REPORT

Riccarton Road West Upgrade Traffic Assessment

Prepared for Dunedin City Council

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Riccarton Road West Upgrade
Traffic Assessment

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1 Introduction

1.1 Site Location

The site includes Riccarton Road West from Gladstone Road South South to SH87. This road is located to the west of Mosgiel on the outskirts of the township. The road is generally surrounded by rural residential land that supports various types of farming.

1.2 Proposed Road Upgrade

The proposal includes upgrading the road for non-motorised users. The main components of the upgrade are the sealed shoulders and a shared path. The widened shoulders will provide room on the road for cyclists and the shared path will be available for use by walkers, cyclists and horse riders. As the main components will require significant changes to the road the opportunity will also be taken to bring the width of the traffic lanes up to an appropriate width.

1.3 Background

The 2006 Transportation Strategy identified four related projects in the Mosgiel area to deal with the growth and land-use changes:

- Construct a link between Centre Street and Carncross Street
- Upgrade Dukes Road and Riccarton Road to improve safety for non-motorised users
- Investigate the feasibility of using Dukes Road South and Gladfield Road as an arterial route option to the south
- Upgrade Dukes Road South and Gladfield Road South as an additional arterial route option to the south if warranted

The Riccarton Road West upgrade is an important stage in implementing the Transportation Strategy. The Dukes Road portion of this route is not being pursued as part of this project at this time. The upgrading of Gladfield Road is not being pursued as it was established that the project was not feasible for funding reasons.

Further detail regarding the background to this project and previous investigations in included in Section 1.1 of the Notice of Requirement.

2 Current Transport Policies

2.1 National

The New Zealand Transport Strategy (NZTS) is the overarching policy document for transportation in New Zealand. It serves as a guide for the government when making decisions regarding transport. The proposed improvements will contribute to the following objectives of the NZTS:

- Improving access and mobility
- Protecting and promoting public health
- Ensuring environmental sustainability
- Assisting safety and personal security

A specific national strategy was developed for walking and cycling in New Zealand called Getting There – On Foot, By Cycle. The main focus of the strategy was to advance walking and cycling as important modes within New Zealand's transport system. The shared path will promote its key principles.

2.2 Regional

This project is consistent with the policies of the Otago Regional Land Transport Strategy. Of particular relevance are the policies relating to safety, access and mobility and public health. Methods 3.1.1 and 3.1.4 aim to improve safety for all road users including those who are vulnerable. Method 3.2.1 outlines the need for improved access to the transport system for all users. Methods 3.2.3 and 3.3.2-3 aim to encourage greater walking and cycling, reduce dependence on private vehicles, improve air quality and noise and reduce traffic growth by promoting alternative modes of transport through the development of walkways and cycleways, through encouraging mode shift, by providing a high level of connectedness between the modes and by improving integration between transport and land use.

2.3 Local

The Dunedin Transportation Strategy (DTS) prepared by the DCC provides the local policy context for the Dunedin transport system and the separate cycling and pedestrian strategies provide more specific guidance on the promotion of cycling and walking as transport modes. Under the outcome areas of Accessible City - Wealthy City, Sustainable City and Safe and Healthy People the DTS refers in particular to the upgrading of Dukes Road and Riccarton Road to improve safety for motorised and non-motorised users. This project is considered a medium-term action by the DCC.

The objective of the Dunedin Cycling Strategy is to increase participation levels for all types of trips and cyclists and improve cycle safety. Methods relevant to this strategy include providing safe infrastructure, a linked network, a pleasant experience and to facilitate multi-modal travel. The Dunedin Pedestrian Strategy objectives are also to increase participation for all type of trips and improve safety for pedestrians. Both the Cycling and Pedestrian Strategies were prepared by the DCC.

2.4 Roading Hierarchy

The Mosgiel roading hierarchy is set out in the Dunedin City District Plan (DCDP). A layout of the roading hierarchy is included in Figure 2-1 below:

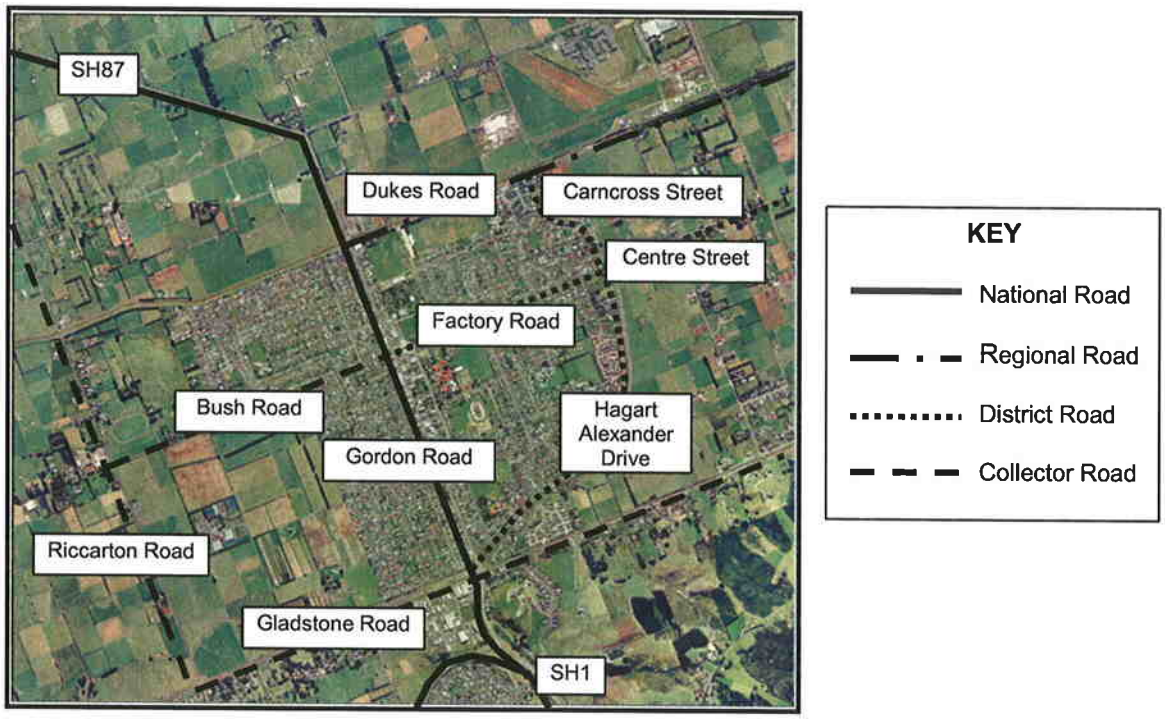


Figure 2-1 : Mosgiel's Roading Hierarchy

The roading hierarchy in Mosgiel currently comprises a National Road, several District and Regional Roads and a number of Collector Roads. The function of these roads is described in the DCDP (Method 20.4.2). National and regional roads provide for the greatest level of movement with a minimum access function. National and regional roads connect major localities and link with areas beyond the City. Some regional roads serve as bypasses around Dunedin City. District roads provide connections between the regional roads and major rural, suburban, commercial and industrial areas. The main function for a collector road is to provide connection within and between neighbourhoods and rural communities. They provide for traffic movement and property access.

The national roads in Figure 2-1 are both SH1 and SH87/Gordon Road. Dukes Road is a regional road. Hagart Alexander Drive, Factory Road, Centre Street and Carncross Street are district roads. The collector roads are Bush Road, Riccarton Road and Gladstone Road South. All other roads on the map are local roads.

3 Existing Road Details

3.1 Existing Road Layout and Details

3.1.1 Facilities for Non-motorised Users

Riccarton Road West does not have any dedicated facilities or even widened shoulders available for cyclists, pedestrians or horse riders.

There is no sealed shoulder for cyclists, pedestrians and horse riders to use. Cyclists are forced to ride within the traffic lane with vehicles passing at 80km/hr. Pedestrians and horse riders have to use the gravel shoulder on the edge of the road. The shoulder is difficult to use because it is narrow and drops steeply into the deep drains on both sides of the road.

3.1.2 Seal Widths

Between Gladstone Road South and SH87 Riccarton Road West is a two-lane, two-way rural road that has a sealed width of 5.5-6.5 metres. The cross section consists of two 2.75-3.25 metre wide traffic lanes and no sealed shoulders.

3.1.3 Geometric Alignment

Riccarton Road West is a generally straight level road. There are a number of locations where the vertical alignment changes. The Silver Stream Bridge is located at a higher elevation than Riccarton Road West which has resulted in a crest curve over the bridge and limited visibility on the approaches. There is also a high spot within the section from Gladstone Road South to Bush Road.

3.1.4 Clear Zones

Riccarton Road West currently does not have sufficient width, ie clear zone, between the edgeline and hazards alongside the road to provide a safe road environment. The road edge drops steeply in places with slopes that are not recoverable.

Figure 3-1 : Steep drains within the clear zone

3.1.5 Speed Limit

The speed limit on the road is 80km/h.

3.1.6 Pavement Marking and Delineation

Riccarton Road West is delineated by a painted centreline with edge lines only marked in the vicinity of the Bush Road intersection.

Other delineation devices include bridge markers on the approaches to the bridges and culverts.

3.1.7 Intersections

The road is intersected by a number of roads. These intersections generally have stop controls but Riccarton Road/Gladstone Road South has give way controls. Riccarton Road West has the right of way at all intersections except that with SH87.

3.1.8 Private Accessways

There are a large number of private properties that use either Riccarton Road West for direct access. The standard of these accessways varies greatly but most are unsealed. On Riccarton Road West there are a number of accessways that have limited sight distance due to high hedges that run along the property boundaries.

Figure 3-2 : Hedges alongside road limiting sight distance from accessways

3.1.9 Bridges and Culverts

There is a bridge structure over the Silver Stream on Riccarton Road West West that currently has an existing rating of Class 100 Grade A. It was built in the 1960's and is likely to have a remaining life of at least 50 years provided it is regularly inspected and maintained.

There are also a number of other bridge and culvert structures along the road. In total there are two smaller bridges and ten culverts on Riccarton Road West.

None of the bridge and culvert structures are wide enough to accommodate pedestrians, cyclists or horses.

Figure 3-3 : Silver Stream Bridge

3.1.10 Scheduled Drains

Alongside a number of sections on the road there are scheduled drains that are managed and maintained by the Otago Regional Council (ORC). These drains form an important part of the Taieri Plain drainage system. These drains are protected by the ORC's Flood Protection Management Bylaw.

The scheduled drains are deep and pose significant risk to motorists as they are within the clear zone. Any crash involving a vehicle leaving the road into one of these drains would not be recoverable and the severity of any injuries would be high.

3.1.11 Rail Level Crossing

The southern main trunk railway line travels parallel to Gladstone Road South. There is a level crossing immediately north of the Riccarton Road/Gladstone Road South intersection which significantly adds to the intersections complexity. The warning system on the level crossing includes signs, lights and bells but no barrier arms.

3.1.12 Overhead Power Poles

Along the Riccarton Road West corridor there are overhead power lines. The poles of the power lines are located within the clear zone.

Figure 3-4 : Power poles within clear zone

3.2 Existing Traffic Volumes

3.2.1 Vehicle Traffic Volumes

Summary of Vehicle Traffic Volumes
As part of the DCC's regular traffic counting programme Riccarton Road has had classified traffic counts undertaken within the past three years. The information gathered from these traffic counts includes traffic volumes, statistics on speeds and the classification of vehicle types. Table 3-1 summaries the volume information from the latest traffic counts:

Table 3-1 : Summary of Vehicle Traffic Volumes and Heavy Vehicle Use

Road	From	To	Year	ADT	%HCV
Riccarton Road East	SH1	Gladstone Road	February 2009	2,280	6%
Riccarton Road West	Gladstone Road	Bush Road	February 2009	2,070	6%
Riccarton Road West	Dukes Road	SH87	February 2009	1,075	5%

Note: ADT = Average Daily Traffic
% HCV = percentage of Heavy Commercial Vehicles

A copy of the daily traffic count and the associated outputs are attached in Appendix A. Note that the section of Riccarton Road East between SH1 and Gladstone Road South is outside the extent of the project. This section was included in the traffic volume analysis to determine the distribution of traffic flows and to provide additional data to correlate the findings on the sections of Riccarton Road West.

Current Traffic Distribution
This information shows that the majority of traffic travelling on the section of Riccarton Road East between SH1 and Gladstone Road South continue on into the next block to Bush Road. The traffic volume between Dukes Road and SH87 is almost half that of the Gladstone Road South to Bush Road block. It is likely that this traffic leaves Riccarton Road West at Bush Road or Dukes Road or into the area

in between. Due to the low volumes on Riccarton Road West between Dukes Road and SH87 it is likely that the majority of this traffic turns off onto Bush Road.

Daily Traffic Profile
The hourly traffic volumes have been considered to determine the daily profile for each counted section on both roads. Figure 3-1 below shows the daily profile for Riccarton Road.

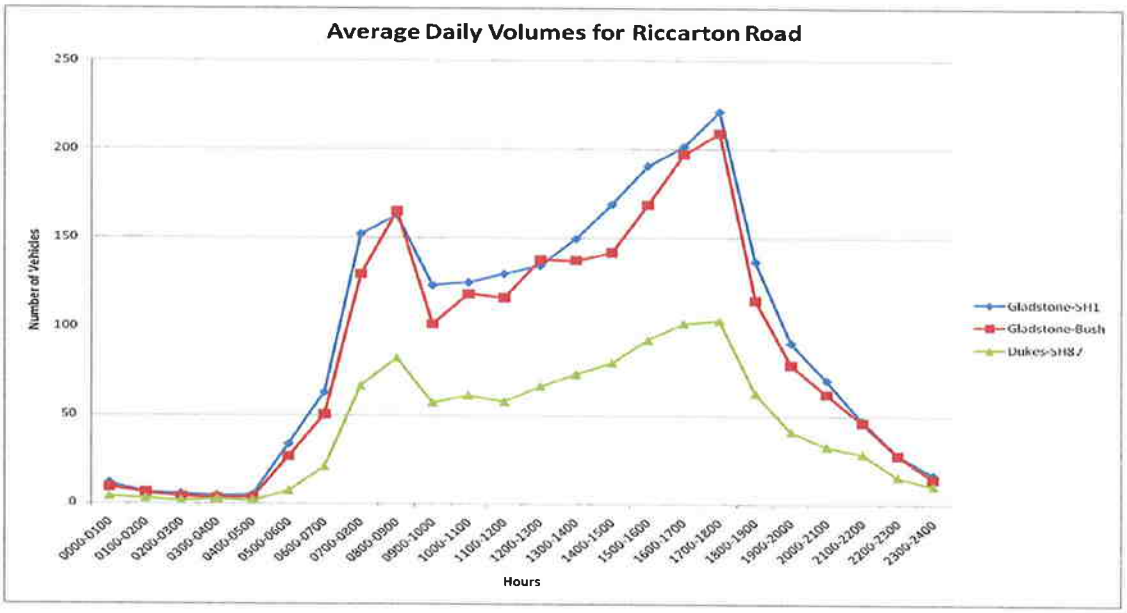


Figure 3-5 : Daily Traffic Profile for Riccarton Road

The daily profile above shows that Riccarton Road has two distinct peaks: the morning peak from 8:00 to 9:00am and the evening peak from 5:00 to 6:00pm. The evening peak is much higher than the morning peak. In the section from Dukes Road to SH87 the peaks are much flatter and traffic volumes are more consistent throughout the day.

Overall this graph shows that the traffic flow on Riccarton Road is tidal which is generally because of commuter traffic. With a road that has tidal flows it is expected that the morning and evening peaks would be the same. However on most of these sections of road the evening peak volumes are significantly higher than the morning peak. This appears to be related to the different route choices and their attractiveness at different times of the day. An analysis of the traffic direction sheds more light on this:

Directional Flow
The direction of the traffic has been considered to determine the predominant flow of traffic and determine why the evening peak is higher.

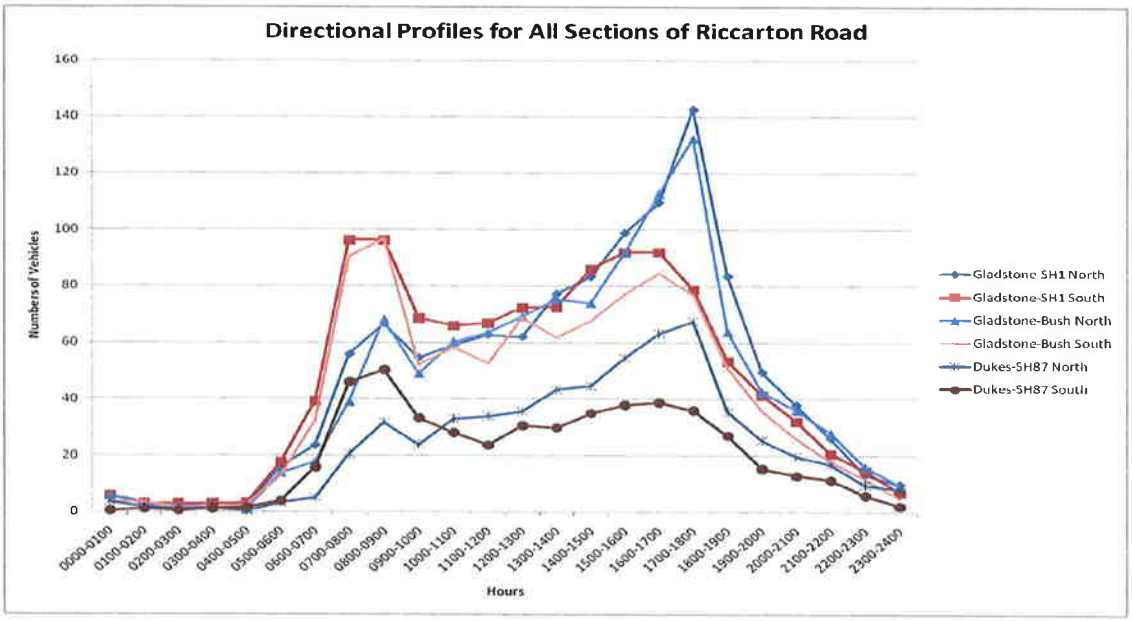


Figure 3-6 : Directional Traffic Profile for Riccarton Road

This graph shows that in the morning traffic is generally travelling southbound on Riccarton Road and travelling northbound in the evening. Therefore this suggests that the majority of traffic is commuters from the north and west of Mosgiel, including residents of Outram, and they are travelling to work or school in Dunedin. The graph also clearly shows that there are more northbound vehicles using the road. While there is no evidence of the cause of this it is likely to be because motorists are choosing to use different routes at different times of the day. In the evening it is likely that some Mosgiel residents in the west of the township are choosing to use Riccarton Road rather than Gordon Road due to queues at the off-ramp roundabout from SH1 and at the Gladstone Road/Hagart Alexander Drive traffic signals.

Heavy Vehicle Traffic

The percentage of heavy vehicles on Riccarton Road is consistent along its length despite the variation in the traffic volumes. For a rural road 6% of heavy vehicles is considered to be a low percentage. As a comparison Dukes Road and SH87 have about 8% heavy vehicles.

Summary of Speed Statistics

The traffic counts also record speed statistics that provide useful information on how the road is used. Table 3-2 below provides a summary of the speed related information for each road and section:

Table 3-2 : Summary of Speed Statistics

Road	From	To	Average Speed	85th%ile Speed	% Exceed Speed Limit
Riccarton Road East	SH1	Gladstone Road	55km/h	62km/h	79%
Riccarton Road West	Gladstone Road	Bush Road	78km/h	88km/h	44%
Riccarton Road West	Dukes Road	SH87	77km/h	89km/h	47%

Note: The posted speed limit on all sections is 80km/h except for Riccarton Road East from SH1 to Gladstone Road South which is 50km/h

The average speeds reflect the posted speed limits. The 85th percentile speed shows that most vehicles on Riccarton Road are travelling less than 10km/hr above the speed limit. There are also many vehicles exceeding the speed limit, especially within the section from SH1 to Gladstone Road South which is not within the scope of the project.

3.2.2 Pedestrian, Cycle and Horse Volumes

No specific counts have been completed for pedestrian, cyclist and horse traffic on Riccarton Road West. Observations during various visits to the site indicate that the existing volumes are low. This is likely to be because the road is deficient and considered unsafe by these users.

3.3 2003 Number Plate Survey

Number plate surveys undertaken in 1997 and 1998 have shown that motorists are already using Riccarton Road as a bypass. A number plate survey was also completed in April 2003. The survey was undertaken during one day with three two hour periods surveyed: 7:30-9:30am, 11:30am-1:30pm, 4:00-6:00pm). The survey data was converted to an estimate of daily traffic volumes. A summary of the matched vehicle data from the number plate survey and a map showing the survey points is attached in Appendix B.

The survey showed that a total 556 vehicles travelled between the survey point northwest of Riccarton Road West on SH87 and the survey points on Gordon Road and Riccarton Road East north of SH1. Of those vehicles 397 (71%) travelled along Riccarton Road with the rest travelling on Gordon Road.

The traffic from Dukes Road was also surveyed. The number of vehicles surveyed at the Dukes Road survey point and the survey points on Gordon Road and Riccarton Road East north of SH1 was 169. Of those vehicles 78 (46%) travelled along Riccarton Road.

The percentage of heavy vehicles using either Gordon Road or Riccarton Road appeared to be dependent only on the source of the traffic. Volumes originating from SH87 had about 10% heavy vehicles regardless of whether that traffic travelled on Gordon Road or Riccarton Road. The traffic originating from Dukes Road had 40-50% heavy vehicles.

Overall the survey showed that during the survey period 65% of through vehicles used Riccarton Road as compared to 35% of vehicles using Gordon Road. The overall percentage of heavy vehicles surveyed travelling through Riccarton Road was 13%.

3.4 Crash History

3.4.1 10-Year Crash Summary

The NZ Transport Agency's Crash Analysis System (CAS) was interrogated to obtain the crash history for the site for the past 10 years. A 10 year crash history was considered because the site is large, the number of crashes is relatively low and the longer history provides a better indication of the crash trends. A summary of all the crashes on Riccarton Road West, including the intersections, is in Table 3-3 below:

Table 3-3 : Summary of Crash History 1999-2008

Year	Fatal	Serious Injury	Minor Injury	Total Injury	Non-Injury	Total
1999				0	1	1
2000			3	3	3	6
2001		1	2	3	2	5
2002			1	1	2	4
2003			1	1	1	2
2004		1		1	1	2
2005				0	1	1
2006			2	2	6	8
2007	1			1	1	2

Year	Fatal	Serious Injury	Minor Injury	Total Injury	Non-Injury	Total
2008			3	3	3	6
Total	**1**	**2**	**12**	**15**	**27**	**36**

The annual profile of crashes on the routes shows that the number of crashes was reducing between 2000 and 2005. However, since then a much higher crash rate was experienced during 2006 and 2008. In 2006 the crash rate is high because on one day the icy/snowing weather conditions caused four vehicles to lose control and fall off the road. There is no such explanation for the 2008 crash rate but it is noted that the majority of crashes that year were at intersections.

The total length of the project is approximately 4.2km so there have been almost 9 crashes reported per kilometre in the past 10 years. This is high but further analysis shows that these crashes are concentrated at the intersections. Figure 3-3 below shows the distribution of crashes along the two roads:

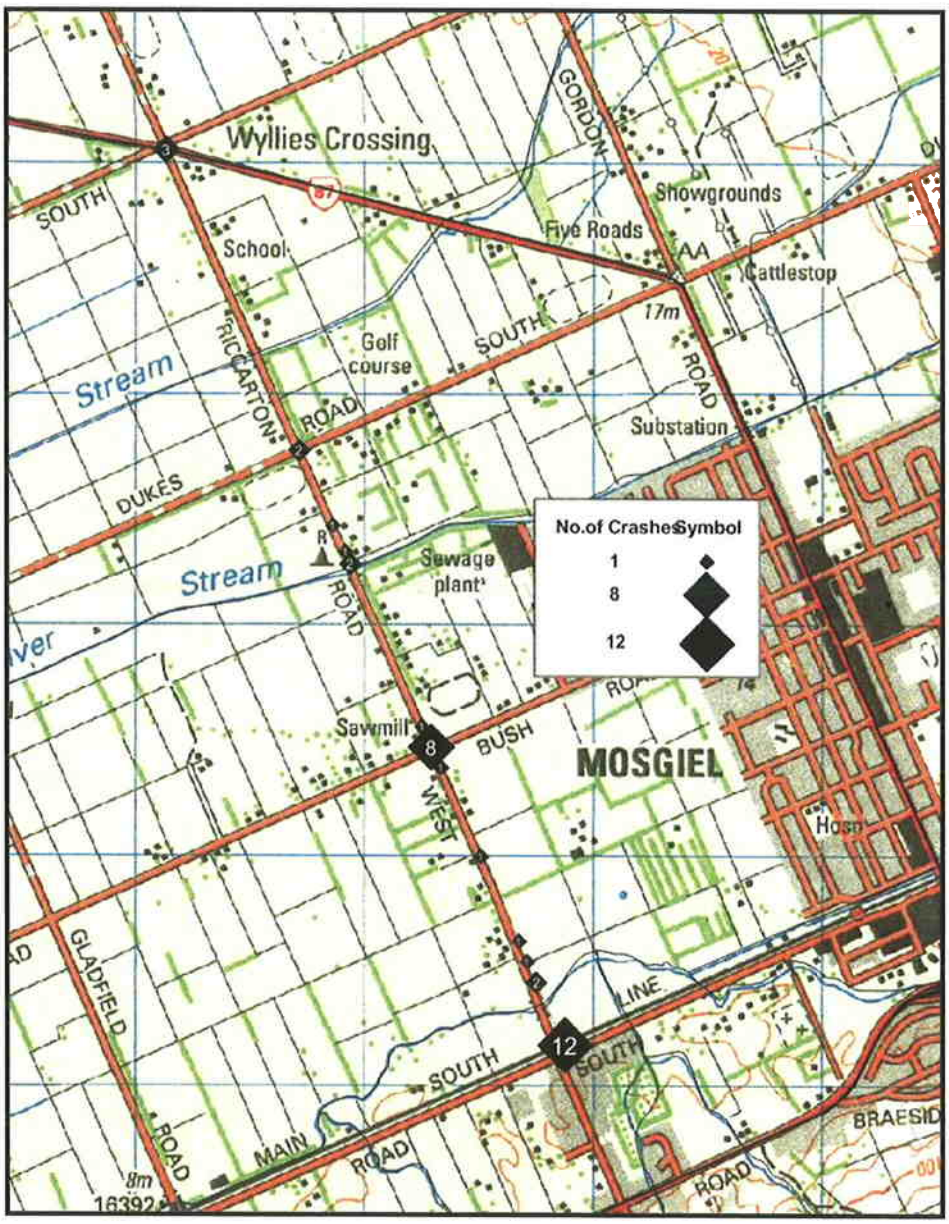


Figure 3-7 : Map of Crashes 1999-2008

The crashes in the map above have been clustered to a 50m radius to show the number of crashes located at specific sites. The map shows that most crashes have occurred at the intersections. In comparison there are far fewer crashes on the mid-block sections.

A copy of the crash listing is attached in Appendix C along with an analysis of the crashes and the crash diagrams.

In 2009 there was a fatal crash on Riccarton Road West which has not been included this analysis. The crash occurred south of the intersection with Dukes Road and involved a refuse truck worker who ran across the road into the path of a northbound van.

3.4.2 Intersection Crashes

Table 3-4 : Total Intersection Crashes 1999-2008

Year	Fatal	Serious Injury	Minor Injury	Total Injury	Non-Injury	Total
Riccarton Rd/Gladstone Rd			6	6	6	12
Riccarton Rd/Bush Rd	1	1	2	4	4	8
Riccarton Rd/Dukes Rd			1	1	1	2
Riccarton Rd/SH87		1		1	2	3
Total	**1**	**2**	**9**	**12**	**13**	**25**

The table above shows that almost 70% of all crashes on this route are located at the intersections. The worst intersection is Riccarton Road/Gladstone Road South with Riccarton Road West/Bush Road also having relatively high numbers of crashes in the past 10 years. The majority of crashes have resulted in only minor or no injuries. The one fatal crash at Riccarton Road West/Bush Road was caused by a vehicle travelling east failing to give way on Bush Road.

The majority of reported intersection crashes have involved vehicles crossing or turning and one party failed to give way. Other crash types include rear-ending of stopped or queued vehicles and vehicles losing control.

Most of the crashes reported involved cars, vans or SUV type vehicles. Heavy vehicles were only involved in 5 crashes and were considered at-fault in 4 of those instances. Bicycles and motorcycles were involved in 3 crashes each with the other motorists involved more likely to be at-fault.

3.4.3 Mid-block Crashes

The mid-block crashes on Riccarton Rd are outlined in Table 3-5 below:

Table 3-5 : Total Midblock Crashes 1999-2008

Section of Road	Fatal	Serious Injury	Minor Injury	Total Injury	Non-Injury	Total
Riccarton: Gladstone Rd to Bush Rd				0	6	6
Riccarton: Bush Rd to Dukes Rd			3	3	2	5
Riccarton: Dukes Rd to SH87				0		0
Total	**0**	**0**	**3**	**3**	**8**	**11**

The mid-block crashes comprise only 30% of all reported crashes on Riccarton Road West in the past 10 years. There have been no serious injury or fatal crashes on these sections of road and in some sections there have been no crashes.

Most of the crashes within the blocks involved vehicles losing control and leaving the road. Other crashes were caused by vehicles hitting stray animals or slow vehicles, vehicles failing to give way exiting a driveway and inappropriate overtaking.

Only two crashes involved heavy vehicles with one of those the fault of the truck driver. The rest of the crashes involved cars or SUVs.

3.5 Existing Road Deficiencies

3.5.1 General Safety Issues

There are a significant number of safety issues on Riccarton Road West between Gladstone Road South and SH87. The main concerns on the road include:

- A narrow seal width varying between 5.5m and 6.5m. The traffic lanes are narrow and vary between 2.75m and 3.25m wide and there are no sealed shoulders.
- The road is poorly delineated with only a centreline and no edgelines, edgemarker posts, raised retroreflective pavement markers.
- There are significant hazards on the side of the road including:
  - deep drains that run alongside most of the road
  - power poles located close to the road
  - steep slopes into the drains
  - large culvert head walls
  - trees and letterboxes

Figure 3-8 : Steep slopes into drains

The narrow seal and lack of sealed shoulder means that there is no room on the road for non-motorised users including pedestrians, cyclists and horse riders. They are required to either share the narrow traffic lane with vehicles or use the steeply sloped shoulder next to the drains.

Figure 3-9 : Cyclist riding within traffic lane

The narrow seal and no sealed shoulder combined with the steep unsealed shoulder, deep drains and other roadside hazards also affects vehicles. There is no area available outside of the traffic lanes for vehicles to recover if they accidently leave the sealed road. A clear zone between the edgeline and any hazards with shallow slopes is generally required for a crash to be recoverable.

There is also restricted sight distance at a number of points which compromises safety on the road. The locations where sight distance is restricted include:

- at the intersections with Gladstone Road South, Bush Road, and Dukes Road
- due to vertical curvature, particularly at the Silver Stream bridge approach
- at a number of driveways due to hedges, landscaping and structures

Figure 3-10 : Restricted sight distance at Silver Stream Bridge

The legal road is narrow which has restricted the DCC's ability to improve many of these issues.

A safety audit was undertaken in April 2009 which confirmed the safety issues outlined above. A summary of the safety audit's findings are attached in Appendix D. To date the DCC has implemented a number of recommendations from the safety audit, particularly relating to the poor delineation. These include better signage at the intersections, signage highlighting the presence of cyclists and hazard markers at private accessways.

3.5.2 Efficiency Issues

There are no significant efficiency issues on this route. The traffic volumes on the route are low so there is very little delay experienced at the intersections. The traffic counts showed that the headway, or gap between vehicles, is at least 32 seconds which is reasonably long. This means that there is almost always a sufficient gap available for vehicles turning onto or off Riccarton Road West at the intersections. The gap is likely to be less at the SH87 intersection but the main issue at those intersections is the lack of sight distance available.

3.5.3 Critical Links

The critical links on this route are currently those that already provide an arterial function and therefore have the higher traffic volumes. These links are:

Riccarton Road West – Gladstone Road South to Bush Road
The traffic volumes on Riccarton Road West between Gladstone Road South and Bush Road are much higher than on other sections. This link has an important function of providing a route into Mosgiel from SH1 south to Bush Road. This section of Riccarton Road West has the highest number of crashes of any section. However, it should be noted that a significant number of those crashes occurred on one day due to severe weather conditions.

3.5.4 Critical Junctions

There are a number of intersections within the route. The crash history showed that the crashes were generally focussed at the intersections. The function and layout of the critical intersections on the route are outlined below:

Riccarton Road/Gladstone Road South Intersection
The intersection of Riccarton Road and Gladstone Road South is a give way controlled cross intersection with Riccarton Road traffic having the right of way. North of the intersection on Riccarton Road West the speed limit changes from 50km/h to 80km/h. The main trunk line railway also runs parallel to Gladstone Road South with a level crossing on Riccarton Road West just north of the intersection. The visibility at the intersection is restricted by hedges and other vegetation. The crashes at this intersection are mainly related to westbound vehicles failing to give way on Gladstone Road South. There are no crashes associated with the railway level crossing. The level crossing has warning lights and bells but no barrier arms.

Figure 3-11 : Riccarton Road / Gladstone Road South Intersection

Riccarton Road West/Bush Road Intersection
This intersection is a stop controlled cross intersection with Riccarton Road West traffic having the right of way. This intersection also has a relatively high crash rate with most crashes caused by vehicles failing to give way on Bush Road. Sight distance is also limited by hedges on the road boundaries.

Figure 3-12 : Riccarton Road West / Bush Road Intersection

3.6 Other Projects Underway

There are no other projects underway on Riccarton Road West. The NZ Transport Agency is currently in the design stage of a project to improve the intersection of SH87, School Road and Riccarton Road West. They are not proposing any significant changes to the southern approach of Riccarton Road West. Therefore it will have very little impact on this project. There are other long-term projects proposed such as the link road between Centre Street and Carncross Street and the development of the Dukes Road industrial zone but the timeframes are uncertain at this stage.

4 The Proposed Upgrade

The proposal is to improve the standard of Riccarton Road West for non-motorised users including cyclists, pedestrians and horse riders. The improvements will comprise of two main components: sealed shoulder widening for cyclists and a shared path for the pedestrians, horse riders and also some cyclists. The opportunity will also be taken to bring the traffic lanes up to an appropriate width as the main components will require significant changes to the road. The details of the upgrade are outlined below:

4.1 Design Guides/References

The guides and references used in the design of the improvements included:

- Transit New Zealand's Draft Geometric Design Manual
- AASHTO: Roadside Design Guide (American Association of State Highway and Transport Officials)
- Austroad's Rural Road Design Guide
- Austroad's Guide to Traffic Engineering Practice Part 13 - Pedestrians
- Austroad's Guide to Traffic Engineering Practice Part 14 - Cyclists
- Transit New Zealand's Supplement to Austroad's Part 14
- Transit New Zealand's Bridge Manual
- Transit New Zealand's Manual of Traffic Signs and Markings (MOTSAM)

Note that the Austroads guides have now been superseded by a new suite of Austroad's guides called the Road Design and Traffic Management Guides. The new guides are simply a repackaging of the old guides and include all of the same information. Also note that the Draft Geometric Design Manual will be superseded by these new guides.

4.2 Shared Path

4.2.1 Path Dimensions

The shared path will be located on the west side of Riccarton Road West. The path will run the entire length of the site which is about 4.2km long. The path will be 3.0 metres wide to accommodate walkers, cyclists and horses.

4.2.2 Bridge Widening

The shared path will continue across the Silver Stream, Mill Stream and Owhiro Stream bridges. The existing road bridges or culverts over these streams will be widened to accommodate the path. The path is likely to be narrowed at these points to 2.2m. A handrail will be provided on the outside of the bridge 1.4m high to provide protection for pedestrians and cyclists. A safety barrier will separate vehicles from the shared path on the bridge and approaches.

4.2.3 Intersections

The path will have a number of points where there will be conflict with motor vehicles. These include intersections and private accessways. Sufficient sight distance will be provided at these locations to ensure both vehicles and the shared path users are visible to each other. No formal crossing treatments have been included at the intersections as the number of users is not likely to warrant it. Further consideration will be given to the treatment for the shared path over the level crossing at the Riccarton Road/Gladstone Road South intersection in consultation with OnTrack.

4.2.4 Connections

The shared path will connect with Gladstone Road South and the path along the Silverstream.

4.3 Road Improvements

4.3.1 Cross-section

Riccarton Road West will be widened to a seal width of 8.5 metres with two 0.75 metre sealed shoulders and 3.5 metre traffic lanes. This will bring the road up to the widths required by accepted industry design guides. The guidance for cross-section widths are based on traffic volumes.

The traffic volumes on the road are about 2,000vpd from Gladstone Road South to Bush Road and about 1,000vpd from Dukes Road to SH87. From the Austroads guide the required traffic lane width is 3.5m where the traffic volume is greater than 1,000vpd. For 1,000vpd roads Austroads requires a sealed shoulder width of 0.5m and 1.0m for 2,000vpd roads. The Geometric Design Manual requires a 3.5m traffic lane and 0.75m sealed shoulder. It is important for the entire road to have a consistent width so a sealed shoulder of 0.75m was chosen.

There will be a 1.25m separation distance between the sealed shoulder and the shared path. A water channel will be provided along the sides of the road except where an ORC scheduled drain exists.

4.3.2 Clear Zones

Clear zones will be provided on both sides of the road where possible. The clear zone cannot be achieved in some places. Strong delineation is proposed in all areas where the clear zone is not met. The reduction in clear zone occurs adjacent to the Bhutan Cypress trees and where widening is required on the western side of the road to avoid significantly affecting a number of residential properties. Further consideration is required to identify other roadside hazards and to provide additional protection to road users.

Figure 4-1 : Bhutan Cypress Tree

4.3.3 Alignment

The horizontal alignment for Riccarton Road West has been designed to make the most of the road reserve available while trying to reduce the impact on adjacent properties. In some places this design will require the centre line of the road to shift about 1.5 metres to the west.

The vertical alignment will not change for most of Riccarton Road West. The vertical curve over the Silver Stream Bridge will be improved to ensure there is sufficient stopping sight distance on the approaches.

4.3.4 Intersections

All intersections will be improved by removing any sight distance restrictions, providing treatments to alert motorists on the approaches to the intersections and widening the mouth of the intersections. Providing a seamless transition between the proposed works and the existing facilities at Riccarton Road/Gladstone Road South will be necessary.

All accesses affected will be upgraded with a sealed surface and improved sight distance.

NZTA is proposing to improve the intersection of SH87 and Riccarton Road West. The design of the two projects will need to be coordinated to ensure that they fit together.

4.3.5 Signage and Markings

The road will include the signs and markings as recommended by the safety audit and in accordance with MOTSAM.

4.3.6 Bridges and Culverts

There are a number of culverts and bridges that will be widened including Mill Stream, Silver Stream and Owhiro Stream. The Silver Stream Bridge will be widened by 4.6 metres. The total deck width between guardrails will be 9.0 metres which includes two 3.5 metre lanes and 1.0m wide shoulders. Guardrail will be required on the bridges over the Silver, Owhiro and Mill Streams.

5 Construction Traffic Impacts

5.1 Construction Timeframes

It has been conservatively estimated that the Riccarton Road West upgrade will take two construction seasons. A construction season generally runs from 1 October to 30 April each year. Therefore the total length of construction from start to finish could be about 18 months.

During this period the construction would not be continuous. The project is long but the work is straightforward so it can easily be split into two sections. It is likely that the contractor will start and complete one section in each construction season. Therefore the restrictions to residents and traffic will only occur from October to April.

5.2 Construction Methodology

The main earthworks and pavement construction is likely to occur in sections but the work will generally follow this methodology:

- Tree felling and vegetation removal
- Temporary fencing and fence removal
- Excavation and other earthworks
- Extension of culverts
- Construction of the carriageway pavement
- Construction of the shared path pavement
- Preparing the carriageway surface for sealing
- Sealing
- Fencing and landscaping activities
- Paint marking and signs

The construction activities that will generate the most traffic will be the earthworks and construction of the pavements. These activities require the transport of waste from the site and pavement materials to the site.

No specific routes will be identified for the construction traffic to travel to and from the site. The construction company undertaking the work will chose the most appropriate routes based on destination. However, other factors may be considered such as sensitivity of the residential areas to construction traffic.

Temporary traffic management will be required as part of the contract to ensure the safety of construction staff, road users and adjacent property owners. The temporary traffic management plan will be prepared and approved in accordance with the Code of Practice for Temporary Traffic Management. In addition to that the contractor will need to consider the access requirements for property owners.

5.3 Impacts on Property Owners

The construction of the road will impact on the adjacent property owners in a number of ways. The specific traffic impacts will be on access and safety. The construction will be undertaken in such a way that access to properties will not be unduly restricted. Some restrictions may be unavoidable but these will occur in consultation with the affected property owner. If changes to the existing accesses are required as part of the project temporary alternatives will be provided.

5.4 Impacts on Road Users

Other users of the road are likely to be impacted by delays during the construction period. The temporary traffic management will include speed restrictions and the road may be reduced to one lane for some of the time. The restriction on road users during construction is unavoidable.

5.5 Dust

The construction work is likely to create dust that could potentially affect motorists using the road. The contractor will be required to minimise dust nuisance as part of their contractual requirements by water spraying the site when it becomes an issue.

6 Trip Attraction for Pedestrian, Cyclist and Horse Rider Facilities

6.1 Predicted Use

The numbers of pedestrians, cyclists and horse riders using the shared path has been predicted using a number of methods.

The type users and trips that the road upgrade and new path will attract are likely to include:

- cyclists and pedestrians travelling to work
- children cycling and walking to school
- recreational cyclists and walkers
- recreational horse riders
- training cyclists
- walking, cycling and riding for other trips such as visiting friends and shopping

Cyclists volumes have been obtained using the cycle demand calculations laid out in the NZ Transport Agency's Economic Evaluation Manual Volume 2. This method is based on assessing the number of cyclists from the number of residents within a 1.6km area of Riccarton Road West. The calculations take into account the attractiveness of the road depending on how close the cyclists live to it. This method has determined that once the road has been upgraded it will generate a total of 180 cyclist trips per day.

Figure 6-1 : Cyclists using the existing road

No similar method is available for pedestrians so a nominal figure of 60 pedestrian trips per day has been assumed. This equates to about 4% of the population using the path who live within 1.6km of the path or 17% of those living within 0.8km of the path.

No assumptions have been made for the number of horse riders who are likely to use the path. No actual counts are available or alternative methods available so there is currently no basis on which to make an assumption.

6.2 Peak Use

Due to the lack of existing count information it has been assumed that the peak volumes for pedestrians and cyclists coincide with the peak times identified for vehicular traffic. These peak times are in the morning from 8:00 to 9:00am and the evening from 5:00 to 6:00pm. The peaks will not be as pronounced as for vehicular traffic because commuter trips for pedestrians and cyclists will be a smaller percentage of the total trips.

The peak use for horse riders is difficult to define as these trips are mainly recreational. It is likely these trips will be spread throughout the day and be more in the weekend.

6.3 Catchment Areas

The catchment areas will differ for pedestrians, cyclists and horse riders. For cyclists the catchment area includes all of Riccarton Road West, parts of the side roads, a portion of the residential areas of Mosgiel west of Carlyle Road and the residential areas of East Taieri. The cycle demand calculations are based on a 1.6km zone around Riccarton Road West. It is likely the catchment area will be similar for horse riders but smaller for pedestrians.

7 Traffic Modelling for Road Upgrade

7.1 Base Information

The upgrade to Riccarton Road West has been modelled using Dunedin's TRACKS network model. The model uses land use and traffic behaviour information to predict traffic flows from land use, parking and road network changes. The purpose of this model is to replicate the existing traffic volumes on the roading network.

The base model was compiled for the existing Dunedin network for 2006.The model has been validated using up to date traffic volume information. The model has been updated to take into account recent changes to the growth predictions on the Dukes Road industrial area.

7.2 Do Minimum Model

The modelled volumes for the key roads on the Mosgiel Arterial Network are outlined in Figure 7-1 below:

Table 7-1 : Base Modelled Volumes on Mosgiel Arterial Network

Road	To	From	Volumes
Riccarton Road West	Gladstone Road	Bush Road	1,616
Riccarton Road West	Bush Road	Dukes Road	878
Riccarton Road West	Dukes Road	SH87	735

When comparing these volumes to the traffic counts currently available (see Table 3-1) there are differences between the figures. These differences are acceptable as the purpose of the model is to approximate the changes to the traffic volumes and not to accurately assess the actual traffic volumes. The model uses mathematical formulae to approximate the traffic network and the general behaviour of drivers using it. The analysis may not take into account extremes of human behaviour nor will it reflect all of the subtle complexities of the transport system.

7.3 Modelling

The modelling was undertaken for the years 2010/11 and 2020/21. These years correspond with times that are 5 and 15 years from the date of the base model and are determined by the modelling process. The 2010/11 model can approximate the conditions following the construction of the new link, 2020/21 corresponds to a point in time 10 years later.

Two options were considered during the modelling: the Do Minimum and the Riccarton Road West upgrade. These two options were compared to determine the effects of the upgrade on Riccarton Road West and rest of the Mosgiel roading network. The Do Minimum was based on no changes to Riccarton Road West or the rest of the roading network. The Riccarton Road West upgrade was modelled using a 10km/hr increase in speeds to replicate the effects the road widening would have on the traffic using the road.

7.4 Riccarton Road West Upgrade Model Output

The outputs for the Do Minimum and Riccarton Road West Upgrade models have been summarised and recorded on a series of plans to compare the two options. Plans for the 2010/11 and 2020/21 models are attached to this report in Appendix E. The modelling outputs for just Riccarton Road West are also summarised in Table 7-2 below:

Table 7-2 : Summary of Modelling Outputs

Section of Riccarton Road West	2010/2011			2020/2021		
	Do Minimum	Upgrade	% Increase	Do Minimum	Upgrade	% Increase
Gladstone Rd to Bush Rd	1,616	1,683	4%	2,001	2,056	3%
Bush Rd to Dukes Rd	878	920	5%	1,179	1,223	4%
Dukes Rd to SH87	735	763	4%	1,017	1,037	2%

The construction of the upgrade on Riccarton will result in a small increase in traffic. Directly following the construction the traffic volumes will increase by about 4%. Ten years later the difference between the two scenarios reduces to about 3%.

The upgrade of Riccarton Road West has very little effect on Mosgiel's arterial network. The modelling shows that traffic does not simply divert from Gordon Road onto Riccarton Road. The effects are network wide within Mosgiel. The modelling indicates that traffic will increase on Riccarton Road West, Dukes Road and Gordon Road and decrease on Factory Road, Hagart Alexander Drive, Puddle Alley and Stedman Road. The changes in the traffic volumes over these roads are minor and equate to less than a 5% change.

7.5 Traffic Growth

The traffic modelling indicates that the traffic growth for the Do Minimum scenario is about 2-4% per year. This is also the case for the upgrade scenario. Therefore the upgrade appears to have no impact on the overall traffic growth.

8 Impact on Cycling, Walking and Horse Riding

8.1 Capacity Effects

The shared path will be 3 metres wide which according to the Austroads Guide to Road Design Part 6A – Pedestrian and Cyclist Paths is more than sufficient for non-directional, regular recreational and commuter use. The capacity of the road to accommodate pedestrians, cyclists and horse riders will be greatly increased by the construction of the path and widened shoulders. The new facilities will attract users from elsewhere and will attract new users as demand will be currently suppressed by the lack of facilities.

8.2 Mobility and Accessibility Effects

The new facilities on Riccarton Road West will improve the overall mobility of residents in the area, improve accessibility and increase the transport choices for the community. Connectivity and reliable access to existing facilities will be greatly enhanced. The shared path will link to existing paths on Gladstone Road South and along the Silver Stream.

The path and widened road will give local residents access to alternative forms of transport by providing a suitable facility. At present the only option available is driving a car to get to school, work or visit friends.

8.3 Safety Effects

Some residents choose to use the road in its current state but it is not considered safe. They are forced to use the side of the road on a steep gravel shoulder close to the traffic lane. The path will provide a safe facility that is separated from vehicles and it will have safe crossing points at intersections. The widened shoulders on the road will also provide room for cyclists who choose to use the road.

The improvements to safety on Riccarton Road West will attract more pedestrians, cyclists and horse riders as demand is likely to be suppressed due to safety concerns.

8.4 Other Effects

The improvements to the facilities for pedestrians, cyclists and horse riders will also have other more minor effects. As more people in the community will be attracted to walk, cycle and ride there will be an improvement to the health and well-being to those people. The new facilities will also make the community more inclusive for the transport disadvantaged such as people with disabilities and mothers with young children.

8.5 Mitigating Impacts

All the traffic impacts resulting from the improved pedestrian, cyclist and horserider facilities are considered positive so no mitigation measures are considered necessary.

9 Impact on Vehicular Traffic

9.1 Traffic Volumes

The modelling shows that the traffic volumes on Riccarton Road West will increase but only by about 4%. This is not considered a significant amount. Comparing this to existing traffic volumes it will equate to about 80 vpd between Gladstone Road South and Bush Road and 40 vpd from Dukes Road to SH87.

The daily profile of traffic in Figure 3-2 shows that in a 24 hour period Riccarton Road West is regularly used by traffic for about 15 hours a day (this is based on the number of hours where the traffic volume is greater than 50 per hour). Therefore if the increase in traffic following the upgrade was spread throughout the 15 hour period it would equate to about 5 vehicles per hour between Gladstone Road South and Bush Road. This change will be minor and will not be discernable to adjacent residents and road users.

9.2 Heavy Vehicle Effects

The TRACKS modelling is not able to separate the increase in traffic shown in the model into light and heavy vehicles. The increase identified above of 80vpd and 40vpd includes all vehicles. There is no indication from the modelling that the proportion of heavy vehicles will change as a result of the road widening. If the proportion of heavy vehicles stays the same as existing the increase in heavy vehicle numbers will be about 5 vpd (6%) between Gladstone Road South and Bush Road and 2 vpd (5%) from Dukes Road to SH87.

The 2003 Travel Survey in Mosgiel showed that significant numbers of vehicles are already using Riccarton Road as a through route. Of the vehicles travelling straight through 13% were heavy vehicles. If we assume that all the traffic attracted to Riccarton Road following the upgrade will travel straight through then the heavy vehicle numbers will be: 11 vpd between Gladstone Road South and Bush Road and 6 vpd from Dukes Road to SH87.

In either case the number of heavy vehicles attracted to the route will be minor and not noticeable to adjacent residents and road users.

9.3 Directional Split Effects

The modelling shows that the main increase in traffic on Riccarton Road following the upgrade will be to northbound traffic. On some sections of Riccarton Road the increase in northbound traffic is twice that of southbound traffic. This appears to indicate that traffic travelling up from the south is being diverted from the Hagart Alexander Drive route onto Riccarton Road.

The difference in the directional split of the new traffic is not likely to lead to a change in the existing directional split balance. The increase in traffic is too low to influence these existing traffic characteristics.

9.4 Daily Traffic Profile Effects

As with the heavy vehicle proportions the modelling does not identify the changes to the daily traffic profile. It is unlikely the type of traffic using the road will be significantly different to those using the road at the moment. Even if there was an increase in traffic that just travels outside the peak period a change to the profile would not occur. As with the directional split the increase in traffic is too low to influence the existing traffic characteristics.

9.5 Changes to Travel Times

The road widening is likely to have only a minor effect on travel times. The road will be widened from 2.75-3.25 metre lanes to 3.5 metre lanes. This may result in an increase in mean speeds. However, the

speed limit will not be changed. At present the mean speeds on Riccarton Road West are below the existing speed limit.

9.6 Effects on Key Links and Junctions

9.6.1 Key Links

The key link on the part of Riccarton Road West being upgraded is between Gladstone Road South and Bush Road. Currently the section of road has the highest traffic volume and the highest number of crashes. The upgrade is likely to improve safety on this link as there will be wider shoulders and improvements to clear zones. This will aid recoverability of vehicles that lose control and reduce the severity of the crashes.

9.6.2 Key Junctions

Both the Gladstone Road South and Bush Road intersections are considered key junctions on this route. Both intersections have significant crash histories. The upgrade will reduce the crashes at these intersections by improving sight distance and making the intersections more visible.

9.7 Safety Effects

Overall the improvements to Riccarton Road West will improve safety for vehicles. The road is quite narrow in places and this has lead to a number of loss of control crashes. Providing a road that has adequate lane widths with improved shoulder widths will reduce crashes. The improvements to the recoverable area for vehicles will reduce the severity of crashes by providing a clear zone with a shallower slope into the drains.

Improving the private accesses through widening, increasing sight distances and increasing conspicuity will reduce the likelihood of any access related crashes.

9.8 Other Effects

The improvements to Riccarton Road West will also have a number of other less obvious effects. It is likely to provide greater accessibility to key destinations and will improve the security of routes around Mosgiel.

9.9 Mitigating Impacts

The negative impacts arising from the improvements to Riccarton Road West include an increase in traffic volumes, heavy vehicle volumes and potentially speeds. All other effects are considered positive. Mitigation measures to the road are not considered necessary to offset the increase in vehicles and speeds. The increase in traffic volumes, including heavy vehicles, is minor and it unlikely to be noticeable by both residents and road users.

The traffic speeds are unlikely to increase significantly as the traffic lane widening is only about 0.5m and the re-establishment of the hedges on the road boundary is likely to have a limiting effect on traffic speeds.

10 Conclusion

The improvements to Riccarton Road West will include wider traffic lanes, sealed shoulders, improved clear zone widths, shallower slopes into the drains and a shared path. The construction of these improvements is likely to take 18 months with the main work being the earthworks and pavement construction. The construction will be completed in sections with temporary access being provided to residents where necessary and temporary traffic management in place to ensure the safety of the construction workers and road users.

The new shoulders and shared path will increase the numbers of pedestrians, cyclists and horse riders using the road. It is difficult to determine accurately the numbers that these facilities will attract but due to the density of housing it is likely that more cyclists will use the facilities than pedestrians or horse riders. The change in traffic volumes was modelled by the Dunedin TRACKS model. The modelling predicted that traffic volumes will be 4-5% greater than existing in 2010/2011.

The impact on pedestrians, cyclists and horse riders from the upgrade to Riccarton Road West is positive. The new facilities will improve the mobility, accessibility and safety of existing and new users. The facilities will attract new users which will improve the health and wellbeing of residents and provide greater transport choices. As the impacts are considered positive no mitigation measures are required.

The improvements to Riccarton Road West for vehicles will have a number of positive and negative impacts on adjacent residents and existing road users. Safety on the road will be improved which will lead to a reduction in crashes. More traffic will use the road and traffic speeds may increase. The overall increase in traffic equates to about 5 vehicles per hour between Gladstone Road South and Bush Road. This increase, including heavy vehicles, will be minor and is likely not to be noticeable to adjacent residents and road users. No mitigation measures are considered necessary as the effects are minor.

Appendix A: Traffic Counts

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-52 -- English (ENZ)

Datasets:

Site:	**[2933.521.] !Riccarton Rd: Gladstone to SH 1 (DCC change Block & RP)**
Direction:	5 - South bound A>B, North bound B>A., **Lane:** 0
Survey Duration:	23:00 Thursday, 19 February 2009 => 8:30 Friday, 27 February 2009
File:	P:\801006000+\801006112\98\Traffic Assessment\Traffic Counts\2933.521.27Feb2009.EC0 (Plus)
Identifier:	K260XD1Y MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**23:00 Thursday, 19 February 2009 => 8:30 Friday, 27 February 2009**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 16423 / 16437 (99.91%)

Weekly Vehicle Counts (Virtual Week)

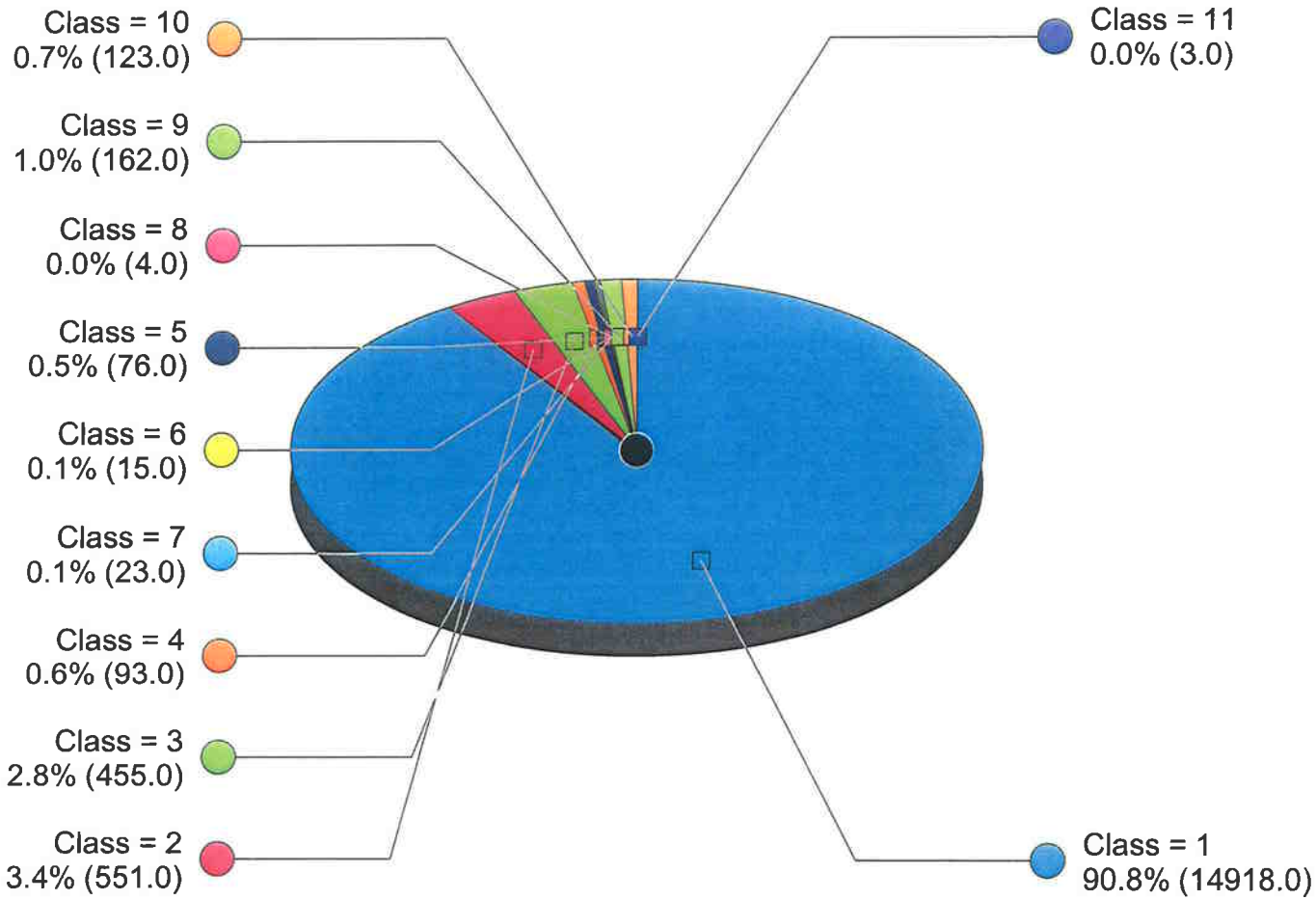
VirtWeeklyVehicle-52
Site: 2933.521..0NS
Description: **!Riccarton Rd: Gladstone to SH 1 (DCC change Block & RP)**
Filter time: **23:00 Thursday, 19 February 2009 => 8:30 Friday, 27 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	6.0	12.0	6.0	8.0	6.0	22.0	27.0	7.3	11.6
0100-0200	3.0	2.0	6.0	4.0	6.5	7.0	14.0	4.7	6.1
0200-0300	4.0	3.0	4.0	4.0	4.0	6.0	13.0	3.8	5.3
0300-0400	5.0	5.0	6.0	7.0	2.0	4.0	4.0	4.5	4.4
0400-0500	5.0	4.0	3.0	6.0	5.0	6.0	5.0	4.7	4.9
0500-0600	43.0	42.0	40.0	40.0	41.0	16.0	6.0	41.2	33.6
0600-0700	71.0	72.0	98.0	80.0	72.5	24.0	12.0	77.7	62.8
0700-0800	185.0	214.0	182.0	200.0	**187.5<**	32.0	30.0	192.7	152.3
0800-0900	**190.0<**	**221.0<**	**221.0<**	**225.0<**	159.0	76.0	54.0	**195.8<**	**163.1<**
0900-1000	136.0	125.0	140.0	164.0	133.0	108.0	58.0	139.6	123.4
1000-1100	106.0	120.0	118.0	144.0	149.0	146.0	93.0	127.4	125.1
1100-1200	137.0	129.0	117.0	132.0	135.0	**146.0<**	**113.0<**	130.0	129.9
1200-1300	144.0	112.0	131.0	139.0	145.0	141.0	130.0	134.2	134.6
1300-1400	146.0	135.0	157.0	165.0	162.0	138.0	146.0	153.0	149.9
1400-1500	180.0	164.0	150.0	166.0	177.0	**169.0<**	**180.0<**	167.4	169.4
1500-1600	187.0	205.0	200.0	223.0	218.0	137.0	168.0	206.6	191.1
1600-1700	219.0	251.0	221.0	225.0	210.0	124.0	163.0	225.2	201.9
1700-1800	**250.0<**	**265.0<**	**265.0<**	**230.0<**	**255.0<**	133.0	154.0	**253.0<**	**221.7<**
1800-1900	133.0	140.0	164.0	171.0	150.0	100.0	101.0	151.6	137.0
1900-2000	76.0	121.0	106.0	83.0	103.0	65.0	83.0	97.8	91.0
2000-2100	55.0	82.0	72.0	78.0	84.0	53.0	66.0	74.2	70.0
2100-2200	42.0	44.0	60.0	58.0	55.0	30.0	39.0	51.8	46.9
2200-2300	23.0	24.0	24.0	33.0	37.0	36.0	18.0	28.2	27.9
2300-2400	12.0	16.0	15.0	17.5	20.0	27.0	8.0	16.3	16.6
Totals									
0700-1900	2013.0	2081.0	2066.0	2184.0	2080.5	1450.0	1390.0	2076.5	1899.4
0600-2200	2257.0	2400.0	2402.0	2483.0	2395.0	1622.0	1590.0	2378.0	2170.0
0600-0000	2292.0	2440.0	2441.0	2533.5	2452.0	1685.0	1616.0	2422.5	2214.5
0000-0000	2358.0	2508.0	2506.0	2602.5	2516.5	1746.0	1685.0	2488.7	2280.3
AM Peak	0800	0800	0800	0800	0700	1100	1100		
	190.0	221.0	221.0	225.0	187.5	146.0	113.0		
PM Peak	1700	1700	1700	1700	1700	1400	1400		
	250.0	265.0	265.0	230.0	255.0	169.0	180.0		

*** - No data.**

Class Bin Chart

ClassBin-53(Metric) **Site:** 2933.521..0NS
Description:!Riccarton Rd: Gladstone to SH 1 (DCC change Block & RP)
Filter time:23:00 Thursday, 19 February 2009 => 8:30 Friday, 27 February 2009
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)
Scheme: Vehicle classification (AustRoads94)
Total=16423



Class Bins

Class 1 - 14918 (90.84%)
Class 2 - 551 (3.36%)
Class 3 - 455 (2.77%)
Class 4 - 93 (0.57%)
Class 5 - 76 (0.46%)
Class 6 - 15 (0.09%)
Class 7 - 23 (0.14%)
Class 8 - 4 (0.02%)
Class 9 - 162 (0.99%)
Class 10 - 123 (0.75%)
Class 11 - 3 (0.02%)
Class 12 - 0 (0.00%)

Speed Statistics

SpeedStat-67
Site: 2933.521..0NS
Description: **!Riccarton Rd: Gladstone to SH 1 (DCC change Block & RP)**
Filter time: **23:00 Thursday, 19 February 2009 => 8:30 Friday, 27 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 16423
Posted speed limit = 50 km/h, Exceeding = 12905 (78.58%), Mean Exceeding = 57.78 km/h
Maximum = 119.0 km/h, **Minimum** = 10.5 km/h, **Mean** = 55.1 km/h
85% Speed = 62.3 km/h, **95% Speed** = 67.7 km/h, **Median** = 54.7 km/h
20 km/h Pace = 45 - 65, **Number in Pace** = 13912 (84.71%)
Variance = 61.99, **Standard Deviation** = 7.87 km/h

Speed Bins (Partial days)

Speed	Bin		Below		Above		Energy	vMult	n * vMult
0 - 10	0	0.0%	0	0.0%	16423	100.0%	0.00	0.00	0.00
10 - 20	30	0.2%	30	0.2%	16393	99.8%	0.00	0.00	0.00
20 - 30	88	0.5%	118	0.7%	16305	99.3%	0.00	0.00	0.00
30 - 40	295	1.8%	413	2.5%	16010	97.5%	0.00	0.00	0.00
40 - 50	3105	18.9%	3518	21.4%	12905	78.6%	0.00	0.00	0.00
50 - 60	9212	56.1%	12730	77.5%	3693	22.5%	0.00	0.00	0.00
60 - 70	3140	19.1%	15870	96.6%	553	3.4%	0.00	0.00	0.00
70 - 80	478	2.9%	16348	99.5%	75	0.5%	0.00	0.00	0.00
80 - 90	63	0.4%	16411	99.9%	12	0.1%	0.00	0.00	0.00
90 - 100	8	0.0%	16419	100.0%	4	0.0%	0.00	0.00	0.00
100 - 110	3	0.0%	16422	100.0%	1	0.0%	0.00	0.00	0.00
110 - 120	1	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
120 - 130	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
130 - 140	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
140 - 150	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
150 - 160	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
160 - 170	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
170 - 180	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
180 - 190	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00
190 - 200	0	0.0%	16423	100.0%	0	0.0%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below		Above	
0	50 (PSL)	3518	21.4%	12905	78.6%

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-62 -- English (ENZ)

Datasets:

Site:	**[2334.1904.] !Riccarton Rd: Bush to Gladstone (DCC Block & RP change)**
Direction:	5 - South bound A>B, North bound B>A., **Lane:** 0
Survey Duration:	23:00 Tuesday, 10 February 2009 => 9:01 Wednesday, 18 February 2009
File:	P:\801006000+\801006112\98\Traffic Assessment\Traffic Counts\2334.1904.18Feb2009.EC0
(Plus)	
Identifier:	M086Y3A5 MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**23:00 Tuesday, 10 February 2009 => 9:01 Wednesday, 18 February 2009**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 15008 / 15019 (99.93%)

Weekly Vehicle Counts (Virtual Week)

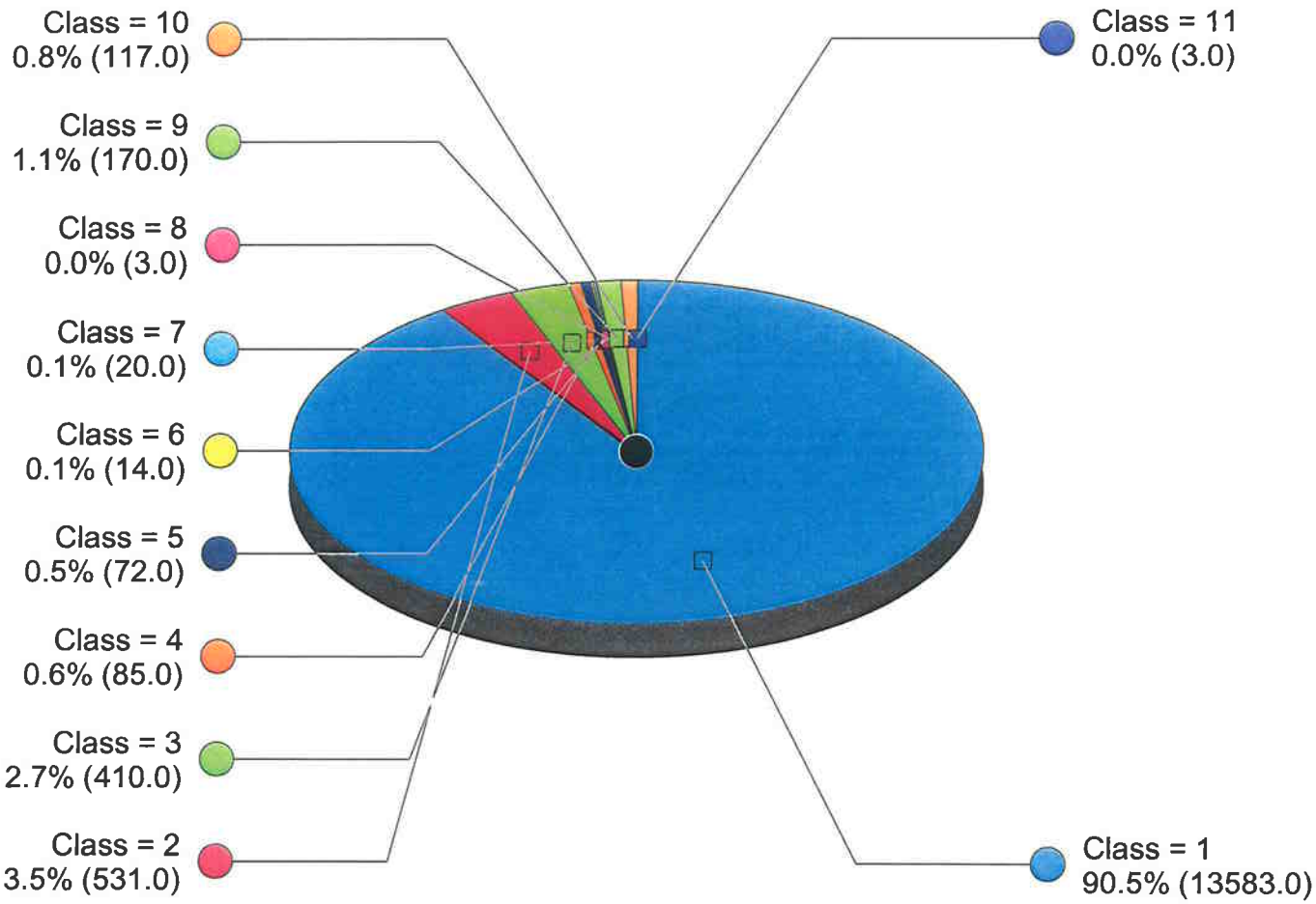
VirtWeeklyVehicle-62
Site: 2334.1904..0NS
Description: **!Riccarton Rd: Bush to Gladstone (DCC Block & RP change)**
Filter time: **23:00 Tuesday, 10 February 2009 => 9:01 Wednesday, 18 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	5.0	6.0	7.5	9.0	6.0	20.0	13.0	6.8	9.3
0100-0200	0.0	6.0	3.0	7.0	7.0	12.0	12.0	4.3	6.3
0200-0300	4.0	4.0	3.5	4.0	1.0	3.0	8.0	3.3	3.9
0300-0400	3.0	4.0	3.5	5.0	1.0	1.0	4.0	3.3	3.1
0400-0500	4.0	3.0	4.0	1.0	4.0	2.0	4.0	3.3	3.3
0500-0600	32.0	28.0	30.5	33.0	32.0	18.0	9.0	31.0	26.6
0600-0700	53.0	70.0	66.0	60.0	52.0	24.0	11.0	61.2	50.3
0700-0800	192.0	171.0	167.5	144.0	149.0	29.0	17.0	165.2	129.6
0800-0900	**204.0<**	**208.0<**	**199.0<**	**180.0<**	**198.0<**	84.0	50.0	**198.0<**	**165.3<**
0900-1000	123.0	114.0	65.5	123.0	123.0	105.0	92.0	102.3	101.4
1000-1100	106.0	119.0	115.0	118.0	132.0	116.0	124.0	118.0	118.6
1100-1200	126.0	93.0	129.0	79.0	110.0	**150.0<**	**127.0<**	107.4	116.3
1200-1300	120.0	137.0	132.0	124.0	141.0	**165.0<**	148.0	130.8	138.1
1300-1400	112.0	129.0	149.0	119.0	130.0	158.0	165.0	127.8	137.4
1400-1500	137.0	135.0	149.0	120.0	153.0	136.0	164.0	138.8	142.0
1500-1600	173.0	156.0	159.0	173.0	193.0	146.0	184.0	170.8	169.1
1600-1700	192.0	214.0	219.0	194.0	**216.0<**	152.0	**195.0<**	207.0	197.4
1700-1800	**257.0<**	**231.0<**	**245.0<**	**216.0<**	200.0	141.0	176.0	**229.8<**	**209.4<**
1800-1900	113.0	107.0	127.0	127.0	155.0	84.0	92.0	125.8	115.0
1900-2000	82.0	85.0	81.0	81.0	102.0	50.0	69.0	86.2	78.6
2000-2100	62.0	62.0	78.0	49.0	66.0	45.0	72.0	63.4	62.0
2100-2200	35.0	50.0	44.0	55.0	70.0	36.0	31.0	50.8	45.9
2200-2300	19.0	17.0	32.0	35.0	36.0	39.0	16.0	27.8	27.7
2300-2400	10.0	11.0	8.0	16.0	27.0	25.0	6.0	13.8	14.3
Totals									
0700-1900	1855.0	1814.0	1856.0	1717.0	1900.0	1466.0	1534.0	1821.7	1739.7
0600-2200	2087.0	2081.0	2125.0	1962.0	2190.0	1621.0	1717.0	2083.3	1976.4
0600-0000	2116.0	2109.0	2165.0	2013.0	2253.0	1685.0	1739.0	2124.9	2018.3
0000-0000	2164.0	2160.0	2217.0	2072.0	2304.0	1741.0	1789.0	2177.1	2070.7
AM Peak	0800	0800	0800	0800	0800	1100	1100		
	204.0	208.0	199.0	180.0	198.0	150.0	127.0		
PM Peak	1700	1700	1700	1700	1600	1200	1600		
	257.0	231.0	245.0	216.0	216.0	165.0	195.0		

* - No data.

Class Bin Chart

ClassBin-63(Metric) **Site:** 2334.1904..0NS
Description:!Riccarton Rd: Bush to Gladstone (DCC Block & RP change)
Filter time:23:00 Tuesday, 10 February 2009 => 9:01 Wednesday, 18 February 2009
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)
Scheme: Vehicle classification (AustRoads94)
Total=15008



Class Bins
Class 1 - 13583 (90.51%)
Class 2 - 531 (3.54%)
Class 3 - 410 (2.73%)
Class 4 - 85 (0.57%)
Class 5 - 72 (0.48%)
Class 6 - 14 (0.09%)
Class 7 - 20 (0.13%)
Class 8 - 3 (0.02%)
Class 9 - 170 (1.13%)
Class 10 - 117 (0.78%)
Class 11 - 3 (0.02%)
Class 12 - 0 (0.00%)

Speed Statistics

SpeedStat-69
Site: 2334.1904..0NS
Description: **!Riccarton Rd: Bush to Gladstone (DCC Block & RP change)**
Filter time: **23:00 Tuesday, 10 February 2009 => 9:01 Wednesday, 18 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 15008
Posted speed limit = 80 km/h, Exceeding = 6576 (43.82%), Mean Exceeding = 87.04 km/h
Maximum = 159.0 km/h, **Minimum** = 14.8 km/h, **Mean** = 78.1 km/h
85% Speed = 87.5 km/h, **95% Speed** = 94.3 km/h, **Median** = 78.5 km/h
20 km/h Pace = 68 - 88, **Number in Pace** = 10910 (72.69%)
Variance = 132.21, **Standard Deviation** = 11.50 km/h

Speed Bins (Partial days)

Speed	Bin		Below		Above		Energy	vMult	n * vMult
0 - 10	0	0.0%	0	0.0%	15008	100.0%	0.00	0.00	0.00
10 - 20	33	0.2%	33	0.2%	14975	99.8%	0.00	0.00	0.00
20 - 30	111	0.7%	144	1.0%	14864	99.0%	0.00	0.00	0.00
30 - 40	49	0.3%	193	1.3%	14815	98.7%	0.00	0.00	0.00
40 - 50	57	0.4%	250	1.7%	14758	98.3%	0.00	0.00	0.00
50 - 60	386	2.6%	636	4.2%	14372	95.8%	0.00	0.00	0.00
60 - 70	2046	13.6%	2682	17.9%	12326	82.1%	0.00	0.00	0.00
70 - 80	5750	38.3%	8432	56.2%	6576	43.8%	0.00	0.00	0.00
80 - 90	5023	33.5%	13455	89.7%	1553	10.3%	0.00	0.00	0.00
90 - 100	1241	8.3%	14696	97.9%	312	2.1%	0.00	0.00	0.00
100 - 110	243	1.6%	14939	99.5%	69	0.5%	0.00	0.00	0.00
110 - 120	48	0.3%	14987	99.9%	21	0.1%	0.00	0.00	0.00
120 - 130	10	0.1%	14997	99.9%	11	0.1%	0.00	0.00	0.00
130 - 140	5	0.0%	15002	100.0%	6	0.0%	0.00	0.00	0.00
140 - 150	3	0.0%	15005	100.0%	3	0.0%	0.00	0.00	0.00
150 - 160	3	0.0%	15008	100.0%	0	0.0%	0.00	0.00	0.00
160 - 170	0	0.0%	15008	100.0%	0	0.0%	0.00	0.00	0.00
170 - 180	0	0.0%	15008	100.0%	0	0.0%	0.00	0.00	0.00
180 - 190	0	0.0%	15008	100.0%	0	0.0%	0.00	0.00	0.00
190 - 200	0	0.0%	15008	100.0%	0	0.0%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below		Above	
0	80 (PSL)	8432	56.2%	6576	43.8%

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-58 -- English (ENZ)

Datasets:

Site:	**[1960.1900.] !Riccarton Rd: SH87 to Dukes (Description change)**
Direction:	5 - South bound A>B, North bound B>A., **Lane:** 0
Survey Duration:	23:00 Wednesday, 11 February 2009 => 8:43 Thursday, 19 February 2009
File:	P:\801006000+\801006112\98\Traffic Assessment\Traffic Counts\1960.1900.19Feb2009.EC0
(Plus)	
Identifier:	R575B66S MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**23:00 Wednesday, 11 February 2009 => 8:43 Thursday, 19 February 2009**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 7716 / 7729 (99.83%)

Weekly Vehicle Counts (Virtual Week)

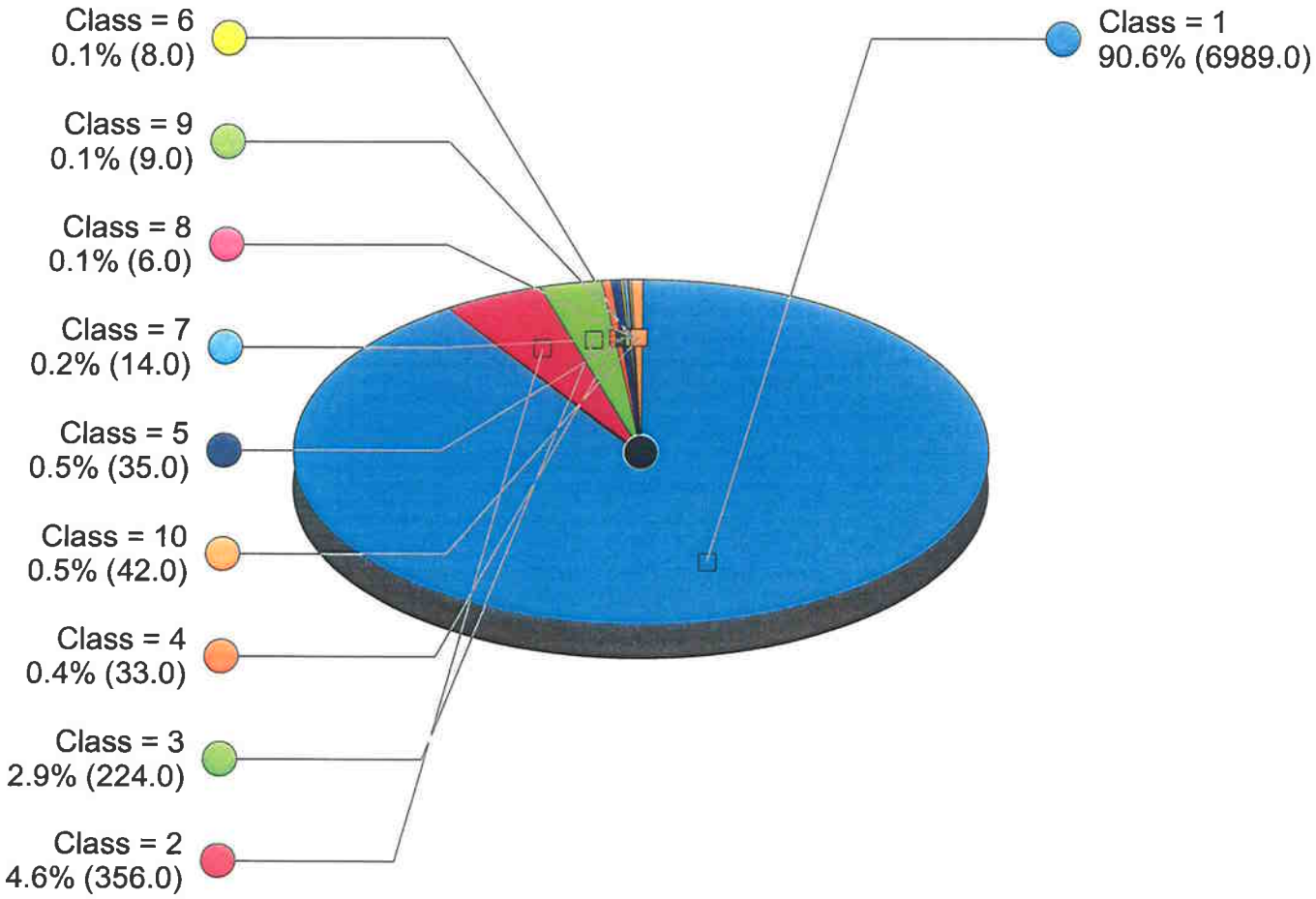
VirtWeeklyVehicle-58
Site: 1960.1900..0NS
Description: **!Riccarton Rd: SH87 to Dukes (Description change)**
Filter time: **23:00 Wednesday, 11 February 2009 => 8:43 Thursday, 19 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	4.0	4.0	2.0	4.0	5.0	4.0	5.0	3.8	4.0
0100-0200	1.0	1.0	0.0	1.5	3.0	4.0	10.0	1.3	2.8
0200-0300	3.0	0.0	1.0	1.5	0.0	2.0	3.0	1.2	1.5
0300-0400	2.0	4.0	3.0	2.5	1.0	2.0	3.0	2.5	2.5
0400-0500	2.0	1.0	2.0	1.0	2.0	4.0	0.0	1.5	1.6
0500-0600	4.0	9.0	9.0	6.0	10.0	10.0	4.0	7.3	7.3
0600-0700	18.0	28.0	27.0	23.0	30.0	12.0	5.0	24.8	20.8
0700-0800	96.0	85.0	86.0	79.5	72.0	22.0	12.0	83.0	66.5
0800-0900	**97.0<**	**131.0<**	**99.0<**	**81.5<**	**106.0<**	37.0	25.0	**99.3<**	**82.3<**
0900-1000	64.0	60.0	67.0	56.0	52.0	63.0	39.0	59.8	57.3
1000-1100	60.0	53.0	57.0	48.0	78.0	58.0	74.0	59.2	61.1
1100-1200	66.0	60.0	37.0	32.0	52.0	**75.0<**	**82.0<**	49.4	57.7
1200-1300	54.0	55.0	61.0	57.0	63.0	88.0	87.0	58.0	66.4
1300-1400	47.0	59.0	65.0	68.0	72.0	**106.0<**	96.0	62.2	73.3
1400-1500	66.0	72.0	63.0	77.0	85.0	87.0	109.0	72.6	79.9
1500-1600	82.0	86.0	86.0	83.0	110.0	86.0	**117.0<**	89.4	92.9
1600-1700	91.0	108.0	91.0	**113.0<**	99.0	101.0	112.0	100.4	102.1
1700-1800	**133.0<**	**115.0<**	**122.0<**	99.0	**117.0<**	73.0	67.0	**117.2<**	**103.7<**
1800-1900	48.0	65.0	78.0	52.0	101.0	51.0	44.0	68.8	62.7
1900-2000	39.0	51.0	38.0	54.0	35.0	29.0	40.0	43.4	40.9
2000-2100	34.0	29.0	42.0	27.0	32.0	28.0	36.0	32.8	32.6
2100-2200	17.0	28.0	23.0	34.0	48.0	28.0	21.0	30.0	28.4
2200-2300	10.0	15.0	16.0	15.0	19.0	23.0	10.0	15.0	15.4
2300-2400	6.0	9.0	6.5	7.0	20.0	20.0	7.0	9.2	10.3
Totals									
0700-1900	904.0	949.0	912.0	846.0	1007.0	847.0	864.0	919.3	905.9
0600-2200	1012.0	1085.0	1042.0	984.0	1152.0	944.0	966.0	1050.4	1028.5
0600-0000	1028.0	1109.0	1064.5	1006.0	1191.0	987.0	983.0	1074.5	1054.2
0000-0000	1044.0	1128.0	1081.5	1022.5	1212.0	1013.0	1008.0	1092.2	1073.8
AM Peak	0800	0800	0800	0800	0800	1100	1100		
	97.0	131.0	99.0	81.5	106.0	75.0	82.0		
PM Peak	1700	1700	1700	1600	1700	1300	1500		
	133.0	115.0	122.0	113.0	117.0	106.0	117.0		

*** - No data.**

Class Bin Chart

ClassBin-59(Metric) **Site:** 1960.1900..0NS
Description:!Riccarton Rd: SH87 to Dukes (Description change)
Filter time:23:00 Wednesday, 11 February 2009 => 8:43 Thursday, 19 February 2009
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)
Scheme: Vehicle classification (AustRoads94)
Total=7716



Class Bins
Class 1 - 6989 (90.58%)
Class 2 - 356 (4.61%)
Class 3 - 224 (2.90%)
Class 4 - 33 (0.43%)
Class 5 - 35 (0.45%)
Class 6 - 8 (0.10%)
Class 7 - 14 (0.18%)
Class 8 - 6 (0.08%)
Class 9 - 9 (0.12%)
Class 10 - 42 (0.54%)
Class 11 - 0 (0.00%)
Class 12 - 0 (0.00%)

Speed Statistics

SpeedStat-68
Site: 1960.1900..0NS
Description: **!Riccarton Rd: SH87 to Dukes (Description change)**
Filter time: **23:00 Wednesday, 11 February 2009 => 8:43 Thursday, 19 February 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 7716
Posted speed limit = 80 km/h, Exceeding = 3644 (47.23%), Mean Exceeding = 87.66 km/h
Maximum = 127.7 km/h, **Minimum** = 13.6 km/h, **Mean** = 77.3 km/h
85% Speed = 88.9 km/h, **95% Speed** = 95.4 km/h, **Median** = 79.2 km/h
20 km/h Pace = 71 - 91, **Number in Pace** = 5194 (67.31%)
Variance = 204.64, **Standard Deviation** = 14.31 km/h

Speed Bins (Partial days)

Speed	Bin		Below		Above		Energy	vMult	n * vMult
0 - 10	0	0.0%	0	0.0%	7716	100.0%	0.00	0.00	0.00
10 - 20	19	0.2%	19	0.2%	7697	99.8%	0.00	0.00	0.00
20 - 30	83	1.1%	102	1.3%	7614	98.7%	0.00	0.00	0.00
30 - 40	123	1.6%	225	2.9%	7491	97.1%	0.00	0.00	0.00
40 - 50	234	3.0%	459	5.9%	7257	94.1%	0.00	0.00	0.00
50 - 60	319	4.1%	778	10.1%	6938	89.9%	0.00	0.00	0.00
60 - 70	766	9.9%	1544	20.0%	6172	80.0%	0.00	0.00	0.00
70 - 80	2528	32.8%	4072	52.8%	3644	47.2%	0.00	0.00	0.00
80 - 90	2629	34.1%	6701	86.8%	1015	13.2%	0.00	0.00	0.00
90 - 100	816	10.6%	7517	97.4%	199	2.6%	0.00	0.00	0.00
100 - 110	161	2.1%	7678	99.5%	38	0.5%	0.00	0.00	0.00
110 - 120	32	0.4%	7710	99.9%	6	0.1%	0.00	0.00	0.00
120 - 130	6	0.1%	7716	100.0%	0	0.0%	0.00	0.00	0.00
130 - 140	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
140 - 150	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
150 - 160	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
160 - 170	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
170 - 180	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
180 - 190	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00
190 - 200	0	0.0%	7716	100.0%	0	0.0%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below		Above	
0	80 (PSL)	4072	52.8%	3644	47.2%

Appendix B: 2003 Number Plate Survey Summary and Map

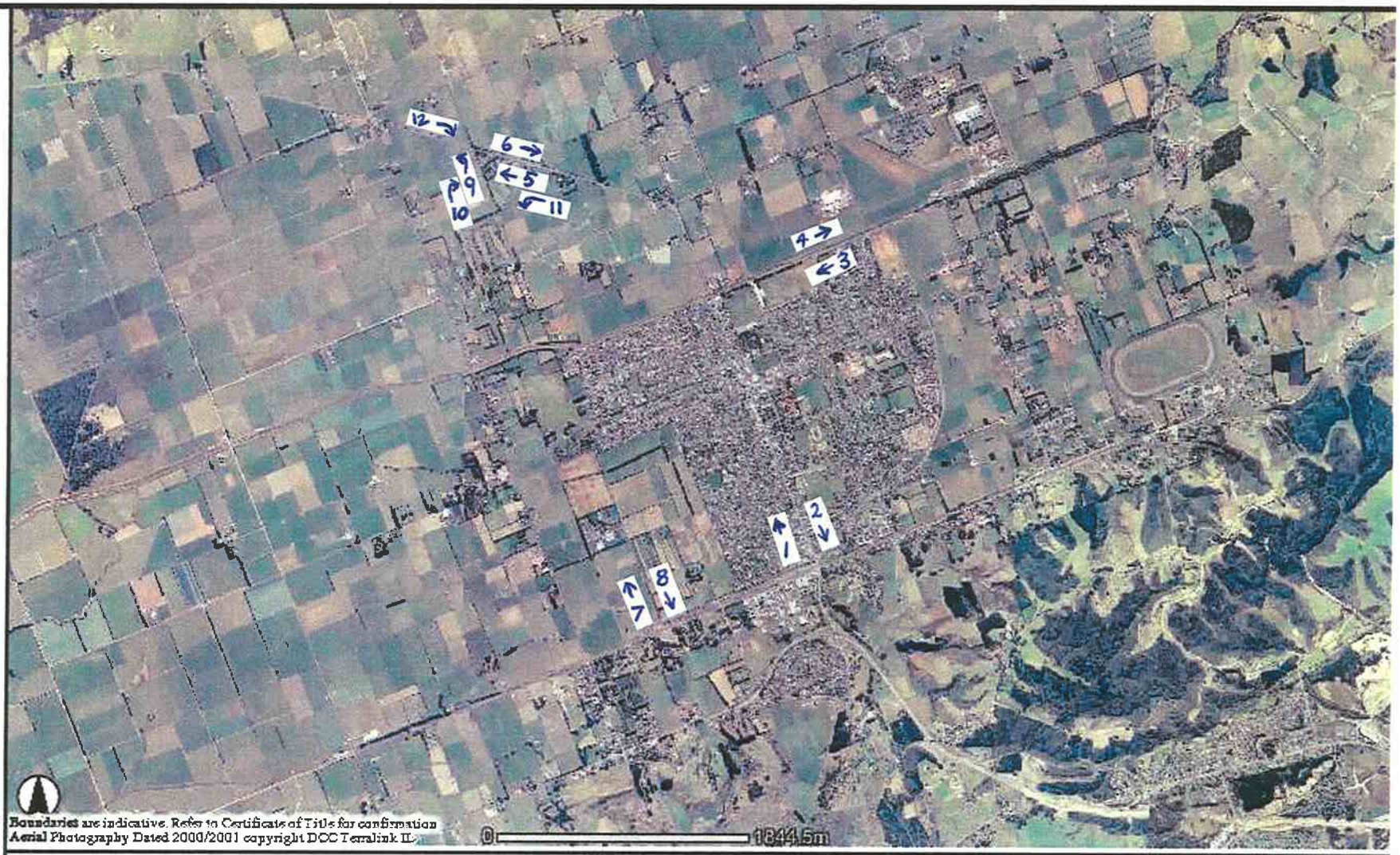
Matched Vehicles from Number Plate Survey

Quarry Rd to Dukes Rd					4.42 km	
Direction	Northbound		Southbound		Combined	
Vehicle Type	LV	HCV	LV	HCV	LV	HCV
No. of Matches (7hr count)	15	10	12	4	27	14
No. of Matches (24hr estimate)	33	22	27	9	60	31
Travel Time(min)	8.88	7.01	11.67	10.24	10.28	8.63

Quarry Rd to Riccarton Rd/SH87 Intersection					5.37 km	
Direction	Northbound		Southbound		Combined	
Vehicle Type	LV	HCV	LV	HCV	LV	HCV
No. of Matches (7hr count)	44	2	20	5	64	7
No. of Matches (24hr estimate)	98	4	45	11	143	16
Travel Time(min)	13.33	6.34	15.88	11.10	14.61	8.72

Riccarton Rd(south) to Riccarton Rd/SH87 Intersection					4.22 km	
Direction	Northbound		Southbound		Combined	
Vehicle Type	LV	HCV	LV	HCV	LV	HCV
No. of Matches (7hr count)	92	11	68	7	160	18
No. of Matches (24hr estimate)	205	25	152	16	357	40
Travel Time(min)	3.57	3.77	3.25	3.70	3.41	3.74

Riccarton Rd(south) to Dukes Rd					km	
Direction	Northbound		Southbound		Combined	
Vehicle Type	LV	HCV	LV	HCV	LV	HCV
No. of Matches (7hr count)	14	3	11	7	25	10
No. of Matches (24hr estimate)	31	7	25	16	56	22
Travel Time(min)	6.63	5.88	4.93	5.71	5.78	5.80


Legend
Photography taken between March 2000 and March 2001.
This information is not intended to be used to determine property boundaries without reference to relevant survey and title records.
This map is for illustration purposes only, and is not intended to be accurate to surveying, engineering or orthographic standards. Every effort has been made to ensure correctness and timeliness of the information presented
Boundaries are indicative. Refer to Certificate of Title for confirmation
Aerial Photography Dated 2000/2001 copyright DCC Terralink IL
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City of Dunedin WebMap

Appendix C: Crash Listing

CODED CRASH LISTING RICCARTON ROAD WEST GLADSTONE ROAD SOUTH TO SH87 1999-2008

CRASH ROAD	CRASH DIST	CRASH DIRN	INTSN	SIDE ROAD	CRASH ID	CRASH DATE	CRASH DOW	CRASH TIME	MVMT	VEHICLES	CAUSES	OBJECTS STRUCK	ROAD CURVE	ROAD WET	LIGHT	WTHRa	JUNC TYPE	TRAF CTRL	ROAD MARK	SPD LIM	CRASH FATAL CNT	CRASH SEV CNT	CRASH MIN CNT	PERS AGE1	PERS AGE2	EASTING	NORTHING
87/0/5.731			I	RICCARTON ROAD WEST	2070766	5/03/2000	Sun	1545	GE	VE1T			R	D	B	F	M	S	C	100	0	0	0			2301133	5480057
87/0/5.731			I	RICCARTON ROAD WEST	2122512	20/09/2001	Thu	1510	GE	CE1C	370A 387A	H	E	D	B	F	M	S	C	100	0	1	0			2301133	5480057
87/0/5.731			I	RICCARTON ROAD	2873036	20/08/2008	Wed	1845	HA	CW24	301A 375A 503A 197B		R	D	DO	F	X	S	C	100	0	0	0			2301133	5480057
BUSH ROAD			I	RICCARTON ROAD WEST	2071464	11/05/2000	Thu	1300	DA	CE1		S	R	D	O	F	X	S	C	100	0	0	0			2302284	5477468
GLADSTONE ROAD SOUTH			I	RICCARTON ROAD EAST	2021936	31/07/2000	Mon	1720	HA	VW1V	302A 335A		R	D	TF	F	X	G	C	70	0	0	5			2302866	5476173
GLADSTONE ROAD SOUTH			I	GLADSTONE ROAD S	2622315	2/07/2006	Sun	1350	HA	CE2C	302A 335A 375A		R	D	O	F	X	G	C	50	0	0	2			2302866	5476173
GLADSTONE ROAD SOUTH			I	RICCARTON ROAD WEST	2673848	2/11/2006	Thu	1245	MG	TW1C	371A		R	D	B	F	X	G	C	50	0	0	0			2302866	5476173
GLADSTONE ROAD SOUTH			I	RICCARTON ROAD WEST	2773542	19/09/2007	Wed	1606	FB	4S1V	181A 331A		R	D	B	F	X	G	C	70	0	0	0			2302866	5476173
GLADSTONE ROAD SOUTH S			I	RICCARTON ROAD W	2623559	20/11/2006	Mon	1620	HA	CS2C	302B 335B 375B		R	D	B	F	X	G	C	50	0	0	4			2302866	5476173
RICCARTON ROAD			I	BUSH ROAD	2720060	20/09/2007	Thu	1445	HA	CE24	301A 375A		R	D	B	F	X	S	C	80	1	0	2			2302284	5477468
RICCARTON ROAD EAST			I	GLADSTONE ROAD SOUTH	2573292	4/10/2005	Tue	2000	HA	CS1V	102B 302B 375B		R	D	DO	F	X	G	C	50	0	0	0			2302866	5476173
RICCARTON ROAD EAST			I	GLADSTONE ROAD SOUTH	2873227	25/09/2008	Thu	1110	FA	CN1C	181A 331A		R	D	O	F	X	S	C	50	0	0	0			2302866	5476173
RICCARTON ROAD WEST	20	N		GLADSTONE ROAD SOUTH	9972068	6/07/1999	Tue	1610	MC	CN1C			R	W	O	L			N	50	0	0	0			2302858	5476191
RICCARTON ROAD WEST			I	BUSH ROAD	2021639	5/06/2000	Mon	1030	HA	SN1V	301B 321B 375B		R	W	O	M	X	S	C	80	0	0	1		50	2302284	5477468
RICCARTON ROAD WEST			I	BUSH ROAD	2072154	14/07/2000	Fri	840	HA	CE2C			R	D	B	F	X	S	C	80	0	0	0			2302284	5477468
RICCARTON ROAD WEST			I	GLADSTONE ROAD SOUTH	2022471	28/11/2000	Tue	1645	JA	CS1VM	302B 375B 132C 801		R	W	O	L	X	G	C	70	0	0	1			2302866	5476173
RICCARTON ROAD WEST	20	S		DUKES ROAD SOUTH	2121419	7/04/2001	Sat	1210	CB	MN1	129A 130A 903		R	D	B	FS			C	80	0	0	1			2301715	5478754
RICCARTON ROAD WEST			I	DUKES ROAD SOUTH	2171670	11/05/2001	Fri	1035	FA	TN1V			R	W	O	L	X	N	C	80	0	0	0			2301707	5478772
RICCARTON ROAD WEST	500	N		GLADSTONE ROAD SOUTH	2173521	17/09/2001	Mon	900	LB	CN1C	929		R	D	O	F	D		C	80	0	0	0			2302661	5476629
RICCARTON ROAD WEST			I	GLADSTONE ROAD SOUTH	2122630	22/10/2001	Mon	1300	HA	VS1V	302B 375B		R	D	B	F	X	G	C	70	0	0	1			2302866	5476173
RICCARTON ROAD WEST			I	GLADSTONE ROAD SOUTH	2270346	4/02/2002	Mon	1415	LB	CS1V	303B 336B		R	D	B	F	X	G	N	70	0	0	0			2302866	5476173
RICCARTON ROAD WEST	500	S		DUKES ROAD SOUTH	2223433	21/06/2002	Fri	2230	CC	CS1	195A 912	V	R	D	DN	F			L	70	0	0	1			2301909	5478315
RICCARTON ROAD WEST	20	N		SILVER STREAM BR	2273272	25/06/2002	Tue	610	EC	CS1	912	W	R	D	DN	F			C	80	0	0	0			2301932	5478264
RICCARTON ROAD WEST	200	N		SILVER STREAM BR	2321269	10/02/2003	Mon	1605	FA	CN1T	112A 832		R	D	B	F			C	80	0	0	1			2301859	5478429
RICCARTON ROAD WEST			I	BUSH ROAD	2370597	21/02/2003	Fri	1500	FO	TS1TC	132A 331A		R	D	O	F	X	S	C	80	0	0	0			2302284	5477468
RICCARTON ROAD WEST			I	BUSH ROAD	2422680	29/09/2004	Wed	1515	JA	CN1S	132B 321B 375B		R	D	B	F	X	S	N	80	0	1	0			2302284	5477468
RICCARTON ROAD WEST	100	S		BUSH ROAD	2474031	7/12/2004	Tue	1806	GE	CS1C	372B 929		R	D	B	F	D	N	C	80	0	0	0			2302325	5477377
RICCARTON ROAD WEST	100	N		BUSH ROAD	2671649	14/04/2006	Fri	615	CB	CS1	129A 134A 358A 402A	V	R	W	TN	F			C	80	0	0	0			2302244	5477559
RICCARTON ROAD WEST	300	N		GLADSTONE ROAD SOUTH S	2672237	22/06/2006	Thu	835	CC	TS1	135A 802	FV	R	I	O	LF			C	80	0	0	0			2302743	5476447
RICCARTON ROAD WEST	330	N		GLADSTONE ROAD SOUTH S	2672239	22/06/2006	Thu	840	CC	4S1	135A 802	F	R	I	O	LF			C	80	0	0	0			2302731	5476474
RICCARTON ROAD WEST	400	N		GLADSTONE ROAD SOUTH S	2672240	22/06/2006	Thu	840	CB	CN1	135A 802	FV	R	I	O	LF			C	80	0	0	0			2302702	5476538
RICCARTON ROAD WEST	900	N		GLADSTONE ROAD SOUTH S	2672184	22/06/2006	Thu	836	CC	CS1	135A 802	V	R	I	O	LF			C	80	0	0	0			2302497	5476994
RICCARTON ROAD WEST			I	GLADSTONE ROAD SOUTH	2821511	28/03/2008	Fri	1115	HA	CW2C	302A 375A		R	D	B	F	X	G	C	70	0	0	2			2302866	5476173
RICCARTON ROAD WEST			I	BUSH ROAD	2871135	17/04/2008	Thu	2100	JA	CW2M	301A		S	D	DN	F	X	S	C	80	0	0	0			2302284	5477468
RICCARTON ROAD WEST			I	BUSH ROAD	2822428	15/07/2008	Tue	1440	LB	SS1T	303B 387B		R	D	B	F	X	S	C	80	0	0	1		59	2302284	5477468
RICCARTON ROAD WEST			A	SILVER STREAM BR	2823396	18/11/2008	Tue	800	CC	4S1	410A	BEZ	R	D	O	F			C	50	0	0	1			2301940	5478246

ENGLISH LANGUAGE LISTING RICCARTON ROAD WEST GLADSTONE ROAD SOUTH TO SH87 1999-2008

CRASH ROAD	CRASH DIST	CRASH DIRN	SIDE ROAD	CRASH ID	CRASH DOW	CRASH TIME	CRASH DATE	MVMT DESCR	CAUSES	ROAD WET	LIGHT	WTHRa	JUNC TYPE	TRAF CTRL	CRASH FATAL CNT	CRASH SEV CNT	CRASH MIN CNT	EASTING	NORTHING
87/0/5.731		I	RICCARTON ROAD WEST	2070766	Sun	1545	5/03/2000	VAN1 EBD on SH 87 overtaking hit TRUCK2 turning right		Dry	Bright Sun	Fine	Multi Rd Join	Stop Sign	0	0	0	2301133	5480057
87/0/5.731		I	RICCARTON ROAD WEST	2122512	Thu	1510	20/09/2001	CAR1 EBD on SH 87 overtaking hit CAR2 turning right, CAR1 hit House Or Bldg	CAR1 did not see or look for other party until too late, misjudged intentions of another party	Dry	Bright Sun	Fine	Multi Rd Join	Stop Sign	0	1	0	2301133	5480057
87/0/5.731		I	RICCARTON ROAD	2873036	Wed	1845	20/08/2008	CAR1 WBD on RICCARTON ROAD hit SUV2 crossing at right angle from right	CAR1 failed to give way at stop sign, didnt see/look when required to give way to traffic from another direction, defective vision SUV2 suddenly swerved to avoid vehicle	Dry	Dark	Fine	X Type Junction	Stop Sign	0	0	0	2301133	5480057
BUSH ROAD		I	RICCARTON ROAD WEST	2071464	Thu	1300	11/05/2000	CAR1 EBD on BUSH ROAD lost control turning right, CAR1 hit Traffic Sign on right hand bend		Dry	Overcast	Fine	X Type Junction	Stop Sign	0	0	0	2302284	5477468
GLADSTONE ROAD SOUTH		I	RICCARTON ROAD EAST	2021936	Mon	1720	31/07/2000	VAN1 WBD on GLADSTONE ROAD SOUTH hit VAN2 crossing at right angle from right	VAN1 failed to give way at give way sign, inattentive: failed to notice intersection or its stop/give way control	Dry	Twilight	Fine	X Type Junction	Give Way Sign	0	0	5	2302866	5476173
GLADSTONE ROAD SOUTH		I	GLADSTONE ROAD S	2622315	Sun	1350	2/07/2006	CAR1 EBD on GLADSTONE ROAD S hit CAR2 crossing at right angle from right	CAR1 failed to give way at give way sign, inattentive: failed to notice intersection or its stop/give way control, didnt see/look when required to give way to traffic from another direction	Dry	Overcast	Fine	X Type Junction	Give Way Sign	0	0	2	2302866	5476173
GLADSTONE ROAD SOUTH		I	RICCARTON ROAD WEST	2673848	Thu	1245	2/11/2006	TRUCK1 WBD on GLADSTONE ROAD SOUTH hit CAR2 reversing along road	TRUCK1 didnt see/look behind when reversing/manoeuvering	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	0	2302866	5476173
GLADSTONE ROAD SOUTH		I	RICCARTON ROAD WEST	2773542	Wed	1606	19/09/2007	SUV1 SBD on GLADSTONE ROAD SOUTH hit rear end of VAN2 stop/slow for cross traffic	SUV1 following too closely, failed to notice car slowing	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	0	2302866	5476173
GLADSTONE ROAD SOUTH S		I	RICCARTON ROAD W	2623559	Mon	1620	20/11/2006	CAR1 SBD on RICCARTON ROAD W hit CAR2 crossing at right angle from right	CAR2 failed to give way at give way sign, inattentive: failed to notice intersection or its stop/give way control, didnt see/look when required to give way to traffic from another direction	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	4	2302866	5476173
RICCARTON ROAD		I	BUSH ROAD	2720060	Thu	1445	20/09/2007	CAR1 EBD on BUSH ROAD hit SUV2 crossing at right angle from right	CAR1 failed to give way at stop sign, didnt see/look when required to give way to traffic from another direction	Dry	Bright Sun	Fine	X Type Junction	Stop Sign	1	0	2	2302284	5477468
RICCARTON ROAD EAST		I	GLADSTONE ROAD SOUTH	2573292	Tue	2000	4/10/2005	CAR1 SBD on RICCARTON ROAD EAST hit VAN2 crossing at right angle from right	VAN2 alcohol test below limit, failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction	Dry	Dark	Fine	X Type Junction	Give Way Sign	0	0	0	2302866	5476173
RICCARTON ROAD EAST		I	GLADSTONE ROAD SOUTH	2873227	Thu	1110	25/09/2008	CAR1 NBD on RICCARTON ROAD EAST hit rear end of CAR2 stopped/moving slowly	CAR1 following too closely, failed to notice car slowing	Dry	Overcast	Fine	X Type Junction	Stop Sign	0	0	0	2302866	5476173
RICCARTON ROAD WEST	20	N	GLADSTONE ROAD SOUTH	9972068	Tue	1610	6/07/1999	CAR1 NBD on RICCARTON ROAD WEST hit CAR2 U-turning from same direction of travel		Wet	Overcast	Light Rain	Unknown	N/A	0	0	0	2302858	5476191
RICCARTON ROAD WEST		I	BUSH ROAD	2021639	Mon	1030	5/06/2000	CYCLIST1 (Age 50)NBD on RICCARTON ROAD WEST hit VAN2 crossing at right angle from right	VAN2 failed to give way at stop sign, did not stop at stop sign, didnt see/look when required to give way to traffic from another direction	Wet	Overcast	Mist	X Type Junction	Stop Sign	0	0	1	2302284	5477468
RICCARTON ROAD WEST		I	BUSH ROAD	2072154	Fri	840	14/07/2000	CAR1 EBD on BUSH ROAD hit CAR2 crossing at right angle from right		Dry	Bright Sun	Fine	X Type Junction	Stop Sign	0	0	0	2302284	5477468
RICCARTON ROAD WEST		I	GLADSTONE ROAD SOUTH	2022471	Tue	1645	28/11/2000	CAR1 SBD on RICCARTON ROAD WEST hit VAN2 turning right onto RICCARTON ROAD WEST from the left	VAN2 failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction MOTOR CYCLE3 lost control under heavy braking ENV: road slippery (rain)	Wet	Overcast	Light Rain	X Type Junction	Give Way Sign	0	0	1	2302866	5476173
RICCARTON ROAD WEST	20	S	DUKES ROAD SOUTH	2121419	Sat	1210	7/04/2001	MOTOR CYCLE1 NBD on RICCARTON ROAD WEST lost control; went off road to left	MOTOR CYCLE1 too far left/right, lost control ENV: strong wind	Dry	Bright Sun	Fine	Unknown	N/A	0	0	1	2301715	5478754
RICCARTON ROAD WEST		I	DUKES ROAD SOUTH	2171670	Fri	1035	11/05/2001	TRUCK1 NBD on RICCARTON ROAD WEST hit rear end of VAN2 stopped/moving slowly		Wet	Overcast	Light Rain	X Type Junction	Nil	0	0	0	2301707	5478772
RICCARTON ROAD WEST	500	N	GLADSTONE ROAD SOUTH	2173521	Mon	900	17/09/2001	CAR2 turning right hit by oncoming CAR1 NBD on RICCARTON ROAD WEST	ENV: entering or leaving private house / farm	Dry	Overcast	Fine	Driveway	N/A	0	0	0	2302661	5476629
RICCARTON ROAD WEST		I	GLADSTONE ROAD SOUTH	2122630	Mon	1300	22/10/2001	VAN1 SBD on RICCARTON ROAD WEST hit VAN2 crossing at right angle from right	VAN2 failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	1	2302866	5476173
RICCARTON ROAD WEST		I	GLADSTONE ROAD SOUTH	2270346	Mon	1415	4/02/2002	VAN2 turning right hit by oncoming CAR1 SBD on RICCARTON ROAD WEST	VAN2 failed to give way when turning to non-turning traffic, inattentive: failed to notice other regulatory sign / markings	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	0	2302866	5476173
RICCARTON ROAD WEST	500	S	DUKES ROAD SOUTH	2223433	Fri	2230	21/06/2002	CAR1 SBD on RICCARTON ROAD WEST lost control; went off road to right, CAR1 hit Ditch	CAR1 suddenly swerved to avoid animal ENV: farm animal straying	Dry	Dark	Fine	Unknown	N/A	0	0	1	2301909	5478315
RICCARTON ROAD WEST	20	N	SILVER STREAM BR	2273272	Tue	610	25/06/2002	CAR1 SBD on RICCARTON ROAD WEST hit obstruction, CAR1 hit Stray Animal	ENV: farm animal straying	Dry	Dark	Fine	Unknown	N/A	0	0	0	2301932	5478264
RICCARTON ROAD WEST	200	N	SILVER STREAM BR	2321269	Mon	1605	10/02/2003	CAR1 NBD on RICCARTON ROAD WEST hit rear end of TRUCK2 stopped/moving slowly	CAR1 too fast on straight ENV: visibility limited by crest or dip	Dry	Bright Sun	Fine	Unknown	N/A	0	0	1	2301859	5478429
RICCARTON ROAD WEST		I	BUSH ROAD	2370597	Fri	1500	21/02/2003	TRUCK1 SBD on RICCARTON ROAD WEST hit rear end of TRUCK2 stop/slow for obstruction	TRUCK1 lost control under heavy braking, failed to notice car slowing	Dry	Overcast	Fine	X Type Junction	Stop Sign	0	0	0	2302284	5477468
RICCARTON ROAD WEST		I	BUSH ROAD	2422680	Wed	1515	29/09/2004	CAR1 NBD on RICCARTON ROAD WEST hit CYCLIST2 turning right onto RICCARTON ROAD WEST from the left	CYCLIST2 lost control under heavy braking, did not stop at stop sign, didnt see/look when required to give way to traffic from another direction	Dry	Bright Sun	Fine	X Type Junction	Stop Sign	0	1	0	2302284	5477468
RICCARTON ROAD WEST	100	S	BUSH ROAD	2474031	Tue	1806	7/12/2004	CAR1 SBD on RICCARTON ROAD WEST overtaking hit CAR2 turning right	CAR2 didnt see/look behind when changing lanes, position or direction ENV: entering or leaving private house / farm	Dry	Bright Sun	Fine	Driveway	Nil	0	0	0	2302325	5477377
RICCARTON ROAD WEST	100	N	BUSH ROAD	2671649	Fri	615	14/04/2006	CAR1 SBD on RICCARTON ROAD WEST lost control; went off road to left, CAR1 hit Ditch	CAR1 too far left/right, lost control while returning to seal from unsealed shoulder, attention diverted by cigarette etc, new driver showed inexperience	Wet	Twilight	Fine	Unknown	N/A	0	0	0	2302244	5477559

CRASH ROAD	CRASH DIST	CRASH DIRN	SIDE ROAD	CRASH ID	CRASH DOW	CRASH TIME	CRASH DATE	MVMT DESCR	CAUSES	ROAD WET	LIGHT	WTHRa	JUNC TYPE	TRAF CTRL	CRASH FATAL CNT	CRASH SEV CNT	CRASH MIN CNT	EASTING	NORTHING
RICCARTON ROAD WEST	300	N	GLADSTONE ROAD SOUTH S	2672237	Thu	835	22/06/2006	TRUCK1 SBD on RICCARTON ROAD WEST lost control; went off road to right, TRUCK1 hit Fence, Ditch	TRUCK1 lost control due to road conditions ENV: road slippery (frost or ice)	Ice/ Snow	Overcast	Light Rain	Unknown	N/A	0	0	0	2302743	5476447
RICCARTON ROAD WEST	330	N	GLADSTONE ROAD SOUTH S	2672239	Thu	840	22/06/2006	SUV1 SBD on RICCARTON ROAD WEST lost control; went off road to right, SUV1 hit Fence	SUV1 lost control due to road conditions ENV: road slippery (frost or ice)	Ice/ Snow	Overcast	Light Rain	Unknown	N/A	0	0	0	2302731	5476474
RICCARTON ROAD WEST	400	N	GLADSTONE ROAD SOUTH S	2672240	Thu	840	22/06/2006	CAR1 NBD on RICCARTON ROAD WEST lost control; went off road to left, CAR1 hit Fence, Ditch	CAR1 lost control due to road conditions ENV: road slippery (frost or ice)	Ice/ Snow	Overcast	Light Rain	Unknown	N/A	0	0	0	2302702	5476538
RICCARTON ROAD WEST	900	N	GLADSTONE ROAD SOUTH S	2672184	Thu	836	22/06/2006	CAR1 SBD on RICCARTON ROAD WEST lost control; went off road to right, CAR1 hit Ditch	CAR1 lost control due to road conditions ENV: road slippery (frost or ice)	Ice/ Snow	Overcast	Light Rain	Unknown	N/A	0	0	0	2302497	5476994
RICCARTON ROAD WEST		I	GLADSTONE ROAD SOUTH	2821511	Fri	1115	28/03/2008	CAR1 WBD on GLADSTONE ROAD SOUTH hit CAR2 crossing at right angle from right	CAR1 failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction	Dry	Bright Sun	Fine	X Type Junction	Give Way Sign	0	0	2	2302866	5476173
RICCARTON ROAD WEST		I	BUSH ROAD	2871135	Thu	2100	17/04/2008	CAR1 WBD on BUSH ROAD hit MOTOR CYCLE2 turning right onto BUSH ROAD from the left	CAR1 failed to give way at stop sign	Dry	Dark	Fine	X Type Junction	Stop Sign	0	0	0	2302284	5477468
RICCARTON ROAD WEST		I	BUSH ROAD	2822428	Tue	1440	15/07/2008	TRUCK2 turning right hit by oncoming CYCLIST1 (Age 59)SBD on RICCARTON ROAD WEST	TRUCK2 failed to give way when turning to non-turning traffic, misjudged intentions of another party	Dry	Bright Sun	Fine	X Type Junction	Stop Sign	0	0	1	2302284	5477468
RICCARTON ROAD WEST		A	SILVER STREAM BR	2823396	Tue	800	18/11/2008	SUV1 SBD on RICCARTON ROAD WEST lost control; went off road to right, SUV1 hit Bridge, Over Bank, Water/River	SUV1 fatigue (drowsy, tired, fell asleep)	Dry	Overcast	Fine	Unknown	N/A	0	0	1	2301940	5478246

Appendix D: Summary of Safety Audit Findings

MWH

Dunedin City Council
Riccarton Road Safety Audit
Summary of Findings

A road safety audit was undertaken by MWH on Riccarton Road to determine the issues for the existing road. Below is a summary of the findings of the Riccarton Road Safety Audit, April 2009:

1 Line marking and Delineation

There is a lack of edgeline delineation which is a serious concern especially at night as the road is narrow and in some places the deep drainage ditches are very close to the road. There is also a lack of overtaking restrictions on the road. There are a number of places where forward visibility is restricted and no-overtaking lines would provide guidance.

The recommendations included:

- Provide a continuous edgeline along both sides of Riccarton Road throughout its length.
- Review the need for no overtaking lines along Riccarton Road, particularly on the approaches to the Silver Stream Bridge and the rail crossing.

2 Signage

The intersections on Riccarton Road are all signed to a different standard which has lead to a lack of consistency. Of particular concern is the Dukes Road intersection as it is almost invisible to approaching vehicles. The Gladstone Road intersection is not clearly visible to southbound traffic.

At a number of locations the width markers on the bridge and culvert ends were faded and incorrectly installed which could give misleading messages. There are also a number of non-frangible power poles located close to the carriageway that require hazard markers.

The recommendations to improve signage were:

- Install PW9 Intersection Ahead signs on Riccarton Road on both approaches to the Dukes Road intersection.
- Install PW9 Intersection Ahead sign on Riccarton Road on the southbound approach to the Gladstone Road intersection. Consider PW9 sign on the northbound approach.
- Relocate width markers on north side of Silver Stream Bridge and south side of Mill Stream to the correct position.
- Review and replace faded width markers along the full route.
- All non-frangible poles, structures and solid hazards adjacent to the carriageway should be marked with hazard markers or, as appropriate, width markers in accordance with MOTSAM (Manual of Traffic Signs and Markings).

3 Road Shoulders/Pavement Edges

The most notable safety issue is the lack of shoulder width combined with deep drains, non-recoverable slopes, and large culvert headwalls. The consequences of leaving the carriageway in many places is severe. Other than widening the carriageway there are few other solutions available. Such major works are beyond the scope of the recommendations of a safety audit.

Recommendations:

- Due to the combined effect of narrow verges, deep drains, non recoverable slopes and large culvert headwall structures, a hazard risk analysis of these features would be valuable from the viewpoint of a strategy of first, seeking to remove likely hazards, secondly modifying (reducing) the effect of the

hazard(s) through re-design, thirdly, protecting the hazard or, as a minimum, improving identification of the hazard(s) to the road user.

4 Bridges, Culverts and Drains

The Silver Stream Bridge does not have any guardrail on the approaches to prevent errant vehicles leaving the road and falling into the deep stream bed.

There are a number of unprotected culvert/drainage headwalls. Until such time that these can be removed, protected or redesigned they should be highlighted. Large culverts at the intersections are not protected from large turning vehicles.

The recommendations relating to bridges, culverts and drains include:

- Install transition guardrail on both approaches to the Silver Stream Bridge and undertake a strength assessment of the existing parapet.
- Install retro reflective edge marker posts to highlight driveways and vehicles accesses.
- Localised widening on the inside of bends should be provided to cater for turning movements of large vehicles.

5 Pedestrian and Cyclist Facilities

Pedestrians would be required to walk on the carriageway as there is no shoulder. There is also no room available for cyclists. The narrow seal width means that cyclists may often come close to passing motorists.

It is recommended that:

- Consideration should be given to additional warning signs along Riccarton Road to warn motorists of the presence of pedestrians and/or cyclists if their volumes are such that their safety becomes an issue.

6 Heavy Vehicle Usage

While the heavy vehicle percentage is low observations on site suggested that the proportion may be higher at times during the day. The heavy vehicles are forced to use almost the full width of the road when turning from the intersections into Riccarton Road. They are also forced to travel close to the centreline which is intimidating to other vehicles. The carriageway was polished in several areas, particularly the intersections.

Recommendation:

- Skid resistance tests of the carriageway surface should be undertaken throughout Riccarton Road and within 50 metres from the key side road approaches, with remedial action taken to address any identified deficiencies.

7 Intersections

The give way signs on Gladstone Road are not obvious to motorists as they are located away from the driver's line of sight. A number of crashes at the intersection have resulted from vehicles failing to give way. From a distance the limit lines are hidden from view and the intersection warning sign is incorrect. Advanced warning of the intersection would be beneficial on both roads. The change in speed limit at this intersection adds extra signage and detracts from the intersection and rail crossing. The location of the speed limit change should be reconsidered.

The recommendations for the Gladstone Road intersection include:

- Relocate RG6 Give Way signs on Gladstone Road to be closer to a driver's line of sight. Replace with larger signs.

- Consider installation of splitter islands on Gladstone Road to provide an area to position a secondary give way sign and to add to a driver's appreciation of the intersection give way point.
- Replace PW13 sign on Gladstone Road with correct version showing priority on Riccarton Road.
- Install PW2 Give Way Ahead signs on both Gladstone Road approaches and consider use of advanced road markings.
- Consider installation of combination sign on Riccarton Road warning of both the Gladstone Road intersection and the rail crossing.
- Carry out a comprehensive review of the intersection of Riccarton Road and Gladstone Road.

Bush Road is marked and signed to a higher standard than the other intersections although the intersection is still difficult to see for through traffic. The visibility from the Bush Road approaches is very limited. The stop controls on Bush Road could be missed due to the straight alignment and perception given by the line of power poles. The markings at the intersection are not standard and may not be improving safety at the intersection.

The recommendations for the Bush Road intersection include:

- Trim or remove vegetation on the south west and north east corners of the intersection to improve visibility for traffic turning from Bush Road.
- Consider installation of splitter islands on Bush Road to provide an area to position a secondary Stop signs.
- Monitor the effect of the non standard approach markings on Bush Road to ensure they do not contribute to any crashes.

The Dukes Road intersection is invisible to motorists on Riccarton Road. This could lead to sudden braking and late turning at speed. The stop sign blends into the background and the power poles suggest a straight through alignment on Dukes Road. There is no advanced warning for vehicles on Riccarton Road.

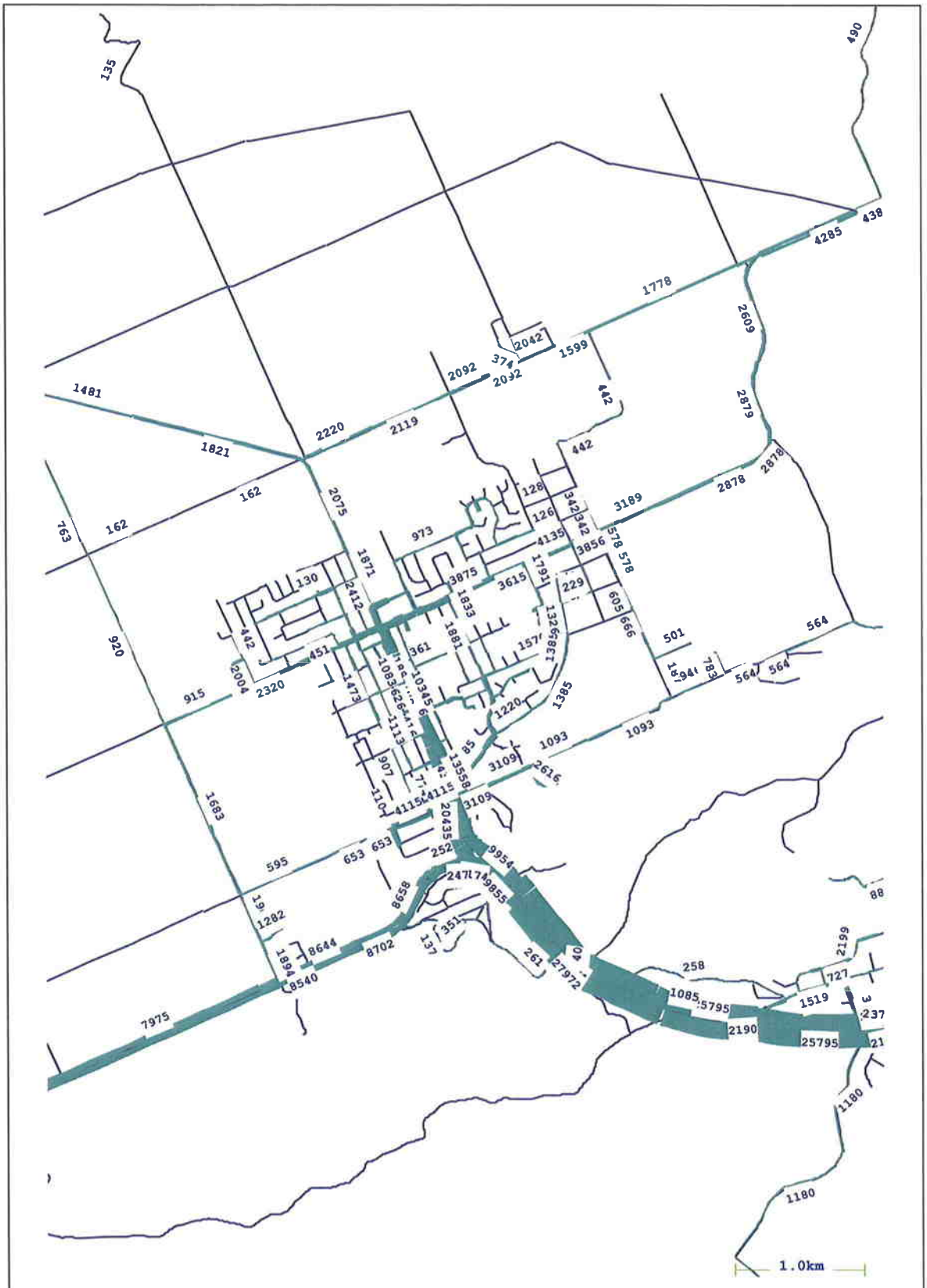
The recommendations are:

- Relocate RG5 Stop signs to be closer to the edge of the Dukes Road seal
- Install PW1 Stop Ahead signs on both Dukes Road approaches and consider use of advanced road markings on the sealed approach.

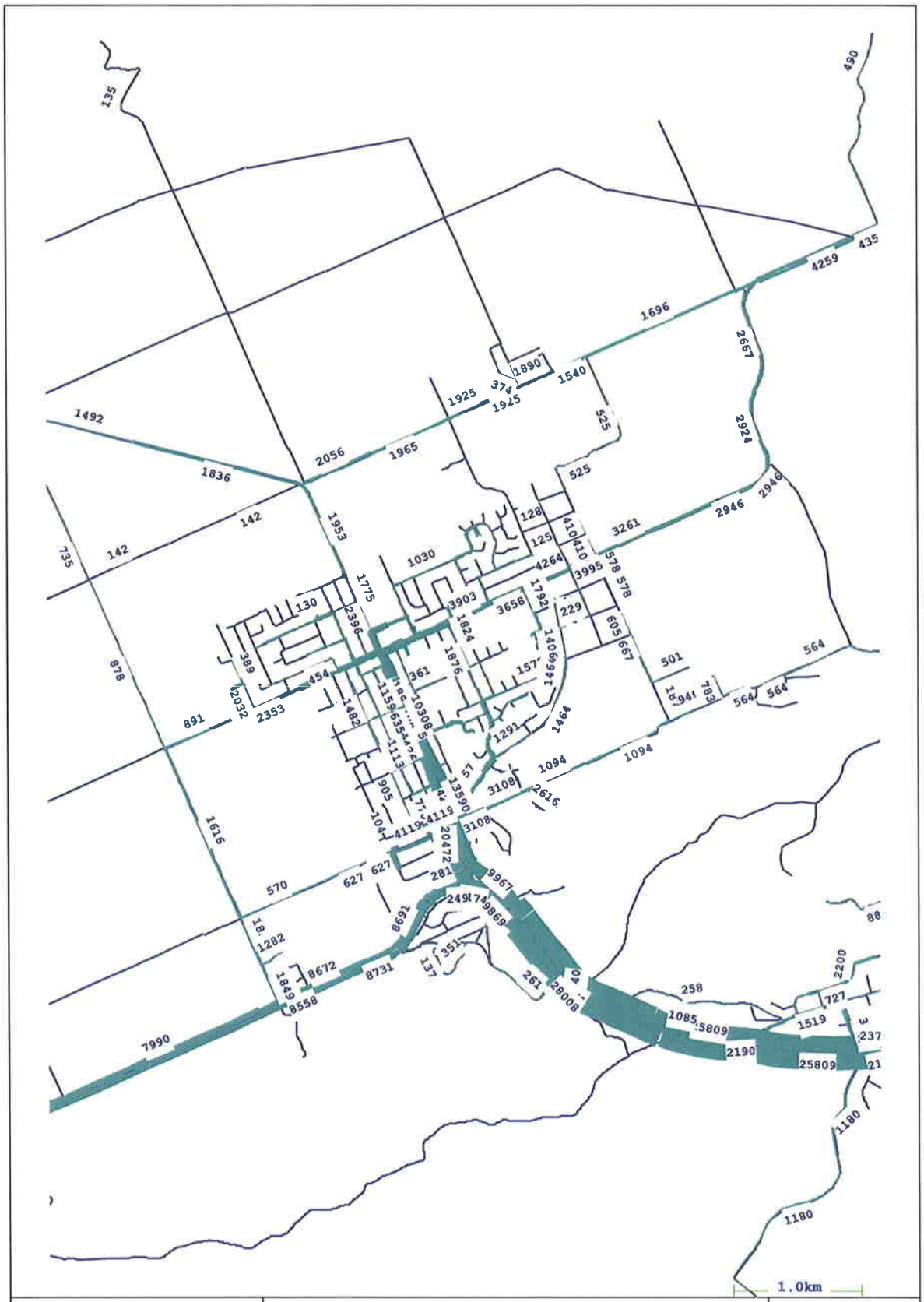
8 Recommendations Implemented To Date

To date the DCC have implemented a number of recommendations from the safety audit. These include better signage at the intersections, signage highlighting the presence of cyclists and hazard markers at private accessways.

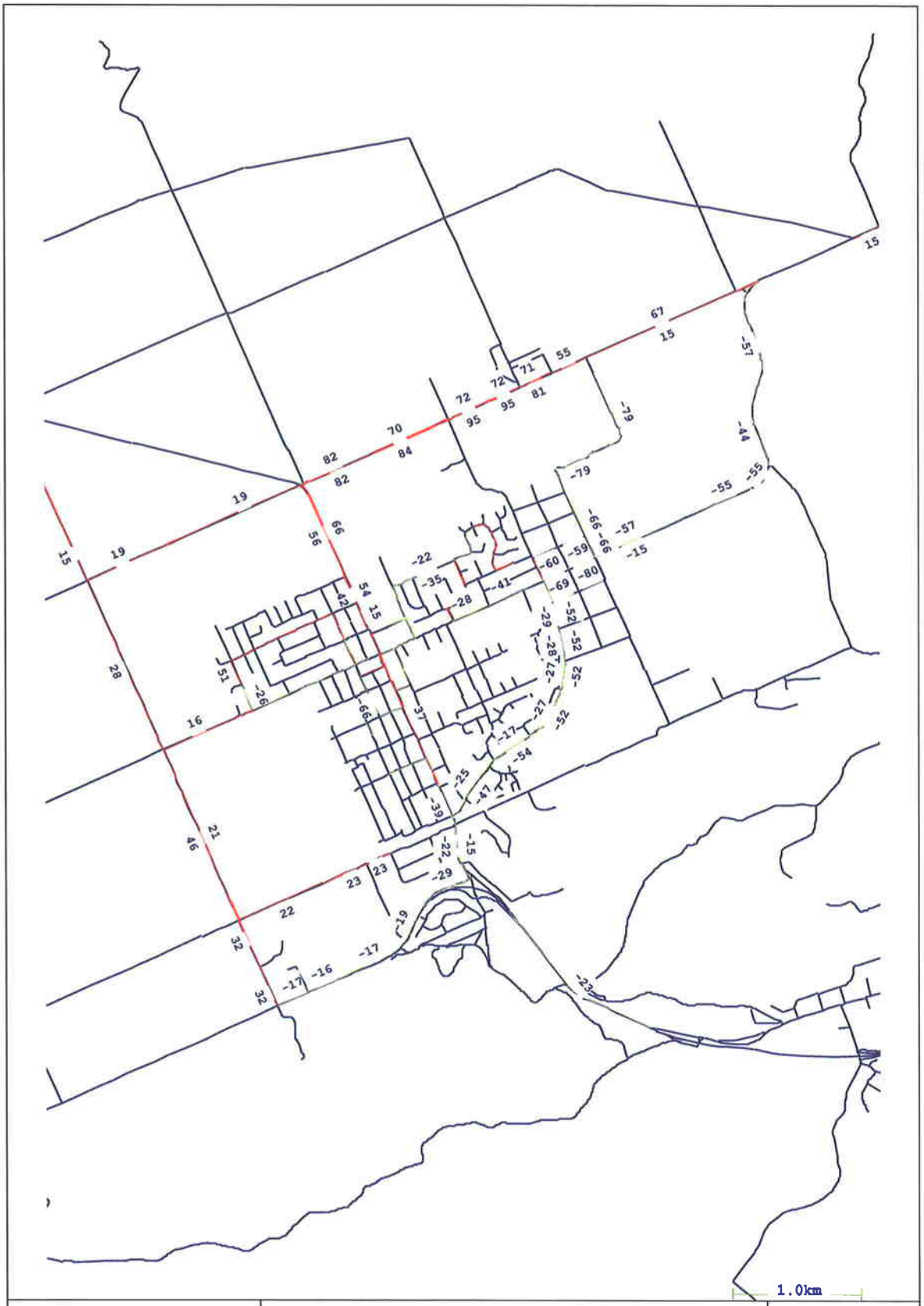
Appendix E: Model Outputs



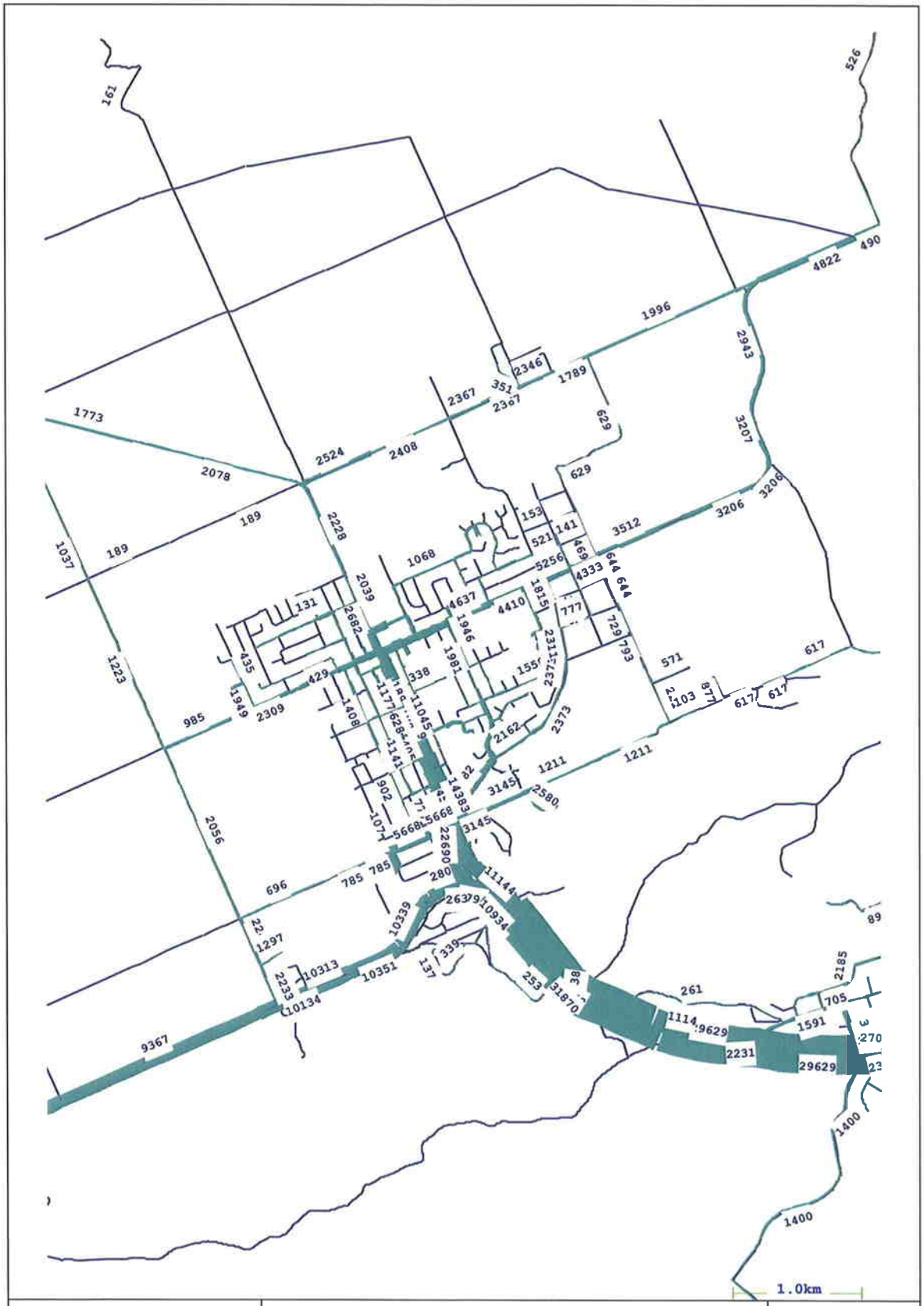
Dunedin Model	**2011** **24 hour Traffic volumes Plot** **Option with 10 km speed increase**	**Figure 1**
Gabites Porter Consultants		



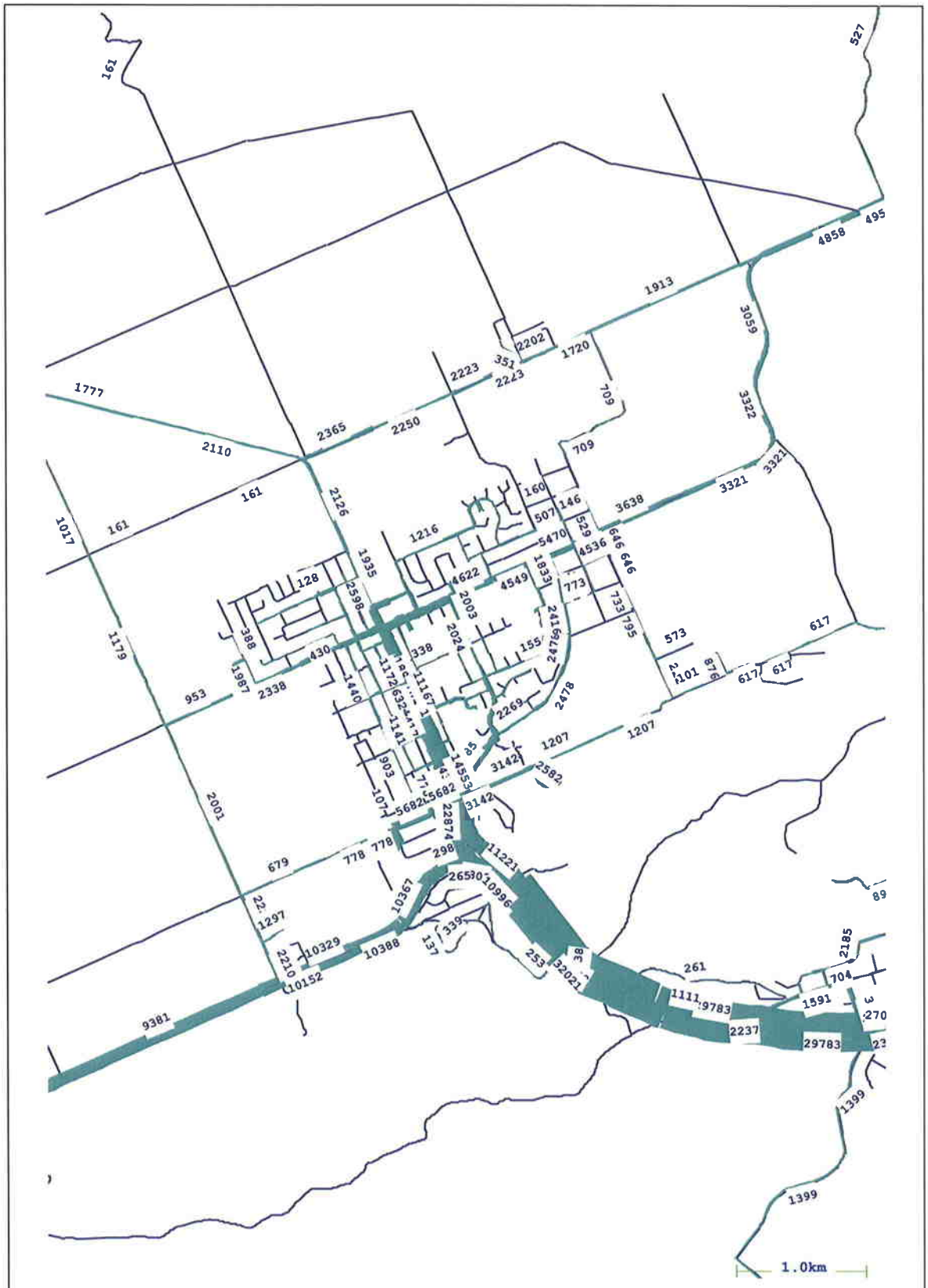
Dunedin Model	**2011** **24 hour Traffic volumes Plot** **Do Min**	**Figure 2**
Gabites Porter Consultants		



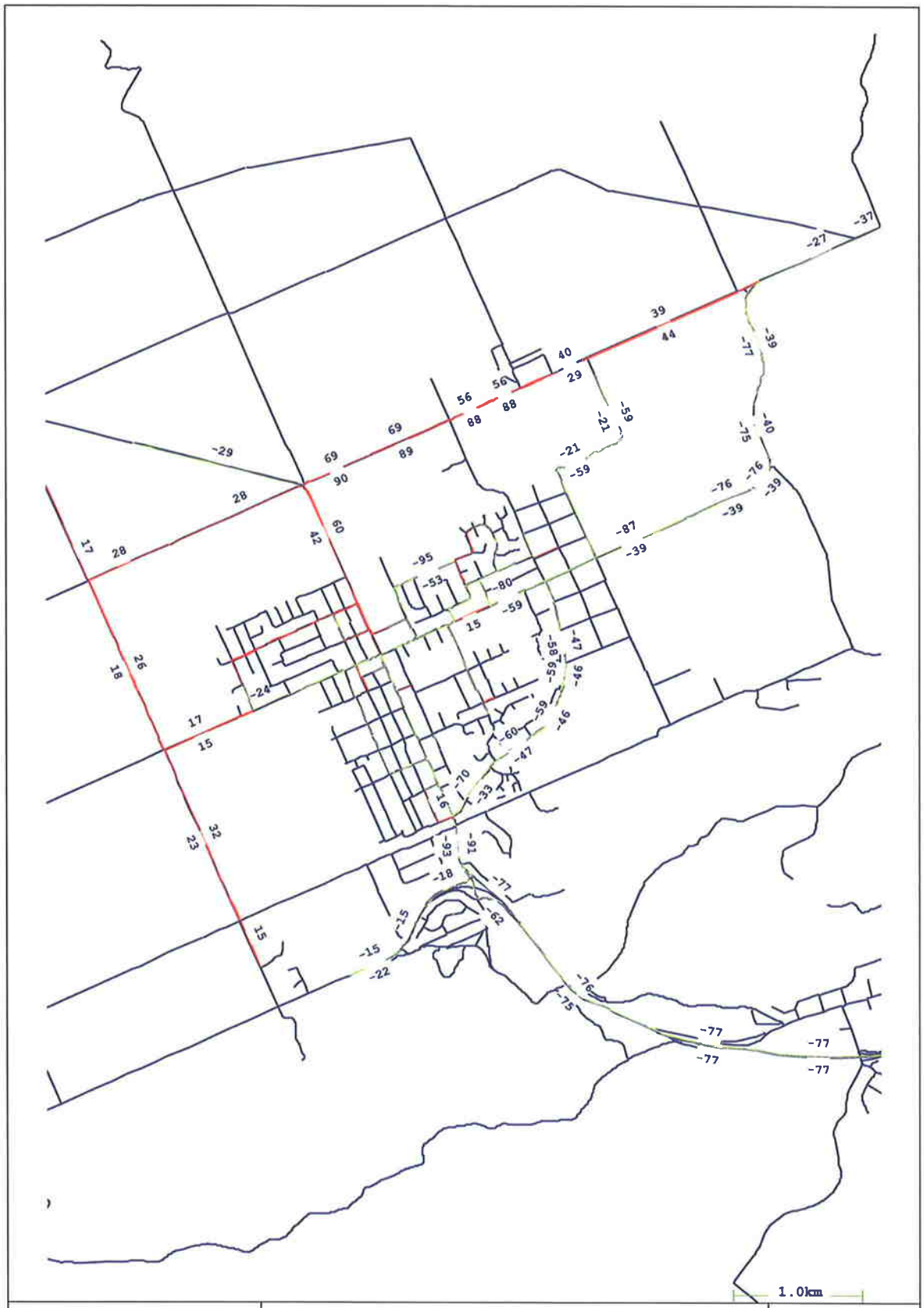
Dunedin Model	**2011**	**Figure 3**
Gabites Porter Consultants	**Traffic volume change Plot** **24 hour**	



Dunedin Model	**2021** **24 hour Traffic volumes Plot** **Option with 10 km speed increase**	**Figure 4**
Gabites Porter Consultants		



Dunedin Model	**2021** **24 hour Traffic volumes Plot** **Do Min**	**Figure 5**
Gabites Porter Consultants		



Dunedin Model	**2021** **Traffic volume change Plot** **24 hour**	**Figure 6**
Gabites Porter Consultants		