**691**	**5**	**A**	**861**	**2**	**A**	**668**	**4**	**A**	**632**	**4**	**A**	**631**	**4**	**A**	**603**	**4**	**A**
	East	Left	8	63	E	4	61	E	3	61	E	10	63	E	10	61	E	7	63	E
		Through	3	63	E	2	61	E	0	61	E	1	63	E	1	61	E	1	63	E
		Right	48	57	E	57	59	E	25	51	D	10	50	D	10	50	D	9	49	D
		Approach	**59**	**58**	**E**	**64**	**60**	**E**	**27**	**52**	**D**	**21**	**56**	**E**	**21**	**56**	**E**	**17**	**56**	**E**
	West	Left	73	237	F	4	9	A	0	9	-	0	8	-	0	8	-	0	8	-
		Through	10	310	F	10	40	D	1	39	D	5	39	D	5	39	D	5	39	D
		Right	60	313	F	44	41	D	21	39	D	20	40	D	20	39	D	20	39	D
		Approach	**143**	**274**	**F**	**59**	**38**	**D**	**22**	**39**	**D**	**25**	**39**	**D**	**25**	**39**	**D**	**25**	**39**	**D**
	Intersection		**1,912**	**27**	**C**	**2,656**	**7**	**A**	**1,653**	**6**	**A**	**1,639**	**6**	**A**	**1,637**	**6**	**A**	**1,567**	**6**	**A**
Southbrook Road / Pak 'n Save supermarket	North	Left	71	4	A	90	2	A	100	3	A	56	3	A	56	3	A	55	3	A
		Through	904	5	A	1,464	4	A	743	4	A	822	4	A	819	4	A	758	4	A
		Right	88	9	A	110	6	A	112	8	A	111	8	A	110	8	A	113	7	A
		Approach	**1,064**	**5**	**A**	**1,664**	**4**	**A**	**955**	**4**	**A**	**989**	**4**	**A**	**985**	**4**	**A**	**926**	**4**	**A**
	South	Left	70	5	A	50	3	A	48	4	A	50	4	A	50	4	A	47	4	A
		Through	650	6	A	815	3	A	617	6	A	591	6	A	590	6	A	570	6	A
		Right	41	15	B	31	6	A	38	10	A	15	11	B	15	10	A	16	9	A
		Approach	**760**	**7**	**A**	**895**	**3**	**A**	**702**	**6**	**A**	**656**	**6**	**A**	**655**	**6**	**A**	**633**	**6**	**A**
	East	Left	21	45	D	18	44	D	16	44	D	24	44	D	24	44	D	24	45	D
		Through	1	45	D	1	44	D	1	44	D	1	44	D	1	44	D	1	45	D
		Right	17	40	D	20	40	D	22	40	D	14	40	D	14	40	D	14	40	D
		Approach	**39**	**43**	**D**	**39**	**42**	**D**	**39**	**42**	**D**	**39**	**43**	**D**	**39**	**43**	**D**	**39**	**43**	**D**
	West	Left	24	9	A	27	9	A	29	9	A	27	9	A	27	9	A	19	8	A
		Through	1	36	D	1	35	C	1	35	C	1	35	C	1	35	C	1	36	D
		Right	26	36	D	24	36	D	21	36	D	24	36	D	24	36	D	31	36	D
		Approach	**51**	**24**	**C**	**51**	**22**	**C**	**51**	**21**	**C**	**51**	**21**	**C**	**51**	**21**	**C**	**51**	**26**	**C**
	Intersection		**1,914**	**7**	**A**	**2,649**	**5**	**A**	**1,747**	**6**	**A**	**1,734**	**6**	**A**	**1,731**	**6**	**A**	**1,649**	**6**	**A**

AM 2048 LOS Intersection	Approach	Movement	Do Minimum Veh	Do Minimum Delay	Do Minimum LOS	Option A Veh	Option A Delay	Option A LOS	Option B.1a Veh	Option B.1a Delay	Option B.1a LOS	Option B.2.1 Veh	Option B.2.1 Delay	Option B.2.1 LOS	Option B.2.2 Veh	Option B.2.2 Delay	Option B.2.2 LOS	Option B.1 Veh	Option B.1 Delay	Option B.1 LOS
Lineside Road / Todds Road	North	Left	14	4	A	9	13	B	0	3	A	14	3	A	14	3	A	22	3	A
		Through	933	4	A	1,487	13	B	768	3	A	846	3	A	844	3	A	785	3	A
		Right	4	11	B	10	19	B	12	10	A	9	10	A	8	10	A	7	9	A
		Approach	**951**	**11**	**B**	**1,505**	**13**	**B**	**780**	**10**	**A**	**869**	**10**	**A**	**866**	**10**	**A**	**814**	**9**	**A**
	South	Left	13	3	A	11	5	A	8	2	A	12	2	A	12	2	A	17	2	A
		Through	731	3	A	878	5	A	689	2	A	648	2	A	647	2	A	624	2	A
		Right	27	19	C	3	18	B	1	13	B	67	17	C	67	15	B	84	16	C
		Approach	**772**	**19**	**C**	**892**	**5**	**A**	**698**	**13**	**B**	**726**	**17**	**C**	**726**	**15**	**B**	**726**	**16**	**C**
	West	Left	29	234	F	16	50	D	13	17	C	8	45	E	8	41	E	8	40	E
		Through	38	243	F	54	50	D	1	44	E	35	56	F	35	51	F	36	53	F
		Right	20	243	F	24	50	D	15	45	E	3	56	F	3	51	F	3	52	F
		Approach	**88**	**243**	**F**	**95**	**50**	**D**	**29**	**45**	**E**	**46**	**56**	**F**	**46**	**51**	**F**	**47**	**53**	**F**
	Intersection		**1,810**	**243**	**F**	**2,492**	**11**	**B**	**1,508**	**45**	**E**	**1,641**	**56**	**F**	**1,638**	**51**	**F**	**1,587**	**53**	**F**
Lineside Road / Flaxton Road	North	Through	835	3	A	1,079	10	A	526	3	A	573	3	A	570	3	A	520	3	A
		Right	118	9	A	364	20	B	257	11	B	277	12	B	277	11	B	267	12	B
		Approach	**953**	**9**	**A**	**1,443**	**12**	**B**	**783**	**11**	**B**	**849**	**12**	**B**	**847**	**11**	**B**	**788**	**12**	**B**
	South	Left	40	2	A	42	5	A	173	2	A	169	2	A	169	2	A	183	2	A
		Through	487	2	A	607	6	A	401	2	A	413	2	A	413	2	A	405	2	A
		Approach	**527**	**2**	**A**	**649**	**6**	**A**	**574**	**2**	**A**	**582**	**2**	**A**	**582**	**2**	**A**	**588**	**2**	**A**
	West	Left	284	13	B	285	47	D	297	10	A	313	11	B	313	10	A	321	11	B
		Right	13	39	E	13	42	D	13	25	C	2	26	D	2	23	C	2	24	C
		Approach	**297**	**39**	**E**	**297**	**47**	**D**	**310**	**25**	**C**	**315**	**26**	**D**	**315**	**23**	**C**	**322**	**24**	**C**
	Intersection		**1,777**	**39**	**E**	**2,389**	**15**	**B**	**1,667**	**25**	**C**	**1,746**	**26**	**D**	**1,743**	**23**	**C**	**1,698**	**24**	**C**
Coldstream Road / REL	South	Left	60	6	A	59	6	A	81	6	A	80	6	A	80	6	A	81	6	A
		Right	28	10	A	14	9	A	19	11	B	17	11	B	17	11	B	19	11	B
		Approach	**88**	**10**	**A**	**74**	**9**	**A**	**99**	**11**	**B**	**98**	**11**	**B**	**98**	**11**	**B**	**100**	**11**	**B**
	East	Left	12	2	A	14	2	A	15	2	A	15	2	A	15	2	A	15	2	A
		Through	265	2	A	203	2	A	256	2	A	228	2	A	229	2	A	244	2	A
		Approach	**277**	**2**	**A**	**216**	**2**	**A**	**271**	**2**	**A**	**243**	**2**	**A**	**244**	**2**	**A**	**259**	**2**	**A**
	West	Through	306	3	A	280	3	A	308	3	A	295	3	A	293	3	A	325	3	A
		Right	99	6	A	99	5	A	173	6	A	139	6	A	141	6	A	161	6	A
		Approach	**406**	**6**	**A**	**379**	**5**	**A**	**481**	**6**	**A**	**434**	**6**	**A**	**434**	**6**	**A**	**486**	**6**	**A**
	Intersection		**771**	**10**	**A**	**669**	**9**	**A**	**851**	**11**	**B**	**775**	**11**	**B**	**776**	**11**	**B**	**845**	**11**	**B**
Kippenberger Ave / MacPhail Ave	North	Left	10	9	A	11	9	A	11	12	B	12	13	B	12	14	B	11	13	B
		Through	109	12	B	164	11	B	294	14	B	224	15	B	226	16	B	275	16	B
		Right	225	14	B	191	14	B	178	17	B	192	18	B	192	19	B	169	18	B
		Approach	**344**	**13**	**B**	**366**	**13**	**B**	**484**	**15**	**B**	**428**	**16**	**B**	**430**	**17**	**B**	**456**	**17**	**B**
	South	Left	92	14	B	29	11	B	60	11	B	39	11	B	39	11	B	58	11	B
		Through	112	16	B	79	13	B	121	14	B	120	14	B	118	14	B	122	14	B
		Right	45	19	B	43	16	B	52	16	B	46	16	B	46	16	B	53	16	B
		Approach	**248**	**16**	**B**	**151**	**14**	**B**	**233**	**14**	**B**	**204**	**14**	**B**	**203**	**14**	**B**	**234**	**14**	**B**
	East	Left	7	10	A	27	11	B	56	15	B	33	13	B	28	14	B	47	15	B
		Through	394	13	B	390	13	B	376	18	B	378	16	B	381	17	B	374	17	B
		Right	78	15	B	43	16	B	28	20	B	49	18	B	47	19	B	38	20	B
		Approach	**479**	**13**	**B**	**460**	**13**	**B**	**461**	**18**	**B**	**461**	**16**	**B**	**456**	**17**	**B**	**459**	**17**	**B**
	West	Left	46	8	A	42	8	A	42	9	A	42	9	A	42	9	A	42	9	A
		Through	261	11	B	211	10	A	285	11	B	353	12	B	337	12	B	344	12	B
		Right	44	13	B	50	13	B	123	14	B	127	14	B	128	14	B	138	14	B
		Approach	**351**	**11**	**B**	**302**	**11**	**B**	**450**	**12**	**B**	**523**	**12**	**B**	**506**	**12**	**B**	**525**	**12**	**B**
	Intersection		**1,422**	**13**	**B**	**1,278**	**12**	**B**	**1,627**	**15**	**B**	**1,615**	**15**	**B**	**1,595**	**15**	**B**	**1,674**	**15**	**B**
Northbrook Road / MacPhail Ave / REL	North	Left	104	7	A	107	7	A	0	15	B	0	12	B	0	13	B	0	13	B
		Through	0	0	-	0	0	-	431	17	B	359	14	B	357	15	B	440	16	B
		Right	51	12	B	127	13	B	22	20	B	23	17	B	22	18	B	22	18	B
		Approach	**155**	**12**	**B**	**233**	**13**	**B**	**454**	**17**	**B**	**381**	**15**	**B**	**380**	**15**	**B**	**463**	**16**	**B**
	South	Left	0	0	-	0	0	-	249	8	A	224	8	A	226	8	A	253	8	A
		Through	0	0	-	0	0	-	130	11	B	94	11	B	93	11	B	129	11	B
		Right	0	0	-	0	0	-	27	13	B	14	13	B	14	13	B	27	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**405**	**9**	**A**	**332**	**9**	**A**	**332**	**9**	**A**	**409**	**9**	**A**
	East	Left	0	0	-	0	0	-	43	14	B	27	13	B	27	14	B	46	14	B
		Through	243	2	A	331	2	A	150	17	B	140	15	B	140	16	B	146	17	B
		Right	153	7	A	57	6	A	0	19	-	0	18	-	0	19	-	0	19	-
		Approach	**396**	**7**	**A**	**388**	**6**	**A**	**193**	**16**	**B**	**168**	**15**	**B**	**167**	**16**	**B**	**192**	**16**	**B**
	West	Left	69	2	A	71	2	A	39	9	A	22	9	A	16	9	A	39	9	A
		Through	411	2	A	354	2	A	241	12	B	249	11	B	258	11	B	201	12	B
		Right	0	0	-	0	0	-	313	14	B	138	14	B	138	14	B	311	14	B
		Approach	**480**	**2**	**A**	**426**	**2**	**A**	**594**	**13**	**B**	**409**	**12**	**B**	**412**	**12**	**B**	**551**	**13**	**B**
	Intersection		**1,030**	**12**	**B**	**1,047**	**13**	**B**	**1,646**	**14**	**B**	**1,289**	**12**	**B**	**1,291**	**13**	**B**	**1,614**	**13**	**B**
REL / Boys Road	North	Left	0	8	-	0	8	-	0	11	-	0	10	-	0	10	-	0	10	-
		Through	0	0	-	0	0	-	748	13	B	645	12	B	638	12	B	778	13	B
		Right	0	11	-	0	11	-	2	16	B	27	15	B	29	15	B	0	15	B
		Approach	**0**	**11**	**-**	**0**	**11**	**-**	**750**	**13**	**B**	**672**	**12**	**B**	**667**	**12**	**B**	**778**	**13**	**B**
	South	Left	0	0	-	0	0	-	2	7	A	0	7	-	0	7	-	0	8	-
		Through	0	0	-	0	0	-	199	10	A	199	10	A	199	10	A	270	10	A
		Right	0	0	-	0	0	-	12	12	B	28	12	B	28	12	B	33	13	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**212**	**10**	**A**	**226**	**10**	**A**	**227**	**10**	**A**	**303**	**10**	**A**
	East	Left	0	0	-	0	0	-	25	13	B	30	11	B	30	12	B	45	13	B
		Through	36	8	A	40	8	A	70	15	B	66	14	B	66	14	B	47	15	B
		Right	0	11	-	0	11	-	0	18	-	0	16	-	0	17	-	0	18	-
		Approach	**36**	**11**	**B**	**40**	**11**	**B**	**94**	**14**	**B**	**96**	**13**	**B**	**96**	**14**	**B**	**92**	**14**	**B**
	West	Left	0	8	-	0	8	-	112	8	A	33	8	A	33	8	A	48	8	A
		Through	70	11	B	98	11	B	140	11	B	99	11	B	99	11	B	95	11	B
		Right	0	0	-	0	0	-	18	13	B	0	13	-	0	13	-	0	13	-
		Approach	**70**	**11**	**B**	**98**	**11**	**B**	**270**	**10**	**A**	**132**	**10**	**A**	**132**	**10**	**A**	**143**	**10**	**A**
	Intersection		**106**	**11**	**B**	**138**	**11**	**B**	**1,327**	**12**	**B**	**1,127**	**12**	**B**	**1,122**	**12**	**B**	**1,316**	**12**	**B**
Lineside Road / REL	North	Through	0	0	-	0	0	-	677	12	B	626	11	B	622	11	B	678	11	B
		Right	0	0	-	0	0	-	175	18	B	0	17	B	0	17	B	0	17	B
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**852**	**13**	**B**	**626**	**11**	**B**	**622**	**11**	**B**	**678**	**11**	**B**
	South	Left	491	0	A	602	0	A	414	11	B	401	11	B	401	11	B	390	11	B
		Through	0	0	-	0	0	-	164	17	B	155	16	B	156	16	B	197	16	B
		Approach	**491**	**0**	**A**	**602**	**0**	**A**	**578**	**13**	**B**	**557**	**12**	**B**	**557**	**12**	**B**	**588**	**13**	**B**
	West	Left	0	0	-	0	0	-	32	10	A	0	10	-	0	10	-	0	10	-
		Right	922	0	A	1,113	0	A	538	16	B	574	16	B	571	15	B	522	16	B
		Approach	**922**	**0**	**A**	**1,113**	**0**	**A**	**570**	**15**	**B**	**574**	**16**	**B**	**571**	**15**	**B**	**522**	**16**	**B**
	Intersection		**1,413**	**0**	**A**	**1,716**	**0**	**A**	**2,000**	**14**	**B**	**1,756**	**13**	**B**	**1,750**	**13**	**B**	**1,787**	**13**	**B**
REL / Marsh Road	North	Left	0	0	-	0	0	-	0	2	-	0	2	-	0	2	-	0	3	-
		Through	0	0	-	0	0	-	812	2	A	589	2	A	582	2	A	649	3	A
		Right	0	0	-	0	0	-	27	5	A	190	5	A	191	5	A	226	6	A
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**839**	**5**	**A**	**779**	**5**	**A**	**772**	**5**	**A**	**875**	**6**	**A**
	South	Left	0	0	-	0	0	-	14	1	A	48	1	A	48	1	A	47	1	A
		Through	0	0	-	0	0	-	160	1	A	108	1	A	108	1	A	150	1	A
		Right	0	0	-	0	0	-	21	11	B	0	8	-	0	8	-	0	8	-
		Approach	**0**	**0**	**-**	**0**	**0**	**-**	**196**	**11**	**B**	**155**	**8**	**A**	**156**	**8**	**A**	**197**	**8**	**A**
	East	Left	0	0	-	0	0	-	34	13	B	0	11	B	0	12	B	0	11	B
		Through	109	0	A	97	0	A	3	18	C	60	15	B	60	17	C	46	18	C
		Right	0	0	-	0	0	-	0	18	-	0	15	-	0	16	-	0	18	-
		Approach	**109**	**0**	**A**	**97**	**0**	**A**	**37**	**18**	**C**	**60**	**15**	**B**	**60**	**17**	**C**	**46**	**18**	**C**
	West	Left	0	0	-	0	0	-	6	5	A	84	6	A	84	6	A	116	7	A
		Through	87	0	A	111	0	A	1	16	C	56	14	B	56	16	C	54	14	B
		Right	0	0	-	0	0	-	6	19	C	37	14	B	40	16	C	29	18	C
		Approach	**87**	**0**	**A**	**111**	**0**	**A**	**13**	**19**	**C**	**177**	**14**	**B**	**181**	**16**	**C**	**199**	**18**	**C**
	Intersection		**197**	**0**	**A**	**208**	**0**	**A**	**1,085**	**19**	**C**	**1,171**	**15**	**B**	**1,169**	**17**	**C**	**1,317**	**18**	**C**

Appendix F Appraisal Summary Table

Measure	Baseline & Method	Do Minimum	Option A	Option B1	Option B2.1	Option B2.2
1.1 Impact on social cost and incidents of crashes						
Conflicts, severance and exposure of vulnerable road users	Southbrook Road daily traffic volumes (24,000 2023 count)	2038 daily volumes estimated at 23,000vpd	Increase to 29,000 vpd in 2038 with four laning	Decreases to 20,000vpd in 2038 with REL		
Lineside Road level crossing exposure	Lineside Road level crossing daily traffic volume (15,150vpd, 2025 mobile roads estimate)	Increase to 16,250vpd by 2038	Increase to 20,800 vpd in 2038 with four laning (no level crossing upgrade)	Decreases to 14,700vpd in 2038 with REL. Upgrade of Lineside Road level crossing		Decreases to 14,700vpd in 2038 with REL. No upgrade of crossing
5.1 Impact on system reliability						
5.1.3 Travel time delay	Travel time delay on Southbrook Road corridor compared to 50kph free flow speed. Baseline of 160% (AM) to 180% (PM) from the 2021 model	Delay increases to >250% of free flow in both AM and PM by 2038	At 2038 travel time delay is between 150% (AM) and 190% (PM)	At 2038 travel time delay is between 160% (AM) and 195% (PM)		
5.1.2 Travel time reliability - motor vehicles	Measured as a percentage of the inter-peak travel time, 120-130% for AM/PM peak (2021 model baseline)	Variation in peak travel time increases to 200% (AM) and 165% (PM) in 2038	2038 AM is 120 to 125%; PM is 140% of interpeak	2038 AM is 120 to 125%; PM is 140% of interpeak		
5.2 Impact on network productivity and utilisation						
5.2.6 Access to key economic destinations (all modes)	100% of Rangiora population within 10min of Southbrook in the AM peak (2028 model estimate)	By 2038 this reduced to ~70% in the AM peak	Estimated 100% of the Rangiora population in 2038			
5.2.6 Access to key economic destinations (all modes)	90% of Rangiora population within 15min of SH1 in the AM peak (2028 model estimate)	By 2038 this reduced to 15% in the AM peak	Approximately 55-60% of the Rangiora population in 2038			
8.1 Impact on greenhouse gas emissions						
8.1.3 Light vehicle use impacts	Network distance travelled (vehicle kilometres) from the CAST model	11.3% increase in vehicle kilometres travelled from 2028 to 2038	0.08% reduction in VKT (8,800km daily) in 2038	0.06% reduction in VKT (7,100km daily) in 2038	0.06% reduction in VKT (6,700km daily) in 2038	0.07% reduction in VKT (8,200km daily) in 2038

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