Ashburton Second Urban Bridge and Associated New Road

Chalmers Ave Intersections Priority Change Report

Ashburton District Council

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1 Introduction

1.1 Purpose

As part of the proposed 2nd bridge crossing of the Ashburton River. This report looks at the merit of changing the intersection priorities along Chalmers Ave, Ashburton.

1.2 Location

Chalmers Ave runs between Walnut Ave and the Ashburton River, as shown in Figure 1 below. The proposed 2nd bridge crossing will be at the southern end of Chalmers Ave.

Figure 1 - Location of Chalmers Ave

1.3 Project Background

It is proposed to construct a 2nd bridge across the Ashburton River at end of Chalmers Ave. This would connect to the suburb of Tinwald. The purpose of this 2nd bridge is to ease congestion on SH1.

2 Existing Information

2.1 Traffic Volumes

Existing traffic volumes are typically 2500-3000 vehicles per day(vpd) along the various sections of Chalmers Ave. Most of the cross-roads which intersect Chalmers Ave typically have less than 1000 vpd. However there are four intersections which have slightly more; Walnut Ave, Victoria St/Wakanui Rd, Havelock St/Wellington St and Moore St.

Walnut Ave and Moore St are existing roundabouts, so the Victoria/Wakanui and Havelock/Wellington intersections will be the most likely candidates for a priority change.

2.2 Crash History

The NZTA Crash Analysis System (CAS) records 55 crashes along Chalmers Ave over the last 10 years (2003-2012) these are shown in Figure 2 below.

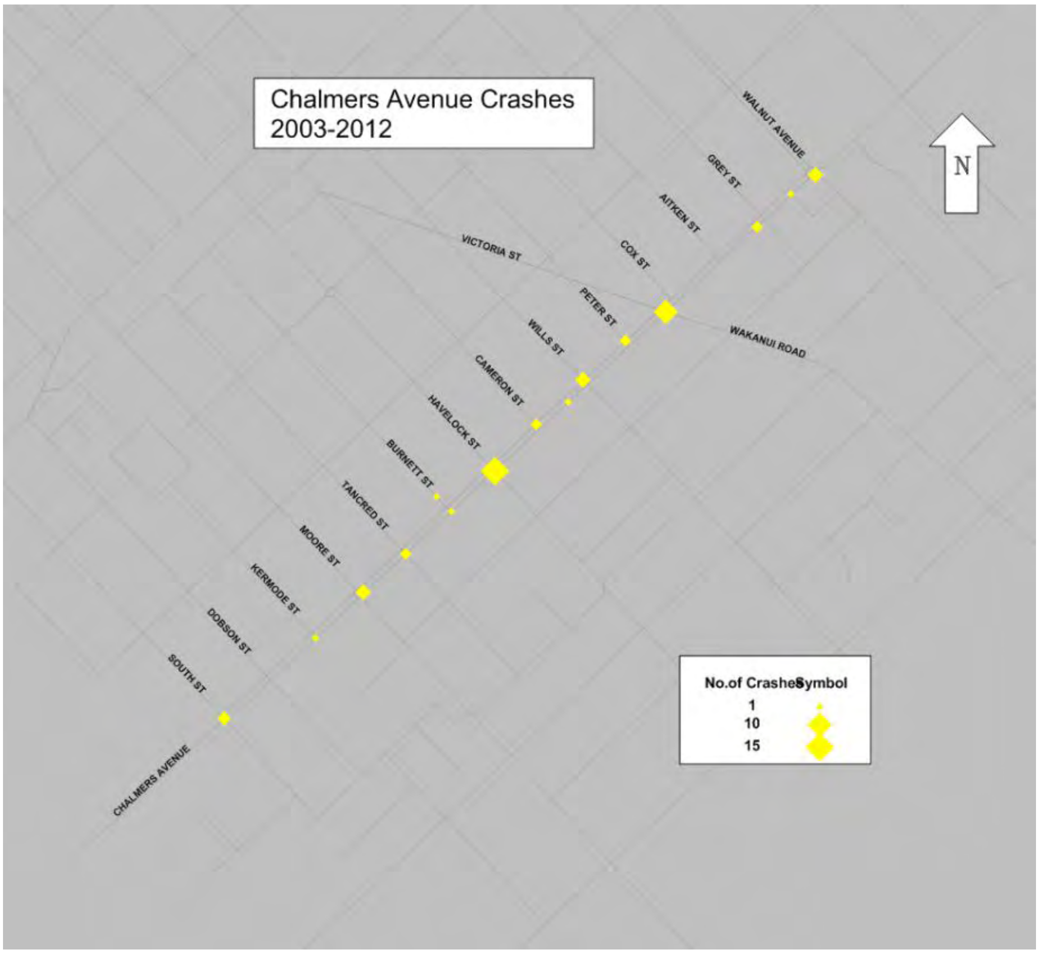

Figure 2 - Chalmers Ave Crashes

Of the 55 crashes, 4 were serious injury crashes and 13 were minor injury crashes. As can be seen in Figure 2, there are more crashes at the Victoria/Wakanui and Havelock/Wellington intersections. This is expected due to the fact that they have higher volumes.

- Victoria/Wakanui intersection has had 10 crashes (2 serious, 1 minor, 7 non-injury) in the last 10 years. This is an injury crash rate of 0.3 (3 injury crashes in 10 years)
- Havelock/Wellington intersection has had 15 crashes (5 minor, 10 non-injury) in the last 10 years. This is an injury crash rate of 0.5 (5 injury crashes in 10 years)

3 Analysis

3.1 Predicted Turning Volumes

To understand how the intersection will operate with the 2nd Ashburton bridge in place, we will consider the predicted intersection turning volumes. A SATURN model was created for the Ashburton 2nd bridge project. The Victoria/Wakanui intersection was included in the modelling and we can examine the predicted turning volumes for this intersection. These are shown for the 2016/2026 AM and PM peaks in Figure 3.

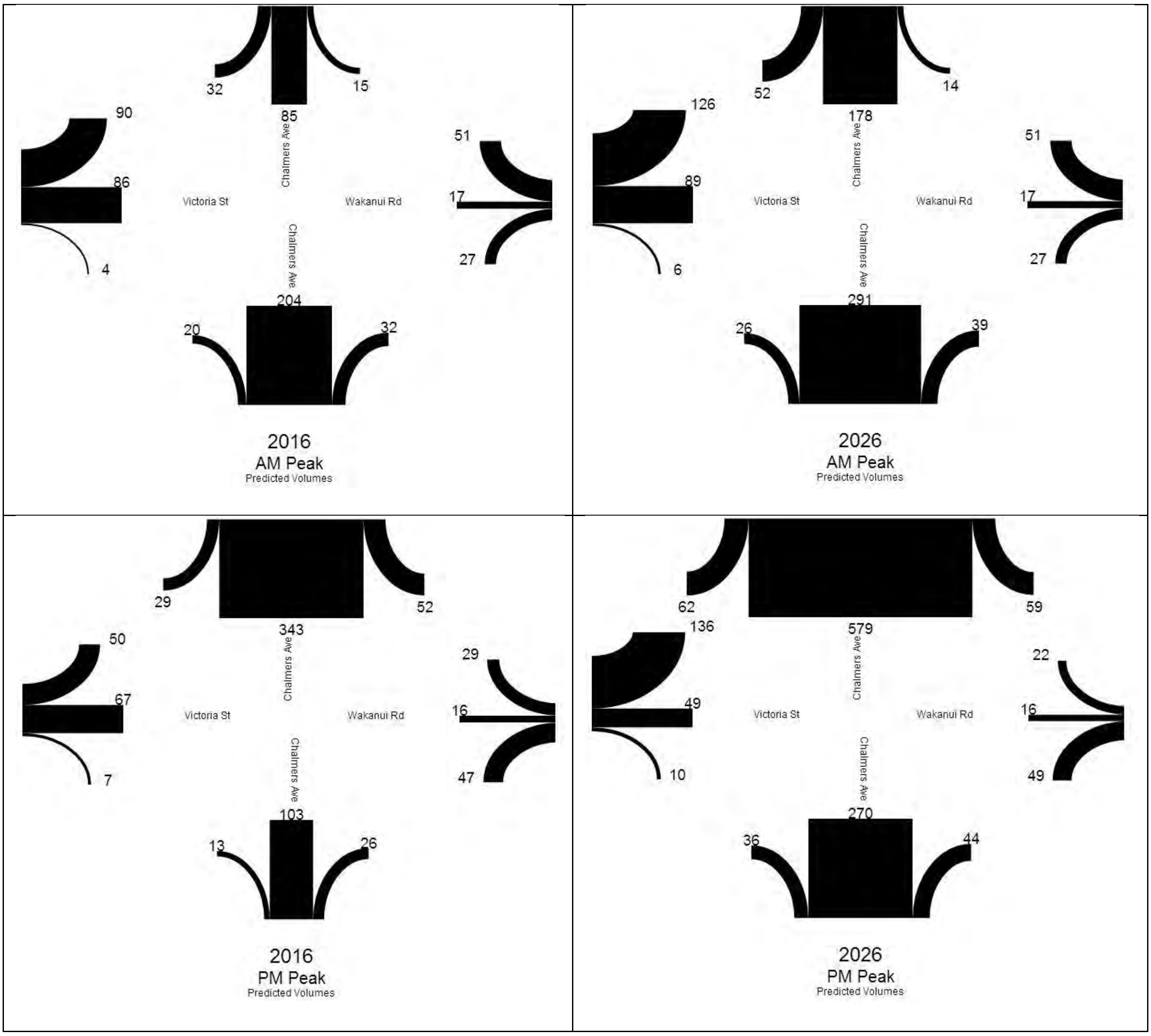

Figure 3 - Predicted Turning Volumes: Victoria/Wakanui

The predicted turning volumes show that Chalmers Road will still be the dominant road with the 2nd bridge in place.

3.2 Intersection Performance

To assess the differences in intersection performance, a basic SIDRA analysis has been used to compare how the intersection performs with alternate priority control. The results are summarised in Table 1 below:-

	Model	95% Worst Queue (m)	Average Delay (s)	Fuel Use (L/h)	CO_2 (kg/h)
Existing Priority	2016 AM	6.0	5.6	22.7	53.7
	2026 AM	10.8	6.6	31.7	74.8
	2016 PM	7.0	4.8	26.5	62.6
	2026 PM	19.0	8.4	46.9	110.5
Change Priority	2016 AM	9.7	6.6	23.1	54.5
	2026 AM	20.5	7.8	32.4	76.3
	2016 PM	20.2	6.9	27.4	64.6
	2026 PM	88.2	10.5	48.6	114.6

Table 1 – SIDRA Results

The results show that by changing priority the intersection will operate with longer queues, greater delays, increased fuel use and emissions. It is expected that similar results would be applicable to the Havelock/Wellington intersection.

3.3 Predictive Crash Models

Using NZTA's crash prediction model (1) from their Economic Evaluation Manual (EEM), a predicted crash risk for the intersections can be calculated.

Expected injury crashes per year = $1.25 \times 10^{-3} \times Q_{major}^{0.21} \times Q_{minor}^{0.51}$

With Q_{major} = 3000 (Chalmers Ave) and Q_{minor} = 1300 (Victoria/Wakanui) and 1700 (Havelock/Wellington), the expected injury crashes per year is therefore 0.26 (Victoria/Wakanui) and 0.3 (Havelock/Wellington).

The predicted crash rates are slightly lower than the existing crash rates. This implies the existing intersections are currently operating slightly worse than expected.

If the intersection priority was changed the predicted crash rates would increase as well. A comparison of results is shown in Table 2.

	Victoria/Wakanui	Havelock/Wellington
Existing Crash Rate (2003-2012)	0.3	0.5
Predicted Crash Rate (Existing Priority)	0.26	0.3
Predicted Crash Rate (Changed Priority)	0.33	0.35

Table 2 - Crash Rates

These results are expected. Increasing the delays to the dominant traffic movements leads to driver frustration, which in turn leads to lower gap acceptance and increased risk taking.

4 Conclusions & Recommendations

4.1 Intersection Priority

Changing the give-way priorities on the Chalmers Ave intersections is not recommended for the following reasons:-

- Roading hierarchy - Chalmers Ave is a 'Principal' road, the intersecting roads are predominantly 'local' or 'collector' roads.
- Traffic flows - Chalmers Ave currently has the dominant traffic flows, this is predicted to continue with the construction of the Ashburton 2nd bridge.
- Intersection efficiency – Preliminary modelling indicates that changing the priority at intersections would result in longer queues, greater delays, increased fuel use and emissions.
- Intersection safety – Use of basic NZTA crash prediction models indicates that changing priorities would result in an increased risk of future injury crashes.

4.2 Existing Crashes

It is noted that both the Victoria/Wakanui and Havelock/Wellington intersections have a higher than expected crash rate. The coded crash reports record some common themes at both intersections "inattentive" or "failed to notice" codes are recorded in most of the crash records. Both intersections have had cyclist crashes within the last 10 years

Observations on site indicate that due to the open and flat nature of the intersections (see Figure 4), perhaps drivers are not perceiving the need to give way.

A potential solution would be to investigate constructing some kerb build outs or a raised platform in the throat of the island to create more obvious visual clues to drivers that there is an intersection present (see Figure 5).

Figure 4 - Havelock St Intersection

Figure 5 - Example of Intersection Throat Treatment.

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Ashburton Second Urban Bridge and Associated New Road

Traffic Impact Assessment

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Traffic Impact Assessment

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Appendices

1 Executive Summary

Opus was commissioned by Ashburton District Council (ADC) to prepare a Notice of Requirement (NOR) for the land required for a second bridge across the Ashburton River within the Ashburton urban area. The Ashburton Second Urban Bridge (ASUB) project builds on a number of investigations into options to address issues associated with the existing SH1 Bridge.

The Ashburton Transportation Study (ATS) (2006-8) identified the main future transportation issue in Ashburton to be the ability of State Highway 1 to cope with future increasing traffic volumes through the Ashburton urban area, particularly at the Ashburton River Bridge. It concluded, through traffic counts, that SH1 through traffic made up a small proportion of the total traffic on the existing bridge, particularly at peak times. It also identified route security issues if the existing bridge was closed for any reason, including isolated incidents on the bridge or wider natural disasters. It recommended a second bridge running from the end of Chalmers Avenue to east of Tinwald.

The Ashburton Second Bridge Issues and Options Report (2010) considered twelve options for a second bridge route. These options included bypass option to the west and east of Ashburton, and options within the Ashburton urban area It concluded that the two options which best met project criteria were the Chalmers Avenue to east of Tinwald and the Chalmers Avenue to Grove Street options. Following public consultation further investigations into options to cross the river were carried out. These additional investigations included a more detailed investigation into six options, including bypass options, Chalmers Avenue options, and SH1 options. It also included a Social Impact Assessment, and the formation of a Community Reference Group. It concluded that the three Chalmers Avenue options (to east of Tinwald – rural or urban, or Grove street) performed very significantly better than the other options. Further investigation into those three options recommended that the Chalmers Avenue to east of Tinwald – Urban option proceed to designation.

It is likely that the ASUB project will not be constructed until approximately 2026. The impacts of the project on the Ashburton transport system at that time are projected to be extremely positive. It is expected to reduce congestion on the existing SH1 Bridge and at other locations through Ashburton, and thereby improve overall travel times significantly, improve safety and accessibility for pedestrians, cyclists and vehicles between Tinwald and north Ashburton, and provide a suitable alternative route should the existing bridge be closed.

There are also a small number of likely minor negative effects as a result of the ASUB. Traffic volumes on Chalmers Avenue are expected to increase. Chalmers Avenue is a two way road with a solid central median. It has more than ample capacity to handle the expected increase in traffic due to this project. There are, however, some existing issues on this route which may be exacerbated by the additional traffic. These include the suitability of the Netherby roundabout for heavy vehicles, safety and amenity for pedestrians and cyclists along and crossing Chalmers Avenue, and existing safety issues at some intersections on Chalmers Avenue.

Mitigation measures are proposed to address these issues. It is considered that these measures will not only mitigate the effects of the ASUB project, but will also provide benefits to all road users, including pedestrians and cyclists using the route regardless of a second bridge.

Therefore, it is considered that the net effect of the ASUB project on the Ashburton transport system is overwhelmingly positive, and that with the proposed mitigation measures in place, the negative effects are less than minor.

2 Introduction

2.1 Background

Ashburton town (the Ashburton District's largest population centre) is situated on the Canterbury Plains approximately midway between Christchurch and Timaru. The town straddles State Highway 1 (SH1) and the South Island Main Trunk railway (SIMT). The State Highway and the railway make up the primary South Island transportation corridor. The town is bisected by the Ashburton River, which runs more or less perpendicular to SH1 and the SIMT. A map of Ashburton is shown in Appendix A. The existing Ashburton river bridge is the only means of crossing the Ashburton River within the Ashburton urban area. The nearest alternative route across the Ashburton River involves a detour of approximately 60 km as shown in Appendix E.

This report:

- Describes the problems the Ashburton Second Urban Bridge addresses
- Briefly outlines the option assessment processes which have resulted in this preferred option
- Details the effects of the proposed route
- A parallel report (Ashburton Second Urban Bridge Option Assessment (Opus August 2013)) describes the options which have been considered, and the process by which they have been assessed throughout the process leading to this Notice of Requirement.

2.1.1 Ashburton Transportation Study

In 2005 Transit New Zealand (now the New Zealand Transport Agency (NZTA)) and Ashburton District Council commissioned Opus to identify present and future transportation demands within the Ashburton urban area through to 2026, and to recommend measures to optimise the performance of the land transport system (the Ashburton Transportation Study).

The Ashburton Transport Study identified the main future issue to be the ability of State Highway 1 to cope with future increasing traffic volumes, through the Ashburton urban area, particularly at the Ashburton River Bridge. It also identified route security issues if the existing bridge was closed for any reason, including isolated incidents on the bridge or wider natural disasters.

A strategy of actions was recommended in the Ashburton Transport Study. One of these recommendations was to provide a second bridge across the Ashburton River. The recommendations of the study have been adopted by the NZTA. The Ashburton District Council has also adopted the recommendations of the study excluding the site for the second bridge. This has followed a separate site selection process.

2.1.2 Second Bridge Issues and Options Report

An Issues and Options Report For a Second Bridge Across the Ashburton River was prepared in January 2010. This report confirmed that the most significant issues for the existing bridge were its capacity to carry the future traffic demand, and route security issues should the bridge be closed due to an incident on the bridge or a wider event such as a flood or earthquake.

The Issues and Options Report identified twelve options for a second bridge route. These options were considered against nine criteria. The options and criteria are briefly described in Section 4.

Option details and descriptions of the assessment process are included in the Ashburton Second Urban Bridge Option Assessment Report

The two options which best met these criteria were the Chalmers Avenue to east of Tinwald and the Chalmers Avenue to Grove Street options.

2.1.3 Consultation on the Options identified in the Issues and Options Report

Extensive public consultation, including a Public Meeting, Community Open Days, and a mail out to affected residents, was carried out following the release of the Issues and Options Report. The results of this consultation are detailed in the Consultation Report dated May 2010, and appended to the Notice of Requirement. In summary, the consultation confirmed a high level of opposition from the Tinwald community to the Chalmers Avenue to Grove Street option, and to a lesser extent the Chalmers Avenue to east of Tinwald option.

2.1.4 Additional Investigations

Following receipt of Community feedback on those options, Council then commissioned further investigations in 2011. These additional investigations include the following:

- Social Impact Assessment (carried out by Taylor Baines and Associates);
- Formation, facilitation and support for a Community Reference Group (carried out by Taylor Baines and Associates); and
- Further detailed investigations of six options, including bypass options, options at the end of Chalmers Avenue, and options near the existing SH1 / railway corridor. The options considered are described in Section 4.

A multi criteria assessment was carried out on each option. The results of this assessment are appended to the Options Assessment Report. The multi criteria assessment identified three routes which clearly best met the project objectives. These were Chalmers Avenue to Grove Street, Chalmers Avenue to East of Tinwald Urban, and Chalmers Avenue to East of Tinwald Rural. Of those three, the Chalmers Avenue to East of Tinwald options scored significantly higher than the Grove Street option. The Ashburton Second Bridge Additional Investigations Report (Opus January 2011) describes the options and their assessment.

Further investigations were commissioned in 2012 to compare the three routes which best met the project objectives. These investigations included further traffic surveys, traffic modelling, and acoustic assessment. These investigations are described in the Ashburton Second Bridge Technical Investigations 2012 Report (October 2012)

The two east of Tinwald options were identified as the Council's preferred options for a further round of consultation. The Ashburton Second Urban Bridge Consultation Report (November 2012) analysed the feedback received during this second phase of consultation. Most of the feedback received opposed a second bridge at the end of Chalmers Avenue. Alternative options suggested included bypass options, four laning the existing State Highway 1 (SH1) route, or transferring SH1 to Melcombe Street, and linking to the existing route on West Street.

The Ashburton Second Urban Bridge Technical Response to Feedback (October 2012) addressed, from a technical perspective, the key issues raised during consultation.

Council decided to proceed with a Notice of Requirement for Chalmers Avenue to East Tinwald – Urban Option A.

3 Description of Problem

As noted above, there have been a number of investigations into the Ashburton transportation system, the existing bridge, and a possible second bridge, from the 2006 Ashburton Transport Study through to the 2012 Options Investigations. These investigations have identified a number of issues with the existing bridge and the surrounding transport network. These are outlined below:

3.1 Capacity

The Ashburton Transport Study identified that:

"In 2006, Ashburton's road network operates satisfactorily. There are some early signs of pressure points, most notably in the evening peak along SH1 at the Ashburton River Bridge, and to a lesser extent SH1 through Tinwald. All the key intersections operate within practical capacity, although the SH1/Moore St signalised intersection shows signs of approaching capacity.

With the additional traffic generated by the proposed development[1] there is, as expected, a resulting deterioration of the operation of Ashburton's road network. By 2026, if the road network remains unchanged, it can be expected that there will be considerable queuing and delay centred about the SH1/Moore Street and SH1/East Street intersections. In addition to these intersections, there are a number of other key intersections expected to be operating above capacity by 2026 in the evening peak. These are:

- *SH1/Havelock Street;*
- *East Street/Havelock Street;*
- *SH1/East Street South;*
- *SH1/Walnut Avenue; and*
- *SH1/Graham Street*

In Tinwald comparatively small numbers of turning vehicles (when compared with the numbers of through vehicles on SH1) are likely to experience increasing delays. The modelling indicated the SH1 intersections with Graham Street and Carters Terrace to be the worst affected, but the installation of signals at SH1/Lagmhor Road would encourage re-routing of local traffic and reduce queuing on the minor roads at their intersections with SH1.

The models indicate the SH1 corridor will show deterioration in operation, especially on the Ashburton River Bridge and through Tinwald. The poor performance of the SH1, Moore Street intersection reduces the volume of traffic able to access the Ashburton River Bridge. Improvements to this intersection will increase the traffic volumes able to access the bridge. This in turn will result in an increase in the traffic volumes using the bridge, and a corresponding decrease in the performance of the bridge, and of the section of SH1 through Tinwald."

[1] Further residential development on land then zoned rural had been identified in the 2005 Ashburton Development Plan

3.1.1 Local vs. Through Traffic

The need for an alternative route for "passing through" traffic, particularly trucks was identified as a key transportation issue during the consultation phase of the Ashburton Transportation Study. However, the traffic count data indicates that traffic "passing through" Ashburton is only a small portion of the total traffic on the existing bridge. Two specific number plate traffic surveys have been carried out to identify Origins and Destinations of traffic in Ashburton, including traffic using the existing Ashburton River Bridge. These were carried out in 2006, as part of the Ashburton Transportation Study, and in 2012. In addition, data from these counts has been compared with NZTA's regular tube counts at a number of locations on SH1 in Ashburton.

These three traffic count data sources conclusively show that at peak times, less than 20% of the traffic on the existing bridge is inter-district traffic "passing through" Ashburton on SH1. The results of these three sources are summarised below. More detailed results are included in Appendices B to D

3.1.1.1 2006 Number Plate Count

A manual number plate survey was carried out as part of the Transportation Study. The numbers of vehicles recorded crossing the existing bridge, and the proportion travelling through Ashburton between south of Tinwald and north of Racecourse Road for the morning, lunch time and evening peaks are shown on Table 3-1. Full Origin Destination information from the 2006 counts is included in Appendix B

	Morning 7:30 – 9:00		Lunch Time 11:30 - 1:30		Evening 4:30 – 6:00	
	Nth	Sth	Nth	Sth	Nth	Sth
North of Racecourse Rd	278	372	348	344	217	326
Existing Bridge	783	553	701	799	768	1071
South of Grahams Rd	308	201	300	195	476	463
Passed through Ashburton	77	41	106	51	115	42
% of Bridge traffic passing through Ashbtn	10%	7%	15%	6%	15%	4%
Passed both bridge and sth of Grahams	219	67	227	55	315	194
% of Bridge traffic passing through Tinwald	28%	12%	32%	7%	41%	18%

Table 3-1 Traffic Volumes through Ashburton 2006

3.1.1.2 NZTA Tube Counts

The 2006 Number Plate Count results are consistent with traffic tube counts carried out by NZTA south of Golf Links Road, north of Wills Street, north of the Ashburton River Bridge and at Winslow on State Highway 1. The 2012 counts indicate that over a 24 hour period, the total volume of traffic at Winslow is 35% of the total volume at the bridge. Over the period 2000 to 2009 this percentage ranged from 30% to 39%. Summaries of the 2012 counts at all four locations, and the 2000 to 2009 counts at the bridge and Winslow are included in Appendix C.

3.1.1.3 2012 Video Count

Due to concerns raised about the currency of the 2006 number plate counts, ADC commissioned a video number plate survey in 2012. The 2012 number plate survey was undertaken in July and August. The survey used infrared video cameras to record number plates of vehicles passing in both directions at eight locations around Ashburton. This required the use of sixteen cameras (one in each direction at each location). Sophisticated number plate recognition and matching software was then used to identify vehicles which passed one or more of the camera locations.

The numbers of vehicles recorded crossing the existing bridge, and the proportion travelling through Ashburton between south of Tinwald and north of Racecourse Road for the morning, lunch time and evening peaks are shown on Table 3-2. Full Origin Destination information from the 2012 counts is included in Appendix D.

	Morning 7:45-9:15		Lunch Time 11:30–1:30		Afternoon 2:30-3:30		Evening 4:30-6:00	
	Nth	Sth	Nth	Sth	Nth	Sth	Nth	Sth
North of Racecourse Rd	402	506	559	524	317	319	603	441
Existing Bridge	1368	858	1442	1565	721	754	1038	1291
South of Grahams Rd	638	519	820	759	403	370	652	549
Passed through Ashburton	136	150	215	210	101	79	186	136
% of Bridge traffic passing through Ashbtn	10%	18%	15%	13%	14%	11%	18%	11%
Passed both bridge and sth of Grahams	538	420	690	613	316	292	525	436
% of Bridge traffic passing through Tinwald	39%	49%	48%	39%	44%	39%	51%	34%

Table 3-2 2012 Video Number Plate Count Summary

The 2012 counts have recorded significantly higher vehicle numbers than the 2006 counts. There are a number of factors which are considered to explain this increase in recorded numbers:

- Increase in overall traffic volumes. NZTA tube counts have recorded the following growth at locations on SH1 through Ashburton between 2006 and 2012
  - North of Racecourse Road 21%
  - South of Walnut Avenue 6%
  - Ashburton River Bridge 31%

    - Winslow 19%
- Seasonal variations. The 2006 counts were conducted in mid-February, whilst the 2012 ones were in late July / early August. People are more likely to walk to work or school in summer than in winter.
- Day of week. The 2012 NZTA hourly tube counts at the bridge on different days of the same week vary by up to 30%. It is possible that the 2006 counts were taken on a day with comparatively low traffic volumes, and/or the 2012 ones were taken on a day with high volumes.

Whilst total traffic volumes may vary annually, seasonally, and weekly, the proportion of bridge traffic which is travelling through Ashburton remains consistent at less than 20%

It is considered that, whilst traffic volumes vary during the day, the proportions of traffic sources on the bridge during the survey periods are representative of daytime traffic on the bridge. It is likely that through traffic makes up a greater proportion of night time traffic on the bridge. However, the small overall volumes of night time traffic means that through traffic makes up a small proportion of the total traffic on the bridge.

3.1.1.4 NZTA and ADC Tube Counts

Data from NZTA and ADC tube counts was also assessed. The NZTA tube counts give a good background understanding of traffic on SH1 through Ashburton and the conclusions gained from these counts are broadly consistent with the results and conclusions of the number plate survey.

3.1.2 Freight

The National State Highway Strategy (June 2007) indicates the freight flows on this section of SH1 in 2006 to be between 2-10 million tonnes. The Strategy indicates if economic growth continued at the same rate as from 2007, freight movements would be expected to double by the year 2020.

Within Canterbury, it is estimated that 80% of the freight being moved along / within this corridor are transported by road, not rail, due to delivery sensitivity time and lack of access to rail. Annual average daily traffic (AADT) counts for 2008 from the NZTA show there are 2014 heavy goods vehicles (HGV's) passing Archibald Street just south of the Ashburton River. This equates to 10% of the total traffic.

The above figures suggest that freight movements across the Ashburton River Bridge can be expected to increase and that the ability to easily cross the Ashburton River is nationally important.

3.1.3 Population Growth

Using past census data, building consent, subdivision and school records, the Ashburton Development Plan projected there would be 31,500 people living in the district by 2021. Of this number, 20800 are expected to live in Ashburton town.

Since the Ashburton Development Plan was adopted by ADC in 2005, growth in Ashburton has been greater than anticipated. The population increased 7.6% between 2001 and 2006, whereas it increased 1.1% between 1996 and 2001. These figures suggest the population in both Ashburton town and district may be higher than that predicted by the Ashburton Development Plan by the year 2021.

3.1.3.1 Tinwald Growth

The Ashburton Development Plan (2005) recommended changes to existing land uses to accommodate and promote development in the town.

The 2010 District Plan review rezoned approximately 71.6ha of land east of the current Tinwald urban boundary. This rezoned land comprises approximately 15.7ha for Residential C development (360m^2 minimum lot size with reticulated sewage, 1,000m^2 without) and approximately 55.9ha for Residential D development (4,000m^2 minimum lot size with reticulated sewage, 10,000m^2 without).

The rezoning opens the way for residential development to occur east of Tinwald. On the assumption that this land has been 80% developed by the time the ASUB project proceeds in 2026, it is expected there could be up to 310 new dwellings located within the area. This level of development will place an estimated 3,000 vehicles per day onto the local road network. Given that the existing SH1 Bridge is the only route between Tinwald and North Ashburton, it is expected that this route will bear the brunt of additional traffic as a result of development east of Tinwald.

Regardless of the presence of a second bridge across the Ashburton River, a roading network will be required in east Tinwald to service the proposed urban development.

3.2 Route Security

The existing Ashburton River Bridge is the only road bridge across the Ashburton River within the Ashburton urban area. The nearest alternative road bridge across the River is located on the Mayfield Valetta Road.

Should the existing bridge be closed for any reason, vehicles travelling between Tinwald and Ashburton would need to use this bridge. This involves a 56km detour to get from Ashburton to Tinwald. A map of the detour route is included in Appendix E.

The bridge could be closed due to a major event such as flooding or earthquake, or due to a more local incident such as an accident or breakdown.

An additional bridge may also be vulnerable to damage during some significant natural events (e.g. severe flooding or a significant earthquake). However provision of an alternative can decrease the risk of the route being closed due to a significant natural event.

3.3 Safety

Potential existing safety issues within the Ashburton urban area are discussed below.

3.3.1 District Wide Comparison

The Ashburton District Road Safety Report 2005 to 2009 (NZTA June 2010) analyses the reported crash rate in the Ashburton District on State Highways, and Council urban and rural roads for the period 2005 to 2009. It also compares the Ashburton accident history with that of all New Zealand and with a group of similar local authorities. Figure 3-1 shows the comparison of the urban crash rates of the Ashburton District with the urban crash rates in all of New Zealand and with a range of similar local authorities. This figure indicates that the urban crash rate within Ashburton is slightly lower than the average New Zealand rate, but slightly higher than the average of similar local authorities (Group D).

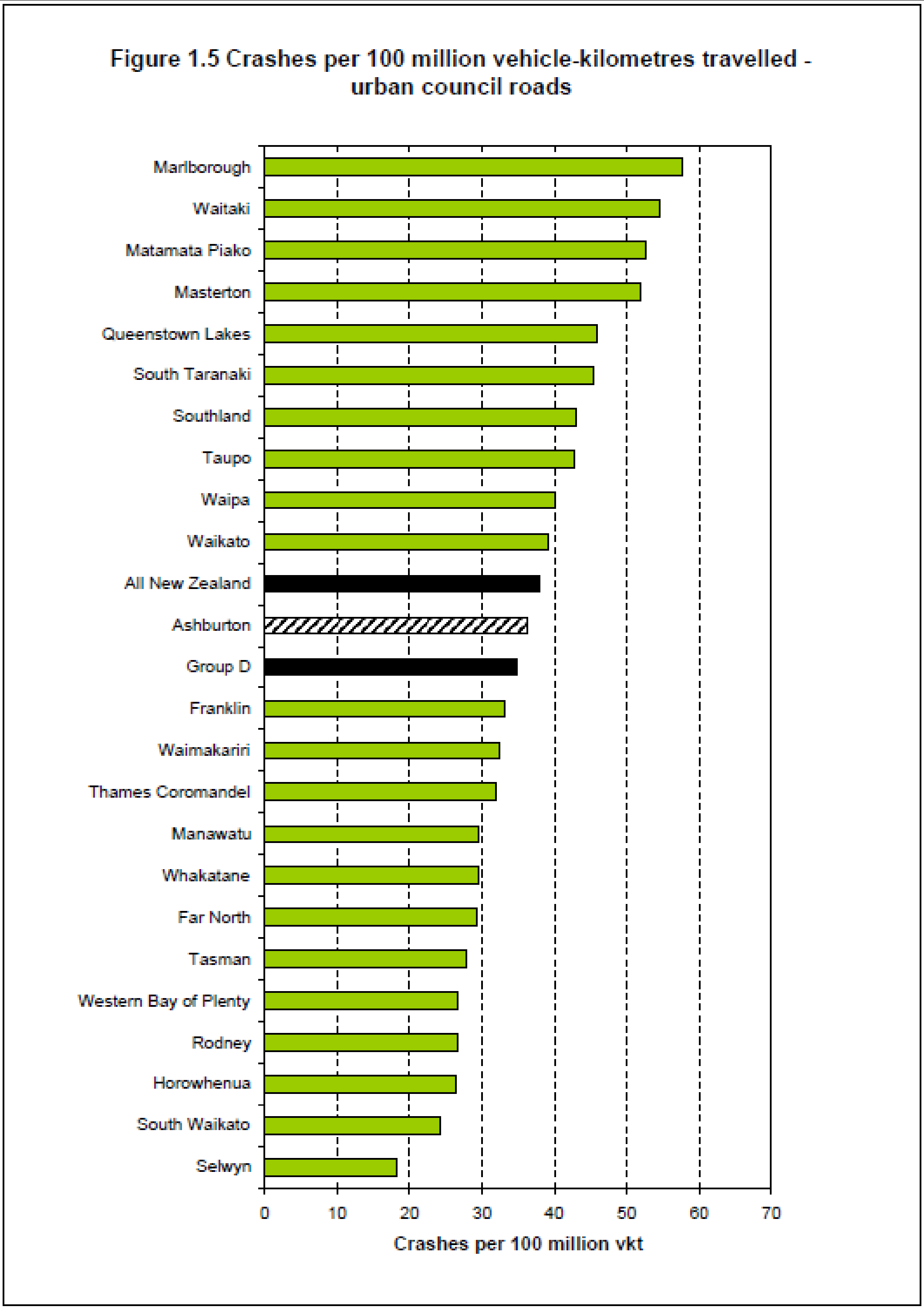


Figure 3-1 Urban Crash Rates (Source: Ashburton Road Safety Report 2005 to 2009 – NZTA)

3.3.2 Crash History 2008 to 2012

The crash history in the Ashburton urban area has been reviewed for the five year period from 1st January 2008 to 31st December 2012. The crash history was assessed using the Land Transport NZ Crash Analysis System (CAS). The overall crash trends in the study area were analysed and then broken down further by location. The study area is indicated below.

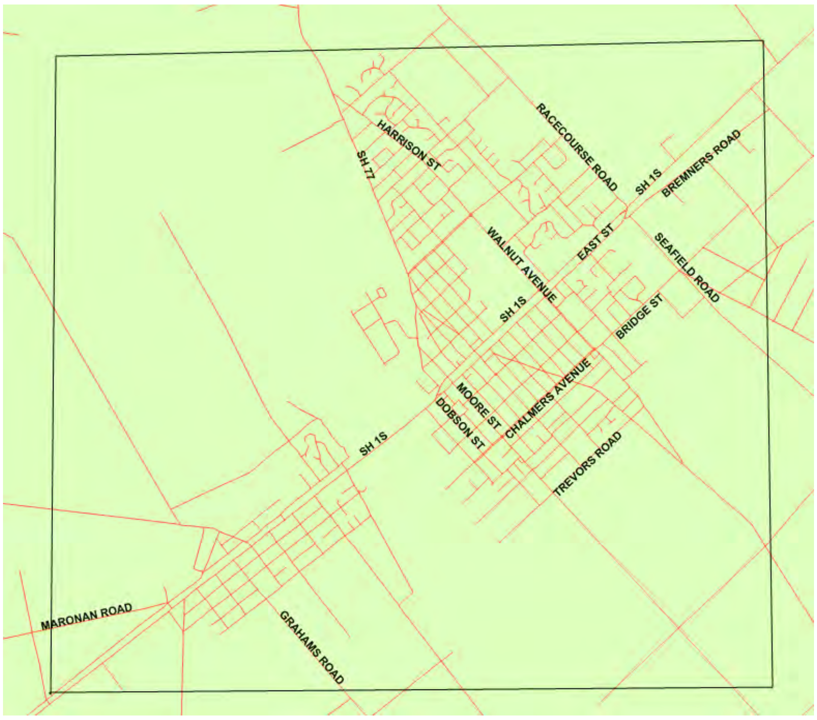


Figure 3-2 Accident Study Area

3.3.2.1 Overall Crash History

A total of 453 crashes were reported in the study area over the five year period. This includes 106 injury crashes and 347 non-injury crashes. Of the injury crashes there was 1 fatal crash, 24 serious and 81 minor crashes. A further breakdown by year of the crashes can be seen in Table 3-3 below.

Year	Fatal	Serious	Minor	Non-injury	Total
2008	1	5	18	80	104
2009	0	7	17	77	101
2010	0	3	15	53	71
2011	0	5	22	69	96
2012	0	4	9	68	81
Total	1	24	81	347	453

Table 3-3 Ashburton District 2008 - 2012 Crashes

There has also been a fatal crash, involving a pedestrian on a mobility scooter and a van, at the pedestrian crossing on SH1 north of Graham Street on June 24th 2013. At the time of writing this crash was still being investigated, and had not been included in the CAS database.

An overview of the severity of all crashes in Ashburton between is shown in Figure 3-3

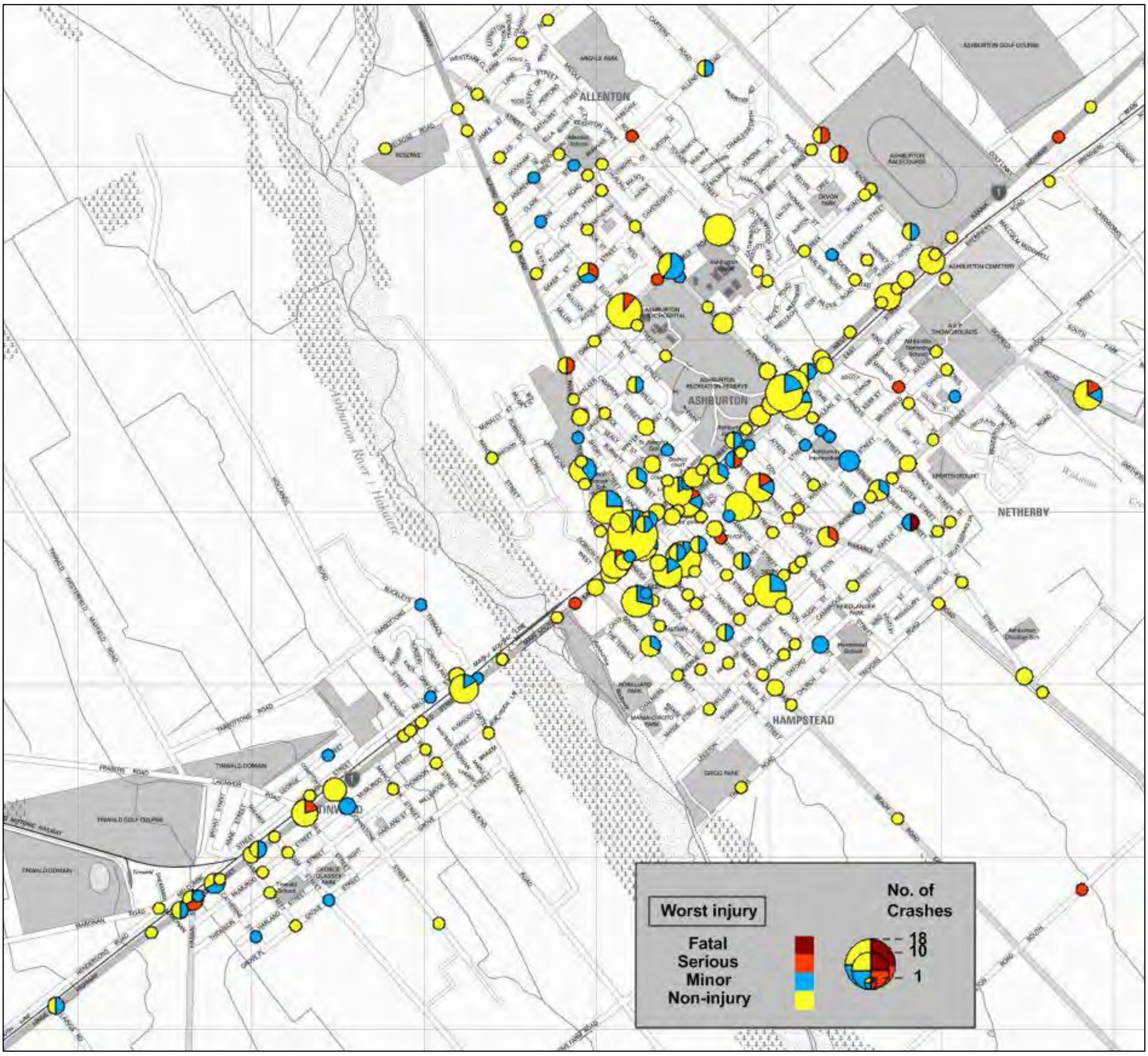


Figure 3-3 Accident Locations by Severity

There are a high number of total crashes along the State Highway. This reflects the fact that SH1 is the main roading spine of Ashburton.

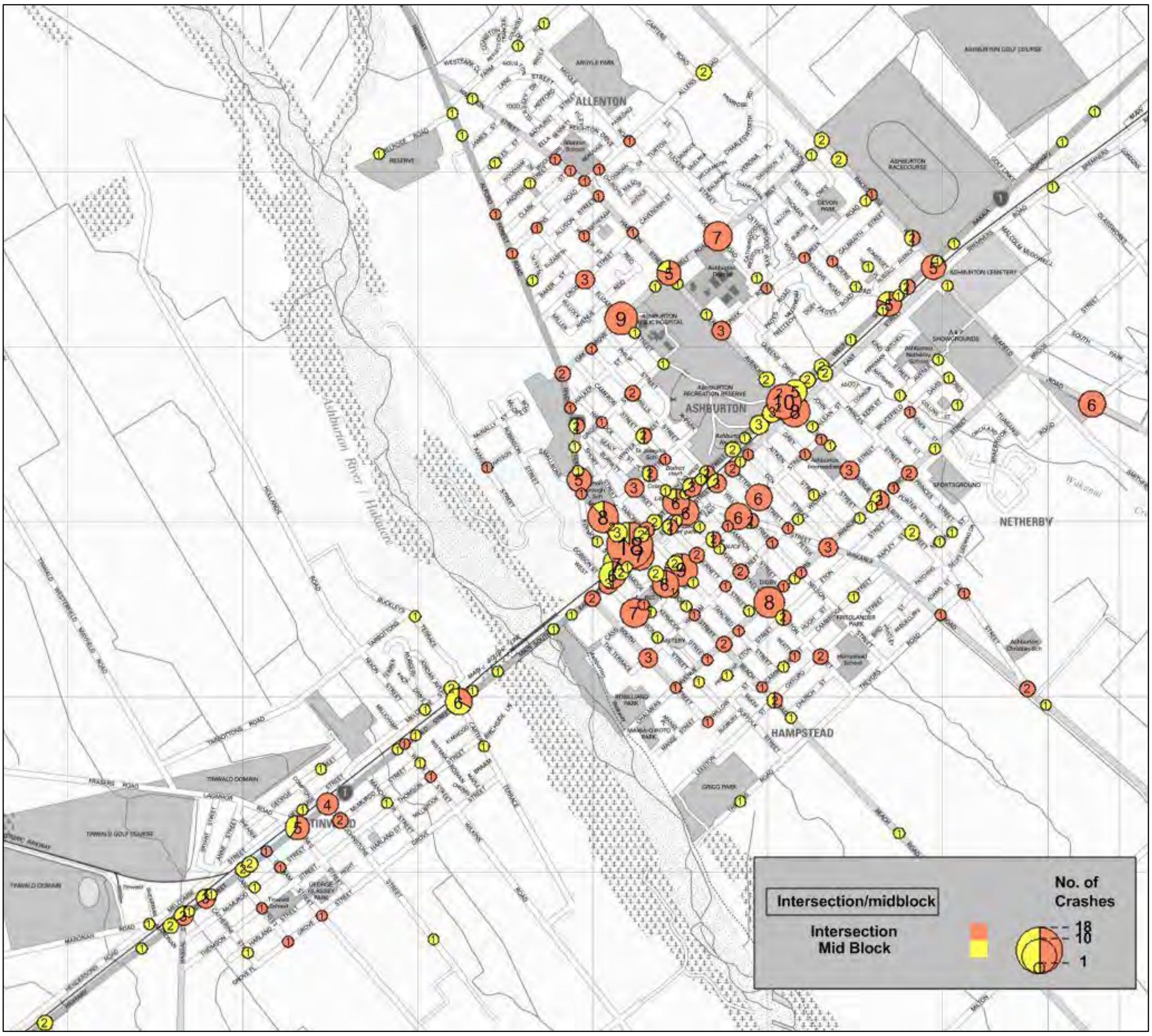


Figure 3-4 Intersection vs. Mid Block Crash Locations

Figure 3-4 depicts the ratio of intersection versus mid-block crashes. Far more accidents occur at intersections than at mid-block locations. This is typical of locations with a grid pattern roading layout, and a high proportion of "cross roads" type intersections.

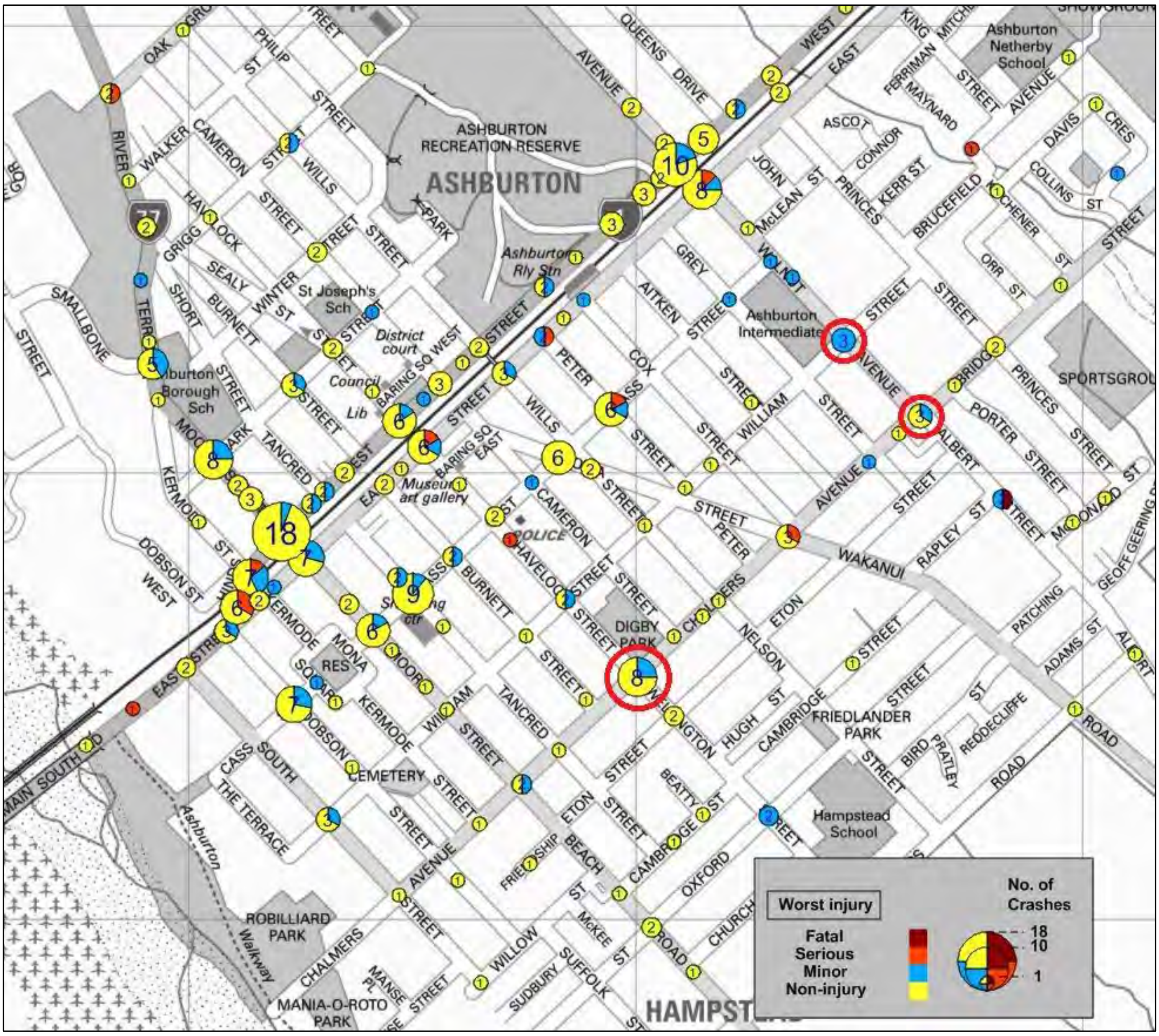


Figure 3-5 Crashes by Severity - North of River

Figure 3-5 shows the severity of crashes on northeast of the proposed bridge site in the last five years.

Chalmers Avenue is parallel to SH1/East Street on the southeast. It joins Walnut Avenue, Bridge Street and Albert Street roundabout in the north and continues to the Ashburton River to the south. Walnut Avenue connects SH1, East Street and Chalmers Avenue, and continues through to Oak Grove to the west. Walnut Avenue, Chalmers Avenue, and Oak Grove form a "ring" of Principal Roads in the Ashburton District Plan. Chalmers and Walnut Avenues (east of SH1) are expected to be the streets most likely to experience the greatest impact as a result of the proposed bridge.

3.3.3 Chalmers Avenue Walnut Avenue Route

The following intersections (circled in Figure 3-5) on the Chalmers Avenue, Walnut Avenue route were identified as having a significant accident rate in the last five years:

- Chalmers Avenue / Havelock Street / Wellington Street / Intersection;
- Albert Street / Bridge Street / Chalmers Avenue / Walnut Avenue Roundabout;
- Walnut Avenue/ William Street Intersection.

- SH1 and East Street / Walnut Avenue intersection pair

There is expected to be an increase in traffic using this route by 2026, when compared to current traffic levels, regardless of the ASUB. The ASUB is expected to result in a further increase in traffic volumes on this route when it is constructed. Both of these increases in traffic are expected to exacerbate any existing safety issues identified below. Mitigation measures to address these issues are outlined in Section 7.

3.3.3.1 Chalmers Avenue/Havelock Street and Wellington Street

The intersection is a Give Way controlled intersection. The collision diagram below shows the 2 minor injury accidents and 6 non-injury accidents that have occurred in the last 5 years.

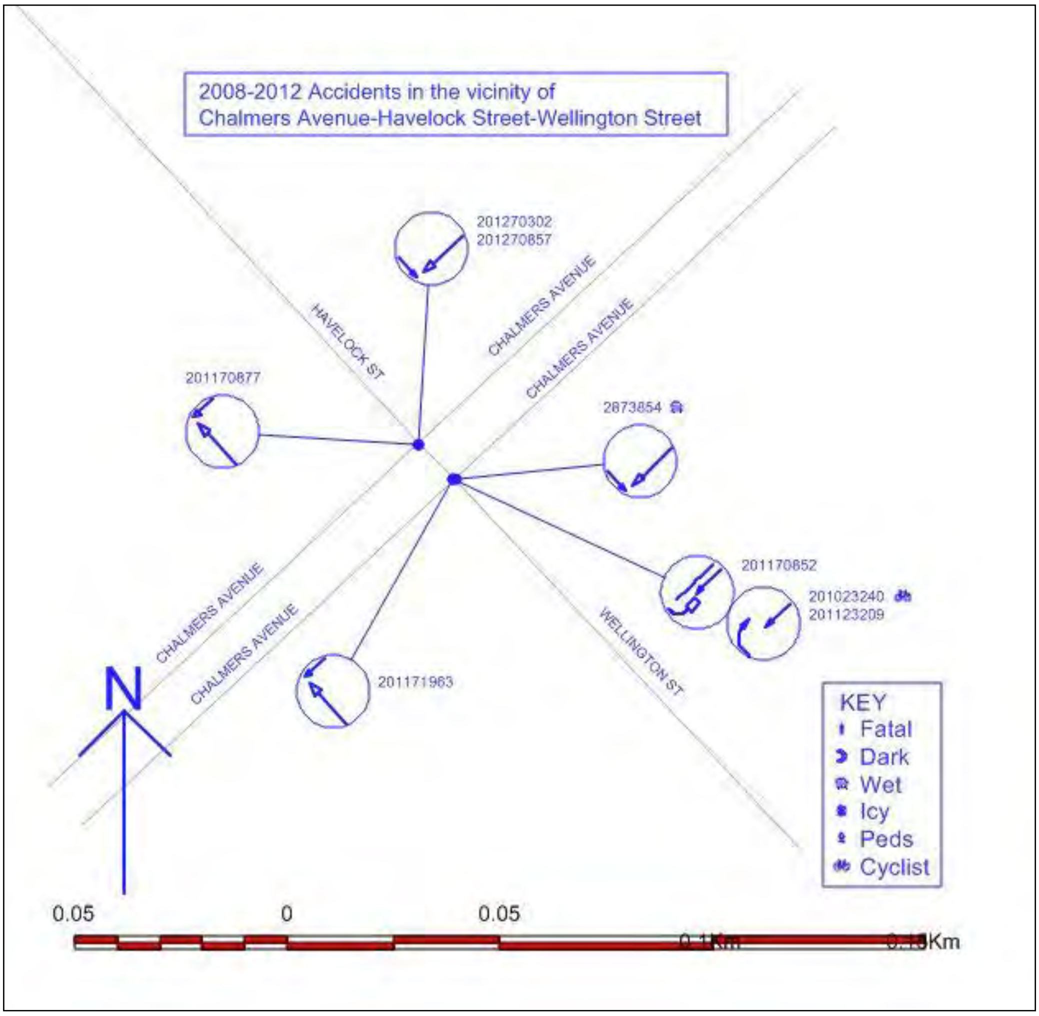


Figure 3-6 Chalmers Avenue / Havelock Street / Wellington Street Collision Diagram

Both of the minor injury accidents involved a right turn collision from Wellington Street onto Chalmers Avenue. One of these happened at 3:22pm on Friday, 3 December 2010. The weather condition was fine, road condition was dry and natural lighting condition was overcast. It involved a car northbound on Wellington Street failing to give way at Give Way sign and hitting an 11 year old cyclist southbound on Chalmers Avenue. The other minor injury accident happened at 4:19pm on Monday, 12 December 2011. The weather condition was fine, road condition was dry and natural lighting condition was bright. It involved a car northbound on Wellington Street failing to give way at the Give Way sign and hitting a Moped southbound on Chalmers Avenue.

3.3.3.2 Chalmers Avenue / Bridge Street/Walnut Avenue / Albert Street Roundabout

The roundabout is give way sign controlled. The collision diagram below shows the 1 minor injury accident and 2 non-injury accident that have occurred in the last five years.

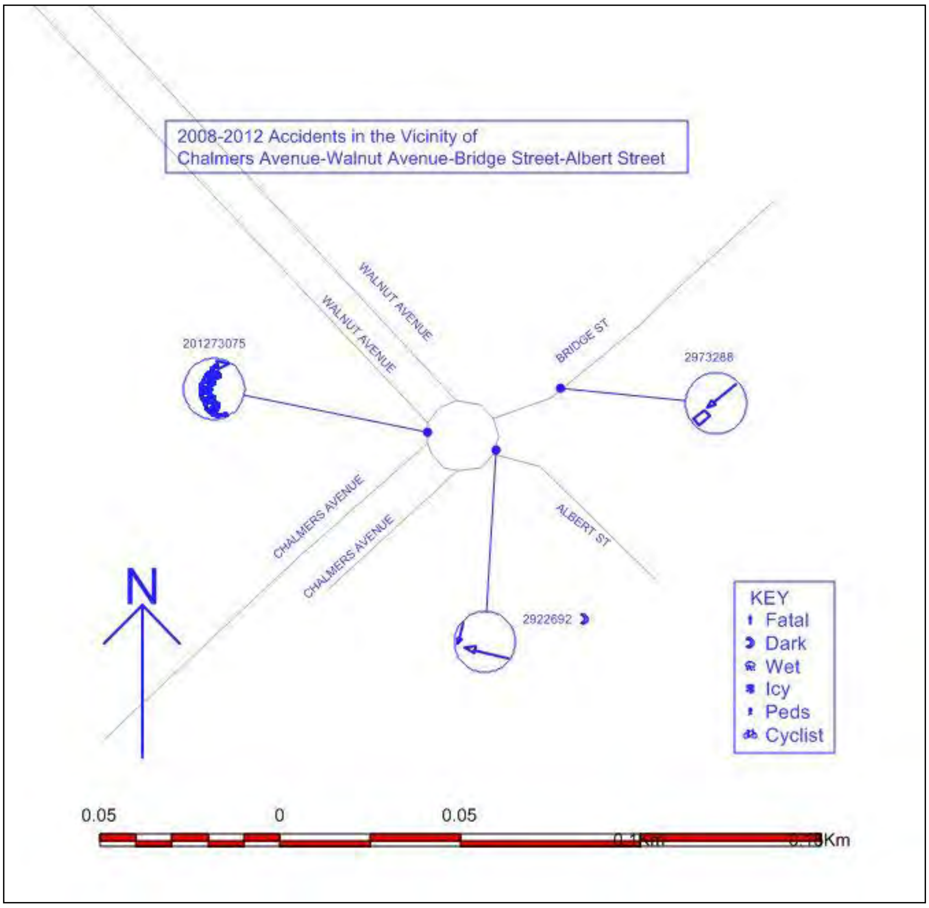


Figure 3-7 Chalmers Avenue / Bridge Street / Walnut Avenue / Albert Street Collision Diagram

The minor injury accident happened at 5:59pm on Sunday, 16 August 2009. The weather condition was fine, road condition was dry and natural lighting condition was twilight. It involved a car northbound on Albert Street failing to give way at give way sign and hitting a truck from Bridge Street. The car driver had Blood Alcohol content above the legal limit which is considered to contribute to the accident.

It is considered that the roundabout operates below the typical accident injury rate and therefore the Chalmers Avenue / Bridge Street/Walnut Avenue / Albert Street roundabout is not considered to have an accident problem.

3.3.3.3 Walnut Avenue/William Street

The intersection is a give way sign controlled intersection, immediately adjacent to Ashburton Intermediate School. The collision diagram below shows the 3 minor injury accidents that have occurred.

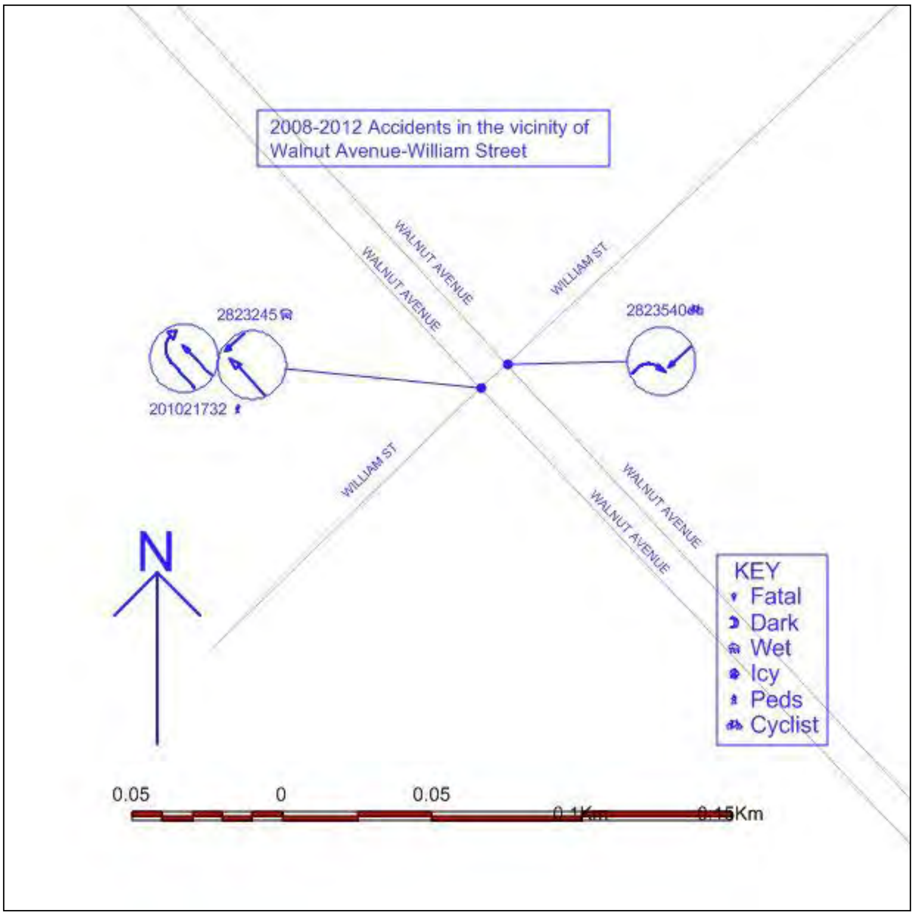


Figure 3-8 Walnut Avenue / William Street Collision Diagram

One of the minor injury accidents happened at 9:00am on Wednesday, 5 November 2008. The weather condition was light rain, road condition was wet and natural lighting condition was overcast. It involved a van southbound on William Street failing to give way at the give way sign and hitting a car westbound on Walnut Avenue.

The second minor injury accident happened at 3:14pm on Wednesday, 5 December 2008. The weather condition was fine, road condition was dry and natural lighting condition was bright. It involved a 10 year old cyclist failing to give way at the give way sign when turning right from Walnut Avenue onto William Street and hitting a car southbound on William Street.

The third minor injury accident happened at 8:22am on Tuesday, 4 May 2010. The weather condition was fine, road condition was dry and natural lighting condition was bright. It involved a car northbound on Walnut Avenue hitting a 15 year old pedestrian on William Street when turning right.

This intersection is immediately adjacent to the Ashburton Intermediate School. There are therefore high numbers of pedestrians and cyclists at this location.

3.3.3.4 State Highway 1 East Street Walnut Avenue Intersection Pair

There have been 18 crashes at these intersections in the past 5 years, including one serious injury, and three minor injury crashes. NZTA and ADC are currently working on proposals to install traffic signals at these intersections. It is expected that these proposals will address safety issues at these intersections.

3.3.4 Right Turn from East Tinwald

Concern has been expressed about the safety of vehicles making right turns onto SH1 from the side roads at east Tinwald. Figure 3-9 shows the recorded crash history in Tinwald between 2008 and 2012.

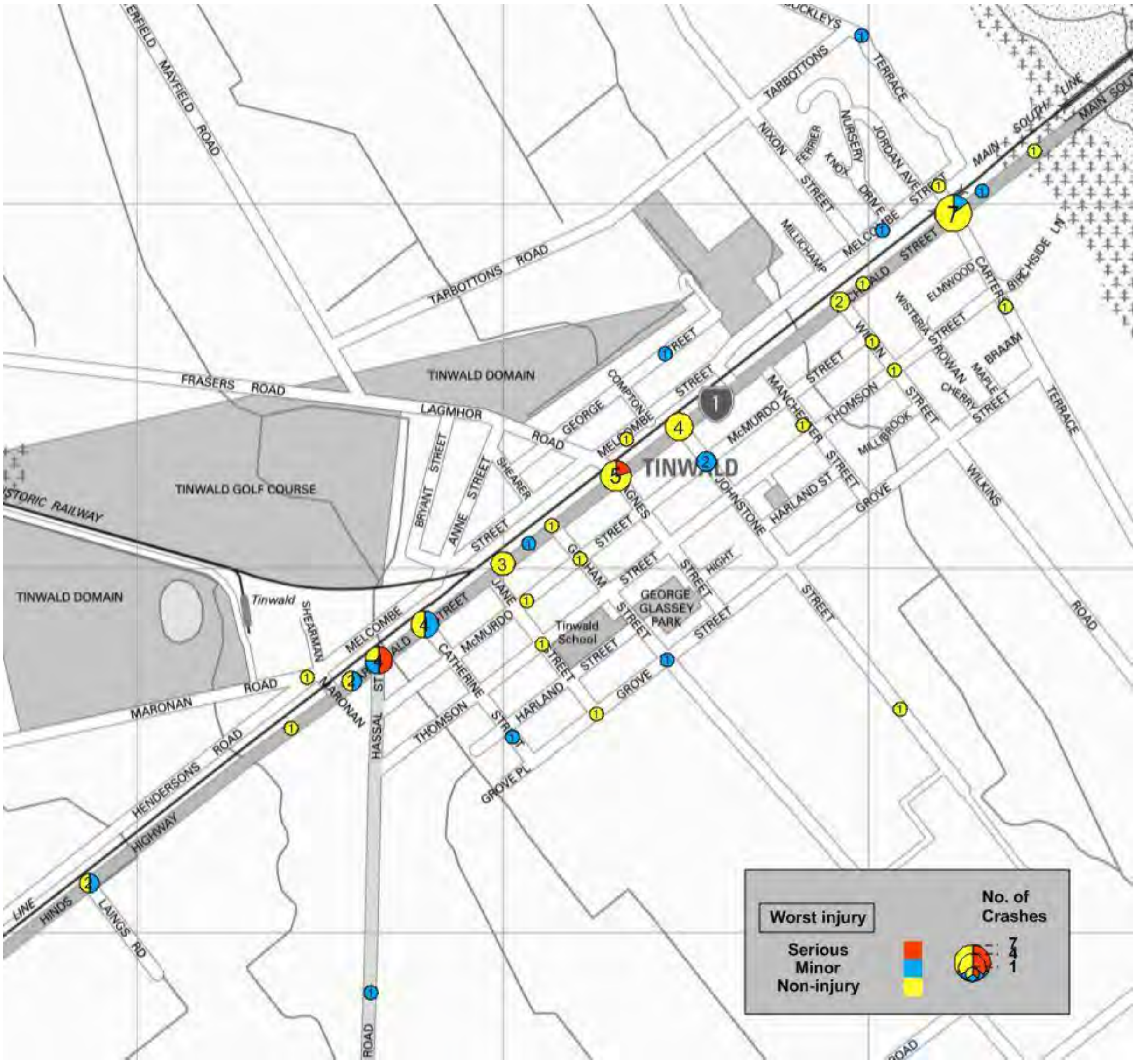


Figure 3-9 Crashes by Severity – Tinwald

Between 2008 and 2012 there have been 29 crashes recorded at intersections on SH1 through Tinwald. Of these, 3 have resulted in serious injury, and 4 in minor injury. Further development in east Tinwald and Lake Hood is expected to result in increased traffic turning right from east Tinwald onto SH1. This, combined with growth in SH1 traffic, will increase delays for vehicles turning onto SH1, and result in drivers taking greater risks, with an accompanying increase in crashes at the intersections through Tinwald.

The ASUB will reduce the volume of traffic turning right at intersections in Tinwald, and is therefore expected to make a significant contribution towards reducing the crash rate at intersections in Tinwald.

ADC and NZTA are currently investigating signals at an intersection in Tinwald. Traffic signals tend to result in a reduction in crashes involving turning vehicles, but an increase in nose to tail crashes.

3.4 Remaining Life of the Existing Bridge

The existing bridge is over 80 years old, having opened in 1931. Ongoing inspections and maintenance indicate that it has the normal defects expected of a bridge of this age. Assuming that an appropriate maintenance regime is continued, it is expected that the bridge will have a remaining life in excess of 25 years.

3.5 Scour at Bridge Foundations

The existing SH1 Bridge across the Ashburton River has been identified as vulnerable to scour. An investigation into bridge scour and sediment management[2] reached the following conclusions:

- *The Ashburton River Bridge is vulnerable to scour damage due to the shallow pier piles and historic bed degradation*
- *Mean river bed levels at the bridge have been relatively constant since the early 1980s due to gravel extraction moving away from the Main Stem to the aggradation zone known as Blands Reach*
- *Over extraction of gravel from the Main Stem and Lower Branches can have a significant effect on the river bed levels at the bridge. Over extraction of Blands Reach can also affect downstream bed levels, but to a lesser degree, and with a considerable lag time.*
- *The bed level at the bridge site may also be affected by the retreat of coastal cliffs at the Ashburton River mouth.*
- *Local scour is continuing to occur, especially around piers in the active river channel. This is aggravated by debris that is regularly caught on the piers.*
- *Rock rip-rap aprons were installed in 1979, and these are considered to provide reasonably effective mitigation against scour of the piers*
- *ECan has prepared a Gravel Management Framework for the river, which aims to provide an agreed level of flood capacity without undue risk of undermining the road and rail bridges*
- *Due to the significant risk of damage to the piers due to further general and local scour, regular bed level surveys are being undertaken.*

[2] SH1S Ashburton River (Hakatere) Bridge – Bridge Scour and Sediment Management Report (Opus July 2013)

In short, there is a risk of the existing bridge being damaged by scour. This risk has been exacerbated in the past by aggressive gravel extraction programmes upstream of the existing bridge. It is currently being managed through gravel management programmes and rock protection measures at the piers. These measures have been in operation for approximately 30 years, and the river bed level has remained reasonably stable during that time.

3.6 Cycling and Walking

The current and future changes in land use in Ashburton and Tinwald are predicted to generate a significant number of trips which will put pressure on the network. Population growth and increasing travel demand will likely result in an increase in the number of vehicle trips. Some additional demand can be met by means other than single occupancy cars such as cycling and walking.

The existing bridge includes a combined pedestrian and cycle path on the eastern side of the bridge, and a cycle path on the western side. Cyclists, pedestrians and mobility scooter users travelling in different directions can be on the cycle/pedestrian path at the same time. The cycle/pedestrian path is not wide enough to allow a cycle and pedestrian to pass comfortably. The potential for conflict between different user groups is high.

The poor walking and cycling facilities on the existing bridge are likely to discourage walking and cycling between Tinwald and Ashburton.

The Canterbury Land Transport Programme contains an NZTA project (investigation, design and construction) for pedestrian / cycling improvements to the Ashburton River Bridge which recognises the lack of adequate non-motorised user facilities across the Ashburton River.

Whilst ADC does not have a travel demand management strategy, there is a Canterbury Regional Travel Demand Management Strategy. The Regional Land Transport Strategy (RLTS) has the following strategic approach to travel demand management:

1. *"Improve the range of transport options available, therefore, giving people greater choice when deciding how to travel*

2. *Establish land use patterns that support a range of transport modes and provide opportunities for people to travel less".*

The above approach is consistent with the ADC's Walking and Cycling Strategy which also aims to:

- *Provide an effective network that ensures accessibility and connectivity; and*

Develop safe walking and cycling facilities and environments"

Refer to the Social Impact Assessment (Taylor Baines and Associates) for further discussion on walking and cycling between Tinwald and Ashburton.

4 Option Assessment

Numerous options have been considered at different stages of both the Ashburton Transport Study, and the Ashburton Second Bridge Investigations. The Ashburton Second Urban Bridge Options Assessment Report (Opus, August 2013) describes the options, and their assessment at all stages of the process

The options and assessment at each stage are summarised below:

4.1 Ashburton Transport Study

The Ashburton Transport Study identified a range of generic options for a second bridge location and associated approach roading. These options were:

- A new bridge forming a continuation of Chalmers Avenue, and linking with Tinwald;
- A new bridge as part of a wider bypass of Ashburton to the South East of Ashburton;
- Providing an additional two lanes on the existing bridge; and
- Providing a new bridge immediately North West of the existing rail bridge. The new bridge would be one way north bound and the existing bridge one way south bound.

The Ashburton Transportation Study assessment of options for a second bridge is reproduced in Table 4-1 below.

Option	**Advantages**	**Disadvantages**
New Bridge at Chalmers Ave	♦ Will address capacity shortfall on existing bridge ♦ Will allow spare capacity on Walnut Ave and Chalmers Ave to be utilised. These roads are both median separated roads with wide seal areas on both sides ♦ Tinwald links to a new bridge can be incorporated into possible future development in Tinwald ♦ Provides alternative route between Tinwald and Ashburton ♦ Will reduce number of vehicles turning right into South Street and East Street ♦ Reduces traffic volume on existing bridge and adjacent network by approximately 40%	♦ Moderate cost for bridge ♦ Moderate cost for new links ♦ Will increase traffic volumes on Walnut Ave and Chalmers Ave

Option	Advantages	Disadvantages
New Bridge as part of Ashburton Bypass	♦ Provides alternative route for SH1 through traffic	♦ High Cost ♦ Does not attract local traffic ♦ Reduces traffic volume on existing bridge and adjacent network by only 25%[3]
Additional lanes on existing bridge[4]	♦ Low Cost for bridge[5]	♦ Does not provide alternative route for local traffic, so continues to concentrate all north south traffic on one route ♦ No reduction in traffic volumes on adjacent network ♦ High cost for four laning and intersection improvements on SH1 (West Street and in Tinwald)
New one way bridge north of existing rail bridge	♦	♦ Continues to concentrate all north south traffic on one route ♦ Either four lanes or one way pairs required on West Street/East street and through Tinwald ♦ High cost for four lanes ♦ Moderate cost for one way pairs ♦ Access and convenience problems for one way pairs particularly for properties on one way sections

Table 4-1 Ashburton Transportation Study Option Assessment

[3] A bypass would only be attractive to traffic travelling through Ashburton, and then only if drivers thought any time saving would outweigh additional travel distance. Since through traffic makes up less than 20% of the existing bridge traffic, the 25% estimated in the ATS is likely to be conservative.
[4] Likely to be a stand-alone bridge adjacent to the existing bridge.
[5] This option would fully utilise the existing bridge.

4.2 Ashburton Second Bridge Issues and Options Report

The Issues and Options Report identified the following twelve options for a second bridge route:

- Eastern Bypass;
- Trevors Road to East of Tinwald;
- Leeston Street to East of Tinwald;
- Chalmers Avenue to East of Tinwald;
- Chalmers Avenue to Grove Street;
- William Street to Grove Street;
- Cass Street to Thomson Street;
- 4 Lane Existing Bridge;
- West Street to Melcombe Street (one way northbound – Existing bridge one way southbound);
- West Street to Melcombe Street (Relocate SH1 to new bridge, existing SH bridge to become local road);
- Park Street to Tarbottons Road;
- Oak Grove to West of Tinwald;
- Western Bypass; and
- Eastern Bypass.

These options were then assessed against the following criteria:

- Access and Mobility;
- Land;
- Engineering – Technical;
- RMA;
- Policies, Plans and Strategies;
- Economics;
- Risks;
- Environmental Impacts; and
- Wider Outcomes.

Drawings of the options are appended to the Option Assessment Report.

The two options which best met these criteria were the Chalmers Avenue to east of Tinwald and the Chalmers Avenue to Grove Street options.

The summary of the Issues and Options Option assessment is reproduced in Table 4-2.

Summary of Issues and Options Option Assessment

Option	Access and Mobility	Land	Engineering-Technical	RMA	Policies, Plans, Strategies	Economics	Risks	Environ Impacts	Wider Outcomes
A – Eastern Bypass	Red	Amber	Green	Amber	Red	Red	Amber	Amber	Amber
B – Trevors Rd to East of Tinwald	Amber	Amber	Amber	Amber	Red	Red	Amber	Amber	Red
C – Leeston St to East of Tinwald	Red	Amber	Amber	Amber	Red	Red	Amber	Amber	Amber
D – Chalmers Ave to East of Tinwald	Green	Amber	Green	Amber	Green	Green	Green	Green	Green
D-E – Chalmers Ave to Grove St	Green	Amber	Green	Amber	Green	Green	Green	Green	Green
E – William St to Grove St	Amber	Amber	Amber	Amber	Green	Amber	Green	Amber	Amber
F – Cass St to Thomson St	Amber	Amber	Amber	Amber	Red	Red	Amber	Amber	Red
G – 4 Lane Existing Bridge	Amber	Red	Amber	Amber	Red	Red	Amber	Amber	Amber
H – West St to Melcombe St (one way north & south)	Red	Red	Red	Amber	Red	Red	Amber	Amber	Amber
H1 – West st to Melcombe St (new SH1)	Amber	Red	Amber	Amber	Amber	Red	Amber	Amber	Amber
I – Park St to Tarbottons Rd	Amber	Red	Red	Amber	Amber	Red	Amber	Amber	Red
J – Oak Grove to West of Tinwald	Amber	Amber	Amber	Amber	Amber	Red	Red	Amber	Red
K – Western Bypass	Red	Red	Amber	Amber	Red	Red	Red	Amber	Red

Table 4-2 Issues and Options Option Assessment

Key:

- Green: Indicates that the option has no significant issues, and makes a positive contribution towards meeting the criteria,
- Amber: Indicates that the option has some issues which are able to be addressed, and makes little positive or negative contribution towards meeting the criteria; and
- Red: Indicates that the option has serious or fatal issues which are not able to be readily addressed, and makes a negative contribution towards meeting the criteria.

4.3 Additional Investigation for a Second Bridge Across the Ashburton River

As noted in Section 2.1, Council commissioned Additional Investigations in 2010 /11 following public consultation. Those investigations considered the following options:

- Bypass: Fairton to Winslow
- Bypass: Seafield Road to Laings Road
- Chalmers Avenue to East of Tinwald – Rural option
- Chalmers Avenue to East of Tinwald – Urban option
- Chalmers Avenue to Grove Street
- Melcombe Street – Rail level crossing to join SH1 south of Tinwald
- Melcombe Street – Rail overbridge to join SH1 south of Tinwald
- State Highway 1 Four Laning

In addition, an option to provide traffic signals in Tinwald was included for comparative purposes. It was not a long term alternative for a second bridge across the Ashburton River.

Option drawings are appended to the Options Assessment Report.

A multi criteria assessment was carried out on each option. The criteria were agreed at a full day workshop attended by project team members from Opus, Taylor Baines and Associates, and ADC. Table 4-3 below is based on the criteria description table in the Additional Investigation report.

Criteria	*Exemplified by*
Safety	Pedestrian, cyclist and motorist safety.
Personal Security	Safety of people in public places.
Emergency Services	Ability of emergency services to respond quickly to emergencies.
Lifeline	Ability to maintain essential utilities to communities in the event of a civil defence emergency.
Route Security	Ability to provide reasonable access in the event of bridge closure
Accessibility	Ability to get to key destinations within town.
Community Severance	The splitting of sectors of a community by a physical & perceived barrier (includes road & traffic).
Active Transport	Promoting active transport (e.g. walking and cycling).
Land	Ease of land acquisition.
Heritage	Impact on heritage sites, buildings etc & archaeology
Environment – Water	Impact on water quality, and river hydraulics.
Amenity & Public Health	Changes to amenity values.
Cost	Total cost - Land & construction. Whole of life cost. Local ratepayer share.
Economic Development	Impact on local businesses operating in Ashburton and Tinwald.
Planning for the Long Term	Addressing short, medium, and long term transportation issues throughout the next 50 years
Sewer Replacement Opportunity	A new bridge may provide a viable route for a sewer to replace the existing siphon under the River.

Table 4-3 Additional Investigation Assessment Criteria

4.3.1 Assessment

Each option was given a score between -2 to +2 for each criteria, where:

- -2 indicates the option has significant negative impact
- -1 indicates the option has moderate negative impact
- 0 indicates the option has little or no impact
- +1 indicates the option has moderate positive impact
- +2 indicates the option has significant positive impact.

The preliminary assessment was then presented to the Community Reference Group, and reviewed and refined in light of the Reference Group comments. A total of 24 scores were changed as a result of the Reference Group inputs.

The full assessment is included in the Assessment Report. A summary of the assessment scores is reproduced in Figure 4-1 below.

Summary of Option Assessment - Feb 2011

	Social									Cultural	Enviro		Economic						
Weighting Version 1	2.5	1	1.5	1	2	2	1	1	2	1	1	2	3	2	2	1			
Weighting Version 2	2	1	1	1	2	2	1	1	2	1	1	2	2	2	2	1			
Option	Safety	Personal Security	Emergency Services	Lifeline	Route Security	Accessibility	Community Severance	Active Transport	Land	Heritage	Environment - Water	Amenity & Public Health	Cost	Economic Development	Planning for the Long Term	Sewer Replacement Opportunity	Raw Total	Weighted - V1	Weighted - V2
Outer Bypass	0	0	0	0	2	0	0	1	-2	0	0	0	-2	0	0	1	0	-4	-2
Inner Bypass	0	0	0	1	2	0	0	1	-2	0	0	-1	-2	0	0	1	0	-5	-3
Chalmers - Rural	1	0	1	2	2	2	1	1	0	0	0	-1	1	1	2	0	13	23	21
Chalmers - Urban	2	1	1	2	2	2	1	2	-1	0	0	-1	1	1	2	0	15	26	23
Chalmers - Grove	1	2	1	2	2	2	-1	1	0	0	0	-2	1	1	1	0	11	19	17
Melcombe - level xing	0	0	1	1	1	1	-1	1	-2	0	0	-2	-1	-1	0	0	-2	-7	-6
Melcombe - Rail overpass	1	0	1	1	1	1	-1	1	-1	0	0	-2	-1	-1	0	0	0	-2	-2
4-laning SH1	0	-1	1	0	1	-2	-2	1	-1	-1	0	-1	-1	-2	0	0	-8	-15	-14
Traffic Signals in Tinwald	1	0	0	0	0	1	1	1	0	0	0	0	2	0	0	0	6	13	10

Figure 4-1 Additional Investigation Option Assessment Summary

Total scores for each option have been calculated as a "raw total" (i.e. a weighting of 1 for each criteria), and as two weighted totals. Weighting Version 1 was established following an exercise with the Reference Group to identify the most important factors from their perspective. These weightings reflect the importance placed on each of the criteria by the Reference Group, with weightings from 1 to 3, and with 0.5 increments.

Weighting Version 2 is a simplified version of Version 1. It only uses two weightings (1 or 2), compared to the five weightings in Version 1. This results in less distinction between the weightings applied to the assessment.

The three Chalmers Avenue bridge options produced positive scores for their raw and weighted scores. The Tinwald signals option was the only other option to produce a positive score. All the other options produced negative scores or zero. The difference between the Chalmers Avenue options and all other options increased significantly when the weightings (which came out of the Reference Group meeting) were applied.

These scores reflect the feeling of the project team that the Chalmers Avenue options make significant positive contributions to accessibility between Ashburton and Tinwald, route security, and the provision of lifeline utilities between Ashburton and Tinwald. They also reflect the high cost of the bypass options, and the severance effects and difficulty accessing SH1 of the Melcombe Street and four laning options.

Of the three Chalmers Avenue options, Grove Street scored consistently lower than the east of Tinwald options. As a result, Council held a consultation round on the Chalmers Avenue to East of Tinwald – Urban and Chalmers Avenue to East of Tinwald – Rural options.

4.4 Final Option Assessment

Following consultation, Council decided on a route in the Chalmers Avenue to East of Tinwald – Urban location. Further investigations were carried out on two sub options of that location, namely a curvilinear alignment, avoiding as many houses and other buildings as possible, and running more or less adjacent to property boundaries (sub option A), and a “straight line” option, running along property boundaries, and along a length of Wilkins Road, with Tee intersections on Wilkins Road (sub option B). These two options are shown on Figure 4-2 and Figure 4-3 respectively:

Figure 4-2 Chalmers Ave to East of Tinwald - Urban Sub Option A

Figure 4-3 Chalmers Ave to East of Tinwald - Urban Sub Option B

Sub option B resulted in traffic on the new principal road route needing to make right angle right and left hand turns, and giving way to traffic on the local road.

Council decided to proceed to designation on sub option A.

5 Proposal Description

Drawings showing the typical alignment and cross section are contained in Volume B of the Notice of Requirement. The key features are described below:

5.1 Alignment

The proposed alignment of the ASUB runs from Grahams Road, approximately 200m east of Grove Street. It follows a curvilinear alignment to cross the river opposite the end of Chalmers Avenue. It then follows Chalmers Avenue to the Chalmers Avenue / South Street intersection. The roading layout is shown on drawing sheets 11 to 14

5.2 Typical Cross-Section

The proposed cross section of the road varies along the length of the route. There are four different typical cross sections as follows:

- Grahams Road to Carters Terrace
- Carters Terrace to Ashburton River
- Bridge across Ashburton River
- Ashburton River to South Street

These typical cross sections are shown in drawing sheet numbers 05 to 07, and described below:

5.2.1 Grahams Road to Carters Terrace

This section has the following typical carriageway cross section

- 1 x 2m wide flush (i.e., painted) central median
- 2 x 3.5m wide traffic lanes
- 2 x 1.8m wide cycle lanes
- 2 x 2.4m wide parking lanes
- 2 x 1.6m wide footpaths

In addition to the typical carriageway as described above, it is proposed to include a further 4.7m – 5.7m width on both sides for stormwater swales and landscaping purposes.

A typical cross section for this length is shown in drawing sheet number 05.

5.2.2 Carters Terrace to Ashburton River

This section has the following typical carriageway cross section:

- 2 x 3.5m wide traffic lanes
- 2 x 1.8m wide cycle lanes
- 2 x 1.6m wide footpaths

Over this section the road is on an embankment across the floodplain of the Ashburton River. It also includes stormwater swales at the base of the embankment on both sides, and pedestrian and cycle paths on both sides connecting to the existing walking and cycling track on the south side of the Ashburton River.

5.2.3 Ashburton River Bridge

The proposed typical bridge cross section includes:

- 2 x 3.5m wide traffic lanes
- 2 x 1.8m wide cycle lanes
- 2 x 1.6m wide footpaths

Typical bridge layouts, including a typical cross section for this length is shown on drawing sheet number 07.

5.2.4 Ashburton River to South Street

This section is similar to the remainder of Chalmers Avenue, and has the following typical carriageway cross section:

- 1 x 10m wide planted central median, incorporating a swale
- 2 x 3.5m wide traffic lanes
- 2 x 2.0m wide cycle lanes
- 2 x 2.5m wide parking lanes
- 2 x 2.0m wide footpaths

In addition to the typical carriageway as described above, it is proposed to include a further 3.5m wide berm on each side for landscaping purposes.

A typical cross section for this length is shown in drawing sheet number 06.

5.3 Pedestrian and Cycle Facilities

The proposed road will include quality footpaths and cycle lanes along the length of the route. It is also proposed to include crossing points at key locations along the route. These locations have not yet been identified because they will tie in with pedestrian and cycle routes through the yet to be developed urban areas east of Tinwald.

5.4 Intersections

5.4.1 East Tinwald

5.4.1.1 Grahams Road

The proposed new road will connect at Grahams Road via a T-intersection, with the new road being controlled via a 'stop' or 'give way'. Grahams Road will retain priority, and will likely have a right-turn bay installed (for right-turning traffic coming from the direction of Lake Hood).

5.4.1.2 Johnstone Street, Wilkins Road and Carters Terrace

The ASUB project will provide a continuation of Chalmers Avenue across the bridge through to Grahams Road. The new road will have priority at all intersections where it crosses Johnstone

Street, Wilkins Road, and Carters Terrace. The intersection layout shown on the drawings consists of cross road type intersections with Right Turn Bays on the new road.

Sufficient land is included within the designation at each of these intersections to install roundabouts rather than a cross roads type intersections. The decision regarding the types of intersections at these locations will be made at the time of detailed design. There are pros and cons for roundabouts as opposed to cross roads type intersections. These are summarised below:

Roundabouts Pros:

- Improved accessibility and safety for vehicles turning onto the new road from side roads
- Would be likely to discourage through vehicles (particularly heavy vehicles) using this route between SH1 south of Tinwald and north Ashburton, including the Business Estate

Roundabout Cons

- Causes delays for vehicles on the main road
- Roundabouts work best when traffic volumes on all arms are reasonably even
- Reduction in accessibility and safety for pedestrian and cyclists

5.4.2 Chalmers Avenue

There will be no change to the layout or priority of intersections along the existing Chalmers Avenue.

However, as noted in Section 7, some minor traffic calming measures are recommended for intersections on Chalmers Avenue in order to improve general safety, and pedestrian and cyclist amenity and safety.

6 Effects of Proposed Bridge and Associated Roading

The proposed ASUB is expected to have a number of impacts on the wider Ashburton Transportation system. Most of these impacts are considered to be positive, though there are a small number of negative impacts. These impacts are discussed in the following sections.

6.1 Base Transport Network

The current programme for ASUB is for construction to occur in or around 2026. The base transport system used for assessing the effects of ASUB is therefore the system as it is likely to be in 2026, and not the system as it currently stands. The following factors are expected to influence and change the Ashburton Transport system by 2026:

- Urban development on land recently zoned Residential C and D in East Tinwald
- Further development of Lake Hood including residential commercial and recreational
- Development of the Ashburton Business Estate
- Urban development on other land recently zoned Residential on the urban fringes of the remainder of Ashburton
- Development of the AE Networks Stadium on SH77
- Possible traffic signals at the Walnut Avenue intersections with SH1 and East Street
- Possible traffic signals on SH1 in Tinwald. The location for these has not yet been decided; and
- Growth of State Highway traffic

These factors are expected to result in the following changes to the operation of the Ashburton Transport system with or without a second bridge at Chalmers Avenue:

- Significant increases in local traffic between Tinwald and Ashburton
- Smaller increase in State Highway through traffic
- Growing congestion on SH1 at the existing bridge, and at intersections of SH1 with Havelock Street, SH77, and South Street
- As a result of this congestion, not all of the evening peak hour traffic wishing to use the bridge will be able to do so within a reasonable time, resulting in a backlog of traffic
- Significant increases in traffic on Bridge Street and Chalmers Ave as a result of the development of the Business Estate
- Significant increase in traffic on cross roads in Tinwald, including Carters Terrace, Wilkins Street, Johnstone Street, and Graham Street. Graham Street will be particularly affected due to the higher density, Residential C area, adjacent to it, combined with the growth at Lake Hood
- Significant volumes of traffic turning right onto SH1 are likely to be concentrated at the possible Tinwald traffic signals. This is likely to increase traffic volumes on local streets in the vicinity of the signals, and reduce volumes on other local streets accessing SH1

6.2 Trip Generation

The ASUB will not of itself result in increased demand for travel within Ashburton. It will redistribute existing vehicle trips from the existing bridge and associated roads to the new bridge and associated roads, and may release suppressed travel demand (see below).

It is expected that the provision of a quality, safe pedestrian and cycle route across the river is likely to encourage some motorists to change mode from private vehicles to walking or cycling. This is expected to result in a reduction in the total number of vehicles crossing the river.

It is also expected that some motorists who postpone peak hour trips, or decide not to travel at all, due to congestion, will choose to revert back to peak time travel. As a result of this suppressed travel being released, there could be a small increase in the total number of trips across the river.

6.3 Traffic Modelling

Traffic modelling to assess and compare options was carried out for the Ashburton Transportation Study, the Ashburton Second Bridge Issues and Options Report, and the final Option Assessment. The final Option Assessment modelling has also been used to assess the effects of the preferred ASUB option.

The overall results of the Ashburton Transportation Study and Second Bridge Issues and Options traffic modelling are discussed briefly below as a background to the final Option Assessment Modelling. The effects of the proposed ASUB option are summarised following the discussion on the Transportation Study and Issues and Options modelling.

6.3.1 Ashburton Transportation Study Modelling

A SATURN traffic model of urban Ashburton was prepared for the Ashburton Transportation Study. Model years of 2006 (the date of the study), 2016, and 2026 were developed, and the model was used to test a suite of measures identified to form the Ashburton Transportation Strategy.

This model used the areas for development identified in the Ashburton District Development Plan (Boffa Miskell, 2005) to identify future origins and destinations of trips. This plan identified Residential and Greenbelt Residential areas to the east of Tinwald.

Two second bridge options were tested for the study. Option 1 was a bypass to the east of Ashburton, leaving the highway just south of Northpark Road, and re-joining it south of Fords Road. Option 2 was an urban option running from the end of Chalmers Avenue, to the east of Tinwald, and joining SH1 south of Fords Road. These options are shown on Figure 6-1.

Table 6-1 is reproduced from the Ashburton Transportation Study Modelling Technical Note[6], and shows the estimated morning, inter, and evening peak traffic volumes, and Average Annualised Daily Traffic (AADT) volumes, in 2026 on the existing and new bridges with no bridge (Do Minimum), and with each of the options.

[6] Technical Note: Options Analysis for Ashburton Transportation Study – Opus 2006

		AM Peak	Interpeak	PM Peak	AADT
SH1 Bridge	Do Minimum	2,600	2,200	3,400	36,000
	Option 1	1,800	1,600	2,200	26,000
	Option 2	1,500	1,300	1,900	21,000
New Bridge	Do Minimum	-	-	-	-
	Option 1	800	600	1,200	10,150
	Option 2	1,100	900	1,400	14,800
Total	Do Minimum	2,600	2,200	3,400	35,800
	Option 1	2,600	2,200	3,400	35,800
	Option 2	2,600	2,200	3,400	35,800

Table 6-1 Ashburton Transportation Study Modelling Results for Existing and New Bridge 2026

This table shows that Option 2 (Chalmers Avenue through east of Tinwald) is estimated to reduce traffic on the existing bridge by 14,800 vehicles per day (vpd) by 2026. This compares with estimated reductions of 10,100 vpd for the bypass option.

The bypass option is less effective because it primarily attracts traffic which is travelling through Ashburton, rather than traffic within the Ashburton urban area. As noted in section 3.1.1 this traffic consists of less than 20% of the traffic on the existing bridge during the peak periods.

Route choices are made based on a combination of travel cost and time.

Bypass routes which are further away from the Ashburton urban area are expected to attract less traffic than Option 1 as modelled. The further away from the urban area a bypass route is, then the greater the additional distance through traffic is required to travel, making it less attractive to such traffic. Local traffic between points in the Ashburton urban area is also less likely to travel the additional distance to use a bypass.

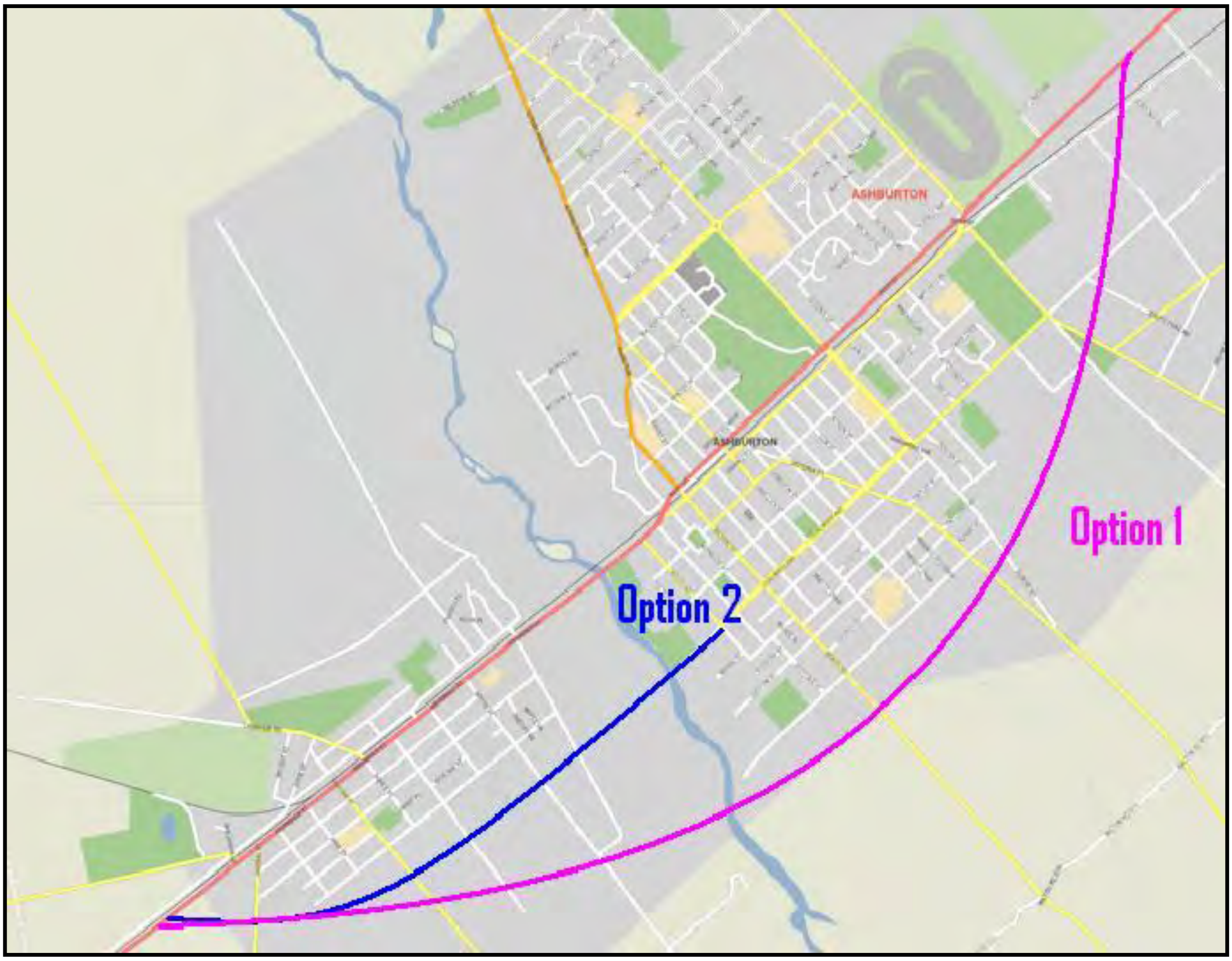


Figure 6-1 Ashburton Transportation Study 2nd Bridge Options

6.3.2 Ashburton Second Bridge Issues and Options Report Modelling

The traffic model prepared for the Ashburton Transport Study was re run as part of the Issues and Options Report. The trip matrices were revised to reflect the changes in land use proposed in the then Draft District Plan Review. The land use changes proposed in the Draft District Plan Review have largely been adopted in the currently Partially Operative District Plan.

Option D/E (Chalmers Avenue to Grove Street) was modelled for the future years of 2016 and 2026, and compared with Do Minimum for the Ashburton Second Bridge Issues and Options Report.

The estimated 2026 traffic volumes (vph) for Do Minimum and Option D/E are shown on Table 6-2.

		AM Peak	Interpeak	PM Peak
SH1 Bridge	Do Minimum	2750	2300	2850
	Option D/E	1800	1550	2050
New Bridge	Do Minimum	-	-	-
	Option D/E	1100	800	1300
Total	Do Minimum	2750	2300	2850
	Option D/E	2800	2350	3350

Table 6-2 Ashburton Second Bridge Issues and Options Report Modelling Results for existing and new bridge 2026

The modelling shows more traffic crossing the River (on both bridges) for Option D/E, compared to Do Minimum, in the morning and evening peak in 2026. This indicates severe congestion on the existing bridge, resulting in some of the traffic wishing to cross the river in those periods not being able to.

6.3.3 Ashburton Second Urban Bridge Final Option Modelling

The SATURN model was used to compare, and assess the impacts of, the final three options for bridge access routes as part of the additional investigations carried out in 2011/12. A separate modelling report[7] has been prepared.

The three Chalmers Avenue options were considered in this modelling. They were a bridge at the end of Chalmers Avenue linking to Grove Street, East of Tinwald – Urban, and East of Tinwald – Rural. The modelling indicated that, in 2026, the East of Tinwald – Urban option would perform slightly better than the East of Tinwald - Rural option, in terms of numbers of vehicles transferring from the existing route, overall travel time and intersection performance. The East of Tinwald – Rural option would, in turn, perform slightly better than the Grove Street option. The East of Tinwald – Urban option is the subject of this Notice of Requirement.

The effects of all three options on the roading network have also been assessed, but only the East of Tinwald – Urban results are reproduced in sections 6.4.3 6.4.4 .

6.4 Modelled Effects

The effects, which have been identified in all of the modelling carried out since the Ashburton Transportation Study in 2006, and are relevant to ASUB, are summarised in the following sections.

6.4.1 Total Network Travel Time

Overall travel time is a measure of the total time that all vehicles in a roading network spend travelling during a particular period. It is measured in Passenger Car Unit (PCU)[8] travel hours per hour. Table 6-3 is reproduced from the modelling report. It shows the total travel time across the Ashburton network for each of the three peak periods

[7] Ashburton Second Bridge 2012 Traffic Model Option Analysis (Opus 2012)
[8] Passenger Car Unit is a method of assessing the total traffic flow based on weightings given to different types of vehicles (e.g a bus is considered the equivalent to 2.5 PCU's)

Option	Morning Peak		Inter peak		Evening Peak	
Do Minimum	**674**	**-**	**583**	**-**	**1101**	**-**
Grove Street	650	-3.6%	574	-1.5%	894	-18.8%
Tinwald Urban	**652**	**-3.3%**	**570**	**-2.2%**	**898**	**-18.4%**
Tinwald Rural	654	-3.0%	571	-2.1%	909	-17.4%

Table 6-3 2026 Estimated Total Network Travel Time (PCU hours per hour)

This table indicates that the ASUB project is expected to reduce the combined daily travel time for all vehicles in the Ashburton urban area by 22 hours in the morning peak, 13 hours in the lunch time peak, and 203 hours in the evening peak. This equates to an average percentage reduction for 3.3%, 2.2% and 18.4%.

In other words that equates to 203 hours that the people of Ashburton will not spend sitting in their cars in traffic getting home every evening.

6.4.2 Traffic Volumes on Existing Bridge

Reducing traffic volumes and resulting congestion on the existing bridge is a key objective of the ASUB project. Table 6-4 shows the estimated 2026 traffic volumes on the existing and proposed bridge, and total volume crossing the Ashburton River.

Bridge	Option	Morning Peak	Inter peak	Evening Peak
SH1 Bridge Northbound	**Do Minimum**	**1260**	**1010**	**1280**
	Grove Street	1030	910	930
	Tinwald Urban	**920**	**840**	**900**
	Tinwald Rural	970	860	1040
2nd Bridge Northbound	**Do Minimum**	**-**	**-**	**-**
	Grove Street	240	90	360
	Tinwald Urban	**340**	**160**	**390**
	Tinwald Rural	290	150	250
SH1 Bridge Southbound	**Do Minimum**	**950**	**1100**	**1470**
	Grove Street	700	890	1150
	Tinwald Urban	**830**	**900**	**1270**
	Tinwald Rural	820	880	1300
2nd Bridge Southbound	**Do Minimum**	**-**	**-**	**-**
	Grove Street	250	210	640
	Tinwald Urban	**130**	**200**	**520**
	Tinwald Rural	130	220	490
Northbound Total	**Do Minimum**	**1260**	**1010**	**1280**
	Grove Street	1260	1010	1290
	Tinwald Urban	**1260**	**1010**	**1290**
	Tinwald Rural	1260	1010	1290
Southbound Total	**Do Minimum**	**950**	**1100**	**1470**
	Grove Street	950	1100	1790
	Tinwald Urban	**950**	**1100**	**1800**
	Tinwald Rural	950	1100	1790

Table 6-4 2026 Estimated Traffic Volumes crossing the Ashburton River

The difference in the total volume of traffic southbound in the evening peak reflects a common phenomenon in traffic flow, which may appear counter intuitive at first glance, i.e. increasing vehicle numbers on a section of road reaches a point where total traffic flow begins to decrease. This is explained below, and shown on Figure 6-2:

- As flow density (the number of vehicles per km) increases, then the speed of those vehicles decreases (bottom left graph in Figure 6-2).
- When flow density is low, and speed is in the free flow range, an increase in vehicle numbers results in an increase in vehicle flow (top left curve in Figure 6-2)
- Flow Density eventually reaches a point where the reduction in speed outweighs the increase in vehicle numbers, and the total traffic flow starts to reduce (point A on Figure 6-2)
- In the ultimate case, congestion reaches a grid lock stage where speed (and traffic flow) approaches zero (point B on Figure 6-2)

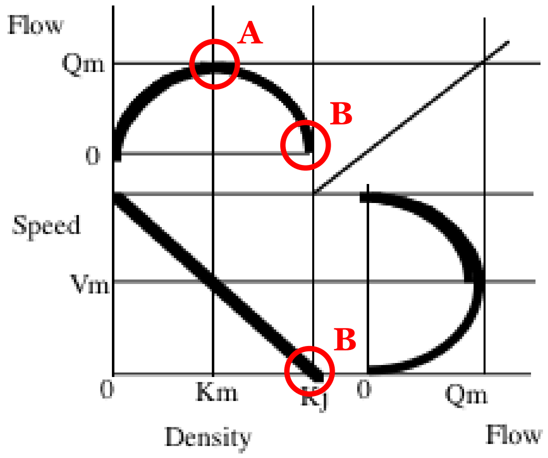


FIGURE 2: Flow-density, and speed-concentration curves (assuming single-regime, linear speed-concentration model)

Figure 6-2 Flow Density and Speed Curves (from Levinson)

The traffic modelling shows 1470 vehicles crossing the bridge southbound in the evening peak in 2026 with no second bridge. Once the second bridge is added, 1800 vehicles are modelled as crossing the river. This indicates that the existing bridge is likely to be operating at, or past, point A on Figure 6-2.

It is estimated that, 27% the traffic crossing the Ashburton River northbound in the morning, and 29% southbound in the evening will use the proposed ASUB route in 2026. This percentage is expected to increase beyond 2026 as east Tinwald and Lake Hood develop further.

6.4.3 Changes in Traffic Volumes

Projected traffic volumes have been assessed at a number of locations within urban Ashburton in 2026 for the Do Minimum option and the Tinwald Urban option. These are shown in Table 6-6 to Table 6-7. The Do Minimum option consists of implementation of the Ashburton Transportation Strategy, including traffic signals at the Walnut Avenue / SH1 / East Street intersection pair, and on SH1 in Tinwald, but not including a second bridge.

Location		Option	Morning Peak	Inter peak	Evening Peak
SH1 south of Walnut Ave	Northbound	Do Minimum	620	610	640
		Tinwald Urban	530	570	510
		Difference	**-90**	**-40**	**-130**
	Southbound	Do Minimum	420	550	750
		Tinwald Urban	410	440	750
		Difference	**-10**	**-110**	**0**
	Total Difference		**-100**	**-150**	**-130**
SH1 south of Moore St	Northbound	Do Minimum	760	610	920
		Tinwald Urban	670	560	670
		Difference	**-90**	**-50**	**-250**
	Southbound	Do Minimum	650	650	1160
		Tinwald Urban	580	540	1010
		Difference	**-70**	**-110**	**-150**
	Total Difference		**-160**	**-160**	**-400**
SH1 north of Agnes St / Lagmhor Rd	Northbound	Do Minimum	840	690	1040
		Tinwald Urban	580	600	710
		Difference	**-260**	**-90**	**-330**
	Southbound	Do Minimum	720	790	870
		Tinwald Urban	760	700	980
		Difference	**40**	**-90**	**110**
	Total Difference		**-220**	**-180**	**-220**
Chalmers Ave south of Walnut Ave	Northbound	Do Minimum	310	220	270
		Tinwald Urban	470	280	430
		Difference	**160**	**60**	**160**
	Southbound	Do Minimum	330	200	530
		Tinwald Urban	240	320	700
		Difference	**-90**	**120**	**170**
	Total Difference		**70**	**180**	**330**

Table 6-5 Modelled 2026 Traffic Volumes (vehicles per hour)

Location		Option	Morning Peak	Inter peak	Evening Peak
South St west of Chalmers Ave	Westbound	Do Minimum	150	80	140
		Tinwald Urban	40	40	30
		Difference	**-110**	**-40**	**-110**
	Eastbound	Do Minimum	240	150	180
		Tinwald Urban	160	130	170
		Difference	**-80**	**-20**	**-10**
	Total Difference		**-190**	**-60**	**-120**
Grove St south of Carters Tce	Northbound	Do Minimum	50	40	20
		Tinwald Urban	30	<10	20
		Difference	**-20**	**0**	**0**
	Southbound	Do Minimum	110	140	390
		Tinwald Urban	20	50	80
		Difference	**-90**	**-90**	**-310**
	Total Difference		**-110**	**-90**	**-310**
Grove St north of Graham Rd	Northbound	Do Minimum	<10	<10	10
		Tinwald Urban	<10	<10	<10
		Difference	**0**	**0**	**0**
	Southbound	Do Minimum	10	20	170
		Tinwald Urban	0	50	100
		Difference	**-10**	**30**	**-70**
	Total Difference		**-10**	**30**	**-70**
Graham St west of Grove St	Westbound	Do Minimum	180	70	160
		Tinwald Urban	40	<10	60
		Difference	**-140**	**-60**	**-100**
	Eastbound	Do Minimum	80	100	40
		Tinwald Urban	100	10	200
		Difference	**20**	**-90**	**160**
	Total Difference		**-120**	**-150**	**60**

Table 6-6 Modelled 2026 Traffic Volumes (vehicles per hour)

Location		Option	Morning Peak	Inter peak	Evening Peak
SH1 south of Maronan St	Northbound	Do Minimum	390	460	700
		Tinwald Urban	390	460	700
		Difference	0	0	0
	Southbound	Do Minimum	520	510	670
		Tinwald Urban	520	510	810
		Difference	0	0	140
	Total Difference		0	0	140
SH1 north of Northpark Rd	Northbound	Do Minimum	750	680	660
		Tinwald Urban	750	680	660
		Difference	0	0	0
	Southbound	Do Minimum	470	550	910
		Tinwald Urban	470	550	910
		Difference	0	0	0
	Total Difference		0	0	0

Table 6-7 Modelled 2026 Traffic Volumes (vehicles per hour)

6.4.3.1 Reduction in Traffic

Overall traffic volumes are expected to decrease on the following roads in 2026 as a result of the construction of ASUB:

SH1 south of Walnut Avenue

The modelling shows a reduction in traffic volumes at this location at all times and directions

South Street between Chalmers Avenue and SH1.

South Street is a key link between Chalmers Avenue and SH1. Vehicles between east Ashburton and Tinwald are likely to use the ASUB route rather than SH1.

Grove Street over its entire length.

The ASUB route is expected to result in a significant reduction in traffic on Grove Street.

It is expected that the provision of traffic signals at an intersection in Tinwald will result in a concentration of traffic turning right at that intersection. Much of the traffic using the signals is expected to transfer to the signalised intersection from other intersections in Tinwald. This will result in an increase in traffic on the "north south" streets in Tinwald (Grove, Thomson, and McMurdo Streets). For example, if the signals are located on Agnes Street, then some vehicles which would otherwise use the other intersections in Tinwald will use the north south streets to access Agnes Street to use the signals. This is expected to result in a significant increase in traffic volumes on these streets by 2026, without a second bridge.

The ASUB route will provide an alternative route for traffic between the residential areas east of Tinwald (including Lake Hood) and north Ashburton, thereby resulting in a reduction in traffic volumes on the north / south streets in Tinwald.

Graham Street between ASUB and SH1.

The modelling shows a reduction in traffic volumes westbound on Graham Street for all periods, but an increase eastbound in the morning and evening, with the ASUB.

There are three factors which are likely to influence the changes in traffic volumes as a result of the ASUB project on this section of Graham Street:

1. By 2026, the newly zoned Residential C area east of Tinwald and the on-going development of Lake Hood, are expected to contribute significant traffic volumes to Graham Street. The ASUB project will provide an alternative route for that traffic accessing north Ashburton, thereby resulting in a reduction in traffic on Graham Street, particularly eastbound traffic wishing to turn right onto SH1.
2. The ASUB route will however provide an alternative route for traffic between east Ashburton (including the eastern areas of the Ashburton Business Estate) and south of Tinwald, using SH1, thereby resulting in an increase in traffic on Graham Street.
3. The freeing up of traffic crossing the existing bridge, as discussed in Section 6.4.2, resulting in an apparent increase in traffic on Graham Street.

Factor 1 is expected to outweigh the other factors westbound in all periods, and eastbound in the interpeak period, resulting in a reduction in traffic in those periods. Factors 2 and 3 are expected to outweigh Factor 1 eastbound in the morning and evening peaks resulting in an increase in traffic during those periods. Overall, the ASUB project is expected to result in a reduction in traffic volumes on Graham Street in 2026.

6.4.3.2 Increase in Traffic

Overall traffic volumes are expected to increase on the following roads in 2026 as a result of the construction of ASUB:

Chalmers Avenue between Walnut Avenue and South Street.

The provision of a direct link to east Tinwald will result in an increase in traffic on Chalmers Avenue of 70, 180, and 330 vph in the morning, interpeak, and evening peaks respectively. This equates to an overall increase of approximately 30% over the three periods when compared with projected 2026 traffic volume without a bridge.

Chalmers Avenue is currently designated as a Principal Road in the Ashburton District Plan. Urban Principal Roads have typical daily traffic flows of between 1,000 to 6,000 vpd[9].

It is expected that Chalmers Avenue will carry up to 8,000 vpd by 2026 without a second bridge, and up to 12,000 vpd with a bridge. Chalmers Avenue is a very wide median divided road with capacity to carry well in excess of the 700vph expected south bound in the evening peak with the ASUB project.

9 Ashburton Partially Operative District Plan Appendix 10-1

As noted in section 6.4.4 below, the intersections on Chalmers Avenue are expected to operate at Level Of Service A with the ASUB in place.

6.4.4 Intersection Performance

Average delays for all vehicles using the intersection and Level of Service (LOS) for the worst performing leg of the intersection are used to assess an intersection's performance. Table 6-8 shows the LOS definitions for the worst performing leg of an intersection from the US Highway Capacity Manual (HCM)

LOS	Signalised Intersection	Unsignalised Intersection
A	<10 sec	<10 sec
B	10-20 sec	10-15 sec
C	20–35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	>80 sec	>50 sec

Table 6-8 LOS Definitions

Figure 6-3 is reproduced from the Traffic Modelling Technical Note for the Ashburton Second Bridge Issues and Options Report. It shows the streets and intersections which are estimated to have a Level of Service (LOS) of E or F under the Do Minimum option.

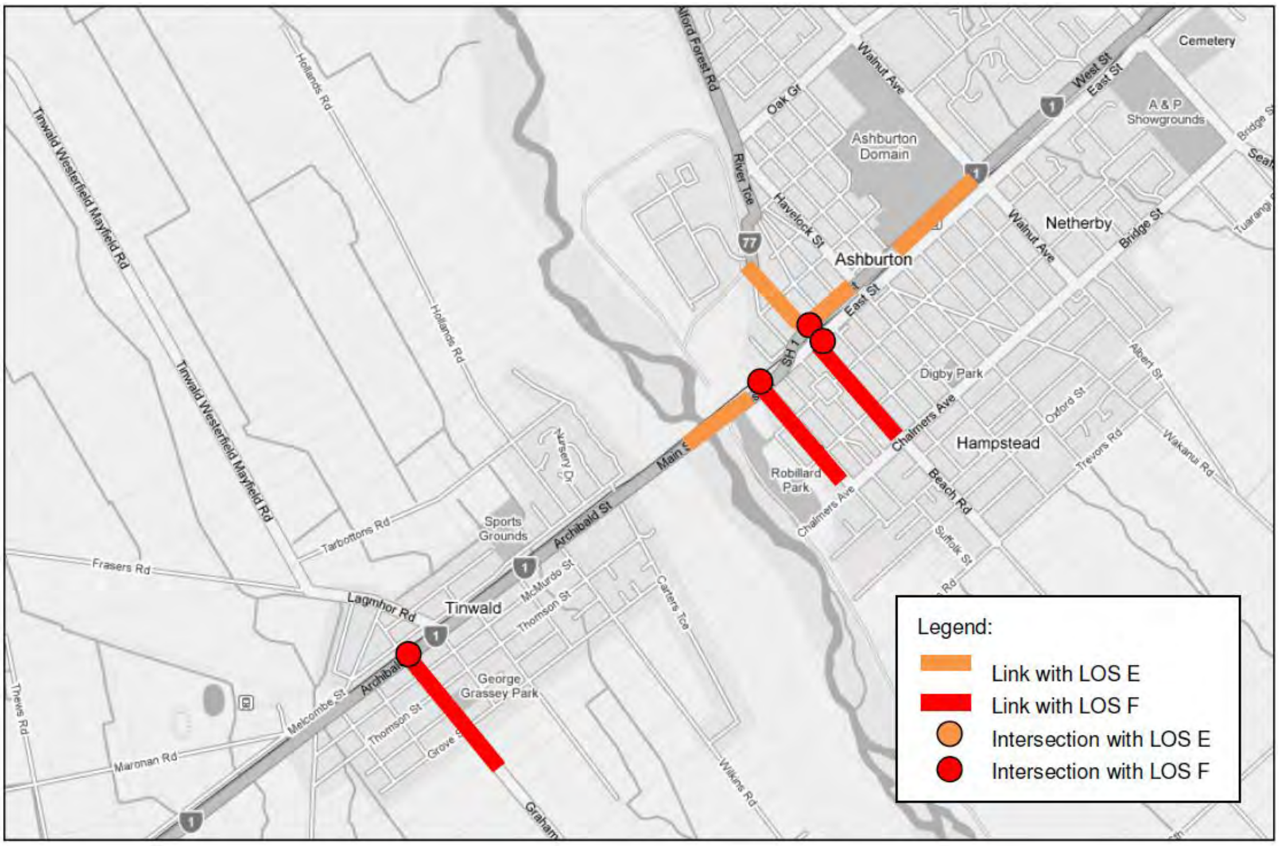


Figure 6-3 Do Minimum Network Performance 2026

It shows the following intersections with at least one leg having LOS F in 2026:

- SH1 / East Street / Moore Street intersection pair. The close proximity of these two intersections mean they effectively operate as one
- SH1 / South Street
- SH1 / Graham Street.

The following roads are assessed at **LOS E** in 2026:

- Ashburton River Bridge
- SH77 (Moore Street), west of SH1
- SH1 north of Moore Street
- SH1 south of Walnut Avenue.

The following roads are assessed at **LOS F** in 2026:

- Moore Street, east of East Street
- South Street, east of SH1
- Graham Street, east of SH1.

Figure 6-4 is also reproduced from the Traffic Modelling Technical Note for the Ashburton Second Bridge Issues and Options Report. It shows the streets and intersections which are estimated to have a Level of Service (LOS) of E or F under the Chalmers Avenue option, which is essentially the same as the ASUB option.

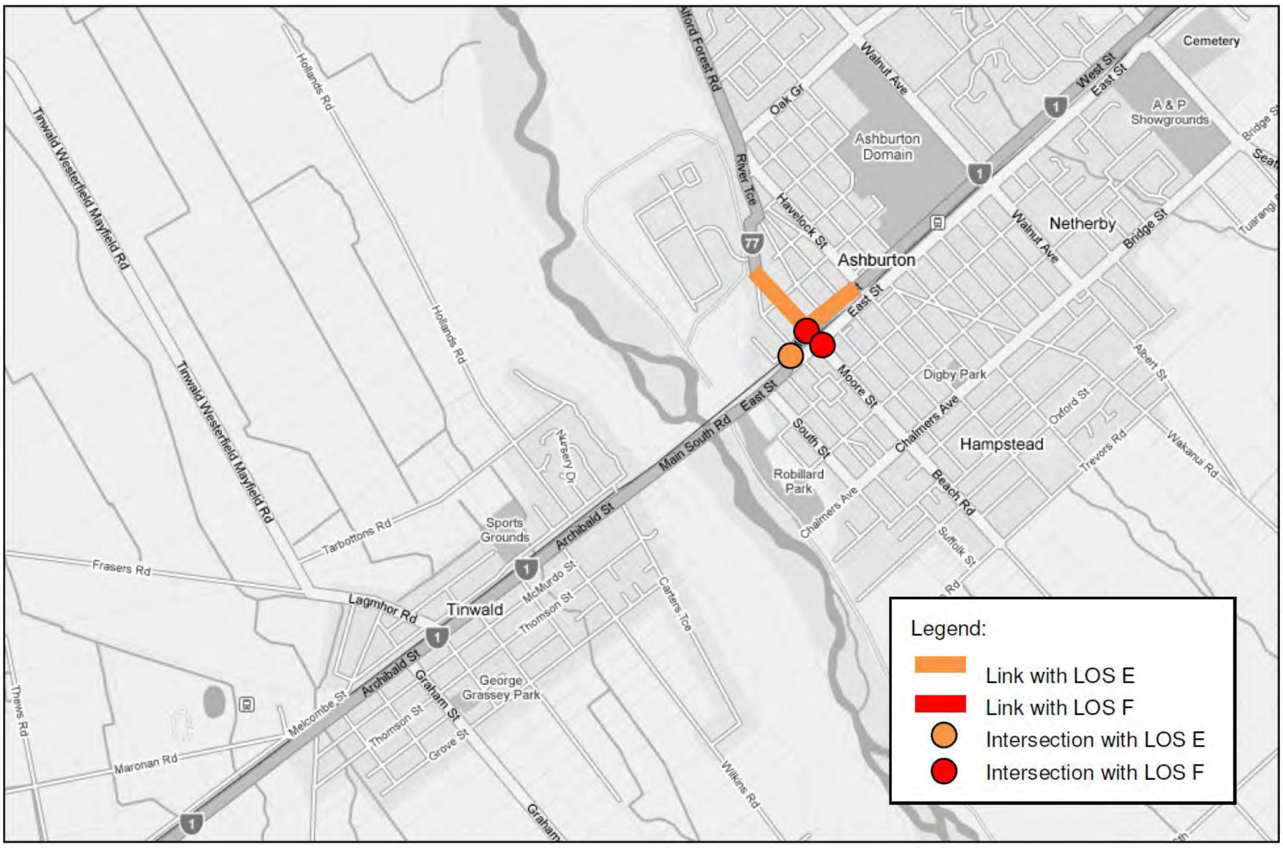


Figure 6-4 Chalmers Avenue Bridge Options Network Performance 2026

This figure shows that the only intersection expected to have at least one leg operating at LOS F under ASUB is the SH1 / East Street / Moore Street intersection pair. Further evaluation was carried out at this intersection and at the SH1 / Graham Street intersection

6.4.4.1 SH1 / East Street / Moore Street intersection pair

The results of further evaluation of this intersection are shown in Table 6-9 below.

Period	Measure	Do Minimum	ASUB	Change
SH1 North				
2026 Morning Peak	Queue length	2	3	1
	Delay	24	29	5
	Level of Service	C	C	
2026 Inter Peak	Queue length	5	4	-1
	Delay	46	46	0
	Level of Service	D	D	
2026 Evening Peak	Queue length	29	10	-19
	Delay	176	60	-116
	Level of Service	F	E	
Moore Street East				
2026 Morning Peak	Queue length	2	2	0
	Delay	25	43	18
	Level of Service	C	D	
2026 Inter Peak	Queue length	4	5	1
	Delay	54	61	7
	Level of Service	D	E	
2026 Evening Peak	Queue length	23	4	-19
	Delay	270	62	-208
	Level of Service	F	E	
SH1 South				
2026 Morning Peak	Queue length	5	5	0
	Delay	23	25	2
	Level of Service	C	C	
2026 Inter Peak	Queue length	5	5	0
	Delay	31	32	1
	Level of Service	C	C	
2026 Evening Peak	Queue length	8	6	-2
	Delay	33	31	-2
	Level of Service	C	C	
Moore Street West				
2026 Morning Peak	Queue length	5	6	1
	Delay	35	33	-2
	Level of Service	C	C	
2026 Inter Peak	Queue length	7	7	0
	Delay	33	32	-1
	Level of Service	C	C	
2026 Evening Peak	Queue length	29	12	-17
	Delay	201	46	-155
	Level of Service	F	D	

Table 6-9 Intersection Performance SH1/ East Street / Moore Street 2026

This table indicates that, whilst the worst performing legs of this intersection are likely to be operating at LOS E, the adoption of ASUB is expected to result in significant improvements in the performance of the intersection in the evening peak. For example, average delay on Moore Street

East in the evening peak is expected to reduce from 270 seconds to 62 seconds, a reduction of 208 seconds. Queue length is estimated to reduce from 23 vehicles to 4 vehicles.

Similarly, the average delay on Moore Street West is expected to reduce from 201 seconds to 46 seconds, a reduction of 155 seconds. Queue lengths are expected to reduce from 29 vehicles to 12 vehicles.

These improvements in the evening peak reflect the severe congestion which is expected in that period without a second bridge. Reducing that congestion as a result of ASUB improves the ability of vehicles to join SH1 southbound from all other legs of the intersection.

The table also indicates that some legs of the intersection are expected to perform slightly worse in other periods as a result of the ASUB project. The increases in delay and queue length at this intersection as a result of ASUB are small in comparison with the reductions in the evening peak. Notwithstanding the deterioration of the performance, all legs of the intersection except the SH1 North and Moore Street East leg are expected to operate at LOS C during the morning and inter peak periods. SH1 North is expected to operate at LOS C during the morning, and LOS D during the inter peak. Moore Street East is expected to operate at LOS D during the morning and LOS E during the inter peak periods.

The adverse effects of the ASUB on this intersection are therefore considered to be less than minor.

6.4.4.2 SH1 / Graham Street Intersection

Changes in turning volumes out of Graham Street are shown on Table 6-10.

Period	Movement	Do Minimum	ASUB	Change
Morning Peak	Left Out	29	<10	-19
	Right Out	153	30	-123
Inter Peak.	Left Out	<10	<10	0
	Right Out	62	<10	-52
Evening Peak	Left Out	22	39	17
	Right Out	144	18	-162

Table 6-10 Movements at SH1 / Graham Street Intersection 2026, from Graham Street

This table indicates that the numbers of vehicles turning right (northbound) are expected to reduce dramatically as a result of ASUB for all periods in 2026. The numbers turning left (southbound) are not expected to reduce so dramatically, and are in fact likely to increase slightly in the evening peak.

6.4.4.3 Other Existing Intersections

A number of other intersections in the wider Ashburton urban area have been assessed. Table 6-11 summarises the assessment of average delay and worst leg LOS for a number of Ashburton intersections in 2026, both with and without ASUB.

Intersection			SH1 / East St	Chalmers / Walnut	Chalmers / Moore	Chalmers / South	ASUB / Graham
Morning Peak	Do Min	Delay	11	3	6	<5	-
		LOS	E	A	A	A	-
	ASUB	Delay	<5	<5	6	<5	2
		LOS	A	A	A	A	A
	Change		-8	<5	<5	<5	
Inter Peak	Do Min	Delay	13	<5	6	<5	-
		LOS	E	A	A	A	-
	ASUB	Delay	7	<5	6	<5	<5
		LOS	B	A	A	A	A
	Change		-6	<5	<5	<5	
Evening Peak	Do Min	Delay	22	<5	5	<5	-
		LOS	F	A	A	A	-
	ASUB	Delay	10	<5	6	<5	<5
		LOS	E	A	A	A	A
	Change		-12	<5	<5	<5	

Table 6-11 Other Intersection Delay (sec) and LOS 2026

By 2026 it is expected that the delays and Levels of Service on SH1 and associated intersections through Ashburton will have deteriorated. However, most other roads and intersections throughout the Ashburton urban area are expected to have small delays and excellent Levels of Service.

The construction of ASUB is expected to significantly reduce delays and improve Levels of Service on SH1, and associated intersections, whilst having minimal adverse impact on the performance of other roads and intersections throughout Ashburton.

6.4.4.4 New Intersections

New intersections are proposed with the new section of road and the following existing roads in east Tinwald:

- Carters Terrace
- Wilkins Road
- Johnstone Street
- Grahams Road

The final layout of these intersections has not yet been confirmed. The minimum proposed treatment is a right turn bay on Grahams Road at that intersection, and double right turn bays (one each direction) on the new road at the other intersections. It is expected that each of them will operate at LOS A or B in 2026.

Cross road type intersections can have high crash rates due to the complexity for drivers of having to identify vehicle movements on three other legs at once. At some later stage, depending on further development and traffic growth, it may be desirable to provide roundabouts at the intersections with Carters Terrace, Wilkins Road, and Johnstone Street. Sufficient land has been allowed for in this NOR to enable roundabouts to be constructed at some future date.

6.5 Safety

6.5.1 Pedestrian and Cycle Accessibility and Safety

6.5.1.1 Accessibility

ASUB will include separate cycle lanes and footpaths across the new bridge and along the access roads. It will also include appropriate crossing points across the new route and side roads.

The pedestrian and cycle facilities provided in ASUB will link with the existing facilities provided on Chalmers Avenue.

Linkages will also be provided to the existing walk and cycle ways on both sides of the Ashburton River.

It is therefore expected that ASUB will provide significant improvements in pedestrian and cyclist accessibility between Tinwald and Ashburton for utility trips (such as trips to and from employment, shopping, school etc). Key destinations on the north side of the river which will have improved access from Tinwald include:

- The Ashburton CBD
- The Ashburton Business Estate
- The EA Stadium
- Ashburton Intermediate School
- Ashburton College
- Ashburton Hospital

The linkages to the walk and cycle ways on either side of the Ashburton River will also provide improved facilities for recreation walking and cycling.

6.5.1.2 Safety

ASUB will be designed in accordance with the design standards operative at the time it is designed and built. This will ensure that the pedestrian and cycle facilities included in the new route will be safe and fit for purpose.

As noted in section 3.3, there are some minor safety issues for pedestrians and cyclists on Chalmers Avenue and Walnut Avenue. Mitigation measures for those locations are discussed in section 7.

6.6 Route Security

The ASUB project will provide a convenient alternative route between Ashburton and Tinwald should the SH1 Bridge be closed for any reason, including natural disasters or localised incidents. This alternative route will save the need for a 56km detour, via SH77, Thompson's Track, Mayfield Valetta Road,Valetta Westerfield Road, Tinwald Westerfield Road.

The ASUB project therefore provides a significant improvement in route security and resilience.

7 Mitigation Measures

As noted in Section 5 the effects of ASUB on the Ashburton transport system are overwhelmingly positive. There are, however, a small number of minor negative impacts. Growth in and around Ashburton is expected to result in significant traffic growth in most locations in the Ashburton roading network by 2026.

The issues that the following mitigation measures address already exist to some extent, but these issues are expected to be exacerbated partly by growth in traffic volumes without the ASUB, and partly by changes as a result of the ASUB.

Consequently, the proposed mitigation measures not only mitigate the adverse effects of the additional traffic resulting from ASUB, they also provide benefits for road users who would be using the existing road regardless even if there was no second bridge constructed.

Table 7-1 below shows the traffic volume currently using Chalmers Avenue, compared to expected volumes using Chalmers Avenue in 2026 with and without a the ASUB. Accordingly, the proposed mitigation measures on Chalmers Avenue will not only mitigate the effects of the 4000 additional traffic resulting from the ASUB, but also benefit the 8000 road users that can be expected on Chalmers Road even if the ASUB was not built."

Based on existing traffic volumes on Chalmers Avenue, and those anticipated with and without the ASUB, table 7-1 shows the proportion of the issues being addressed are attributable to the existing situation, and growth with and without the ASUB

Scenario	Existing	2026 Without Bridge	2026 With ASUB
Traffic Volume (vpd)	6,000	8,000 (+2,000)	12,000 (+4,000)
% of traffic following construction of ASUB	50%	17%	33%

Table 7-1 Current and Projected Traffic Volumes on Chalmers Avenue

7.1 Chalmers Avenue / Walnut Avenue Roundabout

This Roundabout has an unusual layout. Both Chalmers and Walnut Avenues are wide roads with wide solid medians. Bridge and Albert Streets are much narrower two lane, two way roads, and are offset from the centrelines of Chalmers and Walnut Avenues. Parallel and angle parking is provided immediately adjacent to the roundabout on Bridge Street and Chalmers Avenue respectively. Figure 7-1 shows the existing layout of the Netherby Roundabout

Figure 7-1 Netherby Roundabout Aerial Photograph

As noted in Section 3.3.3, this intersection has not had a high crash record for the past five years. It is therefore considered that the unusual intersection layout does not have safety implications for the intersection.

There has, however been some feedback that heavy vehicles can find the layout of the intersection difficult to cope with. Analysis of the intersection has been carried out using "AutoTurn" software to model manoeuvres of heavy vehicles. This analysis indicated that there is adequate room for heavy vehicles to complete all manoeuvres at this intersection.

However, drivers of heavy vehicles travelling north from Chalmers Avenue to Bridge Street need to place their vehicles correctly in the lane early in the manoeuvre in order to successfully exit at the Bridge Street exit of the roundabout. Drivers who are unfamiliar with the unusual layout of the intersection may not be able to identify where they need to place their vehicle until they are committed to a particular line through the intersection.

Some drivers who are unfamiliar with the intersection may also confuse the entrance to the angle parking on Chalmers Avenue with the through lane for the Chalmers Avenue exit to the roundabout.

7.1.1 Proposed Mitigation

The following measures are proposed to address the issues for heavy vehicles negotiating this roundabout:

1. Move the existing throat island in the centre of the Bridge Street approach to the intersection to the south east, and shorten it. This will allow a little more "margin of error" for drivers of heavy vehicles who do not get the line through the intersection right early in the intersection.

2. Remove the front parallel parking place on Bridge Street. This is necessary to allow proposed mitigation 1 above to proceed.

3. Construct a low profile island on the Chalmers Avenue exit from the roundabout, and provide a dropped kerb between this island and the existing planted island at the exit. These measures will better delineate the parking area from the through lane.

4. Remove the existing left turn slip lane, and associated island, between Chalmers Avenue and Walnut Avenue, and realign the existing off road left turn cycle path. This will allow right turning and straight through heavy vehicles to better position themselves on the approach to the intersection.

These measures are shown on drawing number 08.

7.1.1.1 Mitigation Timing

In addition to growth as a result of ASUB, an increasing number of heavy vehicles are likely to use this intersection as businesses establish at the Ashburton Business Estate. This mitigation measure will address the safety issues which may be exacerbated by the additional traffic as a result of the ASUB project. In addition, it will provide safety benefits for all road users at this intersection, including those who use this intersection regardless of a second bridge. It is therefore recommended that:

1. This intersection continue to be monitored

2. These mitigations be implemented before the construction of ASUB if:

    a. Evidence of heavy vehicles hitting or mounting kerbs at the intersection increases or

    b. There is an increase in crashes involving heavy vehicles

3. These mitigation measures are implemented in conjunction with the construction of ASUB if not implemented earlier.

7.2 Chalmers Avenue / Havelock Street / Wellington Street and Victoria / Wakanui Intersections

As noted in the Intersection Priority Review, these intersections had a comparatively high number of crashes, including cycle crashes in the past ten years. Both vehicle and pedestrian and cycle numbers using Chalmers Avenue are likely to increase as a result of ASUB, and thereby put further pressure on these intersections.

A safety assessment of these intersections was carried out as part of the review of intersection priorities along Chalmers Avenue. Site observations indicated that the open and flat nature of these intersections may result in drivers not perceiving a need to give way.

7.2.1 Proposed Mitigation

The following measures are proposed to address the current and future crash rates[10] at these intersections:

1. Construct kerb build outs and/or raised platforms on both sides of the intersections to provide a throat effect and visual narrowing at the intersection. This is similar to the treatment currently at the Wills / Nelson intersection with Chalmers Avenue.

This is shown on drawing sheet number 09.

7.2.1.1 Mitigation Timing

There is expected to be a significant increase in vehicle numbers on Chalmers Avenue as businesses establish in the Ashburton Business Estate even if there is no bridge at the end of Chalmers Avenue. It is therefore recommended that:

1. Crash rates at these intersections continue to be monitored

2. These intersection measures be constructed before the construction of ASUB if warranted by increasing crash rates

3. These mitigation measures be implemented in conjunction with the construction of ASUB if not implemented earlier.

7.2.1.2 Roundabout Option

Roundabouts have also been considered at these intersections.

Advantages:

Roundabouts would have the following advantages at these locations:

- Address the open and flat nature of the intersections, and effectively warn drivers that they need to give way. They would therefore be likely to address the safety issues at the intersections.
- Would act as a minor deterrent to vehicles (particularly heavy vehicles) using this route between north east Ashburton and south of Tinwald. The existing roundabouts at Moore Street and Walnut Avenue would act as a deterrent already. The additional deterrent effect of additional roundabouts is expected to be small.
- Reduce delay for vehicles crossing or turning onto Chalmers Avenue from the east-west streets.
- Provide a clearer path for vehicles turning right across the median on Chalmers Avenue.
    - Vehicles turning right currently use right turn bays, and then have Give Way signs and markings as they cross the median. The visibility from these right turn bays is often restricted by the trees in the centre of the median islands. The right turn bays can also be blocked by vehicles at the give way signs in the central median.

[10] Growth due to the ASUB project plus other growth is expected to contribute to the future crash rate.

Disadvantages

Roundabouts would have the following disadvantages at these locations:

- Increase delays for through traffic on Chalmers Avenue
- Less attractive for cyclists:
  - Confident cyclists tend to "claim the lane", and are visible and have right of way once they have entered the roundabout. Less confident cyclists tend to keep left, and use the outside edge of roundabouts. In this location they are less visible to drivers crossing their paths as drivers enter and leave the roundabout. This reduces the safety for these less confident cyclists.
  - The alternative for less confident cyclists is to cross each roundabout approach individually. This is safer than hugging the outside edge of the roundabout, but means they lose right of way at the cross roads, and so is less convenient.

The advantages of roundabouts are likely to outweigh the disadvantages where there are significant numbers of vehicles making the following manoeuvres:

- Crossing Chalmers Avenue on the east – west road
- Turning right into Chalmers Avenue
- Turning right from Chalmers Avenue

Of the intersections on Chalmers Avenue which are not currently roundabouts, the intersection with Havelock Street is expected to have the largest number of vehicles making these manoeuvres.

A roundabout at this intersection is not expected to be required as part of the ASUB project, however this is something Council may wish to consider as a separate exercise if there is an increase in crashes involving vehicles crossing Chalmers Avenue or turning right at the intersection.

7.3 Walnut Avenue / William Street Intersection

This intersection is immediately adjacent to Ashburton Intermediate School, and as noted in the Intersection Priority Review, this intersection had a comparatively high number of crashes, including cycle crashes in the past ten years. Both vehicle and pedestrian and cycle numbers using Walnut Avenue are likely to increase as a result of ASUB, and thereby put further pressure on this intersection.

7.3.1 Proposed Mitigation

The following measure is proposed to address the current and future crash rates at this intersection:

1. Construct kerb build outs and raised platforms on William Street to provide priority to pedestrians along Walnut Avenue and improve visibility of the intersection.

This is shown on drawing sheet number 09.

7.3.1.1 Mitigation Timing

Any new traffic signals at the Walnut Avenue / SH1 / East Street intersection pair is likely to make Walnut Avenue a more attractive route for vehicles accessing north east Ashburton, including the eastern part of the Business Estate. There is therefore likely to be an increase in vehicle numbers on Walnut Avenue as businesses establish in the Ashburton Business Estate even if there is no bridge at the end of Chalmers Avenue. It is therefore recommended that:

1. Crash rates at this intersection continue to be monitored
2. These intersection measures be constructed before the construction of ASUB if warranted by increasing crash rates
3. These mitigation measures be implemented in conjunction with the construction of ASUB if not implemented earlier.

7.4 Pedestrian Facilities on Chalmers Avenue

The crash history on Chalmers Avenue does not indicate a significant safety issue for pedestrians crossing Chalmers Ave at the moment. Traffic volumes on Chalmers Avenue are comparatively light at the moment, so gaps to cross the road are relatively common.

Increasing traffic volumes in the future, including the additional traffic as a result of ASUB are likely to result in it becoming more difficult for pedestrians, including school children, to cross Chalmers Avenue.

Chalmers Avenue has a wide seal area (from kerb to kerb) on each side of the grassed median. This seal area consists of a parking lane, cycle lane, traffic lane, and sealed shoulder adjacent to the median island. This wide area of seal means it takes pedestrians a comparatively long time to cross the road. It also means that pedestrians waiting at the kerb can be hidden by parked vehicles.

There are existing pedestrian facilities on Chalmers Avenue and Bridge Street at the following locations:

1. Moore Street intersection (crossing points and pedestrian paths on all four approaches to the roundabout)
2. Havelock Street intersection (zebra crossing on Chalmers Avenue immediately north of the intersection)
3. Outside the Netherby shops (zebra crossing on Chalmers Avenue south of the Walnut Avenue roundabout)
4. Walnut Avenue intersection (crossing points and pedestrian paths on the Walnut Avenue and Bridge Street approaches to the roundabout)

7.4.1 Proposed Mitigation

The following measures are proposed to improve future pedestrian amenity and safety on Chalmers Avenue and Bridge Street:

1. Construct pedestrian facilities on Chalmers Avenue as follows::

   a. Kerb build outs from the kerb line to the edge of the parking lane at the footpath side on both sides of the road at midblock points

   b. Kerb build outs from the kerb line to the edge of the traffic lane on both sides of the grassed median

   c. Pedestrian pathway connecting the kerb build outs across the grassed median

   d. At the following mid-block locations:

      i. South Street to Dobson Street

      ii. Tancred Street to Burnett Street

      iii. Cameron Street to Wills Street

      iv. Cox Street to Aitken Street

2. Construct a pedestrian refuge with kerb build outs on Bridge Street between Princes Street and Orr Street ().

The locations of the existing and proposed pedestrian facilities on Chalmers Avenue are shown on drawing number 10. A concept plan of a typical pedestrian facility is shown on drawing number 09.

7.4.1.1 Mitigation Timing

These pedestrian measures will mitigate the pedestrian amenity and safety issues exacerbated by the additional traffic using Chalmers Avenue as a result of the ASUB project. In addition they will address pedestrian amenity and safety issues which currently exist, and which will be exacerbated by other growth on Chalmers Avenue by 2026. Implementation of these mitigation measures sooner rather than later will improve the environment for pedestrians crossing Chalmers Avenue, including pupils accessing schools in the area. It is therefore recommended that:

1. These pedestrian measures be considered for inclusion in Council's budget for the coming few years

2. These mitigation measures be implemented in conjunction with the construction of ASUB if not implemented earlier.

7.5 Access to SH1 in Tinwald

During consultation it has been suggested that an "exit strategy" onto SH1 in Tinwald is necessary. Such an approach has been deliberately omitted from the development of ASUB. ASUB is intended to improve access between Tinwald and Ashburton. As such it is a local road for local traffic. It is not intended to provide an alternative route for SH1 traffic.

As noted in Section 6.4.4, a comparatively small number of vehicles are expected to turn on or off SH1 at Graham Street, and use ASUB to access locations north of Ashburton.

7.6 Changing Priority of Intersections on Chalmers Avenue

Opus has been commissioned to investigate changing the priority of intersections on Chalmers Avenue, so that east - west traffic has priority over north - south traffic on Chalmers Avenue.

A separate report[11] has been produced to address the priority of the intersections on Chalmers Avenue. It concluded that:

Changing the give-way priorities on the Chalmers Ave intersections is not recommended for the following reasons:-

- *Roading hierarchy - Chalmers Ave is a 'Principal' road, the intersecting roads are predominantly 'local' or 'collector' roads.*
- *Traffic flows - Chalmers Ave currently has the dominant traffic flows, this is predicted to continue with the construction of the Ashburton 2nd bridge.*
- *Intersection efficiency – Preliminary modelling indicates that changing the priority at intersections would result in longer queues, greater delays, increased fuel use and emissions.*
- *Intersection safety – Use of basic NZTA crash prediction models indicates that changing priorities would result in an increased risk of future injury crashes.*

[11] Chalmers Avenue Intersections Priority Change Report (Opus September 2013)

8 Conclusions

Numerous options for addressing the capacity on the existing SH1 Ashburton River bridge and the associated future congestion have been investigated over the course of three separate studies (the Ashburton Transportation Study, the Ashburton Second Bridge Issues and Options Report, and the Ashburton Second Bridge Additional Investigations Report). Each of these studies concluded that a bridge located at the end of Chalmers Avenue, and linking to east Tinwald was the most effective way of addressing the capacity issues on the bridge and providing access for planned growth in east Tinwald.

The ASUB project is not expected to be constructed until 2026. By that time, it is expected that Ashburton and its transportation system would have undergone significant change. It is therefore important to consider the impacts of the ASUB project in the context of the urban and transport environment expected to be present at that stage.

This Traffic Impact Assessment shows that the ASUB project is expected to significantly improve the operation of the Ashburton transport system in 2026. In particular it will address the following project objectives:

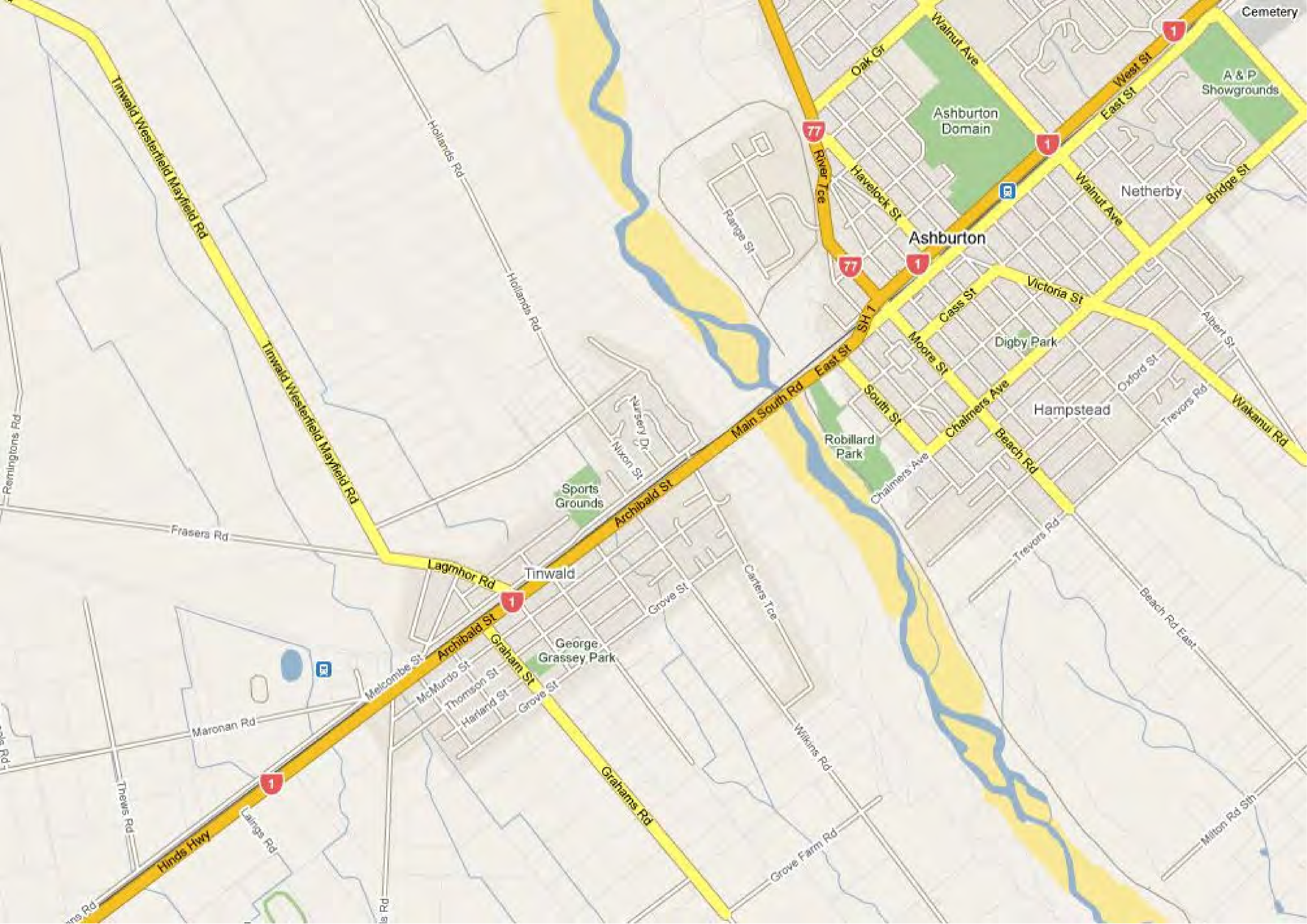
- Safety issues accessing SH1 in Tinwald
- Increasing future congestion on the SH1 bridge
- Future growth in Tinwald and resulting increasing traffic numbers
- Pedestrian and cyclist access and safety issues
- Route security

The ASUB project is expected to have a number of positive effects on the Ashburton transport system. It is also expected to have a small number of minor negative effects. These effects are due to additional traffic volumes on the existing Chalmers Avenue route as a result of the ASUB project. They are an exacerbation of existing safety and geometric issues on the existing routes.

The proposed mitigation measures will provide a benefit to road users, including pedestrians and cyclists beyond purely addressing the issues due to the ASUB.

Therefore, it is considered that the net effect of the ASUB project on the Ashburton transport system is overwhelmingly positive, and that with the proposed mitigation measures in place, the adverse effects are less than minor.

Appendix A – Map of Ashburton


Cemetery
Oak Gr
Walnut Ave
A & P Showgrounds
Ashburton Domain
West St
East St
77
1
River Tce
Havelock St
Netherby
Walnut Ave
Bridge St
Ashburton
Range St
Hollands Rd
Tinwald Westerfield Mayfield Rd
Victoria St
Cass St
SH 1
Moore St
Digby Park
Albert St
East St
Main South Rd
South St
Oxford St
Hampstead
Chalmers Ave
Trevors Rd
Wakanui Rd
Nursery Dr
Nixon St
Robillard Park
Beach Rd
Chalmers Ave
Remingtons Rd
Sports Grounds
Archibald St
Frasers Rd
Trevors Rd
Lagmhor Rd
Tinwald
Carters Tce
Beach Rd East
Grove St
Archibald St
Melcombe St
George Grassey Park
Graham St
McMurdo St
Thomson St
Harland St
Grove St
Maronan Rd
Wilkins Rd
Thews Rd
Grahams Rd
Milton Rd Sth
Laings Rd
Hinds Hwy
Grove Farm Rd

Appendix B – Traffic Counts – Ashburton Transportation Study 2006

AM PEAK			TO																MATCH	OBSERVED VEH	% MATCH
			Sector 15	Sector 15	Sector 4	Sector 4	Sector 6	Sector 6	Sector 8	Sector 8	Sector 9	Sector 9	Sector 12	Sector 12	Sector 13	Sector 13	Sector 14	Sector 14			
			11	12	21	22	31	32	41	42	51	52	61	62	71	72	81	82			
FROM	Sector 15	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	278	0%
	Sector 15	12	0	0	0	134	0	67	0	20	0	129	0	41	7	0	4	0	401	372	108%
	Sector 4	21	123	0	0	67	0	0	0	19	0	0	0	0	0	0	3	0	212	327	65%
	Sector 4	22	0	0	0	0	0	53	52	0	0	155	0	40	6	0	4	0	309	412	75%
	Sector 6	31	41	0	35	0	0	0	0	0	0	0	0	0	0	0	3	0	79	159	49%
	Sector 6	32	41	0	0	0	0	0	57	0	0	97	0	27	11	0	3	0	236	314	75%
	Sector 8	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0%
	Sector 8	42	26	0	39	0	17	0	0	0	0	67	0	23	11	0	5	0	187	168	112%
	Sector 9	51	92	0	139	0	33	0	69	0	0	0	0	0	9	0	7	0	349	783	45%
	Sector 9	52	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	67	553	12%
	Sector 12	61	77	0	107	0	21	0	73	0	219	0	0	0	7	0	1	0	505	308	164%
	Sector 12	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	201	0%
	Sector 13	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0%
	Sector 13	72	18	0	25	0	10	0	36	0	0	43	0	19	0	0	3	0	154	110	140%
	Sector 14	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	0%
	Sector 14	82	11	0	0	18	0	15	0	11	0	33	0	12	6	0	0	0	107	65	163%
MATCH			428.7	0	344	219.3	80.67	134	288	50.67	218.7	524	0	229.3	56	0	32.67	0			
OBSERVED VEH			278	372	327	412	159	314	735	168	783	553	308	201	70	110	43	65			
% MATCH			154%	0%	####	53%	51%	43%	39%	30%	28%	95%	0%	114%	80%	0%	75%	0%			

INTERPEAK			TO																MATCH	OBSERVED VEH	% MATCH
			Sector 15	Sector 15	Sector 4	Sector 4	Sector 6	Sector 6	Sector 8	Sector 8	Sector 9	Sector 9	Sector 12	Sector 12	Sector 13	Sector 13	Sector 14	Sector 14			
			11	12	21	22	31	32	41	42	51	52	61	62	71	72	81	82			
FROM	Sector 15	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	349	0%
	Sector 15	12	0	0	0	163	0	104	0	34	0	208	0	51	11	0	5	0	574	345	166%
	Sector 4	21	140	0	0	93	0	0	0	33	0	0	0	0	0	0	6	0	271	420	65%
	Sector 4	22	0	0	0	0	0	87	43	0	0	234	0	47	14	0	4	0	428	380	113%
	Sector 6	31	76	0	66	0	0	0	0	0	0	0	0	0	0	0	7	0	148	318	46%
	Sector 6	32	72	0	0	0	0	0	50	0	0	173	0	33	10	0	7	0	343	409	84%
	Sector 8	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	214	0%
	Sector 8	42	32	0	41	0	35	0	0	0	0	84	0	19	9	0	3	0	221	174	127%
	Sector 9	51	122	0	169	0	72	0	49	0	0	0	0	0	13	0	6	0	430	701	61%
	Sector 9	52	0	0	0	0	0	0	0	0	0	0	0	55	0	0	0	0	55	799	7%
	Sector 12	61	106	0	130	0	54	0	42	0	227	0	0	0	14	0	8	0	579	301	193%
	Sector 12	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195	0%
	Sector 13	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0%
	Sector 13	72	23	0	31	0	27	0	16	0	0	51	0	13	0	0	5	0	164	85	194%
	Sector 14	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0%
	Sector 14	82	16	0	0	14	0	19	0	8	0	24	0	8	2	0	0	0	90	44	205%
MATCH			584.5	0	435.5	268.5	187	209	198.5	74.5	227	772	0	224.5	70.5	0	49	0			
OBSERVED VEH			348.5	344.5	419.5	380	318	409	214	173.5	701	799	300.5	194.5	79.5	84.5	45.5	44			
% MATCH			168%	0%	104%	71%	59%	51%	93%	43%	32%	97%	0%	115%	89%	0%	108%	0%			

PM PEAK			TO																MATCH	OBSERVED VEH	% MATCH
			Sector 15	Sector 15	Sector 4	Sector 4	Sector 6	Sector 6	Sector 8	Sector 8	Sector 9	Sector 9	Sector 12	Sector 12	Sector 13	Sector 13	Sector 14	Sector 14			
			11	12	21	22	31	32	41	42	51	52	61	62	71	72	81	82			
FROM	Sector 15	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	217	0%
	Sector 15	12	0	0	0	131	0	91	0	38	0	184	0	115	17	0	9	0	584	326	179%
	Sector 4	21	51	0	0	81	0	0	0	39	0	0	0	0	0	0	9	0	181	529	34%
	Sector 4	22	0	0	0	0	0	79	33	0	0	246	0	139	24	0	13	0	534	387	138%
	Sector 6	31	37	0	95	0	0	0	0	0	0	0	0	0	0	0	14	0	146	463	32%
	Sector 6	32	40	0	0	0	0	0	34	0	0	238	0	123	23	0	9	0	466	446	104%
	Sector 8	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169	0%
	Sector 8	42	31	0	51	0	61	0	0	0	0	115	0	63	17	0	11	0	350	229	153%
	Sector 9	51	45	0	202	0	139	0	29	0	0	0	0	0	23	0	13	0	451	768	59%
	Sector 9	52	0	0	0	0	0	0	0	0	0	0	0	194	0	0	0	0	194	1071	18%
	Sector 12	61	42	0	183	0	101	0	23	0	315	0	0	0	29	0	7	0	701	476	147%
	Sector 12	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	463	0%
	Sector 13	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133	0%
	Sector 13	72	15	0	29	0	23	0	7	0	0	57	0	27	0	0	7	0	165	87	190%
	Sector 14	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0%
	Sector 14	82	9	0	0	19	0	22	0	7	0	41	0	17	5	0	0	0	121	66	183%
MATCH			270.7	0	560.7	230.7	324	192.7	126	84.67	314.7	881.3	0	677.3	138	0	92	0			
OBSERVED VEH			216.7	326	529.3	386.7	462.7	446	168.7	229.3	768	1071	476	463.3	132.7	86.67	70	66			
% MATCH			125%	0%	106%	60%	70%	43%	75%	37%	41%	82%	0%	146%	104%	0%	131%	0%			

Appendix C – Traffic Counts – NZTA Tube Counts

NZTA Tube Counts

NZTA Surveys

The following is a summary of State Highway traffic volumes at the existing bridge and at Winslow from 2000 to 2009 obtained from NZTA tube counts. These are Average Daily Traffic volumes, and are the total of traffic in both directions:

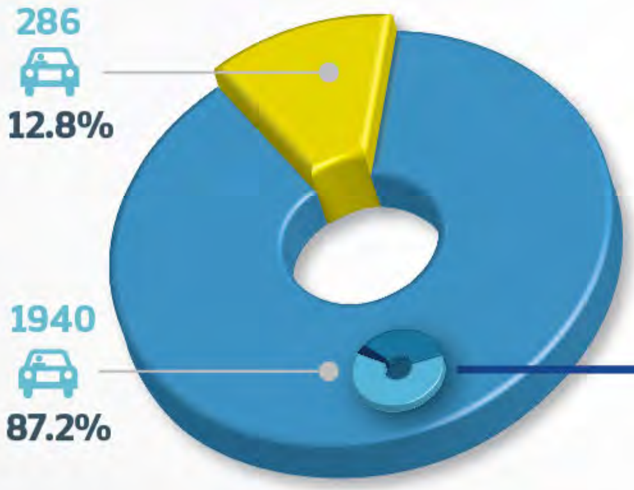
Year	Count Just sth of Bridge	Count at Winslow	Percentage of Bridge Traffic at Winslow
2000	16500	5320	32%
2001	18520	5500	30%
2002	17900	6480	36%
2003	17690	6420	36%
2004	20280	7080	35%
2005	19612	7279	37%
2006	18537	6760	37%
2007	20049	7423	36%
2008	19904	7083	37%
2009	20733	8178	39%

Appendix D – Traffic Counts – Number Plate Survey 2012

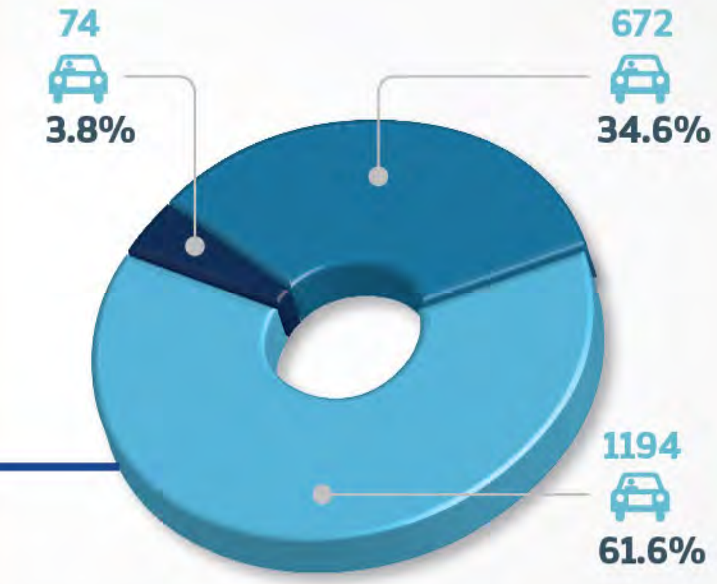
TRAFFIC ON SH1 BRIDGE 2012

MORNING (7:45am To 9:15am)

Traffic Both Ways



Sources of Local Traffic



Local traffic is traffic which joined and/or left SH1 between south of Graham St and north of Racecourse Rd

KEY

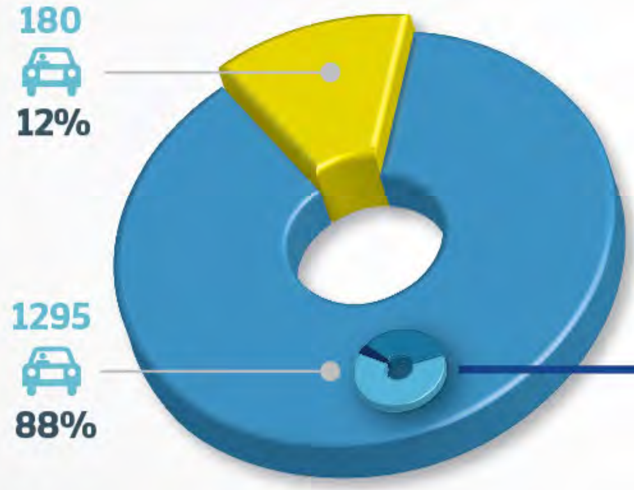
- SH 1 straight through traffic
- All other traffic

KEY

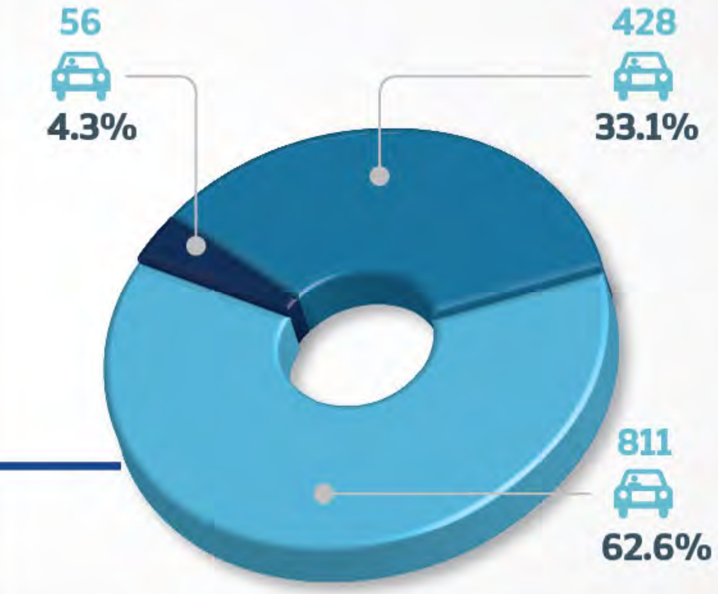
- Joins SH1 between Graham St and the bridge, crosses the bridge & continues north of Racecourse Rd, and vice versa
- Joins SH1 between Racecourse Rd and the bridge, crosses the bridge and continues south of Graham St and vice versa
- Joins and leaves SH1 between Graham St and Racecourse Rd, and crosses the bridge

AFTERNOON (2:30pm To 3:30pm)

Traffic Both Ways



Sources of Local Traffic



Local traffic is traffic which joined and/or left SH1 between south of Graham St and north of Racecourse Rd

KEY

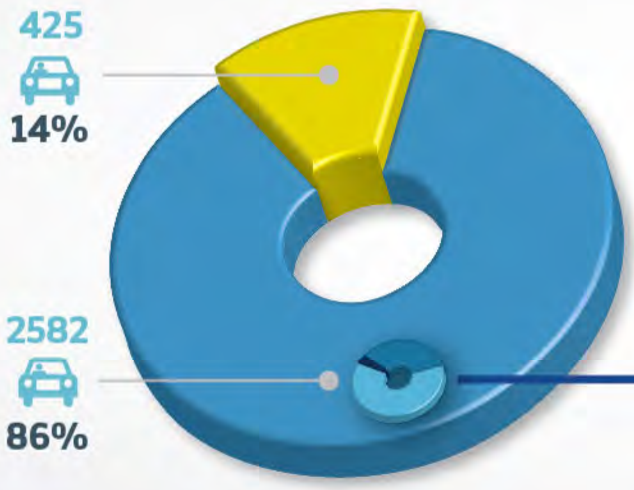
- SH 1 straight through traffic
- All other traffic

KEY

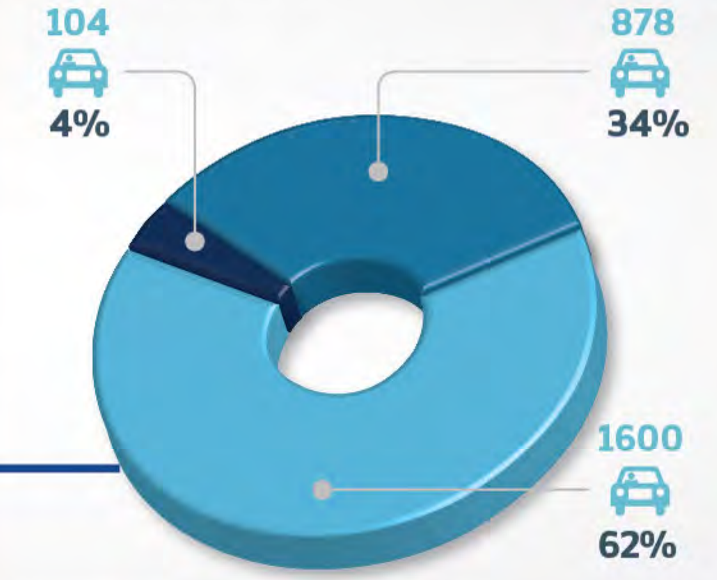
- Joins SH1 between Graham St and the bridge, crosses the bridge & continues north of Racecourse Rd, and vice versa
- Joins SH1 between Racecourse Rd and the bridge, crosses the bridge and continues south of Graham St and vice versa
- Joins and leaves SH1 between Graham St and Racecourse Rd, and crosses the bridge

MIDDAY (11:30am to 1:30pm)

Traffic Both Ways



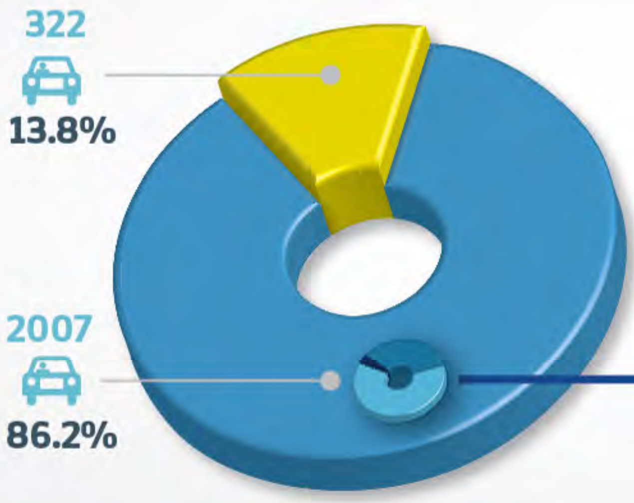
Sources of Local Traffic



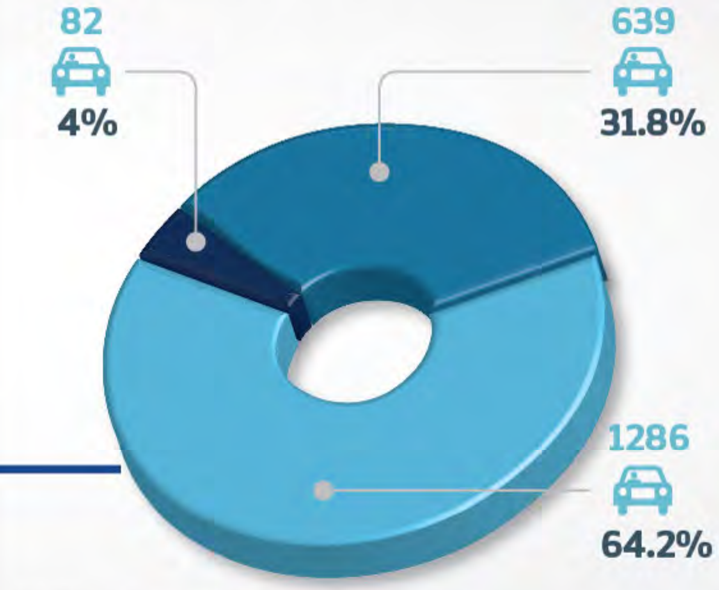
Local traffic is traffic which joined and/or left SH1 between south of Graham St and north of Racecourse Rd

EVENING (4:30pm to 6:00pm)

Traffic Both Ways



Sources of Local Traffic

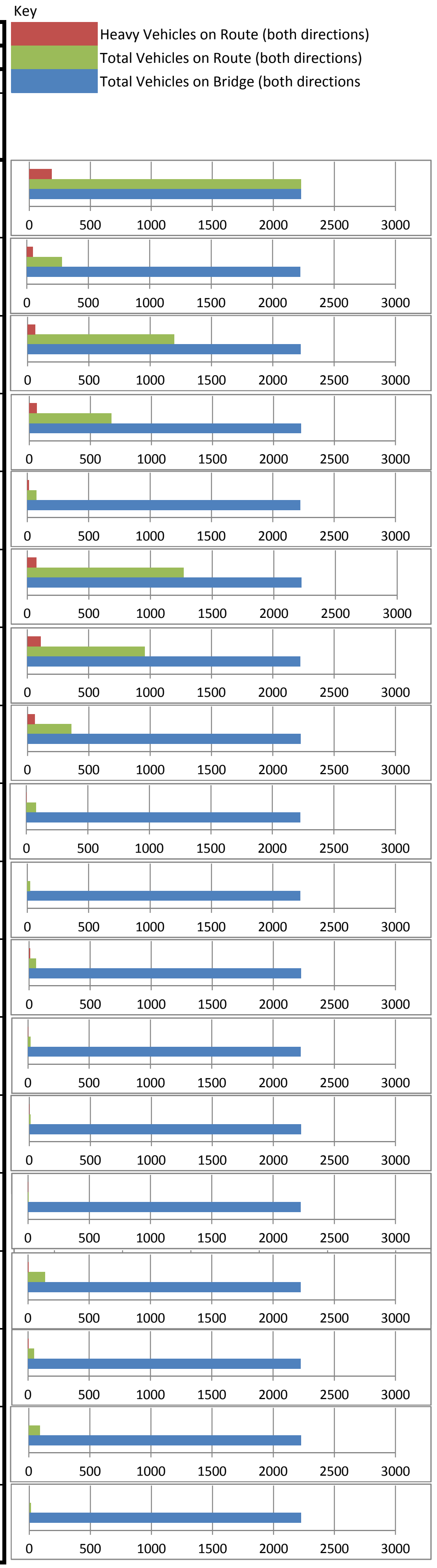


Local traffic is traffic which joined and/or left SH1 between south of Graham St and north of Racecourse Rd

Based on numberplates photographed by infrared cameras at 16 points. Numberplates matched as they pass the 16 cameras. Information gathered on 17 July and 7 August.

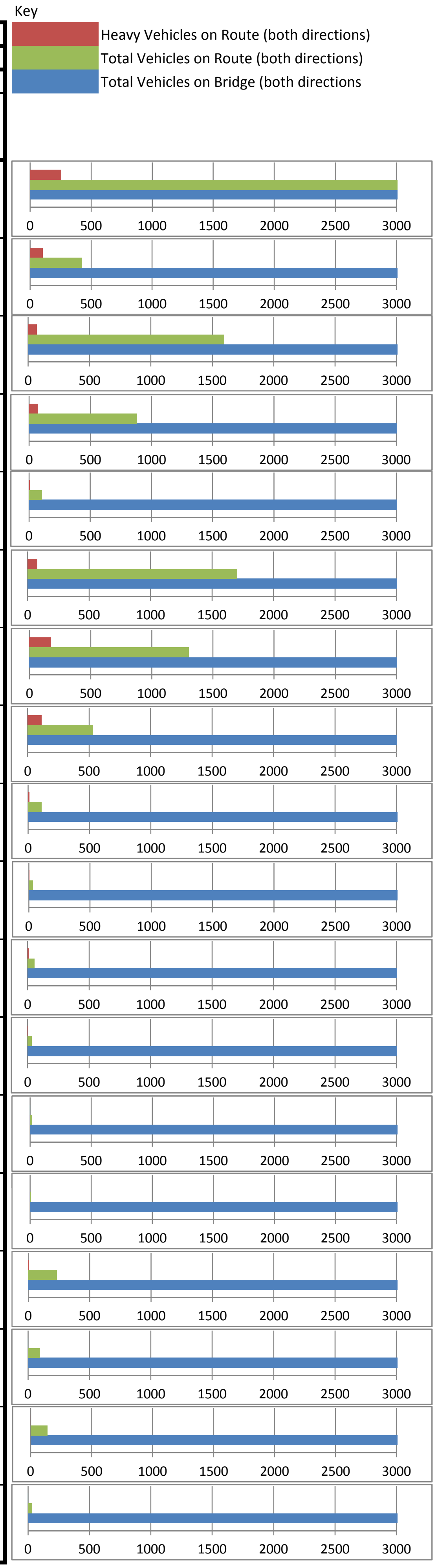
Ashburton Traffic Number Plate Survey Results July August 2012 - By Route

	Morning (7:45-9:15am) (2226 vehicles cross bridge)														
	Northbound					Southbound					Both Directions				
	Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles		
Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route
Crossing the bridge	1368	100.0%	95	6.9%	6.9%	858	100.0%	91	10.6%	10.6%	2226	100.0%	186	8.4%	8.4%
Straight through on SH1	136	9.9%	28	2.0%	20.6%	150	17.5%	20	2.3%	13.3%	286	12.8%	48	2.2%	16.8%
Joining and leaving SH1 between south of Graham St and north of Racecourse Rd	789	57.7%	33	2.4%	4.2%	405	47.2%	31	3.6%	7.7%	1194	53.6%	64	2.9%	5.4%
Joining SH1 between the bridge and north of Racecourse Rd, crossing the bridge, and continuing south of Graham St and vice versa	402	29.4%	27	2.0%	6.7%	270	31.5%	34	4.0%	12.6%	672	30.2%	61	2.7%	9.1%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing north of Racecourse Rd and vice versa	41	3.0%	7	0.5%	17.1%	33	3.8%	6	0.7%	18.2%	74	3.3%	13	0.6%	17.6%
Joining or leaving SH1 between Graham St and the bridge, and crossing the bridge	830	60.7%	40	2.9%	4.8%	438	51.0%	37	4.3%	8.4%	1268	57.0%	77	3.5%	6.1%
Crossing the bridge to or from south of Graham St	538	39.3%	55	4.0%	10.2%	420	49.0%	54	6.3%	12.9%	958	43.0%	109	4.9%	11.4%
Crossing the bridge to or from north of Racecourse Rd	177	12.9%	35	2.6%	19.8%	183	21.3%	26	3.0%	14.2%	360	16.2%	61	2.7%	16.9%
Crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	35	2.6%	0	0.0%	0.0%	45	5.2%	1	0.1%	2.2%	80	3.6%	1	0.0%	1.3%
To or from south of Graham St, crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	7	0.5%	0	0.0%	0.0%	18	2.1%	0	0.0%	0.0%	25	1.1%	0	0.0%	0.0%
Crossing the bridge to or from SH77 (past Farm Rd)	34	2.5%	6	0.4%	17.6%	20	2.3%	1	0.1%	5.0%	54	2.4%	7	0.3%	13.0%
To or from south of Graham St, crossing the bridge, to or from SH77 (past Farm Rd)	11	0.8%	2	0.1%	18.2%	11	1.3%	1	0.1%	9.1%	22	1.0%	3	0.1%	13.6%
Crossing the bridge to or from Racecourse Rd (past Farm Rd)	6	0.4%	1	0.1%	16.7%	4	0.5%	1	0.1%	25.0%	10	0.4%	2	0.1%	20.0%
To or from south of Graham St, crossing the bridge, to or from Racecourse Rd (past Farm Rd)	4	0.3%	1	0.1%	25.0%	2	0.2%	1	0.1%	50.0%	6	0.3%	2	0.1%	33.3%
Crossing the bridge to or from East St (south of Walnut Ave)	72	5.3%	1	0.1%	1.4%	68	7.9%	3	0.3%	4.4%	140	6.3%	4	0.2%	2.9%
To or from south of Graham St, crossing the bridge, to or from East St (south of Walnut Ave)	23	1.7%	1	0.1%	4.3%	26	3.0%	3	0.3%	11.5%	49	2.2%	4	0.2%	8.2%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing to or from East St (south of Walnut Ave) and vice versa	49	3.6%	0	0.0%	0.0%	42	4.9%	0	0.0%	0.0%	91	4.1%	0	0.0%	0.0%
To or from south of Graham St, crossing the bridge, passing East St (sth of Walnut Ave) to or from north of Racecourse Rd	7	0.5%	0	0.0%	0.0%	5	0.6%	0	0.0%	0.0%	12	0.5%	0	0.0%	0.0%



Ashburton Traffic Number Plate Survey Results July August 2012 - By Route

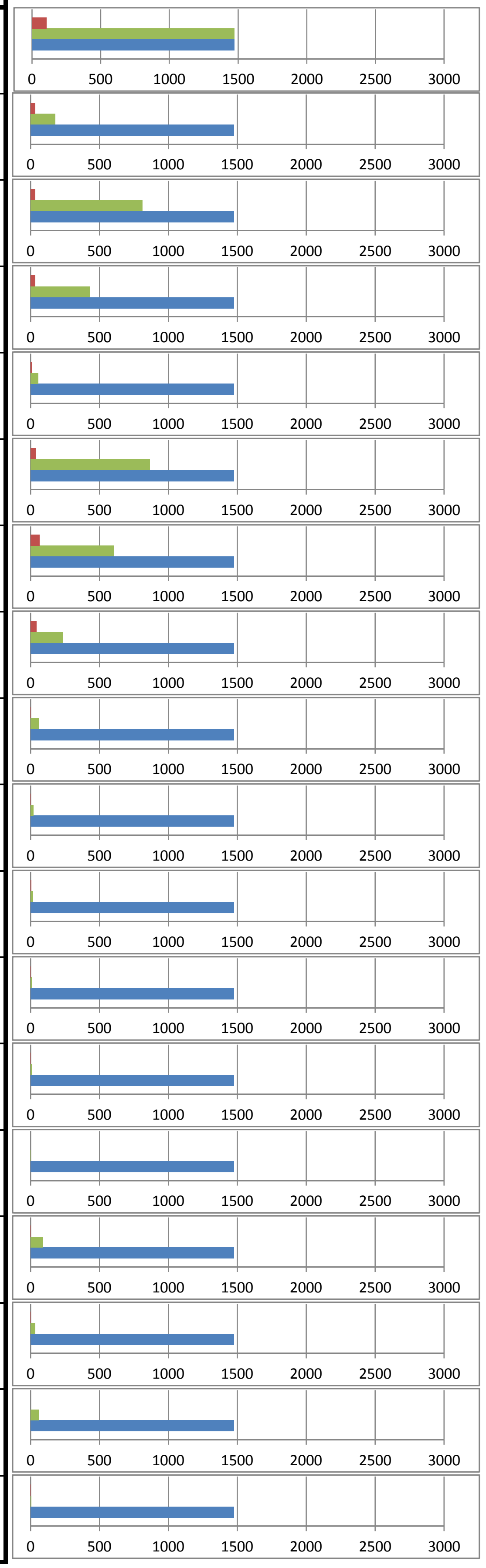
Route	Midday (11:30-1:30pm) (3007 vehicles cross bridge)														
	Northbound					Southbound					Total				
	Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles		
	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route
Crossing the bridge	1442	100.0%	160	11.1%	11.1%	1565	100.0%	94	6.0%	6.0%	3007	100.0%	254	8.4%	8.4%
Straight through on SH1	215	14.9%	71	4.9%	33.0%	210	13.4%	34	2.2%	16.2%	425	14.1%	105	3.5%	24.7%
Joining and leaving SH1 between south of Graham St and north of Racecourse Rd	704	48.8%	41	2.8%	5.8%	896	57.3%	30	1.9%	3.3%	1600	53.2%	71	2.4%	4.4%
Joining SH1 between the bridge and north of Racecourse Rd, crossing the bridge, and continuing south of Graham St and vice versa	475	32.9%	48	3.3%	10.1%	403	25.8%	23	1.5%	5.7%	878	29.2%	71	2.4%	8.1%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing north of Racecourse Rd and vice versa	48	3.3%	0	0.0%	0.0%	56	3.6%	7	0.4%	12.5%	104	3.5%	7	0.2%	6.7%
Joining or leaving SH1 between Graham St and the bridge, and crossing the bridge	752	52.1%	41	2.8%	5.5%	952	60.8%	37	2.4%	3.9%	1704	56.7%	78	2.6%	4.6%
Crossing the bridge to or from south of Graham St	690	47.9%	119	8.3%	17.2%	613	39.2%	57	3.6%	9.3%	1303	43.3%	176	5.9%	13.5%
Crossing the bridge to or from north of Racecourse Rd	263	18.2%	71	4.9%	27.0%	266	17.0%	41	2.6%	15.4%	529	17.6%	112	3.7%	21.2%
Crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	58	4.0%	8	0.6%	13.8%	50	3.2%	2	0.1%	4.0%	108	3.6%	10	0.3%	9.3%
To or from south of Graham St, crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	23	1.6%	6	0.4%	26.1%	12	0.8%	0	0.0%	0.0%	35	1.2%	6	0.2%	17.1%
Crossing the bridge to or from SH77 (past Farm Rd)	31	2.1%	7	0.5%	22.6%	26	1.7%	2	0.1%	7.7%	57	1.9%	9	0.3%	15.8%
To or from south of Graham St, crossing the bridge, to or from SH77 (past Farm Rd)	18	1.2%	5	0.3%	27.8%	14	0.9%	2	0.1%	14.3%	32	1.1%	7	0.2%	21.9%
Crossing the bridge to or from Racecourse Rd (past Farm Rd)	9	0.6%	1	0.1%	11.1%	8	0.5%	0	0.0%	0.0%	17	0.6%	1	0.0%	5.9%
To or from south of Graham St, crossing the bridge, to or from Racecourse Rd (past Farm Rd)	5	0.3%	0	0.0%	0.0%	3	0.2%	0	0.0%	0.0%	8	0.3%	0	0.0%	0.0%
Crossing the bridge to or from East St (south of Walnut Ave)	89	6.2%	2	0.1%	2.2%	144	9.2%	3	0.2%	2.1%	233	7.7%	5	0.2%	2.1%
To or from south of Graham St, crossing the bridge, to or from East St (south of Walnut Ave)	38	2.6%	2	0.1%	5.3%	59	3.8%	1	0.1%	1.7%	97	3.2%	3	0.1%	3.1%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing to or from East St (south of Walnut Ave) and vice versa	51	3.5%	0	0.0%	0.0%	85	5.4%	2	0.1%	2.4%	136	4.5%	2	0.1%	1.5%
To or from south of Graham St, crossing the bridge, passing East St (sth of Walnut Ave) to or from north of Racecourse Rd	10	0.7%	2	0.1%	20.0%	26	1.7%	0	0.0%	0.0%	36	1.2%	2	0.1%	5.6%



Ashburton Traffic Number Plate Survey Results July August 2012 - By Route

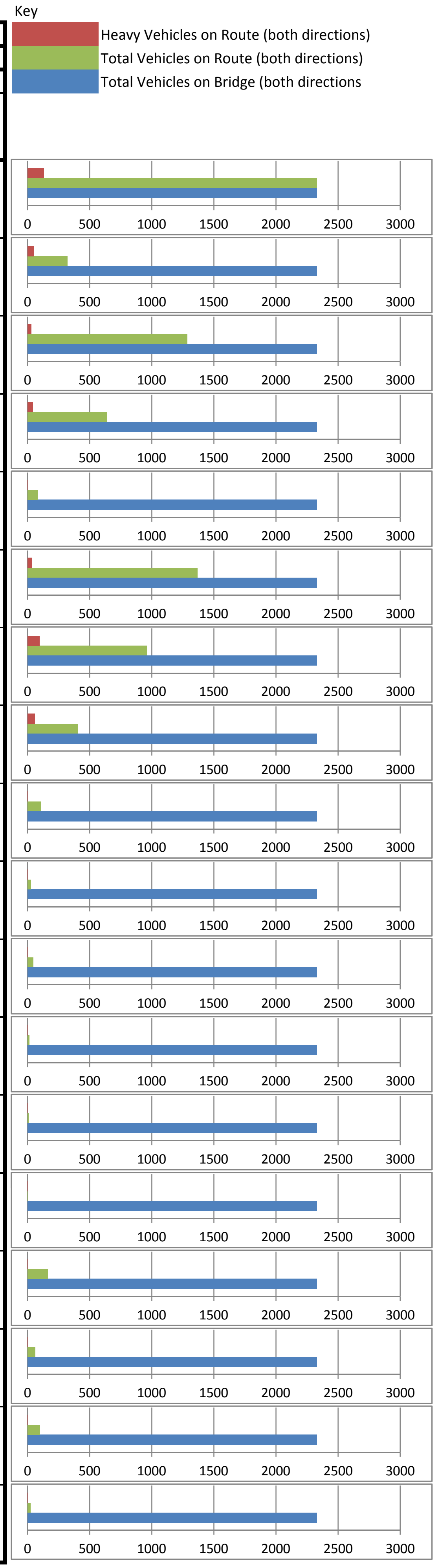
Key
- Heavy Vehicles on Route (both directions)
- Total Vehicles on Route (both directions)
- Total Vehicles on Bridge (both directions

Route	Afternoon (2:30-3:30pm) (1475 vehicles cross bridge)														
	Northbound					Southbound					Total				
	Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles		
	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route
Crossing the bridge	721	100.0%	66	9.2%	9.2%	754	100.0%	41	5.4%	5.4%	1475	100.0%	107	7.3%	7.3%
Straight through on SH1	101	14.0%	19	2.6%	18.8%	79	10.5%	14	1.9%	17.7%	180	12.2%	33	2.2%	18.3%
Joining and leaving SH1 between south of Graham St and north of Racecourse Rd	375	52.0%	18	2.5%	4.8%	436	57.8%	14	1.9%	3.2%	811	55.0%	32	2.2%	3.9%
Joining SH1 between the bridge and north of Racecourse Rd, crossing the bridge, and continuing south of Graham St and vice versa	215	29.8%	24	3.3%	11.2%	213	28.2%	9	1.2%	4.2%	428	29.0%	33	2.2%	7.7%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing north of Racecourse Rd and vice versa	30	4.2%	5	0.7%	16.7%	26	3.4%	4	0.5%	15.4%	56	3.8%	9	0.6%	16.1%
Joining or leaving SH1 between Graham St and the bridge, and crossing the bridge	405	56.2%	23	3.2%	5.7%	462	61.3%	18	2.4%	3.9%	867	58.8%	41	2.8%	4.7%
Crossing the bridge to or from south of Graham St	316	43.8%	43	6.0%	13.6%	292	38.7%	23	3.1%	7.9%	608	41.2%	66	4.5%	10.9%
Crossing the bridge to or from north of Racecourse Rd	131	18.2%	24	3.3%	18.3%	105	13.9%	18	2.4%	17.1%	236	16.0%	42	2.8%	17.8%
Crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	39	5.4%	2	0.3%	5.1%	23	3.1%	0	0.0%	0.0%	62	4.2%	2	0.1%	3.2%
To or from south of Graham St, crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	10	1.4%	1	0.1%	10.0%	11	1.5%	0	0.0%	0.0%	21	1.4%	1	0.1%	4.8%
Crossing the bridge to or from SH77 (past Farm Rd)	8	1.1%	3	0.4%	37.5%	10	1.3%	1	0.1%	10.0%	18	1.2%	4	0.3%	22.2%
To or from south of Graham St, crossing the bridge, to or from SH77 (past Farm Rd)	5	0.7%	1	0.1%	20.0%	3	0.4%	0	0.0%	0.0%	8	0.5%	1	0.1%	12.5%
Crossing the bridge to or from Racecourse Rd (past Farm Rd)	8	1.1%	1	0.1%	12.5%	0	0.0%	0	0.0%	0.0%	8	0.5%	1	0.1%	12.5%
To or from south of Graham St, crossing the bridge, to or from Racecourse Rd (past Farm Rd)	1	0.1%	0	0.0%	0.0%	0	0.0%	0	0.0%	0.0%	1	0.1%	0	0.0%	0.0%
Crossing the bridge to or from East St (south of Walnut Ave)	51	7.1%	1	0.1%	2.0%	41	5.4%	1	0.1%	2.4%	92	6.2%	2	0.1%	2.2%
To or from south of Graham St, crossing the bridge, to or from East St (south of Walnut Ave)	20	1.5%	1	0.1%	5.0%	12	1.6%	1	0.1%	8.3%	32	1.4%	2	0.1%	6.3%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing to or from East St (south of Walnut Ave) and vice versa	31	2.3%	0	0.0%	0.0%	29	3.8%	0	0.0%	0.0%	60	2.7%	0	0.0%	0.0%
To or from south of Graham St, crossing the bridge, passing East St (sth of Walnut Ave) to or from north of Racecourse Rd	4	0.6%	0	0.0%	0.0%	3	0.4%	1	0.1%	33.3%	7	0.5%	1	0.1%	14.3%

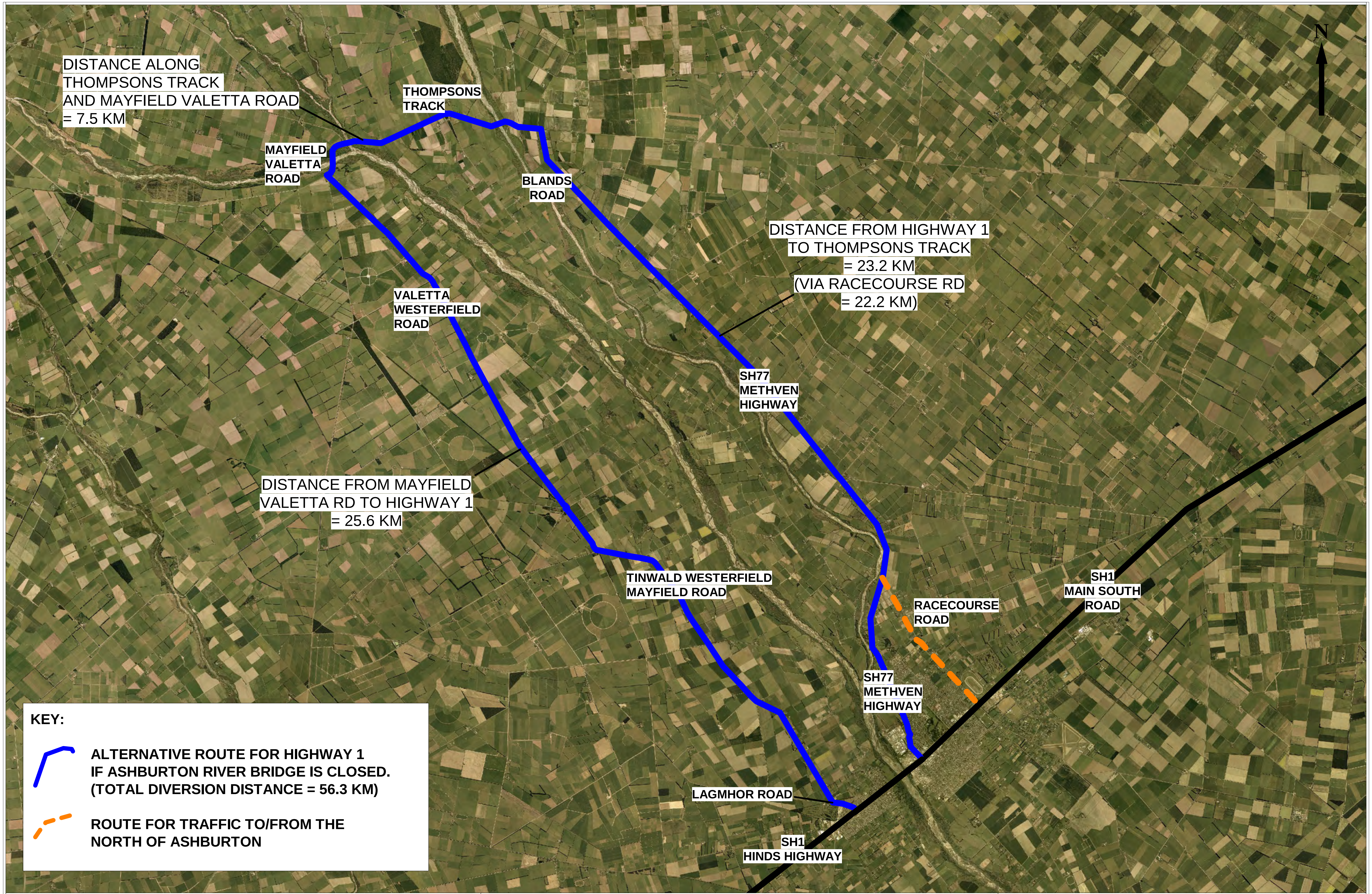


Ashburton Traffic Number Plate Survey Results July August 2012 - By Route

Route	Evening (4:30-6:00pm) (2329 vehicles cross bridge)														
	Northbound					Southbound					Total				
	Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles			Total Vehicles		Heavy Vehicles		
	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route	Number	% on bridge	Number	% of Total Veh on Bridge	% of Veh on Route
Crossing the bridge	1038	100.0%	85	8.2%	8.2%	1291	100.0%	47	3.6%	3.6%	2329	100.0%	132	5.7%	5.7%
Straight through on SH1	186	17.9%	34	3.3%	18.3%	136	10.5%	19	1.5%	14.0%	322	13.8%	53	2.3%	16.5%
Joining and leaving SH1 between south of Graham St and north of Racecourse Rd	485	46.7%	15	1.4%	3.1%	801	62.0%	15	1.2%	1.9%	1286	55.2%	30	1.3%	2.3%
Joining SH1 between the bridge and north of Racecourse Rd, crossing the bridge, and continuing south of Graham St and vice versa	339	32.7%	36	3.5%	10.6%	300	23.2%	7	0.5%	2.3%	639	27.4%	43	1.8%	6.7%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing north of Racecourse Rd and vice versa	28	2.7%	0	0.0%	0.0%	54	4.2%	6	0.5%	11.1%	82	3.5%	6	0.3%	7.3%
Joining or leaving SH1 between Graham St and the bridge, and crossing the bridge	513	49.4%	15	1.4%	2.9%	855	66.2%	21	1.6%	2.5%	1368	58.7%	36	1.5%	2.6%
Crossing the bridge to or from south of Graham St	525	50.6%	70	6.7%	13.3%	436	33.8%	26	2.0%	6.0%	961	41.3%	96	4.1%	10.0%
Crossing the bridge to or from north of Racecourse Rd	214	20.6%	34	3.3%	15.9%	190	14.7%	25	1.9%	13.2%	404	17.3%	59	2.5%	14.6%
Crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	53	5.1%	2	0.2%	3.8%	53	4.1%	1	0.1%	1.9%	106	4.6%	3	0.1%	2.8%
To or from south of Graham St, crossing the bridge to or from Chalmers Ave (sth of Walnut Ave)	17	1.6%	1	0.1%	5.9%	12	0.9%	0	0.0%	0.0%	29	1.2%	1	0.0%	3.4%
Crossing the bridge to or from SH77 (past Farm Rd)	13	1.3%	2	0.2%	15.4%	34	2.6%	3	0.2%	8.8%	47	2.0%	5	0.2%	10.6%
To or from south of Graham St, crossing the bridge, to or from SH77 (past Farm Rd)	6	0.6%	1	0.1%	16.7%	8	0.6%	2	0.2%	25.0%	14	0.6%	3	0.1%	21.4%
Crossing the bridge to or from Racecourse Rd (past Farm Rd)	2	0.2%	1	0.1%	50.0%	6	0.5%	0	0.0%	0.0%	8	0.3%	1	0.0%	12.5%
To or from south of Graham St, crossing the bridge, to or from Racecourse Rd (past Farm Rd)	2	0.2%	1	0.1%	50.0%	1	0.1%	0	0.0%	0.0%	3	0.1%	1	0.0%	33.3%
Crossing the bridge to or from East St (south of Walnut Ave)	72	6.9%	1	0.1%	1.4%	91	7.0%	3	0.2%	3.3%	163	7.0%	4	0.2%	2.5%
To or from south of Graham St, crossing the bridge, to or from East St (south of Walnut Ave)	29	2.8%	1	0.1%	3.4%	32	2.5%	0	0.0%	0.0%	61	2.6%	1	0.0%	1.6%
Joining SH1 between south of Graham St and the bridge, crossing the bridge, and continuing to or from East St (south of Walnut Ave) and vice versa	43	4.1%	0	0.0%	0.0%	59	4.6%	3	0.2%	5.1%	102	4.4%	3	0.1%	2.9%
To or from south of Graham St, crossing the bridge, passing East St (sth of Walnut Ave) to or from north of Racecourse Rd	7	0.7%	1	0.1%	14.3%	15	1.2%	0	0.0%	0.0%	22	0.9%	1	0.0%	4.5%



Appendix E – Alternative Route



OPUS

ASHBURTON SECOND BRIDGE

Alternative Route for State Highway 1 if Existing Bridge is Closed

Date:
02/12/2011

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