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Proposed Residential Development - Toolamba

Traffic Impact Assessment

May 2018

Report

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3	25/07/2015	Updated Report
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1. Introduction

Paffrath Consulting has been engaged by Chris Smith & Associates, on behalf of their Client Mr. S. Rea, to undertake a traffic impact assessment for the proposed 270 Lot Residential Development to be located on the south-west periphery of Toolamba.

It is intended to review the existing and proposed road infrastructure, with respect to the additional traffic volumes and turning movements at external intersections, in support for the Residential Development.

This Traffic Impact Assessment Report has been prepared to ensure that any potential adverse effects from the proposed Development on road safety and operational efficiency are identified. The report will also address the following issues: -

- Review any previous traffic engineering assessments and any other relevant documents;
- Determination of traffic volumes generated by the proposed Residential Development;
- Impact of the proposed Residential Development on the existing infrastructure of Wren Street and Rutherford Road and the proposed internal roads;
- Determination of road widths to be adopted;
- Recommendations for any traffic management devices for the existing/new intersections;
- Pedestrian and cyclists infrastructure requirements;
- Impact of staged Development; and
- Recommendations for appropriate mitigating works.

2. Existing Conditions

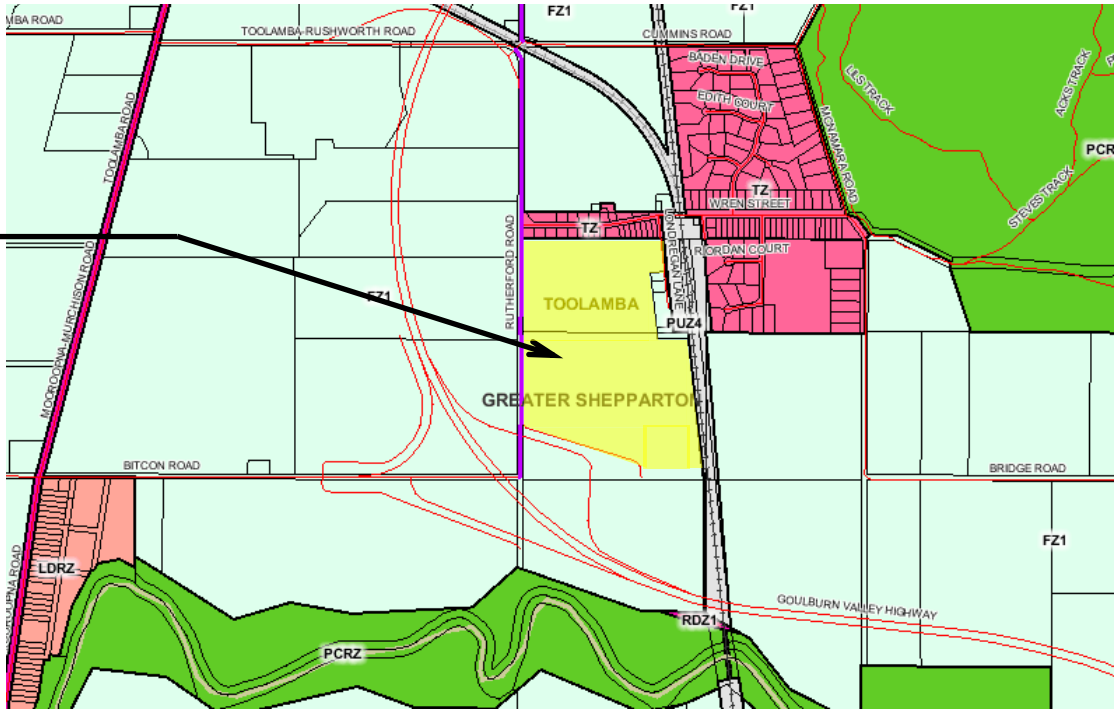
2.1 Site Location

The site of the proposed residential neighbourhood is located on the south western side of Toolamba within a Farming Zone and is subject to Floodways overlays.

This site is currently used for grazing and cropping purposes.

Figure 1 Locality Plan

Proposed Residential Development



Source: Department of Transport, Planning and Local Infrastructure; Planning Maps Online

The surrounding land uses are mainly Township and Farming, with public use (transport) zoning along the eastern side of the proposed development.

Through the southern portion of the proposed development is a public acquisition overlay identifying land which is proposed to be acquired for the Shepparton Bypass project.

2.2 Surrounding Street Network

The current entrance to the site is from Rutherford Road which is a sealed two-lane two-way traffic undivided rural road travelling in a north/south direction, with a regulatory speed limit of 100-km/h along the length of the Development. The seal width for Rutherford Road is in the order of 6.2m, with gravel shoulders approximately 1.0m wide, and has open drainage channels along both sides. Rutherford Road is currently classified as a rural access road.

Rutherford Road, north of the Wren Street intersection, is a sealed two-lane two-way traffic undivided rural road with a regulatory speed limit of 100-km/h and a seal width of 6.5m, with gravelled shoulders approximately 1.0m wide.

Close to the northern portion of the proposed development runs Wren Street, which is fronted by existing housing. Approximately 280m east of the Rutherford Road intersection, the proposed development connects with Wren Street via a part of the Rea land that resembles a vacant lot but is actually an undeveloped provision for access to the site. Wren Street is a sealed two-lane two-way traffic undivided rural street travelling in an east/west direction, with a regulatory speed limit of 50-km/h along the length of the Development. The seal width is in the order of 8.5m, with a 1.5m wide grass shoulder along its northern side and has type B2 kerbing along the southern side. Wren Street is classified as a Collector Level 1 road.

The Wren Street intersection with Rutherford Road is a T-intersection with central traffic island and a controlling Give-Way. There is an existing school bus stop approximately 40m north of the intersection, along the western side of Rutherford Road.

Rutherford Road is used predominately for the movement of cars and trucks from arterials or Rural Collectors for access to properties and farms, whereas Wren Street is mainly used for access to properties, farms or rural businesses.

2.3 Existing Traffic Flows

The peak traffic volumes utilising both Rutherford Road and Wren Street are detailed in Table 1.

Table 1 Two-way Weekday Traffic Count Summary

Road	Date	Traffic Volume – vpd	Hourly Peak – vph AM	Hourly Peak – vph PM	% Commercial Vehicles
Source: Greater Shepparton City Council Traffic Counts (Appendix C)					
Rutherford Road – Nth of Intersection	24/10/2012	690	77	69	7.8
Wren Street – East of Intersection	29/06/2006	797	55	88	3.3
Bitcon Road	27/03/2009	242	19	29	6.6
Bridge Road	19/12/2012	548	42	65	2.2

2.4 Crash Data

An examination of the VicRoads CrashStats database revealed, that for the last five years of available crash data, there have been no recorded casualty crashes along the lengths or within the vicinity of the proposed development, or at the intersection of Rutherford Road and Wren Street.

2.5 Impact of Shepparton Bypass

A western freeway bypass for Shepparton has been planned and approved. The course of the proposed bypass is to be located to the south and west of Toolamba, connecting with the Goulburn Valley Highway from Arcadia in the south to Congupna in the north.

The construction of the bypass will be undertaken in stages and is unlikely to occur for at least 10 years. The current proposal allows for the placement of both on and off ramps to be connected to Bitcon Road, which is also proposed to be extended through to Bridge Road in the east.

3. Proposed Development

The proposed development site is on the south-west periphery of Toolamba and will consist of 272 Residential Lots, which is to progress in 16 stages. Refer to Appendix A – Concept Plan for traffic assessment.

The Development will have access to and egress from both Rutherford Road and Wren Street. Ultimately, it is proposed that the development will be connected to the Bitcon Road – Bridge Road future extension.

However, for the purpose of this traffic impact assessment, this connection has been omitted due to the uncertainty of the freeway bypass construction timeframe.

It is considered that the volume of bypass interchange user traffic that may choose to access either the proposed development or the Toolamba Township via the road network that is to be analysed in this report, would have negligible impact on the analysis due to the traffic movements being very low in that regard.

Internally the development will have a central spine road – north/south alignment, through which the residential development is directly connected to both Wren Street to the north and ultimately to the Bitcon Road extension to the south.

There will also be a connection to Rutherford Road from the centrally located east/west spine road. The Rutherford Road connection is approximately 370m south of the Wren Street intersection.

In considering the lot configuration, availability of sewer and services and Toolamba's unique small town appeal, the Developer contemplates that the development site may have a 'build out' horizon in the vicinity of 20 years.

This report acknowledges that VicRoads has an interest in the land which is subject to the Public Acquisition Overlay (PAO) and that their future freeway design has not progressed beyond the preliminary phase.

Council has recently agreed to support a submission that proposes the Urban Growth Zone (UGZ) for that portion of the land which is north of the northern boundary of the PAO. The rezoning to UGZ would run in conjunction with an application for approval of a "Precinct Structure Plan" (PSP).

The proposed staging of the residential development is as follows: -

Table 2 Proposed Subdivision Layout

Stage Number	Number of Lots	Frontage Facing	Main Entrance/Exit Point
1	18	Internal Street	Wren Street
2	17	Internal Street	Wren Street
3	16	Internal Street	Wren Street
4	16	Internal Street	Wren St / Rutherford Rd
5	20	Internal Street	Wren St / Rutherford Rd
6	13	External Street	Rutherford Rd
7	21	Internal Street	Wren St / Rutherford Rd
8	18	Internal Street	Wren St / Rutherford Rd
9	16	Internal Street	Wren St / Rutherford Rd
10	18	Internal Street	Wren St / Rutherford Rd
11	11	External Street	Rutherford Rd
12	19	Internal Street	Wren St / Rutherford Rd
13	21	Internal Street	Wren St / Rutherford Rd
14	17	Internal Street	Wren St / Rutherford Rd
15	16	Internal Street	Wren St / Rutherford Rd
16	15	Internal Street	Wren St / Rutherford Rd

4. Traffic Generation

Residential areas are the largest traffic generating land use category. Failure to estimate adequately the amount of traffic produced by a new subdivision can cause traffic problems on adjacent main roads and safety and environmental problems on internal roads.

Recent data from the Greater Shepparton City Council suggests that 10 vehicle trips per dwelling per day will provide characteristic traffic generation rates for a new subdivision – multi-car medium-high income suburb. For typical one car households in single family dwellings, the generation rate will be in the range of 6 to 8 vehicle trips per dwelling per day.

Typical relationship between peak hourly volumes and average daily traffic is 11% to 16% in rural situations.

Table 3 Traffic Generation Rates

Stages	Number of Allotments (cumulative)	Estimated Daily Traffic Volume (two-way)		Estimated Peak Hour Traffic Volume (two-way)	
1, 2 & 3 – Wren St	51		510		57
6 & 11 – Rutherford Rd	24		240		27
Remaining 50/50 Split	197	Wren & Rutherford	985 985	Wren & Rutherford	109 109

Traffic generation for residential uses is typically tidal in nature, with the majority of vehicle movements during the AM peak hour occurring in the outbound direction, and traffic movements during the PM peak hour generally occurring in the inbound direction.

The traffic split can really only be determined by an origin/destination survey once the Development has been completed. But to ensure that any potential adverse impacts from the Development are identified early and any corrective measures designed, the following Traffic Flow Characteristic have been adopted based on the Approximations Related to Intersection Design[1], the RTA Guide to Traffic Generating Developments – October 2002 and the supplied existing traffic volume data from the Greater Shepparton City Council (refer to Appendix C): -

[1] *Traffic Engineering and Practice – Chapter 8 Traffic Engineering Folklore*, DW Bennett & KW Ogden, Monash University 1996

- 80% departing and 20% entering for the directional differences in morning peak flows;
- 30% departing and 70% entering for the directional differences in evening peak flows; and

An analysis will also be made on the movements based on the predicted year 20 values at a 0.5% p.a. growth rate for both Wren Street and Rutherford Road existing traffic volumes to ensure there will be no traffic related issues in the future.

Based on the supplied traffic volumes, it is assumed that of the traffic utilising Wren Street 50% will be turning west (left) and 50% will be turning east (right) at the intersection. As Wren Street provides easier access to the Toolamba Township, the assumed traffic split at the Rutherford entrance is that, 10% of the total volume will be turning south (left) to utilise Bitcon Road and 90% will be turning north (right) to utilise Rutherford Road and the Toolamba Rushworth Road to gain access to the arterial road network.

The anticipated maximum peak hourly traffic volumes at the intersections on the completion of the Development are: -

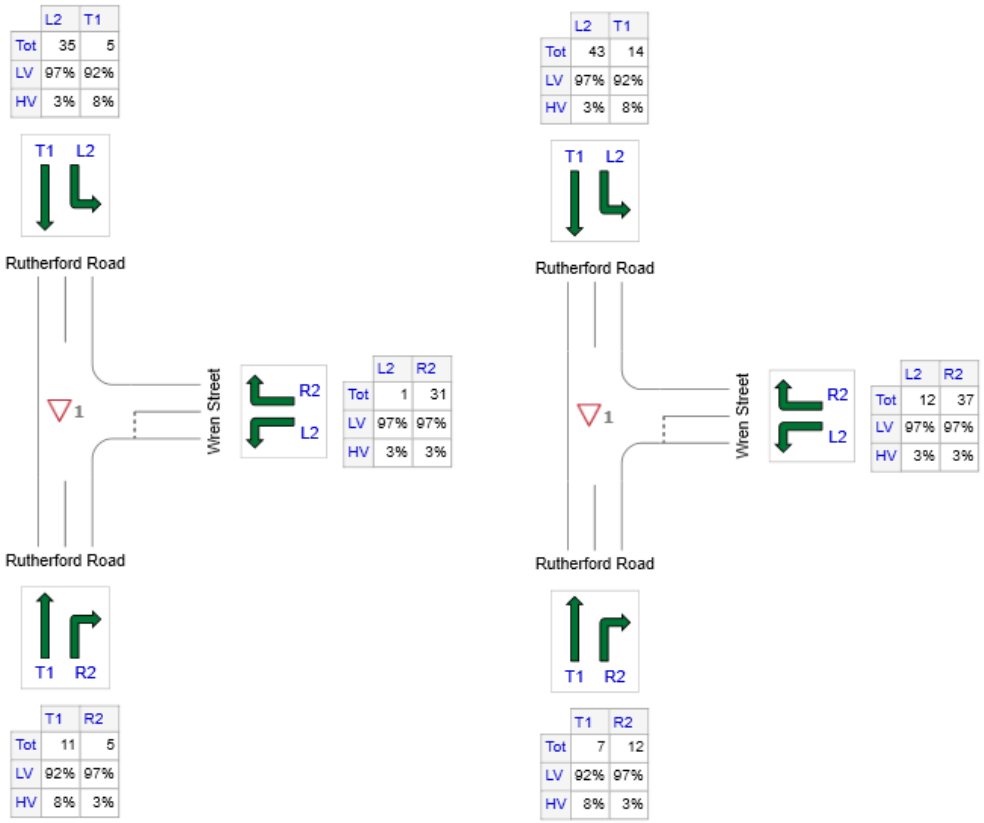
Table 4 Site Generated Traffic Movements – Peak Hour

Location	Existing Traffic Counts		Estimated at Completion (at Year 20 with 0.5% pa growth)	
	Vehicles per Hour		Vehicles per Hour	
	AM	PM	AM	PM
Wren Street				
Eastbound through	35	48	50	65
Westbound through	28	42	32	49
Left turn into Development			17	58
Right turn into Development			17	58
North/south entrance				
Left turn out of Development			67	25
Right turn out of Development			67	25
Rutherford Road – South of Wren				
Northbound through	14	17	16	19
Southbound through	5	23	10	31
Left turn into Development			24	86
Right turn into Development			3	10

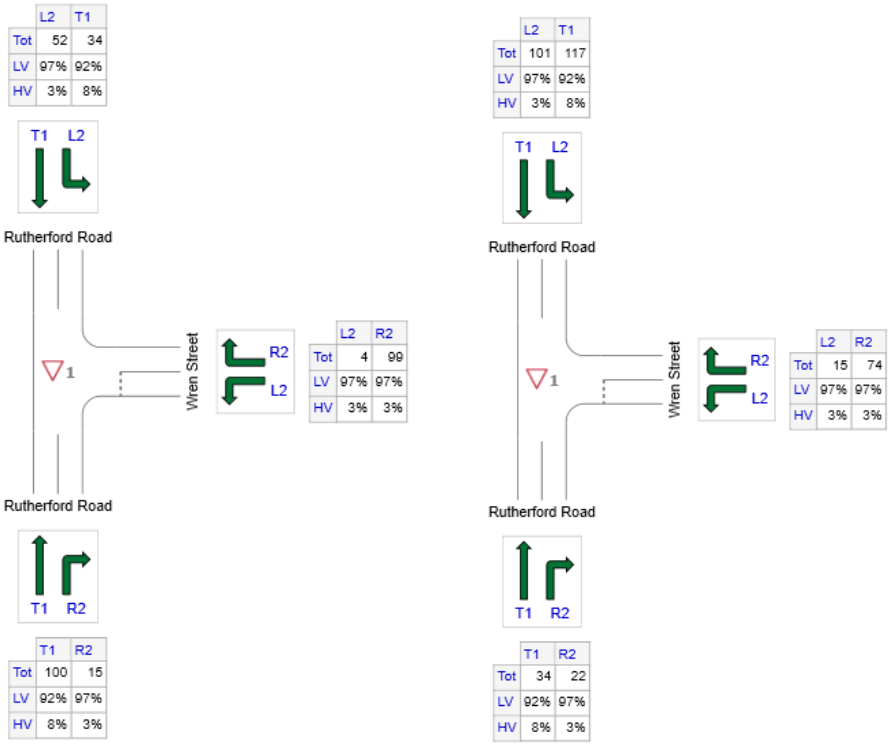
Location	Existing Traffic Counts		Estimated at Completion (at Year 20 with 0.5% pa growth)	
	Vehicles per Hour		Vehicles per Hour	
	AM	PM	AM	PM
East/west entrance				
Left turn out of Development			11	4
Right turn out of Development			98	37
Wren/Rutherford				
Left turn out onto Rutherford	1	12	4	15
Right turn out onto Rutherford	31	37	99	74
Left turn into Wren	35	43	52	101
Right turn into Wren	5	12	15	22
Northbound through	11	7	100	34
Southbound through	5	14	34	117

Figure 2 Diagrams of Intersection Traffic Volumes

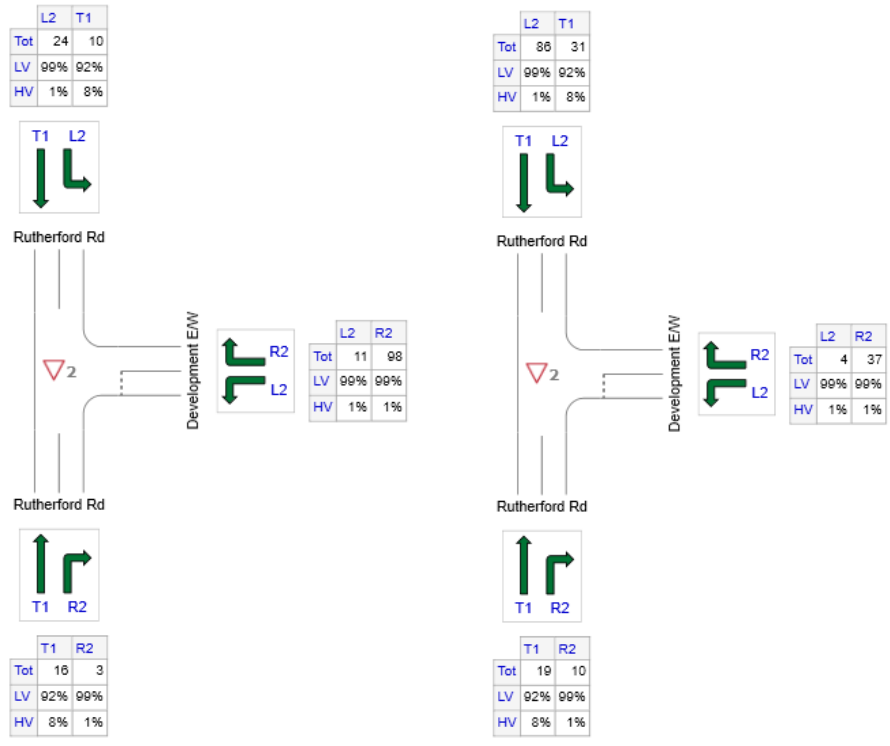
Wren St / Rutherford Rd Intersection Existing Conditions – AM & PM



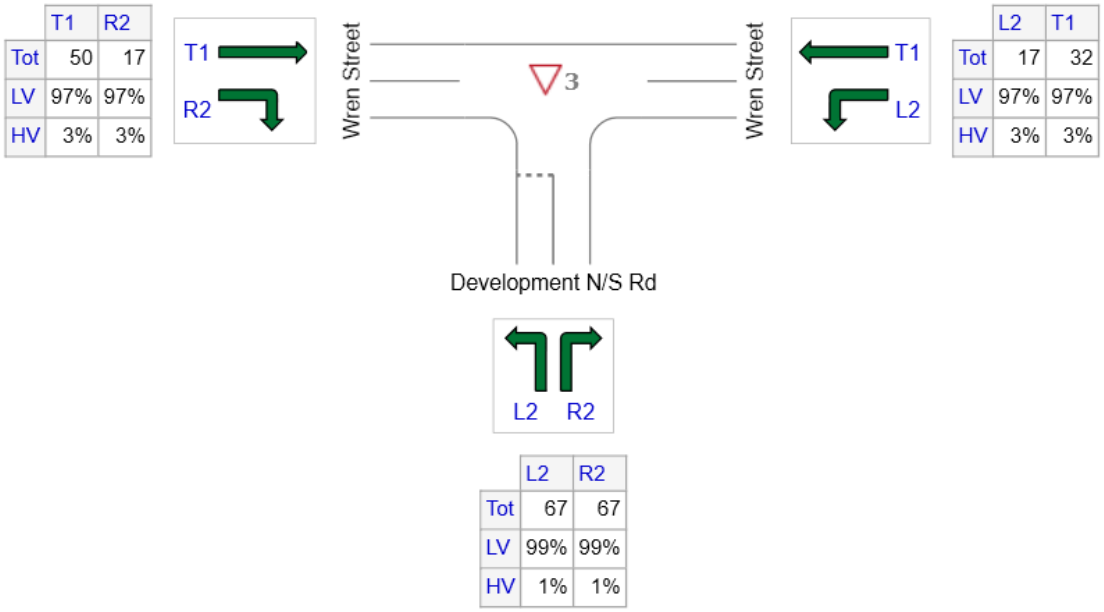
Wren St / Rutherford Rd Intersection Proposed Conditions – AM & PM

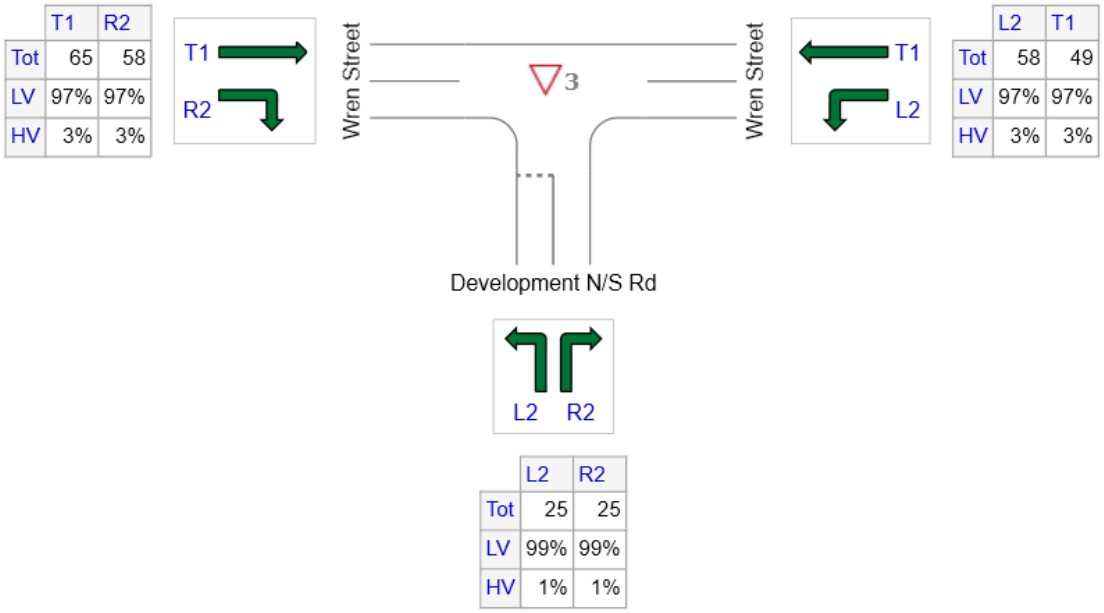


Rutherford Rd / Proposed East-West Rd Intersection – AM & PM



Wren St / Proposed North-South Rd Intersection – AM & PM





5. Intersection Analysis

The existing Rutherford Road and Wren Street intersection and the proposed entrances into the development are all T-intersections with through, left and right turning movements.

The operations of the intersections were analysed using SIDRA Intersection, during the AM and PM peak hours. This computer package, originally developed by the Australian Road Research Board, provides information about the capacity of an intersection in terms of a range of parameters, as described below:

- Degree of Saturation (DOS) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 5.
- The 95th Percentile (95%ile) Queue represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and
- Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

Table 5 Measures and Criteria

Level of Service	Degree of Saturation	Traffic Signals and Roundabouts	Control Delay per Vehicle (sec/veh)	Give Way and Stop Signs	Control Delay per Vehicle (sec/veh)
A (*excellent*)	x ≤ 0.6	Good operation	d ≤ 10	Good operation	d ≤ 10
B (*very good*)	0.6 < x ≤ 0.7	Good with acceptable delays and spare capacity	10 < d ≤ 20	Acceptable delays and spare capacity	10 < d ≤ 15
C (*good*)	0.7 < x ≤ 0.8	Satisfactory	20 < d ≤ 35	Satisfactory but an accident study required	15 < d ≤ 25
D (*acceptable*)	0.8 < x ≤ 0.9	Operating near capacity	35 < d ≤ 55	Near capacity and accident study required	25 < d ≤ 35
E (*poor*)	0.9 < x ≤ 1.0	At capacity; at signals incidents will cause excessive delays and roundabouts require other control mode	55 < d ≤ 80	At capacity and requires other control mode	35 < d ≤ 50
F (*very poor*)	1.0 < x	Unsatisfactory and requires other control mode	80 < d	Unsatisfactory and requires other control mode	50 < d

Source: RTA Guide to Traffic Generating Developments

For unsignalised intersections, a DOS of up to 0.80 is considered to be good operating conditions, with values above 0.90 considered to be poor operating conditions. Beyond a DOS of 1.00, queues and delays increase disproportionately.

Three scenarios were reviewed, the first was standard T-intersections with no auxiliary lanes, the second was all intersections were to be roundabouts and the third was to see the effects of one of the internal exit roads being blocked would have on the existing standard T-intersections layouts. A summary of the SIDRA results are shown below in Table 6, and a copy of the SIDRA output are attached at Appendix B.

Based on the output from the SIDRA analysis, the model results for the intersection during morning and evening peak times are: -

Table 6 Modelling Results

Approach		Movement	Existing Conditions			Post-development Conditions		
			Degree of Saturation	95th%ile Queue (m)	Average Delay (s)	Degree of Saturation	95th%ile Queue (m)	Average Delay (s)
EXISTING T-INTERSECTION LAYOUTS								
Rutherford / Wren								
AM Peak	Rutherford Road (South approach)	Through	0.009	0.2	0.1	0.067	0.7	0.1
		Right	0.009	0.2	7.6	0.067	0.7	7.8
	Rutherford Road (North approach)	Through	0.023	0.0	0.0	0.050	0.0	0.0
		Left	0.023	0.0	7.9	0.050	0.0	7.9
	Wren Street (East approach)	Right	0.027	0.6	4.7	0.100	2.4	5.3
		Left	0.027	0.6	4.6	0.100	2.4	4.7
PM Peak	Rutherford Road (South approach)	Through	0.012	0.4	0.1	0.036	1.0	0.5
		Right	0.012	0.4	7.6	0.036	1.0	8.2
	Rutherford Road (North approach)	Through	0.033	0.0	0.0	0.125	0.0	0.0
		Left	0.033	0.0	7.9	0.125	0.0	7.9
	Wren Street (East approach)	Right	0.040	1.0	4.8	0.087	2.1	5.6
		Left	0.040	1.0	4.6	0.087	2.1	5.0
Rutherford / East-West								
AM Peak	Rutherford Road (South approach)	Through				0.011	0.1	0.0
		Right				0.011	0.1	7.5
	Rutherford Road (North approach)	Through				0.020	0.0	0.0
		Left				0.020	0.0	7.9
	Wren Street (East approach)	Right				0.091	2.2	4.8
		Left				0.091	2.2	4.6
PM Peak	Rutherford Road (South approach)	Through				0.017	0.4	0.2
		Right				0.017	0.4	7.8
	Rutherford Road (North approach)	Through				0.067	0.0	0.0
		Left				0.067	0.0	7.9
	Wren Street (East approach)	Right				0.036	0.8	5.0
		Left				0.036	0.8	4.7

Approach		Movement	Existing Conditions			Post-development Conditions		
			Degree of Saturation	95th%ile Queue (m)	Average Delay (s)	Degree of Saturation	95th%ile Queue (m)	Average Delay (s)
Wren / North-South								
AM Peak	Wren Street (East approach)	Through				0.028	0.0	0.0
		Left				0.028	0.0	4.6
	Wren Street (West approach)	Through				0.039	0.7	0.1
		Right				0.039	0.7	4.8
	North/South Road (South approach)	Right				0.105	2.8	5.0
		Left				0.105	2.8	4.7
PM Peak	Wren Street (East approach)	Through				0.061	0.0	0.0
		Left				0.061	0.0	4.6
	Wren Street (West approach)	Through				0.075	2.3	0.3
		Right				0.075	2.3	5.0
	North/South Road (South approach)	Right				0.042	1.0	5.3
		Left				0.042	1.0	4.7
EXISTING T-INTERSECTION LAYOUTS WITH BLOCKAGES								
Rutherford / Wren – Proposed North/South Blocked								
AM Peak	Rutherford Road (South approach)	Through				0.154	4.1	0.2
		Right				0.154	4.1	7.8
	Rutherford Road (North approach)	Through				0.049	0.0	0.0
		Left				0.049	0.0	7.9
	Wren Street (East approach)	Right				0.048	1.2	6.0
		Left				0.048	1.2	4.8
PM Peak	Rutherford Road (South approach)	Through				0.070	2.2	0.6
		Right				0.070	2.2	8.3
	Rutherford Road (North approach)	Through				0.125	0.0	0.0
		Left				0.125	0.0	7.9
	Wren Street (East approach)	Right				0.101	2.8	6.0
		Left				0.101	2.8	5.2
Rutherford / Wren – Proposed East/West Blocked								
AM Peak	Rutherford Road (South approach)	Through				0.019	0.6	0.2
		Right				0.019	0.6	7.8
	Rutherford Road (North approach)	Through				0.059	0.0	0.0
		Left				0.059	0.0	7.9
	Wren Street (East approach)	Right				0.187	5.0	5.0
		Left				0.187	5.0	4.6
PM Peak	Rutherford Road (South approach)	Through				0.028	0.9	0.7
		Right				0.028	0.9	8.3
	Rutherford Road (North approach)	Through				0.139	0.0	0.0
		Left				0.139	0.0	7.9
	Wren Street (East approach)	Right				0.135	3.4	5.4
		Left				0.135	3.4	4.7

Approach		Movement	Existing Conditions			Post-development Conditions		
			Degree of Saturation	95th%ile Queue (m)	Average Delay (s)	Degree of Saturation	95th%ile Queue (m)	Average Delay (s)
Rutherford / East-West – Proposed North-South Blocked								
AM Peak	Rutherford Road (South approach)	Through				0.011	0.1	0.0
		Right				0.011	0.1	7.6
	Rutherford Road (North approach)	Through				0.039	0.0	0.0
		Left				0.039	0.0	7.9
	Wren Street (East approach)	Right				0.210	5.7	4.9
		Left				0.210	5.7	4.6
PM Peak	Rutherford Road (South approach)	Through				0.018	0.5	0.4
		Right				0.018	0.5	8.2
	Rutherford Road (North approach)	Through				0.134	0.0	0.0
		Left				0.134	0.0	7.9
	Wren Street (East approach)	Right				0.088	2.1	5.2
		Left				0.088	2.1	4.7
Wren / North-South – Proposed East-West Blocked								
AM Peak	Wren Street (East approach)	Through				0.028	0.0	0.0
		Left				0.028	0.0	4.6
	Wren Street (West approach)	Through				0.056	1.6	0.1
		Right				0.056	1.6	4.8
	North/South Road (South approach)	Right				0.183	5.5	5.2
		Left				0.183	5.5	4.7
PM Peak	Wren Street (East approach)	Through				0.064	0.0	0.0
		Left				0.064	0.0	4.6
	Wren Street (West approach)	Through				0.139	5.0	0.4
		Right				0.139	5.0	5.0
	North/South Road (South approach)	Right				0.074	2.0	5.9
		Left				0.074	2.0	4.7

The outcomes of the SIDRA analysis in Table 6 can be summarised as follows: -

- This type of increase in traffic volume and change in operation of the intersection is considered to be indiscernible to the general motorist and is not expected to have any material impact on the operation of the surrounding road network. This is supported by the SIDRA Intersection analysis shown in Table 6, which identifies that 95th percentile queues and average delays at the Wren Street / Rutherford Road intersection is not expected to change due to the modest increase in traffic volumes that could be expected to be generated by the development shown in the concept plans.
- It is noted that the Wren Street / Rutherford Road intersection currently operate under 'excellent' conditions during the AM and PM peak hours, and it is expected that it will continue to do so under the anticipated post-development traffic volumes; even when one development entrance has become blocked.

6. Sight Distance

Intersection (*including driveways*) safety performance is dependent upon adequate horizontal and vertical sight distance for all entering traffic.

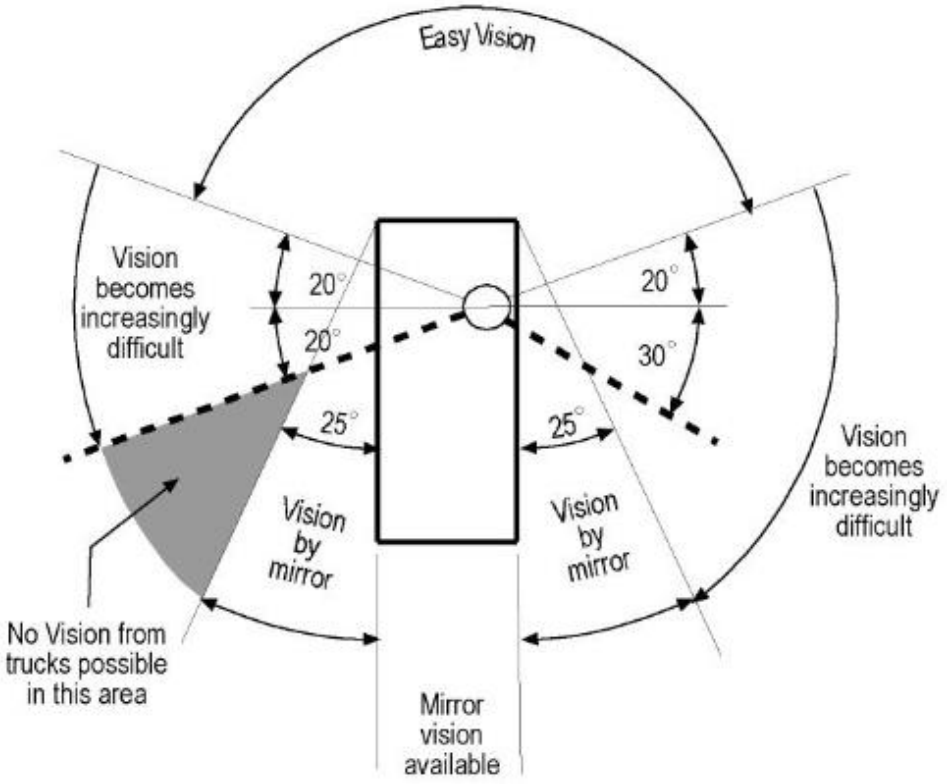
A feature of intersections is that sight lines are often required at large angles to the user's normal viewpoint. In a motor vehicle, the driver may have to look through the side windows. As well, the paths travelled are often significantly curved, which means that drivers find it more difficult to estimate stopping distances along the travel path.

The type and extent of sight distance available will significantly influence the design and location of an intersection. Both horizontal and vertical sight lines must be taken into account to check for disruption by natural objects, such as trees, and structures, such as fences, buildings and safety barriers.

The types of sight distance that must be provided in designing all intersections include: Approach Sight Distance (*ASD*), Safe Intersection Sight Distance (*SISD*) and Minimum Gap Sight Distance (*MGSD*).

Table 7 provides specific requirements for sight distance on level grades. The values in these tables refer to passenger cars only.

Figure 3 Sight Restrictions due to Vehicle Design



Source: Austroads Guide to Road Design Part 4A – Unsignalised & Signalised Intersections

6.1 Approach sight distance (ASD)

ASD is the minimum level of sight distance which must be available on the minor road approaches to all intersections. ASD is numerically equal to normal car stopping sight distance (*SSD*), which is defined as the distance travelled by a vehicle between the times when the driver receives a stimulus signifying a need to stop and the time the vehicle comes to rest.

The difference between ASD and SSD is the object height used in its calculation. ASD is measured from a driver's eye height (*1.1m*) to 0.0m, which ensures that a driver is able to see any line marking and kerbing at the intersection.

In circumstances where it is unreasonable or exceedingly difficult to achieve ASD, the design should provide, as an absolute minimum, SSD measured from a driver's eye height (*1.1m*) to an object height of 0.2m. This will ensure that signs and other road furniture at the intersection are clearly visible and provides a minimum standard to ensure that drivers are aware of the presence of an intersection.

6.2 Safe intersection sight distance (SISD)

SISD is the minimum standard that should be provided on the major road at any intersection. It provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (*e.g. in the worst case, stalling across the traffic lanes*), and to decelerate to a stop before reaching the collision point. It is generally sufficient to enable cars to cross a major road safely from a side road.

SISD shall be provided at all intersections.

6.3 Minimum gap sight distance (MGSD)

MGSD is based on distances corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections.

MGSD is:

- measured from the point of conflict (*between approaching and entering vehicles*) back along the centre of the travel lane of the approaching vehicle
- measured from a point 1.1 m (*driver's eye height*) to a point 0.65 m (*object height – typically a vehicle indicator light*) above the travelled way.

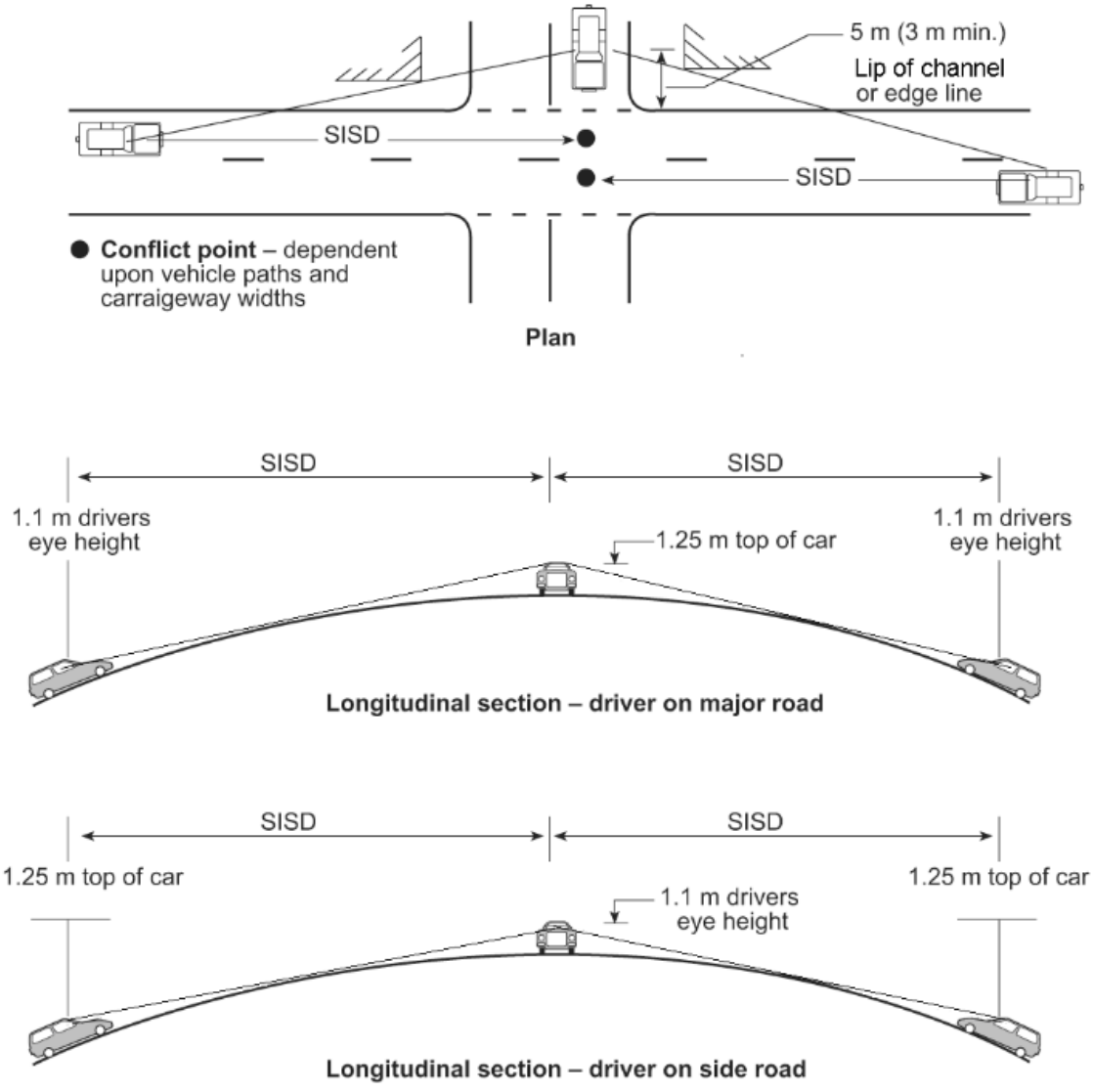
The MGSD required for the driver of an entering vehicle to see a vehicle in the conflicting streams in order to safely commence the desired manoeuvre is dependent upon the:

- length of the gap being sought
- observation angle to approaching traffic.

The critical acceptance gap time varies according to:

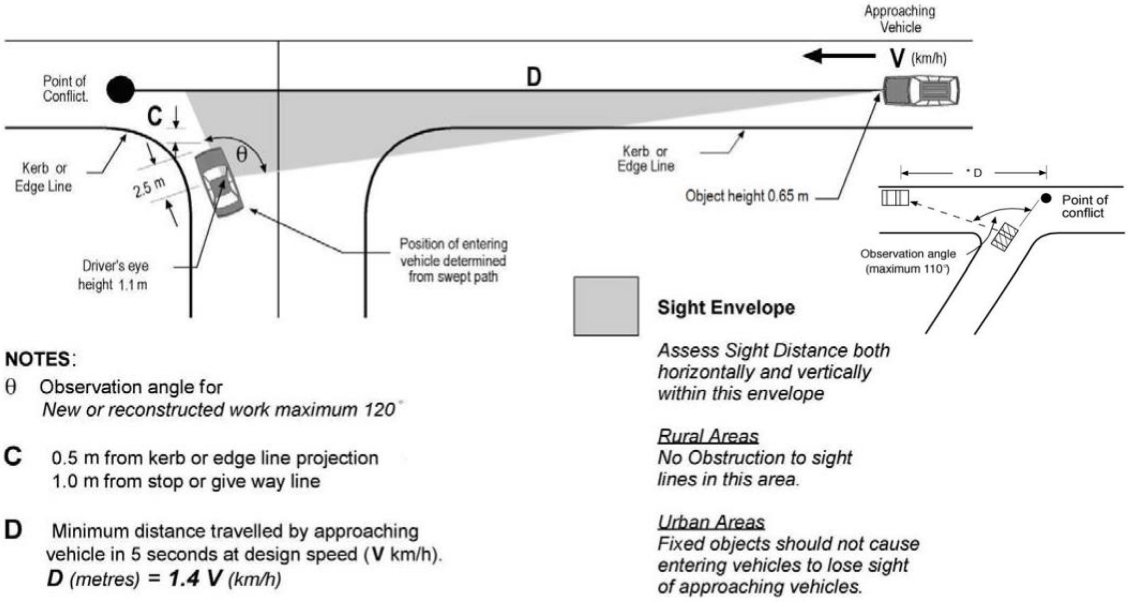
- the type of manoeuvre – left-turn/right-turn/crossing
- the width of carriageway – increased time required for greater widths
- whether the major road has a one-way or two-way traffic flow – increased time required to look both ways.

Figure 4 SISD



Source: Austroads Guide to Road Design Part 4A – Unsignalised & Signalised Intersections

Figure 5 Sight Distance to a Through Vehicle – Left & Right Turn



Source: Austroads Guide to Road Design Part 4A – Unsignalised and Signalised Intersections

Table 7 Intersection Sight Distance for Level Grade

Design speed (major road) (km/h)	ASD - Approach sight distance (1.1m to 0.0m)		SISD - Safe intersection sight distance (1.1m to 1.25m)	
	Absolute minimum 1.5 secs	Desirable 2.0 secs	Absolute minimum 1.5 secs	Desirable 2.0 secs
	m	m	m	m
40	34	40	67	73
50	48	55	90	97
60	64	73	114	123
70	83	92	141	151
80	103	114	170	181
90	126	139	201	214
100	151	165	234	248

Source: Austroads Guide to Road Design Part 4A – Unsignalised and Signalised Intersections

Table 8 MGSD ('D' metres) for Various Speeds

Critical gap acceptance time (ta) (secs)	85th percentile speed of approaching vehicle (km/h)										
	10	20	30	40	50	60	70	80	90	100	110
4	11	22	33	44	55	67	78	89	100	111	122
5	14	28	42	55	69	83	97	111	125	139	153
6	17	33	50	67	83	100	117	133	150	167	183
7	19	39	58	78	97	117	136	155	175	194	214
8	22	44	67	89	111	133	155	178	200	222	244
9	25	50	75	100	125	150	175	200	225	250	275
10	28	56	83	111	139	167	194	222	250	278	305

Source: Austroads Guide to Road Design Part 4A – Unsignalised and Signalised Intersections

6.4 Available Sight Distance

ASD requirements for the intersection and the entranceway are exceeded by the existing layouts.

The minimum requirements for SISD and MGSD are available at all approaches to the intersections along both Wren Street and the Rutherford Road.

The critical acceptance gap times for various manoeuvres into, from and across Wren Street and the Rutherford Road (*see table* 9), have been used within the SIDRA analysis to determine delays.

Table 9 Critical acceptance gaps and follow-up headways

Movement	Critical Gap	Follow-up Headway
RHT – from major road	4.5 sec	2.5 sec
LHT – from minor road	5.0 sec	3.0 sec
RHT – from minor road	7.0 sec	4.0 sec

7. Design Objectives

7.1 Road Hierarchy

In considering the classification, function and general composition of the road network, this report is guided by clause 12.3.2 of the Infrastructure Design Manual, version 4.3 dated 26 September 2014, which is prepared and maintained by the Local Government Infrastructure Design Association of which Greater Shepparton City Council is a member. The assigned road hierarchy for the proposed development is shown in Appendix A – Road Hierarchy Plan. The typical cross sections for the proposed roads are also shown in Appendix A – Typical Cross Sections-Road Reserves.

7.2 Pavement and Seal Widths

Table 10 below summarises the existing and proposed road characteristics: -

Table 10 Street and Rural Road Characteristics

Road Name	Classification (see note 1)	Maximum AADT Volume	Sealed Width (m)	Comments
Existing				
Wren Street	Collector Level 1			Has an existing sealed width of 6.8m
Rutherford Road	Rural Living Access			Has an existing sealed width of 6.2m south of Wren and 6.5m north of Wren
Proposed				
North/South spine	Collector Level 1	3,000	13.6	This is a modified cross section (see note 2)
East/West spine	Collector Level 1	3,000	13.6	This is a modified cross section (see note 2)
Other Internal	Access Street	1,000	7.5	The development does not propose to construct pavements less than 7.5 m width
Rutherford (East-West to Wren)	External Collector/Rural Living	3,000	9.9	This is a modified cross section (see note 3)

Notes:-

1. *The context of the road classification is what it would be if the road were to be constructed today.*
2. *This modified cross section allows for 2 no on road bicycle lanes each having 1.2m width and a shared path having a width of 2.5m on one side and footpath having a width of 1.5 on the other side.*
3. *This modified cross section is a hybrid that allows for road widening to achieve a 6.8 m width of seal on the east side fronting the development while maintaining the existing 3.1m width of seal on the west side*

7.3 Design Speed Values

The existing regulatory speed restriction along Wren Street, which is to be continued within the Development, is 50-km/h.

It is recommended that along the internal street, that slow points be installed between 100m to 140m apart to ensure that the required 30 to 50-km/h speed restrictions are maintained along their lengths.

The types of slow point to be installed to meet the objective of reduced mid-block traffic speeds are Parallel, Angled or Offset – all of which have the potential for landscaping.

Rutherford Road has a current regulatory speed limit of 100-km/h, along both approaches to Wren Street, which needs to be reviewed as the development progresses along Rutherford Road and/or the construction of the Shepparton Bypass.

Based on VLimits, the speed limit along Rutherford Road needs to be reduced to 50-km/h once Stage 5 has been completed.

7.4 Pedestrians and Cyclists

7.4.1 Pedestrians

Pedestrians form the largest single road-user group. Nearly all short trips could be undertaken on foot and even longer trips, whether the main mode of transport is by private car, public transport or cycling - require the road user to be a pedestrian at some stage of the journey. Walking is a key element in the way Australians travel to work, school and local facilities.

Planning and designing good pedestrian infrastructure with well-connected and amenable facilities will benefit the whole community.

Pedestrian networks should be planned in combination with land uses to provide residential access to mixed use centres and be designed with passive surveillance and good lighting to provide an attractive and safe walking environment.

Some of the design requirements for designing pedestrian infrastructure are: -

- Minimum path widths for different pedestrians
  - Pedestrians in a wheelchair – 1.2m
  - Pedestrian in wheelchair passing pram – 1.5m
  - Two pedestrians in wheelchairs passing – 1.8m

- Minimum pedestrian through route width
  - 1.2m over short distance (allows 1 wheelchair)
  - 1.8m desirable to allow 2 wheelchairs to pass (1.5m minimum), 2m near schools and small shops
  - At least 2.4m in commercial or shopping environments
  - 3m – 4m in busy C.B.D pedestrian area

- Installation of Tactile Ground Surface Indicator's
  - Warning TGSI positioned 0.3m from edge of hazard, perpendicular to the direction of travel and across the entire ramp width preferred depth of 0.8m (minimum 0.6m)
  - Directional TGSI used where a person has to deviate from their path of travel to access a facility, at a minimum width of 0.8m. Also used to guide pedestrian through complicated area, at a minimum width of 0.3m.

- Non-Signalised Intersections
  - Design details such as kerb radii and provision of refuges or kerb extensions can greatly influence pedestrian safety at unsignalised intersections. Recommended kerb radii are 6m for local access streets and 9m for intersections with neighbourhood connectors
- Roundabouts
  - Roundabouts should be designed with adequate entry curvature or deflection to reduce the speed of approaching vehicles. Recommended to locate kerb ramps and median cut throughs at least 6m from the vehicle holding line (1 - 2 car lengths)

Currently within Toolamba the footpath surface and access vary, including designated concrete footpaths at the General Store and Hotel, but mostly the footpaths are gravel, dirt or sealed road shoulders.

7.4.2 Proposed Pedestrian Network Plan

A proposed Pedestrian Network Plan for this Development has been developed detailing the use of shared paths and noting that all internal streets to have a pedestrian path on both sides (refer to Appendix A).

7.4.3 Cyclists

The provision of a footpath, shared path and/or a bicycle lane from the development is required to provide a link to the recreational areas, schools and to the shopping precinct.

The requirements set out below are based on the Greater Shepparton City Council's Infrastructure Design Manual and discussions with the Councils Development Branch.

- A footpath is required on both sides of streets classified as a Residential Court Bowl, to facilitate pedestrian and bicycle movements. No separate provisions for cyclists are required.
- Along Access Streets, footpaths are required on both sides of the street to facilitate pedestrian and bicycle movements. No separate provisions for cyclists are required.
- For the Collector Streets, footpaths will be required along both sides of the street with on road bike lanes – or the footpaths are widened to be classified as shared paths. As this shared path will be utilised for both commuting and local access purposes, the minimum width is to be 2.5m.
- With respect to car parks and pedestrian paths along Rutherford Road where there are residential lots on one side only, car parking and pedestrian paths would only be required on one side of the road. Consideration needs to be given to linking the pedestrian path to the shared path network in the land where there are lots on one side only.

The City of Greater Shepparton in 2009 produced a cycling guide and in December 2013 the revised Bicycle Strategy was finalised, which provides a framework for the provision of a network of bicycle paths throughout the Greater Shepparton area.

The Guide provided a variety of routes to ride, including the Toolamba Circuit and the Tatura Toolamba Circuit.

One of the recommendations of the Bicycle Strategy (based on public consultation meeting held within the region), is to provide direct, preferably off-road cycling paths between key towns and destinations within cycling distance. Suggested examples included: -

- Murchison – Toolamba – Shepparton
- Tatura – Toolamba
- Toolamba – Old Toolamba

The needs of bicycle users and their requirements for an efficient and usable bicycle network require coherence, directness, safety, attractiveness and comfort.

Bicycle network infrastructure should form a coherent unit by linking popular destinations with local residential streets via regional and local routes. Intersections should seek to provide a clear path for bicycle riders as well as for other modes.

A major consideration in the provision of bicycle operating space on rural roads is the speed of other traffic. Where comfortable and safe sharing of a road is not achievable due to high speeds, some form of separation is needed such as sealed shoulders or off-road paths. When creating links in a rural bicycle transport system, which will make riding an attractive and desirable transport option, it is sometimes more economical to build off-road connecting paths (designed to carry only bicycles and pedestrian traffic) rather than sealed shoulders which have to be constructed to bear the loads of heavy vehicles. This has to be balanced with other factors associated with separate off-road paths: remoteness of facility; connectivity; maintenance etc.

In regional towns where street corridors are wide, sharing of road space is an easy option but careful attention must be paid to intersections. The main aim of the bicycle facilities is to guide the user along a clear and unambiguous path through all intersections along a route.

If the bicycle facility is part of a bicycle network route, separation is advisable in order to provide an adequate level of service and safety. The degree of separation required is largely dependant upon the prevailing speed and traffic volume of the road – see Figure 6. The amount of space available and the way existing space is distributed within the road reserve are other important issues to be considered. Where the facility is to be located in low volume and low speed a mixed traffic road profile can be safely considered. Where a road is to be fitted with bicycle facilities, which are not part of the bicycle network, shared facilities are more commonly used.

The road shoulder is suitable for regional and local bicycle network routes in moderate to low speed environments – see Figure 6.

There are currently no dedicated bicycle facilities provided in the township of Toolamba. This is in part due to its current size and limited number of trip generators.

7.4.4 Separating Cyclists from Pedestrians.

The most effective way to increase the capacity of off-road facilities for cyclists and pedestrians is to separate the user types by providing a separate footpath and a separate bicycle path.

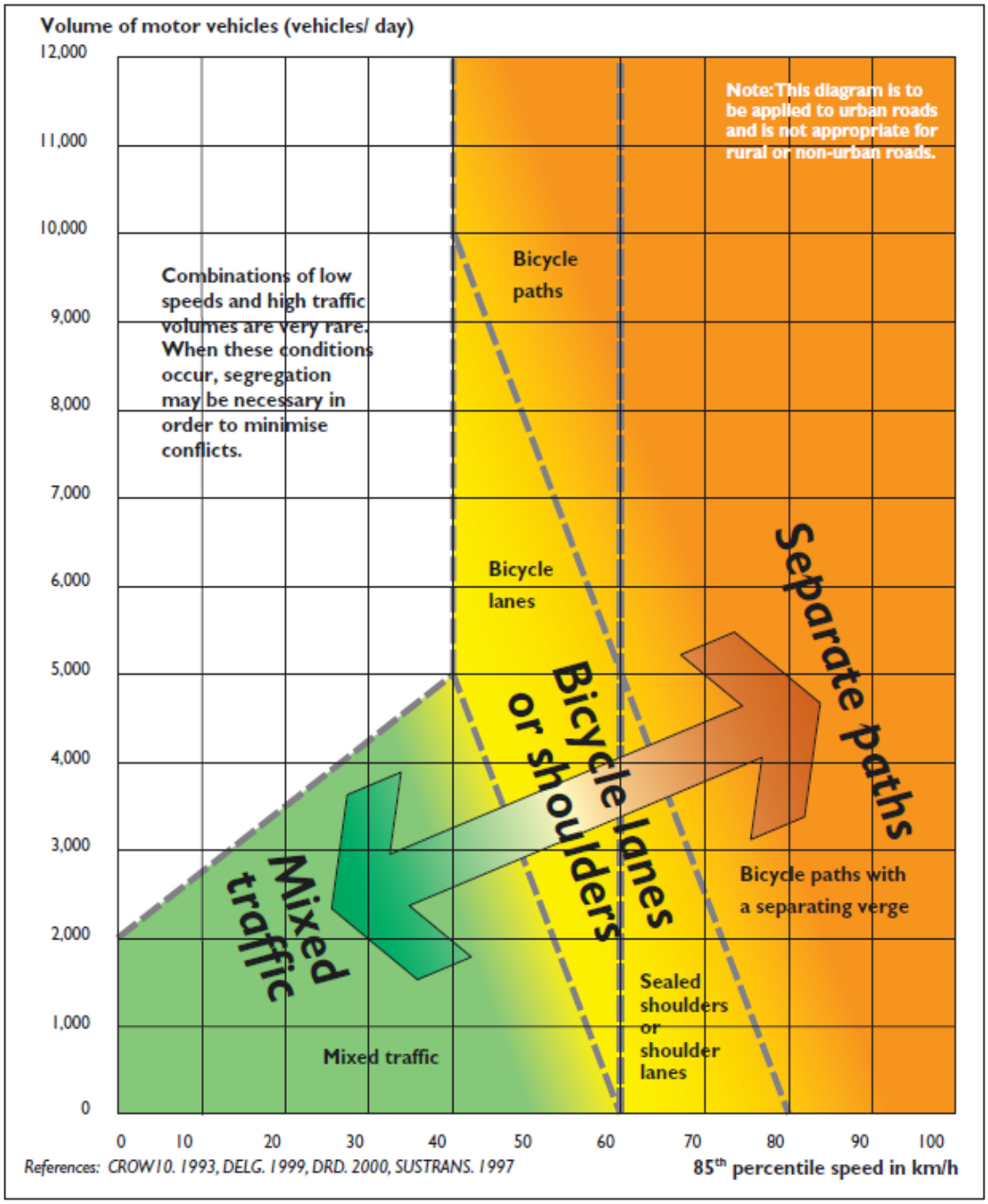
The benefits of separation are increased capacity, safety and Level of Service.

Separating cyclists from pedestrians recognises the speed differential between cyclists and pedestrians and reduces the number of delayed passing that cyclists experience along a path. Separation also allows cyclists to maintain higher speeds, reduces the potential for conflict between cyclists and pedestrians and improves the level of service for pedestrians, especially elderly or disabled pedestrians.

7.4.5 Proposed Bicycle Network Plan

A proposed Bicycle Network Plan for this Development has been developed detailing the use of on-road bicycle lanes and shared paths (refer to Appendix A).

Figure 6 Minimum levels of separation



7.5 Street Lighting

Performance and design requirements of lighting are based on an assessment of degree of activity, risk of crime and the required aesthetic appeal.

The objective of street lighting is to provide: -

- increased levels of lighting at focal points and hazardous locations.
- lighting in locations where pedestrians are required to make decisions regarding their safety.

Illumination level requirements are detailed in AS/NZS1158.1.1 – 2005 (vehicular traffic lighting), AS/NZS1158.3.1 – 2005 (lighting for pedestrian areas) and AS/NZS1158.4 – 2009 (supplementary lighting for pedestrian crossings).

Any lighting provided must be designed such that if one source fails, a second will continue to provide at least some light and the minimum design requirements are: -

- Lighting along Roadways
  - Local roads require minimum pedestrian lighting level of P3/P4/P5
  - Collector roads require minimum pedestrian lighting level of P3/P4
  - Arterial roads are to be designed to a minimum vehicular lighting level of V3
- Lighting level for Pedestrian and Cyclists Pathways
  - Pathways are to be lit to a minimum horizontal and vertical illuminance of 5 lux, with a minimum of 20 lux at sites with high pedestrian volumes or conflict
- Lighting Pole Design for Pedestrian and Cyclists Pathways
  - Poles should be setback from path by 0.8m – 1m (0.5m absolute minimum for cyclist paths)
  - Pedestrian lights to be mounted at a height of 7m, with the outreach arm length between 0 to 1.5m
- Lighting level for Pedestrian Crossings
  - Minimum horizontal illuminance on a marked pedestrian crossing is 30 lux, except for sites with low pedestrian and traffic volumes where it may be reduced to 20 lux
- Light pole placement along footpaths
  - Light poles (and other street furniture) should be placed outside the pedestrian through-route zone (desirable minimum width of 1.5m, absolute minimum width of 1.2m)

Within the stages of the development, the following lighting categories will be required: -

Table 11 Lighting Category

Street Characteristics	Lighting Category
Residential Court Bowl	P5
Access Streets	P4
Connector Street – Level 1	P3

7.6 Intersection Type

The form of rural intersection control and traffic flows are the key crash risk factors associated with designing a rural intersection.

7.6.1 Priority-Controlled Intersections

Improvement of the safety performance of rural road priority-controlled intersections should be based on the following general principles: -

- minimise the number of high-exposure, high-speed conflict points,
- establish clear priority for movements through the intersection,
- separate conflict points in space (e.g. auxiliary lanes) and time (traffic signals),
- control the angle of conflict; crossing streams of traffic should intersect at a right-angle or close to it, while merging streams should intersect at small angles to ensure low relative speed between the vehicles,
- control approach speeds using alignment, lane width, traffic control, speed limits, and ITS (e.g. vehicle activated signs),
- define and minimise conflict areas,
- provide adequate sight distances,
- minimise roadside hazards,
- provide for all vehicular and non-vehicular traffic likely to use the intersection, including where necessary, special provisions for heavy vehicles, public transport vehicles, pedestrians and other vulnerable road users.

A safe infrastructure solution will seek to: -

1. minimise opportunities for impacting other road users by separating conflicting movements (e.g. exclusion, separation),
2. reduce impact speeds to survivable levels (e.g. < 50 km/h for right-angle impacts) if impacts are inevitable,

3. minimise impact force transfer to road users in other ways, e.g. by reducing vehicle angles, changing vehicle impact areas (e.g. from side to rear), extending crash duration, or by redirecting vehicles.

7.6.2 Roundabouts

A rural roundabout is inherently safer than a comparable priority-controlled or signalised intersection.

A key contributor to the safer operation of roundabouts is the relatively low intersection negotiation speed and the inherent expectation to give way. Speed of less than 50 km/h should be achieved prior to the vehicle entering the circulating lanes of the roundabout. Thus, approach speeds on rural roads will typically need to be reduced. Methods to achieve this involve using a series of curves on the approach, as outlined in the Guide to Road Design - Part 3 (Austroads 2010) and in Part 4B (Austroads 2011). This can be difficult to achieve in practice.

One of the solutions to approach speed dissipation problems is to avoid multi-lane roundabouts where possible. For the majority of rural roundabouts, delay and queuing are minor considerations, and approach capacity may not be needed – design provisions can be made for future expansion.

8. Concluding Remarks & Recommendations

8.1 Analysis

- This Traffic Impact Assessment has investigated the potential impacts of the traffic from the proposed 272 Lot Residential Development on the existing traffic operations of Wren Street and the surrounding Roads.
- Based on the projected number of total daily trips estimated for the proposed Residential Development and the predicted trip distribution, the impact on Wren Street and other surrounding roads will be minimal and any marginal traffic increase will be well within the capacity and function of these roads.
- The results in Table 6 further indicate that the existing and proposed intersection forms are readily able to accommodate the post development peak hour traffic volumes, with
  - low degrees of saturation, queue lengths and delays along both Wren Street and Rutherford Road, and
  - low degrees of saturation and queue lengths and delays at the connecting intersections to the development.
- The moderate traffic volumes generated from the proposed Development have been modelled using the SIDRA software. The results demonstrate that adequate capacity is available at the existing and proposed T-intersections.
- The proposed new intersections (Wren / North-South and Rutherford / East-West) have minimal disruption to weekday through traffic on the existing road and they also have uninterrupted sightlines (although it is anticipated that a number of young trees are to be removed/trimmed at the proposed Wren / North-South intersection) ensuring safety is maximised.
- The traffic volume and parking demands likely to be generated as a result of this Residential Development is adequately provided for by the internal road network and private parking provisions.
- Street lighting will be required at the intersections to the Development and within the internal roads.
- To ensure connectivity with Council's Bicycle Strategy and Walking Guide, the Developer is to provide footpaths and on-road bike lanes – or footpaths that are widened to be classified as shared paths. As this shared path will be utilised for both commuting and local access purposes, the minimum width of 2.5m is recommended.
- The provision of slow points (shifting of vehicle paths laterally) between 100m to 140m apart are required along the main north/south and east/west streets to ensure that the required 30 to 50-km/h speed restrictions are maintained along their lengths.
-

- Safety improvement of the Wren Street / Rutherford Road intersection operation can be achieved by the reduction of the existing 100-km/h speed zone to 80-km/h, commencing from Wren Street to Toolamba-Rushworth / Rutherford Road intersection.
- Based on the analysis undertaken the recommended trigger points for various works are as follows: -
  - Construction of the Wren Street / North-South intersection at Stage 1.
  - Linemarking of pedestrian/cyclist facilities along Wren Street (Rutherford Road to Londregan Lane) at Stage 6.
  - Construction of the Rutherford Road / East-West intersection at Stage 6 including the reduction of the existing 100-km/h speed zone to 50-km/h, commencing at the southern end of the development, along Rutherford Road to Wren Street. This point is also the anticipated connection point to the future on-ramp to the Shepparton Bypass to Melbourne.
  - Construction of pedestrian/cyclist facilities along Rutherford Road (Rutherford Road / East-West) to Wren Street at the completion of Stage 6.
- Accordingly, it is concluded the traffic related issues should not form an impediment to the approval of this Residential Development.

8.2 Pre Shepparton Bypass

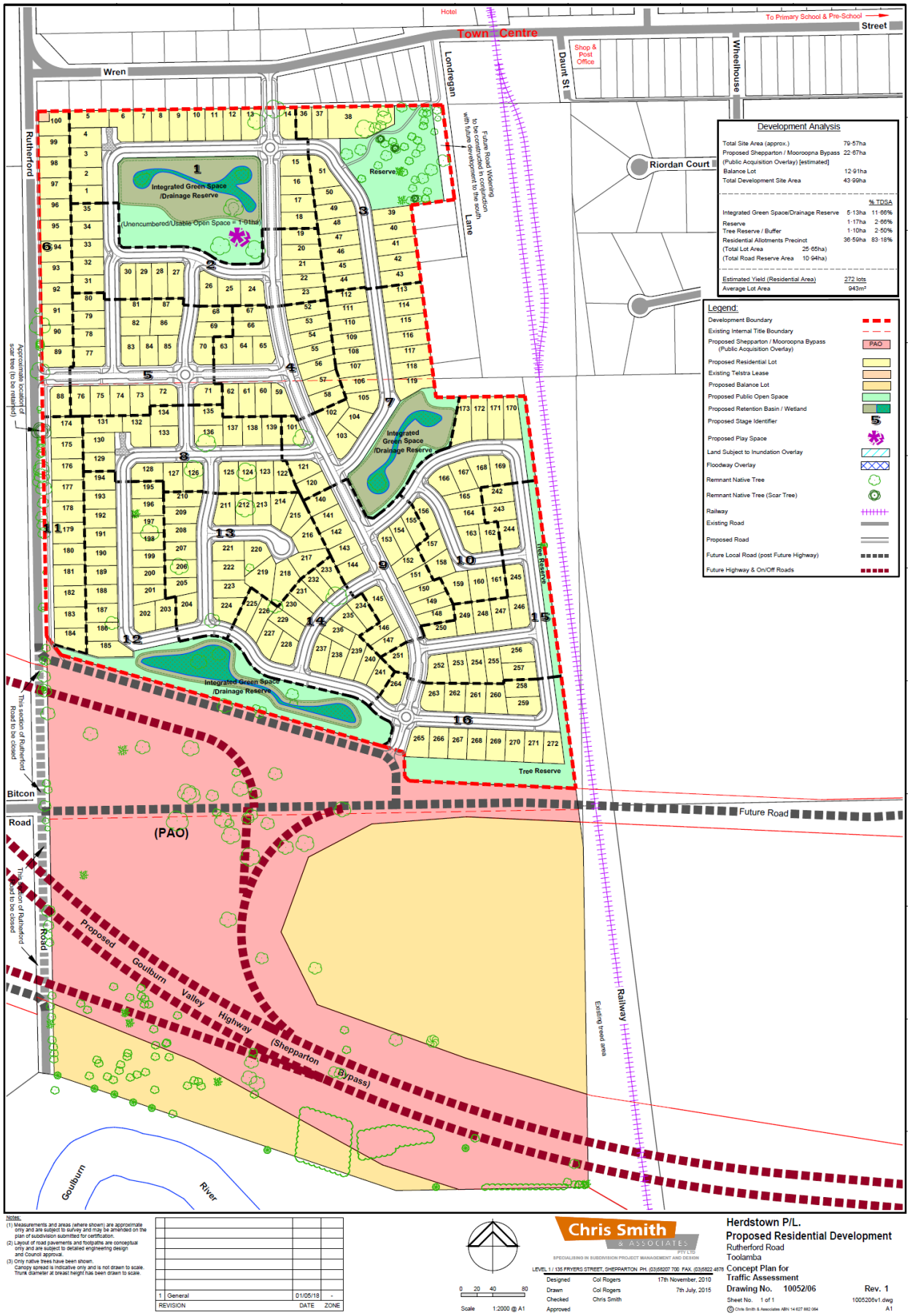
- In conjunction with Council, look into the feasibility to provide pedestrian/cyclist access to the Goulburn River via Rutherford Road, with the provision of end-of-trip facilities.

8.3 Post Shepparton Bypass

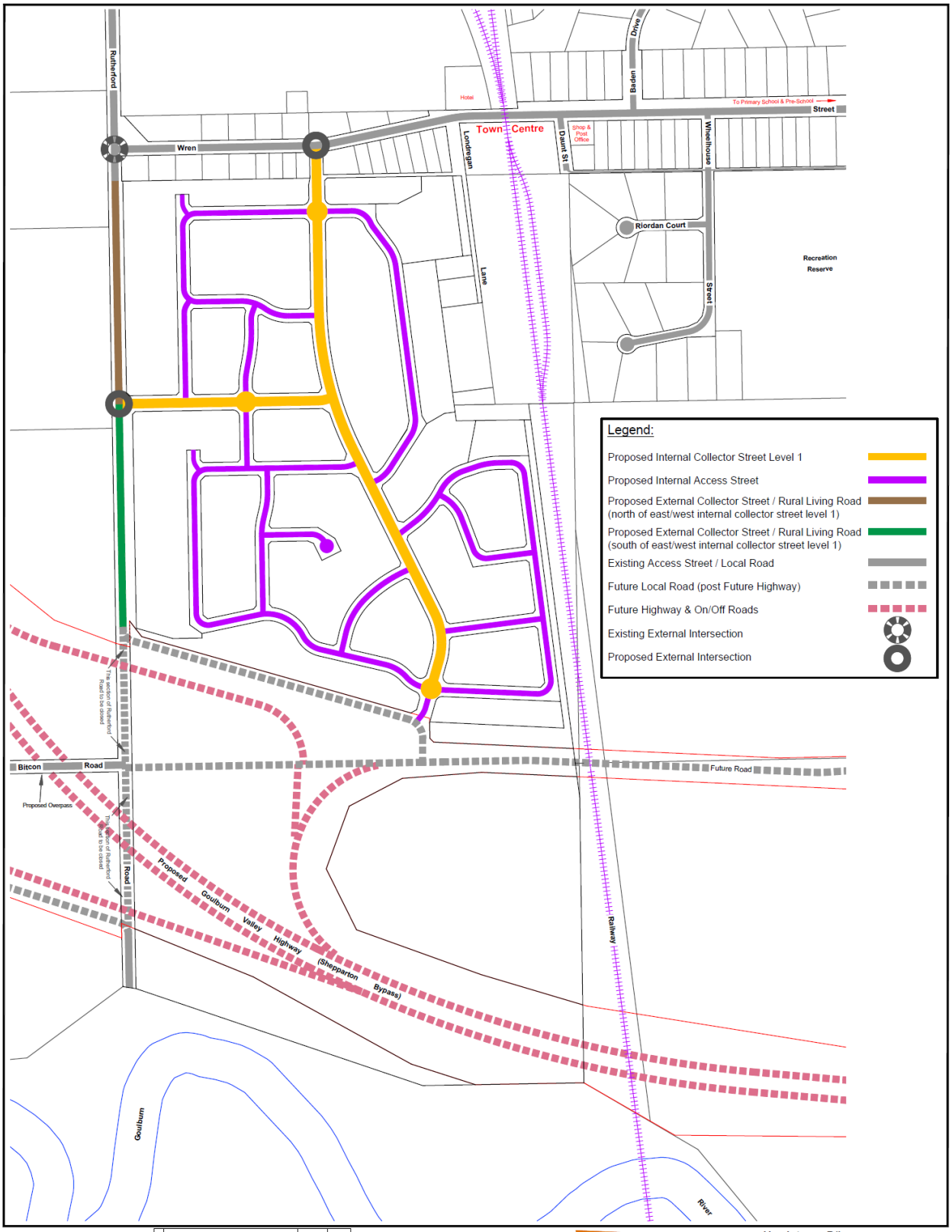
- Most of the traffic generation utilising the Shepparton Bypass within this region will be from the west of Toolamba, which has a denser regional demographic than the north-eastern side, hence utilising Bitcon Road. The additional traffic utilising Rutherford Road or the North-South internal road will mainly come from the township itself, which have the spare capacity to cater for this increase without detriment to the road user.

APPENDIX A
Plans

Concept Plan for Traffic Assessment



Road Hierarchy Plan



REVISION		DATE	ZONE
4	General	2/05/18	-
3	General	10/2/17	-
2	No. of Sheets	25/5/16	-
1	General	24/2/16	-

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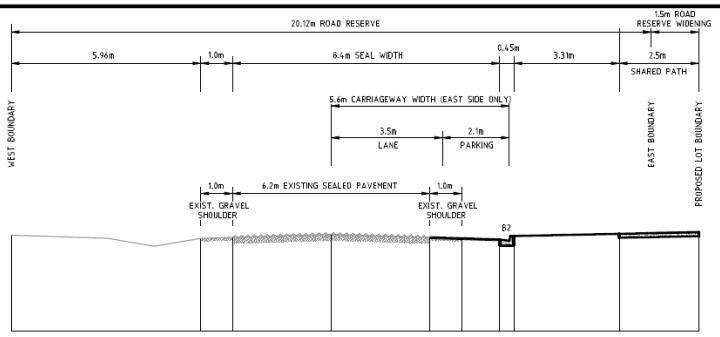
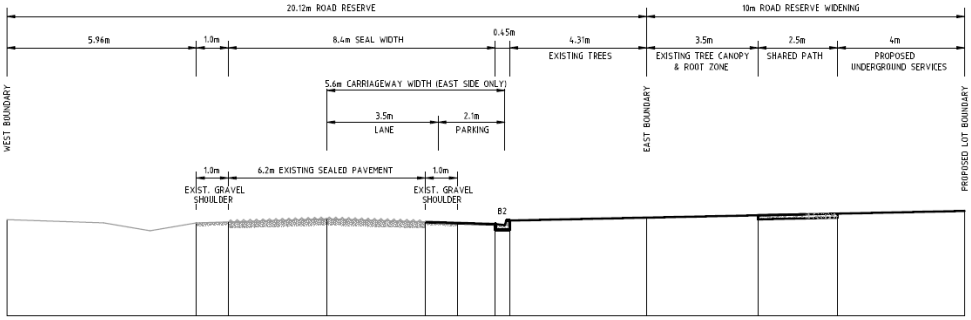
Designed	Col Rogers	19th February, 2015
Drawn	Col Rogers	3rd July, 2015
Checked	Gary Steigenberger	
Approved		

Herdstown P/L.
Residential Development
Rutherford Road
Toolamba
Precinct Structure Plan:
Road Hierarchy Plan
Drawing No. 15018/04 **Rev. 4**
Sheet No. 4 of 6 15018_PSPv4.dwg
A3

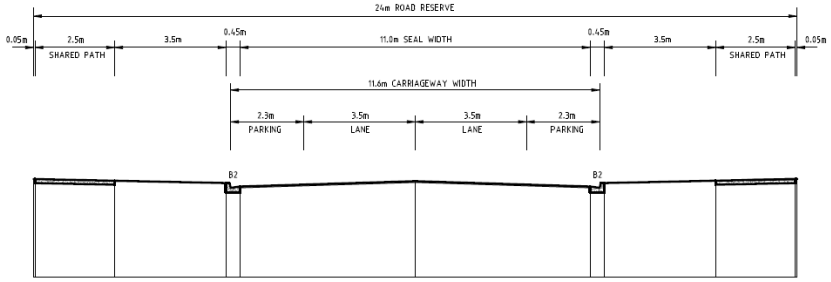
Typical Cross Sections – Road Reserve



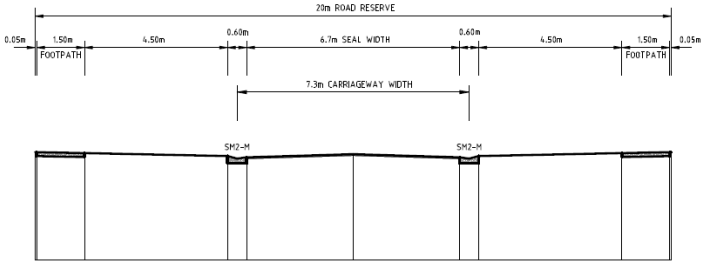
TYPICAL CROSS SECTION - EXTERNAL COLLECTOR / RURAL LIVING
(RUTHERFORD ROAD - LOTS NORTH OF EAST/WEST INTERNAL COLLECTOR ROAD)



TYPICAL CROSS SECTION - EXTERNAL COLLECTOR / RURAL LIVING
(RUTHERFORD ROAD - LOTS SOUTH OF EAST/WEST INTERNAL COLLECTOR ROAD)



TYPICAL CROSS SECTION - INTERNAL COLLECTOR LEVEL 1



TYPICAL CROSS SECTION - INTERNAL ACCESS STREET

4	General	1/05/18	-
3	General	26/6/17	-
2	Notes	24/2/16	-
1	General	01/2/16	-
REVISION		DATE	ZONE

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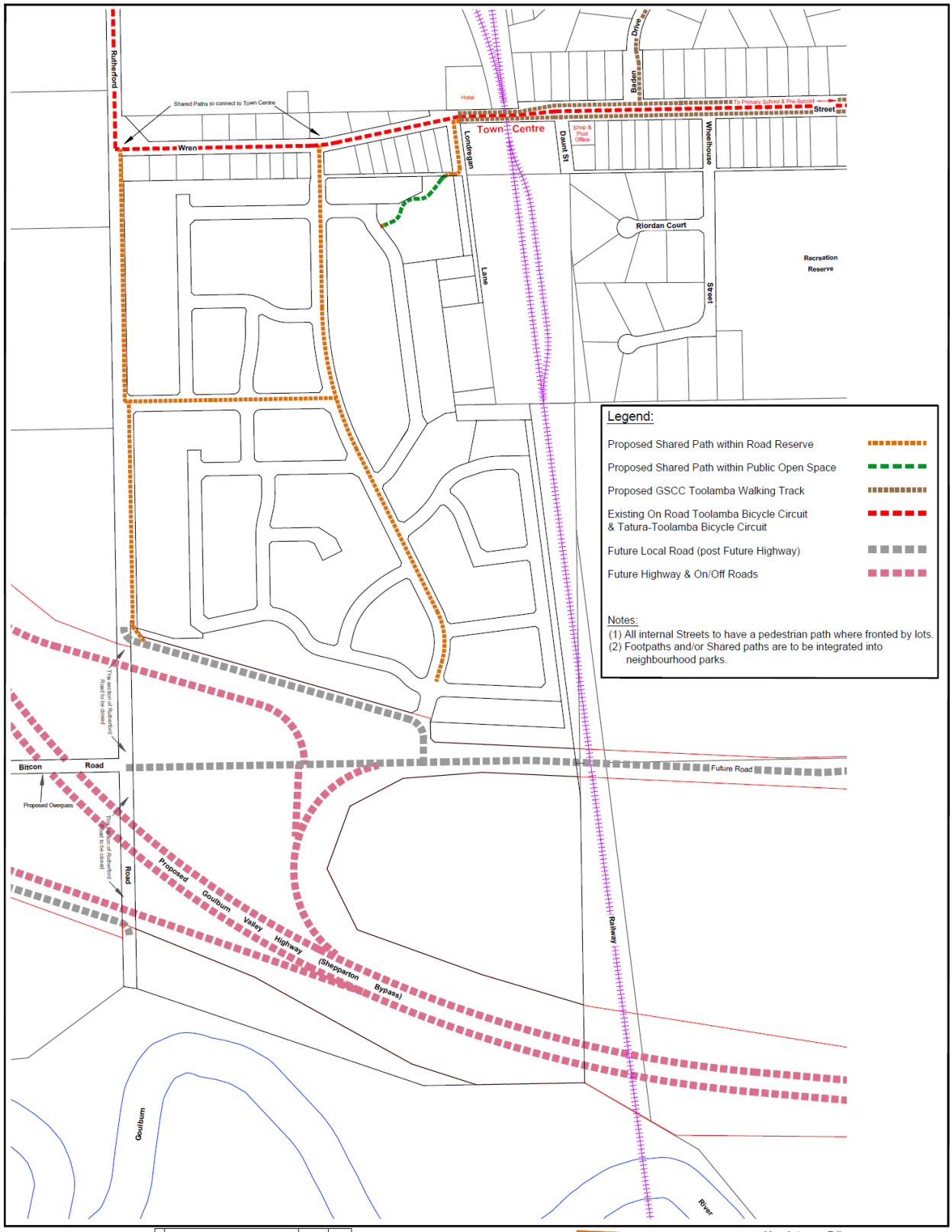
Designed		
Drawn	Lisa Stevens / Col Rogers	July 2015
Checked	Chris Smith	July 2015
Approved		

Mr. S. Rea
Proposed Residential Development
Rutherford Road, Toolamba

Typical Cross Sections - Road Reserves

Drawing No. 10052/TS01 **Rev. 4**
Sheet No. 1 of 1 10052_TS01v4.dwg
A4

Proposed Pedestrian & Bicycle Network Plan



REVISION	DATE	ZONE
4 General	2/05/18	-
3 General	10/2/17	-
2 No. of Sheets	25/5/16	-
1 General	24/2/16	-

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Approved		

Herdstown P/L.
Residential Development
Rutherford Road
Toolamba
Precinct Structure Plan:
Bicycle & Pedestrian Network Plan
Drawing No. 15018/05 **Rev. 4**
Sheet No. 5 of 6 15018_PSPv4.dwg
A3

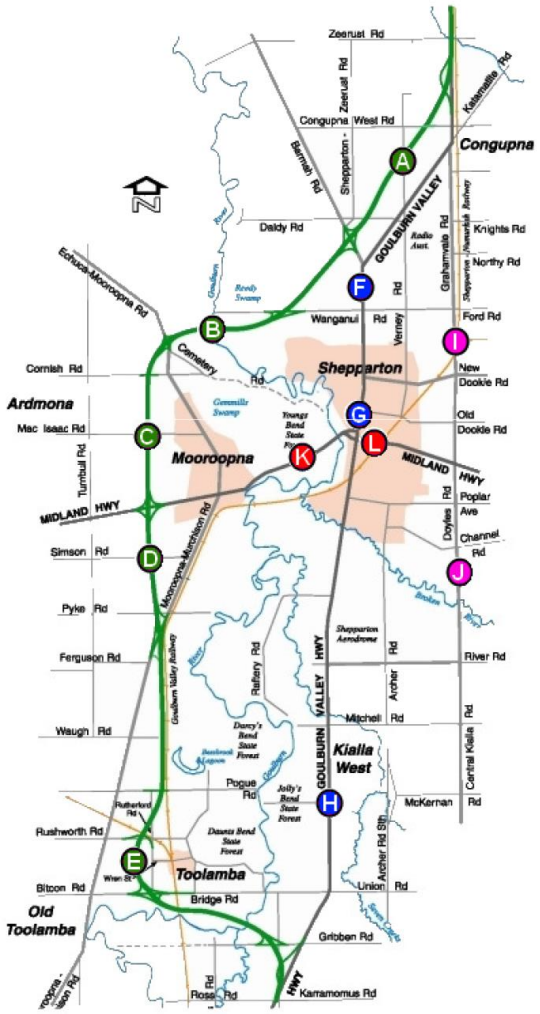
Traffic Volumes – All Traffic (2041)

Shepparton Bypass

- A: 7,000
- B: 13,100
- C: 7,700
- D: 6,300
- E: 5,500

Goulburn Valley Highway

- F: 13,700
- G: 12,300
- H: 9,600



Shepparton Alternative Route

- I: 5,600
- J: 6,400

Midland Highway

- K: 32,800
- L: 17,700

Two-Way
24-Hour

APPENDIX B
Intersection Analysis

Movement Summaries

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren Existing AM Peak]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	12	7.8	0.009	0.1	LOS A	0.0	0.2	0.08	0.21	0.08	92.0
3	R2	5	3.3	0.009	7.6	LOS A	0.0	0.2	0.08	0.21	0.08	61.8
Approach		17	6.4	0.009	2.4	NA	0.0	0.2	0.08	0.21	0.08	81.9
East: Wren Street												
4	L2	1	3.3	0.027	4.6	LOS A	0.1	0.6	0.09	0.54	0.09	53.2
6	R2	33	3.3	0.027	4.7	LOS A	0.1	0.6	0.09	0.54	0.09	57.4
Approach		34	3.3	0.027	4.7	LOS A	0.1	0.6	0.09	0.54	0.09	57.3
North: Rutherford Road												
7	L2	37	3.3	0.023	7.9	LOS A	0.0	0.0	0.00	0.58	0.00	51.9
8	T1	5	7.8	0.023	0.0	LOS A	0.0	0.0	0.00	0.58	0.00	82.0
Approach		42	3.9	0.023	6.9	NA	0.0	0.0	0.00	0.58	0.00	54.6
All Vehicles		93	4.1	0.027	5.3	NA	0.1	0.6	0.05	0.50	0.05	59.2

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren Existing PM Peak]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	7	7.8	0.012	0.1	LOS A	0.1	0.4	0.14	0.40	0.14	85.5
3	R2	13	3.3	0.012	7.6	LOS A	0.1	0.4	0.14	0.40	0.14	57.9
Approach		20	5.0	0.012	4.9	NA	0.1	0.4	0.14	0.40	0.14	67.4
East: Wren Street												
4	L2	13	3.3	0.040	4.6	LOS A	0.1	1.0	0.08	0.53	0.08	53.2
6	R2	39	3.3	0.040	4.8	LOS A	0.1	1.0	0.08	0.53	0.08	57.4
Approach		52	3.3	0.040	4.8	LOS A	0.1	1.0	0.08	0.53	0.08	56.5
North: Rutherford Road												
7	L2	45	3.3	0.033	7.9	LOS A	0.0	0.0	0.00	0.51	0.00	52.7
8	T1	15	7.8	0.033	0.0	LOS A	0.0	0.0	0.00	0.51	0.00	84.0
Approach		60	4.4	0.033	6.0	NA	0.0	0.0	0.00	0.51	0.00	58.5
All Vehicles		132	4.1	0.040	5.3	NA	0.1	1.0	0.05	0.50	0.05	58.8

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development AM Peak]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	105	7.8	0.067	0.1	LOS A	0.1	0.7	0.06	0.09	0.06	96.0
3	R2	16	3.3	0.067	7.8	LOS A	0.1	0.7	0.06	0.09	0.06	64.3
Approach		121	7.2	0.067	1.1	NA	0.1	0.7	0.06	0.09	0.06	91.5
East: Wren Street												
4	L2	4	3.3	0.100	4.7	LOS A	0.3	2.4	0.24	0.57	0.24	52.6
6	R2	104	3.3	0.100	5.3	LOS A	0.3	2.4	0.24	0.57	0.24	56.8
Approach		108	3.3	0.100	5.3	LOS A	0.3	2.4	0.24	0.57	0.24	56.6
North: Rutherford Road												
7	L2	55	3.3	0.050	7.9	LOS A	0.0	0.0	0.00	0.41	0.00	53.9
8	T1	36	7.8	0.050	0.0	LOS A	0.0	0.0	0.00	0.41	0.00	86.7
Approach		91	5.1	0.050	4.8	NA	0.0	0.0	0.00	0.41	0.00	64.0
All Vehicles		320	5.3	0.100	3.6	NA	0.3	2.4	0.10	0.34	0.10	69.2

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development PM Peak]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	36	7.8	0.036	0.5	LOS A	0.1	1.0	0.25	0.26	0.25	88.3
3	R2	23	3.3	0.036	8.2	LOS A	0.1	1.0	0.25	0.26	0.25	59.6
Approach		59	6.0	0.036	3.5	NA	0.1	1.0	0.25	0.26	0.25	76.3
East: Wren Street												
4	L2	16	3.3	0.087	5.0	LOS A	0.3	2.1	0.28	0.58	0.28	52.4
6	R2	78	3.3	0.087	5.6	LOS A	0.3	2.1	0.28	0.58	0.28	56.6
Approach		94	3.3	0.087	5.5	LOS A	0.3	2.1	0.28	0.58	0.28	55.9
North: Rutherford Road												
7	L2	106	3.3	0.125	7.9	LOS A	0.0	0.0	0.00	0.31	0.00	55.0
8	T1	123	7.8	0.125	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	89.4
Approach		229	5.7	0.125	3.7	NA	0.0	0.0	0.00	0.31	0.00	70.1
All Vehicles		382	5.2	0.125	4.1	NA	0.3	2.1	0.11	0.37	0.11	67.0

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development AM Peak - N/S Blocked]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	180	7.8	0.154	0.2	LOS A	0.6	4.1	0.14	0.22	0.14	90.7
3	R2	91	3.3	0.154	7.8	LOS A	0.6	4.1	0.14	0.22	0.14	61.1
Approach		271	6.3	0.154	2.7	NA	0.6	4.1	0.14	0.22	0.14	80.1
East: Wren Street												
4	L2	19	3.3	0.048	4.8	LOS A	0.2	1.2	0.17	0.55	0.17	52.4
6	R2	33	3.3	0.048	6.0	LOS A	0.2	1.2	0.17	0.55	0.17	56.6
Approach		52	3.3	0.048	5.6	LOS A	0.2	1.2	0.17	0.55	0.17	55.2
North: Rutherford Road												
7	L2	37	3.3	0.049	7.9	LOS A	0.0	0.0	0.00	0.28	0.00	55.5
8	T1	54	7.8	0.049	0.0	LOS A	0.0	0.0	0.00	0.28	0.00	90.5
Approach		91	6.0	0.049	3.2	NA	0.0	0.0	0.00	0.28	0.00	72.8
All Vehicles		413	5.8	0.154	3.2	NA	0.6	4.1	0.12	0.27	0.12	74.5

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development PM Peak - N/S Blocked]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	62	7.8	0.070	0.6	LOS A	0.3	2.2	0.29	0.30	0.29	86.9
3	R2	52	3.3	0.070	8.3	LOS A	0.3	2.2	0.29	0.30	0.29	58.8
Approach		114	5.8	0.070	4.1	NA	0.3	2.2	0.29	0.30	0.29	73.5
East: Wren Street												
4	L2	81	3.3	0.101	5.2	LOS A	0.4	2.8	0.30	0.56	0.30	52.2
6	R2	39	3.3	0.101	6.0	LOS A	0.4	2.8	0.30	0.56	0.30	56.4
Approach		120	3.3	0.101	5.5	LOS A	0.4	2.8	0.30	0.56	0.30	53.7
North: Rutherford Road												
7	L2	45	3.3	0.125	7.9	LOS A	0.0	0.0	0.00	0.13	0.00	57.3
8	T1	184	7.8	0.125	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	95.1
Approach		229	6.9	0.125	1.6	NA	0.0	0.0	0.00	0.13	0.00	84.9
All Vehicles		463	5.7	0.125	3.2	NA	0.4	2.8	0.15	0.29	0.15	72.5

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development AM Peak - E/W Blocked]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	17	7.8	0.019	0.2	LOS A	0.1	0.6	0.18	0.31	0.18	87.6
3	R2	16	3.3	0.019	7.8	LOS A	0.1	0.6	0.18	0.31	0.18	59.2
Approach		33	5.6	0.019	3.9	NA	0.1	0.6	0.18	0.31	0.18	73.1
East: Wren Street												
4	L2	16	3.3	0.187	4.6	LOS A	0.7	5.0	0.13	0.55	0.13	53.0
6	R2	207	3.3	0.187	5.0	LOS A	0.7	5.0	0.13	0.55	0.13	57.2
Approach		223	3.3	0.187	5.0	LOS A	0.7	5.0	0.13	0.55	0.13	57.0
North: Rutherford Road												
7	L2	96	3.3	0.059	7.9	LOS A	0.0	0.0	0.00	0.60	0.00	51.7
8	T1	11	7.8	0.059	0.0	LOS A	0.0	0.0	0.00	0.60	0.00	81.6
Approach		106	3.7	0.059	7.1	NA	0.0	0.0	0.00	0.60	0.00	53.8
All Vehicles		362	3.6	0.187	5.5	NA	0.7	5.0	0.10	0.54	0.10	57.1

MOVEMENT SUMMARY

▽ Site: 1 [Rutherford Wren + Development PM Peak - E/W Blocked]

Existing Rutherford Road / Wren Street Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Road												
2	T1	20	7.8	0.028	0.7	LOS A	0.1	0.9	0.32	0.35	0.32	85.3
3	R2	23	3.3	0.028	8.3	LOS A	0.1	0.9	0.32	0.35	0.32	57.8
Approach		43	5.4	0.028	4.8	NA	0.1	0.9	0.32	0.35	0.32	69.9
East: Wren Street												
4	L2	20	3.3	0.135	4.7	LOS A	0.5	3.4	0.19	0.56	0.19	52.8
6	R2	131	3.3	0.135	5.4	LOS A	0.5	3.4	0.19	0.56	0.19	57.0
Approach		151	3.3	0.135	5.3	LOS A	0.5	3.4	0.19	0.56	0.19	56.5
North: Rutherford Road												
7	L2	220	3.3	0.139	7.9	LOS A	0.0	0.0	0.00	0.58	0.00	51.9
8	T1	33	7.8	0.139	0.0	LOS A	0.0	0.0	0.00	0.58	0.00	82.1
Approach		253	3.9	0.139	6.9	NA	0.0	0.0	0.00	0.58	0.00	54.7
All Vehicles		446	3.8	0.139	6.2	NA	0.5	3.4	0.09	0.55	0.09	56.4

MOVEMENT SUMMARY

▽ Site: 2 [Rutherford + Development AM Peak]

Proposed Rutherford Road / Development E/W Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Rd												
2	T1	17	7.8	0.011	0.0	LOS A	0.0	0.1	0.04	0.11	0.04	95.6
3	R2	3	1.0	0.011	7.5	LOS A	0.0	0.1	0.04	0.11	0.04	73.4
Approach		20	6.7	0.011	1.2	NA	0.0	0.1	0.04	0.11	0.04	92.1
East: Development E/W												
4	L2	12	1.0	0.091	4.6	LOS A	0.3	2.2	0.09	0.54	0.09	60.2
6	R2	103	1.0	0.091	4.8	LOS A	0.3	2.2	0.09	0.54	0.09	54.2
Approach		115	1.0	0.091	4.7	LOS A	0.3	2.2	0.09	0.54	0.09	54.9
North: Rutherford Rd												
7	L2	25	1.0	0.020	7.9	LOS A	0.0	0.0	0.00	0.48	0.00	39.4
8	T1	11	7.8	0.020	0.0	LOS A	0.0	0.0	0.00	0.48	0.00	84.8
Approach		36	3.0	0.020	5.6	NA	0.0	0.0	0.00	0.48	0.00	50.3
All Vehicles		171	2.1	0.091	4.5	NA	0.3	2.2	0.06	0.48	0.06	57.5

MOVEMENT SUMMARY

▽ Site: 2 [Rutherford + Development PM Peak]

Proposed Rutherford Road / Development E/W Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Rd												
2	T1	20	7.8	0.017	0.2	LOS A	0.1	0.4	0.15	0.22	0.15	90.3
3	R2	11	1.0	0.017	7.8	LOS A	0.1	0.4	0.15	0.22	0.15	69.3
Approach		31	5.5	0.017	2.8	NA	0.1	0.4	0.15	0.22	0.15	83.0
East: Development E/W												
4	L2	4	1.0	0.036	4.7	LOS A	0.1	0.8	0.16	0.54	0.16	59.8
6	R2	39	1.0	0.036	5.0	LOS A	0.1	0.8	0.16	0.54	0.16	53.8
Approach		43	1.0	0.036	4.9	LOS A	0.1	0.8	0.16	0.54	0.16	54.5
North: Rutherford Rd												
7	L2	91	1.0	0.067	7.9	LOS A	0.0	0.0	0.00	0.49	0.00	39.2
8	T1	33	7.8	0.067	0.0	LOS A	0.0	0.0	0.00	0.49	0.00	84.3
Approach		123	2.8	0.067	5.8	NA	0.0	0.0	0.00	0.49	0.00	48.9
All Vehicles		197	2.8	0.067	5.1	NA	0.1	0.8	0.06	0.46	0.06	54.3

MOVEMENT SUMMARY

▽ Site: 2 [Rutherford + Development AM Peak - N/S Blocked]

Proposed Rutherford Road / Development E/W Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Rd												
2	T1	17	7.8	0.011	0.0	LOS A	0.0	0.1	0.06	0.11	0.06	95.4
3	R2	3	1.0	0.011	7.6	LOS A	0.0	0.1	0.06	0.11	0.06	73.2
Approach		20	6.7	0.011	1.2	NA	0.0	0.1	0.06	0.11	0.06	91.9
East: Development E/W												
4	L2	14	1.0	0.210	4.6	LOS A	0.8	5.7	0.13	0.54	0.13	60.0
6	R2	245	1.0	0.210	4.9	LOS A	0.8	5.7	0.13	0.54	0.13	54.0
Approach		259	1.0	0.210	4.8	LOS A	0.8	5.7	0.13	0.54	0.13	54.4
North: Rutherford Rd												
7	L2	61	1.0	0.039	7.9	LOS A	0.0	0.0	0.00	0.57	0.00	38.6
8	T1	11	7.8	0.039	0.0	LOS A	0.0	0.0	0.00	0.57	0.00	82.3
Approach		72	2.0	0.039	6.7	NA	0.0	0.0	0.00	0.57	0.00	43.7
All Vehicles		351	1.5	0.210	5.0	NA	0.8	5.7	0.10	0.52	0.10	53.4

MOVEMENT SUMMARY

▽ Site: 2 [Rutherford + Development PM Peak - N/S Blocked]

Proposed Rutherford Road / Development E/W Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Rutherford Rd												
2	T1	20	7.8	0.018	0.4	LOS A	0.1	0.5	0.23	0.23	0.23	89.3
3	R2	11	1.0	0.018	8.2	LOS A	0.1	0.5	0.23	0.23	0.23	68.6
Approach		31	5.5	0.018	3.1	NA	0.1	0.5	0.23	0.23	0.23	82.1
East: Development E/W												
4	L2	7	1.0	0.088	4.7	LOS A	0.3	2.1	0.20	0.56	0.20	59.6
6	R2	92	1.0	0.088	5.2	LOS A	0.3	2.1	0.20	0.56	0.20	53.6
Approach		99	1.0	0.088	5.2	LOS A	0.3	2.1	0.20	0.56	0.20	54.1
North: Rutherford Rd												
7	L2	213	1.0	0.134	7.9	LOS A	0.0	0.0	0.00	0.58	0.00	38.5
8	T1	33	7.8	0.134	0.0	LOS A	0.0	0.0	0.00	0.58	0.00	82.1
Approach		245	1.9	0.134	6.8	NA	0.0	0.0	0.00	0.58	0.00	43.1
All Vehicles		375	2.0	0.134	6.1	NA	0.3	2.1	0.07	0.55	0.07	48.0

MOVEMENT SUMMARY

▽ Site: 3 [Wren + Development AM Peak]

Wren Street / Development N/S Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Development N/S Rd												
1	L2	71	1.0	0.105	4.7	LOS A	0.4	2.8	0.11	0.53	0.11	42.8
3	R2	71	1.0	0.105	5.0	LOS A	0.4	2.8	0.11	0.53	0.11	41.6
Approach		141	1.0	0.105	4.8	LOS A	0.4	2.8	0.11	0.53	0.11	42.2
East: Wren Street												
4	L2	18	3.3	0.028	4.6	LOS A	0.0	0.0	0.00	0.19	0.00	46.6
5	T1	34	3.3	0.028	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	48.1
Approach		52	3.3	0.028	1.6	NA	0.0	0.0	0.00	0.19	0.00	47.6
West: Wren Street												
11	T1	53	3.3	0.039	0.1	LOS A	0.1	0.7	0.07	0.14	0.07	48.2
12	R2	18	3.3	0.039	4.8	LOS A	0.1	0.7	0.07	0.14	0.07	45.9
Approach		71	3.3	0.039	1.2	NA	0.1	0.7	0.07	0.14	0.07	47.7
All Vehicles		263	2.1	0.105	3.2	NA	0.4	2.8	0.08	0.36	0.08	44.7

MOVEMENT SUMMARY

▽ Site: 3 [Wren + Development PM Peak]

Wren Street / Development N/S Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Development N/S Rd												
1	L2	26	1.0	0.042	4.7	LOS A	0.1	1.0	0.14	0.53	0.14	42.7
3	R2	26	1.0	0.042	5.3	LOS A	0.1	1.0	0.14	0.53	0.14	41.5
Approach		53	1.0	0.042	5.0	LOS A	0.1	1.0	0.14	0.53	0.14	42.1
East: Wren Street												
4	L2	61	3.3	0.061	4.6	LOS A	0.0	0.0	0.00	0.29	0.00	45.4
5	T1	52	3.3	0.061	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	47.1
Approach		113	3.3	0.061	2.5	NA	0.0	0.0	0.00	0.29	0.00	46.3
West: Wren Street												
11	T1	68	3.3	0.075	0.3	LOS A	0.3	2.3	0.19	0.26	0.19	46.6
12	R2	61	3.3	0.075	5.0	LOS A	0.3	2.3	0.19	0.26	0.19	44.1
Approach		129	3.3	0.075	2.5	NA	0.3	2.3	0.19	0.26	0.19	45.5
All Vehicles		295	2.9	0.075	2.9	NA	0.3	2.3	0.11	0.32	0.11	45.2

MOVEMENT SUMMARY

▽ Site: 3 [Wren + Development AM Peak - E/W Blocked]

Wren Street / Development N/S Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Development N/S Rd												
1	L2	185	1.0	0.183	4.7	LOS A	0.8	5.5	0.11	0.52	0.11	42.8
3	R2	75	1.0	0.183	5.2	LOS A	0.8	5.5	0.11	0.52	0.11	41.7
Approach		260	1.0	0.183	4.8	LOS A	0.8	5.5	0.11	0.52	0.11	42.5
East: Wren St												
4	L2	19	3.3	0.028	4.6	LOS A	0.0	0.0	0.00	0.19	0.00	46.5
5	T1	34	3.3	0.028	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	48.0
Approach		53	3.3	0.028	1.7	NA	0.0	0.0	0.00	0.19	0.00	47.5
West: Wren Street												
11	T1	53	3.3	0.056	0.1	LOS A	0.2	1.6	0.12	0.25	0.12	46.9
12	R2	46	3.3	0.056	4.8	LOS A	0.2	1.6	0.12	0.25	0.12	44.5
Approach		99	3.3	0.056	2.3	NA	0.2	1.6	0.12	0.25	0.12	45.8
All Vehicles		412	1.8	0.183	3.8	NA	0.8	5.5	0.10	0.41	0.10	43.9

MOVEMENT SUMMARY

▽ Site: 3 [Wren + Development PM Peak - E/W Blocked]

Wren Street / Development N/S Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Development N/S Rd												
1	L2	69	1.0	0.074	4.7	LOS A	0.3	2.0	0.12	0.53	0.12	42.7
3	R2	28	1.0	0.074	5.9	LOS A	0.3	2.0	0.12	0.53	0.12	41.6
Approach		98	1.0	0.074	5.1	LOS A	0.3	2.0	0.12	0.53	0.12	42.4
East: Wren St												
4	L2	65	3.3	0.064	4.6	LOS A	0.0	0.0	0.00	0.30	0.00	45.3
5	T1	52	3.3	0.064	0.0	LOS A	0.0	0.0	0.00	0.30	0.00	47.0
Approach		117	3.3	0.064	2.6	NA	0.0	0.0	0.00	0.30	0.00	46.1
West: Wren Street												
11	T1	68	3.3	0.139	0.4	LOS A	0.7	5.0	0.24	0.38	0.24	45.3
12	R2	162	3.3	0.139	5.0	LOS A	0.7	5.0	0.24	0.38	0.24	42.8
Approach		231	3.3	0.139	3.6	NA	0.7	5.0	0.24	0.38	0.24	43.6
All Vehicles		445	2.8	0.139	3.7	NA	0.7	5.0	0.15	0.39	0.15	44.0

APPENDIX C
Traffic Counts

CITY OF GREATER SHEPPARTON

SINGLE DAY TRAFFIC COUNT SUMMARY

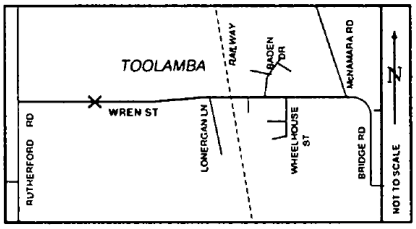
STREET / ROAD

Wren St, Toolamba

LOCATION

between Rutherford Rd and Londregan Ln

MAP



DATE

29 June 2006

DAY

Thursday

SPEED ZONE

50 km/h

FILENAME- wren2706.ec6

TOTAL VOLUMES

HOUR	West bound	East bound	Both Ways Combined
0000-0100	2	1	3
0100-0200	0	1	1
0200-0300	0	0	0
0300-0400	0	0	0
0400-0500	1	2	3
0500-0600	8	2	10
0600-0700	17	3	20
0700-0800	28	17	45
0800-0900	23	11	34
0900-1000	25	19	44
1000-1100	20	35	55
1100-1200	19	21	40
1200-1300	21	24	45
1300-1400	24	27	51
1400-1500	23	23	46
1500-1600	23	28	51
1600-1700	40	48	88
1700-1800	42	34	76
1800-1900	20	31	51
1900-2000	16	19	35
2000-2100	13	30	43
2100-2200	23	10	33
2200-2300	9	9	18
2300-2400	1	4	5
12hour (7-19)	308	318	626
16hour (6-22)	377	380	757
18hour (6-24)	387	393	780
24hour (0-24)	**398**	**399**	**797**
AM peak hour	0700-0800	1000-1100	1000-1100
volume	28	35	55
PM peak hour	1700-1800	1600-1700	1600-1700
volume	42	48	88

NOTES

School holidays.

SPEED ANALYSIS

	West bound		East bound		Both Ways Combined	
	MEAN	85%ile	MEAN	85%ile	MEAN	85%ile
0000-0100	64.1	0.0	57.2	0.0	61.8	0.0
0100-0200	0.0	0.0	58.6	0.0	58.6	0.0
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	45.5	0.0	45.7	0.0	45.6	0.0
0500-0600	53.7	0.0	47.9	0.0	52.5	0.0
0600-0700	59.5	64.4	60.2	0.0	59.6	68.0
0700-0800	53.9	61.6	51.6	55.4	53.0	58.7
0800-0900	56.1	63.4	51.9	56.9	54.7	61.9
0900-1000	52.0	56.5	49.3	56.9	50.8	56.9
1000-1100	50.3	56.2	48.3	57.2	49.0	56.9
1100-1200	50.2	56.2	46.9	55.1	48.5	56.2
1200-1300	54.6	65.5	48.4	54.4	51.3	59.4
1300-1400	51.6	55.4	49.9	55.8	50.7	55.8
1400-1500	50.3	60.8	49.8	56.5	50.1	56.5
1500-1600	50.5	58.0	49.1	54.4	49.7	56.2
1600-1700	50.8	56.2	51.3	57.6	51.1	57.6
1700-1800	52.5	58.7	49.3	56.9	51.1	58.3
1800-1900	54.7	61.6	50.3	54.7	52.0	61.6
1900-2000	52.7	63.7	54.6	60.8	53.7	62.6
2000-2100	50.3	53.6	52.3	58.0	51.7	58.0
2100-2200	54.5	68.0	55.5	0.0	54.8	66.6
2200-2300	52.5	0.0	49.8	0.0	51.2	54.7
2300-2400	46.3	0.0	43.1	0.0	43.7	0.0
TOTAL	52.7	60.5	50.2	57.6	**51.4**	**58.7**

SPEED VOLUMES

SPEED (km/h)	West bound VOL	%	East bound VOL	%	Both Ways Combined VOL	%
00-40	27	6.8%	28	7.0%	55	6.9%
41-50	115	28.9%	162	40.6%	277	34.8%
51-60	192	48.2%	170	42.6%	362	45.4%
61-70	53	13.3%	37	9.3%	90	11.3%
71-80	9	2.3%	2	0.5%	11	1.4%
81-90	2	0.5%	0	0.0%	2	0.3%
91-100	0	0.0%	0	0.0%	0	0.0%
101-110	0	0.0%	0	0.0%	0	0.0%
111-120	0	0.0%	0	0.0%	0	0.0%
121-130	0	0.0%	0	0.0%	0	0.0%
131-140	0	0.0%	0	0.0%	0	0.0%
141-150	0	0.0%	0	0.0%	0	0.0%

CLASS VOLUMES

CLASS	West bound VOL	%	East bound VOL	%	Both Ways Combined VOL	%
1	371	93.2%	375	94.0%	746	93.6%
2	14	3.5%	11	2.8%	25	3.1%
3	11	2.8%	10	2.5%	21	2.6%
4	0	0.0%	1	0.3%	1	0.1%
5	1	0.3%	1	0.3%	2	0.3%
6	0	0.0%	0	0.0%	0	0.0%
7	0	0.0%	1	0.3%	1	0.1%
8	1	0.3%	0	0.0%	1	0.1%
9	0	0.0%	0	0.0%	0	0.0%
10	0	0.0%	0	0.0%	0	0.0%
11	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
13	0	0.0%	0	0.0%	0	0.0%
Commercial (Class 3-12)	13	3.3%	13	3.3%	26	**3.3%**

CLASS	LENGTH (m)	VEHICLE TYPE	AXLES	AXLE GROUPS
1	SHORT <5.5	SHORT VEHICLE	2	1 or 2
2		SHORT VEHICLE TOWING	3 - 5	3
3	MEDIUM	TWO AXLE TRUCK OR BUS	2	2
4	6.5 - 14.5	THREE AXLE TRUCK OR BUS	3	2
5		FOUR AXLE TRUCK	>3	2
6		3 AXLE ARTICULATED VEHICLE	3	3
7	LONG	4 AXLE ARTICULATED VEHICLE	4	>2
8	11.5 - 19.0	5 AXLE ARTICULATED VEHICLE	5	>2
9		6 AXLE ARTICULATED VEHICLE	>5	>2
10	MEDIUM COMBINATION	B-DOUBLE	>6	4
11	17.5-36.5	DOUBLE ROAD TRAIN	>6	5 or 6
12	>33.0	TRIPLE ROAD TRAIN	>6	>6
13	-	ALL OTHER VEHICLES	-	-

For further information, please contact Design Services at Locked Bag 1000, Shepparton 3632.

CITY OF GREATER SHEPPARTON

SINGLE DAY TRAFFIC COUNT SUMMARY

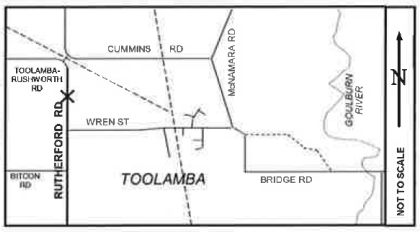
STREET / ROAD

Rutherford Rd, Toolamba

LOCATION

between Toolamba-Rushworth Rd and Wren

MAP



DATE

24 October 2012

DAY

Wednesday

SPEED ZONE

100 km/h

FILENAME- **ruth2410.ec2**

TOTAL VOLUMES

HOUR	South bound	North bound	Both Ways Combined
0000-0100	2	0	2
0100-0200	0	0	0
0200-0300	0	0	0
0300-0400	0	1	1
0400-0500	0	0	0
0500-0600	3	9	12
0600-0700	6	21	27
0700-0800	14	29	43
0800-0900	31	46	77
0900-1000	21	34	55
1000-1100	8	9	17
1100-1200	17	11	28
1200-1300	16	19	35
1300-1400	26	19	45
1400-1500	19	18	37
1500-1600	31	30	61
1600-1700	51	17	68
1700-1800	36	33	69
1800-1900	33	15	48
1900-2000	15	9	24
2000-2100	8	10	18
2100-2200	5	7	12
2200-2300	4	3	7
2300-2400	2	2	4
12hour (7-19)	303	280	583
16hour (6-22)	337	327	664
18hour (6-24)	343	332	675
24hour (0-24)	**348**	**342**	**690**
AM peak hour volume	0800-0900	0800-0900	0800-0900
	31	46	77
PM peak hour volume	1600-1700	1700-1800	1700-1800
	51	33	69

NOTES

SPEED ANALYSIS

	South bound		North bound		Both Ways Combined	
	MEAN	85%ile	MEAN	85%ile	MEAN	85%ile
0000-0100	0.0	0.0	0.0	0.0	0.0	0.0
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.0	82.1	0.0	82.1	0.0
0400-0500	94.3	0.0	0.0	0.0	0.0	0.0
0500-0600	87.8	0.0	82.1	0.0	83.5	94.3
0600-0700	86.0	0.0	75.7	84.6	78.0	87.8
0700-0800	89.6	87.5	77.0	84.6	81.1	86.0
0800-0900	88.9	87.8	80.6	90.4	83.9	89.6
0900-1000	88.6	87.1	76.8	88.9	81.3	88.9
1000-1100	92.5	0.0	72.4	0.0	81.9	88.6
1100-1200	87.5	94.0	72.0	87.5	81.4	92.5
1200-1300	86.0	86.4	78.2	87.5	81.8	87.5
1300-1400	87.8	91.1	74.4	83.9	82.1	86.0
1400-1500	87.5	87.5	75.3	87.8	81.6	87.8
1500-1600	86.8	87.1	76.3	87.5	81.6	87.5
1600-1700	88.2	86.4	77.3	85.7	85.5	86.8
1700-1800	93.2	88.2	77.4	84.6	85.6	88.2
1800-1900	88.6	94.0	70.5	82.8	82.9	93.2
1900-2000	92.5	90.4	79.6	0.0	87.7	88.6
2000-2100	85.7	0.0	85.6	0.0	85.6	92.5
2100-2200	79.0	0.0	82.4	0.0	81.0	85.7
2200-2300	70.9	0.0	88.1	0.0	78.3	0.0
2300-2400	77.4	0.0	75.4	0.0	76.4	0.0
TOTAL	79.3	90.4	77.3	88.6	**78.3**	**89.3**

85th %ile not calculated for less than 10 vehicles.

SPEED VOLUMES

SPEED (km/h)	South bound VOL	%	North bound VOL	%	Both Ways Combined VOL	%
00-40	0	0.0%	0	0.0%	0	0.0%
41-50	6	1.7%	4	1.2%	10	1.4%
51-60	12	3.4%	15	4.4%	27	3.9%
61-70	50	14.4%	66	19.3%	116	16.8%
71-80	102	29.3%	113	33.0%	215	31.2%
81-90	123	35.3%	100	29.2%	223	32.3%
91-100	42	12.1%	36	10.5%	78	11.3%
101-110	12	3.4%	8	2.3%	20	2.9%
111-120	1	0.3%	0	0.0%	1	0.1%
121-130	0	0.0%	0	0.0%	0	0.0%
131-140	0	0.0%	0	0.0%	0	0.0%
141-150	0	0.0%	0	0.0%	0	0.0%

CLASS VOLUMES

CLASS	South bound VOL	%	North bound VOL	%	Both Ways Combined VOL	%
1	310	89.1%	310	90.6%	620	89.9%
2	11	3.2%	5	1.5%	16	2.3%
3	23	6.6%	23	6.7%	46	6.7%
4	3	0.9%	2	0.6%	5	0.7%
5	0	0.0%	1	0.3%	1	0.1%
6	1	0.3%	1	0.3%	2	0.3%
7	0	0.0%	0	0.0%	0	0.0%
8	0	0.0%	0	0.0%	0	0.0%
9	0	0.0%	0	0.0%	0	0.0%
10	0	0.0%	0	0.0%	0	0.0%
11	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
13	0	0.0%	0	0.0%	0	0.0%
Commercial (Class 3-12)	27	7.8%	27	7.9%	54	**7.8%**

CLASS	LENGTH (m)	VEHICLE TYPE	AXLES	AXLE GROUPS
1	SHORT <5.5	SHORT VEHICLE	2	1 or 2
2		SHORT VEHICLE TOWING	3 - 5	3
3	MEDIUM	TWO AXLE TRUCK OR BUS	2	2
4	6.5 - 14.5	THREE AXLE TRUCK OR BUS	3	2
5		FOUR AXLE TRUCK	>3	2
6		3 AXLE ARTICULATED VEHICLE	3	3
7	LONG	4 AXLE ARTICULATED VEHICLE	4	>2
8	11.5 - 19.0	5 AXLE ARTICULATED VEHICLE	5	>2
9		6 AXLE ARTICULATED VEHICLE	>5	>2
10	MEDIUM COMBINATION	B-DOUBLE	>6	4
11	17.5-36.5	DOUBLE ROAD TRAIN	>6	5 or 6
12	>33.0	TRIPLE ROAD TRAIN	>6	>6
13	-	ALL OTHER VEHICLES	-	-

For further information, please contact Design Services at Locked Bag 1000, Shepparton 3632.

CITY OF GREATER SHEPPARTON

SINGLE DAY TRAFFIC COUNT SUMMARY

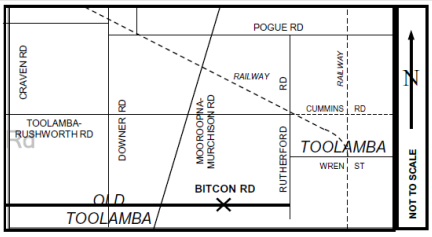
STREET / ROAD

Bitcon Rd, Toolamba

LOCATION

b/w Mooroopna-Murchison Rd & Rutherford

MAP



DATE

27 May 2009

DAY

Wednesday

SPEED ZONE

100 km/h

FILENAME- bitc2605.ec9

TOTAL VOLUMES

HOUR	West bound	East bound	Both Ways Combined
0000-0100	0	1	1
0100-0200	0	0	0
0200-0300	0	0	0
0300-0400	1	0	1
0400-0500	0	0	0
0500-0600	1	3	4
0600-0700	2	9	11
0700-0800	5	6	11
0800-0900	5	14	19
0900-1000	3	6	9
1000-1100	4	11	15
1100-1200	5	5	10
1200-1300	8	9	17
1300-1400	4	4	8
1400-1500	7	9	16
1500-1600	10	14	24
1600-1700	11	17	28
1700-1800	23	6	29
1800-1900	6	4	10
1900-2000	4	5	9
2000-2100	8	5	13
2100-2200	2	1	3
2200-2300	1	1	2
2300-2400	0	2	2
12hour (7-19)	91	105	196
16hour (6-22)	107	125	232
18hour (6-24)	108	128	236
24hour (0-24)	**110**	**132**	**242**
AM peak hour volume	0700-0800	0800-0900	0800-0900
	5	14	19
PM peak hour volume	1700-1800	1600-1700	1700-1800
	23	17	29

SPEED ANALYSIS

	West bound		East bound		Both Ways Combined	
	MEAN	85%ile	MEAN	85%ile	MEAN	85%ile
0000-0100	0.0	0.0	121.9	0.0	121.9	0.0
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	64.6	0.0	0.0	0.0	64.6	0.0
0400-0500	0.0	0.0	0.0	0.0	0.0	0.0
0500-0600	98.0	0.0	86.5	0.0	89.4	0.0
0600-0700	99.2	0.0	84.3	0.0	87.0	90.4
0700-0800	84.9	0.0	90.8	0.0	88.1	92.2
0800-0900	89.9	0.0	90.5	100.1	90.3	103.0
0900-1000	88.3	0.0	88.9	0.0	88.7	0.0
1000-1100	78.7	0.0	87.9	94.7	85.4	94.7
1100-1200	83.0	0.0	95.8	0.0	89.4	0.0
1200-1300	89.5	0.0	84.8	0.0	87.0	95.8
1300-1400	90.9	0.0	83.4	0.0	87.2	0.0
1400-1500	81.4	0.0	94.5	0.0	88.8	96.5
1500-1600	86.2	0.0	89.6	103.7	88.2	103.3
1600-1700	90.0	95.4	86.6	95.8	87.9	97.9
1700-1800	88.8	97.2	91.9	0.0	89.4	97.6
1800-1900	100.1	0.0	97.6	0.0	99.1	0.0
1900-2000	84.2	0.0	94.5	0.0	89.9	0.0
2000-2100	97.7	0.0	87.9	0.0	93.9	104.0
2100-2200	94.2	0.0	87.9	0.0	92.1	0.0
2200-2300	103.3	0.0	77.7	0.0	90.5	0.0
2300-2400	0.0	0.0	91.5	0.0	91.5	0.0
TOTAL	89.0	101.5	89.4	100.1	**89.2**	**100.8**

85th %ile not calculated for less than 10 vehicles.

SPEED VOLUMES

SPEED (km/h)	West bound VOL	West bound %	East bound VOL	East bound %	Both Ways Combined VOL	Both Ways Combined %
00-40	0	0.0%	0	0.0%	0	0.0%
41-50	0	0.0%	0	0.0%	0	0.0%
51-60	1	0.9%	3	2.3%	4	1.7%
61-70	6	5.5%	4	3.0%	10	4.1%
71-80	15	13.6%	20	15.2%	35	14.5%
81-90	39	35.5%	40	30.3%	79	32.6%
91-100	31	28.2%	43	32.6%	74	30.6%
101-110	13	11.8%	18	13.6%	31	12.8%
111-120	4	3.6%	2	1.5%	6	2.5%
121-130	0	0.0%	2	1.5%	2	0.8%
131-140	0	0.0%	0	0.0%	0	0.0%
141-150	1	0.9%	0	0.0%	1	0.4%

NOTES

CLASS VOLUMES

CLASS	West bound VOL	West bound %	East bound VOL	East bound %	Both Ways Combined VOL	Both Ways Combined %
1	97	88.2%	115	87.1%	212	87.6%
2	6	5.5%	8	6.1%	14	5.8%
3	6	5.5%	9	6.8%	15	6.2%
4	0	0.0%	0	0.0%	0	0.0%
5	0	0.0%	0	0.0%	0	0.0%
6	0	0.0%	0	0.0%	0	0.0%
7	0	0.0%	0	0.0%	0	0.0%
8	1	0.9%	0	0.0%	1	0.4%
9	0	0.0%	0	0.0%	0	0.0%
10	0	0.0%	0	0.0%	0	0.0%
11	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
13	0	0.0%	0	0.0%	0	0.0%
Commercial (Class 3-12)	7	6.4%	9	6.8%	16	**6.6%**

CLASS	LENGTH (m)	VEHICLE TYPE	AXLES	AXLE GROUPS
1	SHORT <5.5	SHORT VEHICLE	2	1 or 2
2	MEDIUM 6.5 - 14.5	SHORT VEHICLE TOWING	3 - 5	3
3		TWO AXLE TRUCK OR BUS	2	2
4		THREE AXLE TRUCK OR BUS	3	2
5		FOUR AXLE TRUCK	>3	2
6	LONG 11.5 - 19.0	3 AXLE ARTICULATED VEHICLE	3	3
7		4 AXLE ARTICULATED VEHICLE	4	>2
8		5 AXLE ARTICULATED VEHICLE	5	>2
9		6 AXLE ARTICULATED VEHICLE	>5	>2
10	MEDIUM COMBINATION 17.5-36.5	B-DOUBLE	>6	4
11		DOUBLE ROAD TRAIN	>6	5 or 6
12	>33.0	TRIPLE ROAD TRAIN	>6	>6
13	-	ALL OTHER VEHICLES	-	-

For further information, please contact Design Services at Locked Bag 1000, Shepparton 3632.

CITY OF GREATER SHEPPARTON

SINGLE DAY TRAFFIC COUNT SUMMARY

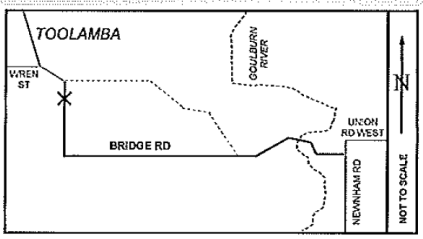
STREET / ROAD

Bridge Rd, Toolamba

LOCATION

200m south of Wren St

MAP



DATE

19 December 2012

DAY

Wednesday

SPEED ZONE

50 km/h

FILENAME- **brid1812.ec2**

TOTAL VOLUMES

HOUR	South bound	North bound	Both Ways Combined
0000-0100	0	1	1
0100-0200	0	0	0
0200-0300	0	0	0
0300-0400	0	0	0
0400-0500	1	1	2
0500-0600	7	2	9
0600-0700	16	7	23
0700-0800	25	16	41
0800-0900	25	17	42
0900-1000	13	14	27
1000-1100	8	14	22
1100-1200	16	5	21
1200-1300	14	18	32
1300-1400	7	13	20
1400-1500	21	13	34
1500-1600	18	31	49
1600-1700	30	21	51
1700-1800	24	41	65
1800-1900	7	19	26
1900-2000	8	12	20
2000-2100	13	11	24
2100-2200	11	13	24
2200-2300	5	8	13
2300-2400	1	1	2
12hour (7-19)	208	222	430
16hour (6-22)	256	265	521
18hour (6-24)	262	274	536
24hour (0-24)	**270**	**278**	**548**
AM peak hour	0700-0800	0800-0900	0800-0900
volume	25	17	42
PM peak hour	1600-1700	1700-1800	1700-1800
volume	30	41	65

NOTES

SPEED ANALYSIS

	South bound		North bound		Both Ways Combined	
	MEAN	85%ile	MEAN	85%ile	MEAN	85%ile
0000-0100	0.0	0.0	67.8	0.0	67.8	0.0
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	74.0	0.0	51.5	0.0	62.8	0.0
0500-0600	76.1	0.0	67.5	0.0	74.2	0.0
0600-0700	73.9	85.3	75.0	0.0	74.2	85.3
0700-0800	70.0	78.5	68.2	79.9	69.3	79.6
0800-0900	74.0	82.1	62.7	67.7	69.4	82.1
0900-1000	72.4	82.1	65.6	74.5	68.9	77.8
1000-1100	71.1	0.0	66.3	75.2	68.0	79.6
1100-1200	71.2	76.7	64.9	0.0	69.7	76.7
1200-1300	68.1	78.8	69.2	77.8	68.7	78.8
1300-1400	68.9	0.0	64.9	72.4	66.3	74.2
1400-1500	72.7	82.1	63.8	69.5	69.3	79.9
1500-1600	72.7	79.2	64.5	74.9	67.5	76.7
1600-1700	72.0	81.7	66.2	79.2	69.6	80.6
1700-1800	66.6	77.8	66.2	74.9	66.3	76.7
1800-1900	71.3	0.0	63.0	69.1	65.2	72.4
1900-2000	68.1	0.0	61.9	69.1	64.4	77.0
2000-2100	70.1	78.5	61.2	65.9	66.0	73.4
2100-2200	67.9	75.2	63.2	72.4	65.4	74.9
2200-2300	79.1	0.0	77.1	0.0	77.9	79.6
2300-2400	67.3	0.0	69.7	0.0	68.5	0.0
TOTAL	71.2	81.7	65.6	75.2	**68.4**	**79.2**

85th %ile not calculated for less than 10 vehicles.

SPEED VOLUMES

SPEED (km/h)	South bound VOL	%	North bound VOL	%	Both Ways Combined VOL	%
00-40	3	1.1%	4	1.4%	7	1.3%
41-50	8	3.0%	14	5.0%	22	4.0%
51-60	28	10.4%	63	22.7%	91	16.6%
61-70	66	24.4%	109	39.2%	175	31.9%
71-80	109	40.4%	69	24.8%	178	32.5%
81-90	47	17.4%	18	6.5%	65	11.9%
91-100	8	3.0%	0	0.0%	8	1.5%
101-110	1	0.4%	0	0.0%	1	0.2%
111-120	0	0.0%	0	0.0%	0	0.0%
121-130	0	0.0%	0	0.0%	0	0.0%
131-140	0	0.0%	1	0.4%	1	0.2%
141-150	0	0.0%	0	0.0%	0	0.0%

CLASS VOLUMES

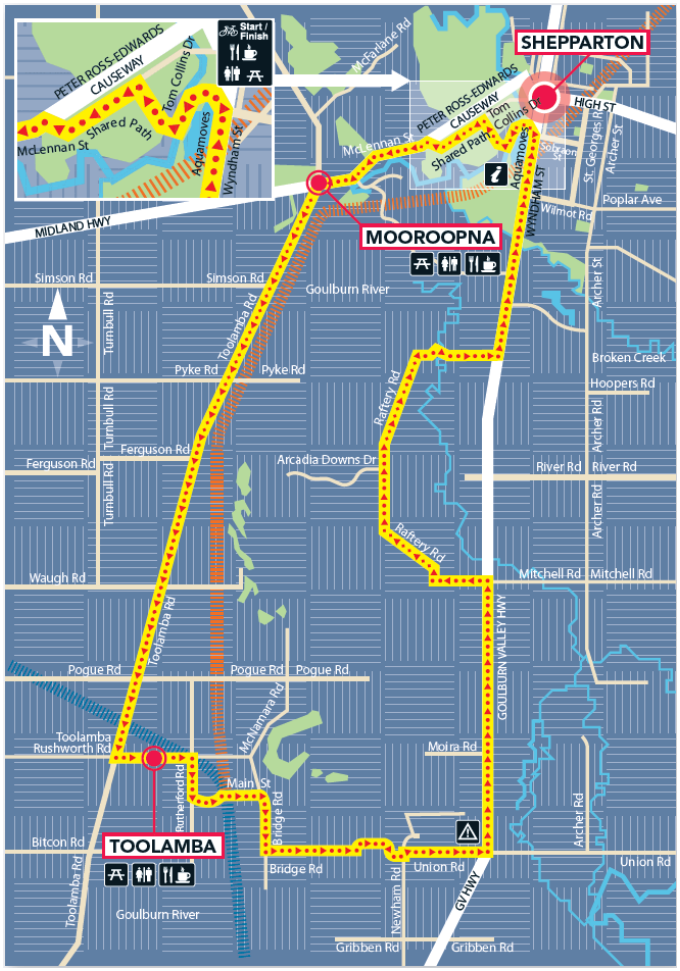
CLASS	South bound VOL	%	North bound VOL	%	Both Ways Combined VOL	%
1	247	91.5%	252	90.6%	499	91.1%
2	19	7.0%	18	6.5%	37	6.8%
3	4	1.5%	8	2.9%	12	2.2%
4	0	0.0%	0	0.0%	0	0.0%
5	0	0.0%	0	0.0%	0	0.0%
6	0	0.0%	0	0.0%	0	0.0%
7	0	0.0%	0	0.0%	0	0.0%
8	0	0.0%	0	0.0%	0	0.0%
9	0	0.0%	0	0.0%	0	0.0%
10	0	0.0%	0	0.0%	0	0.0%
11	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
13	0	0.0%	0	0.0%	0	0.0%
Commercial (Class 3-12)	4	1.5%	8	2.9%	12	**2.2%**

CLASS	LENGTH (m)	VEHICLE TYPE	AXLES	AXLE GROUPS
1	SHORT <5.5	SHORT VEHICLE	2	1 or 2
2	MEDIUM 6.5 - 14.5	SHORT VEHICLE TOWING	3 - 5	3
3		TWO AXLE TRUCK OR BUS	2	2
4		THREE AXLE TRUCK OR BUS	3	2
5		FOUR AXLE TRUCK	>3	2
6	LONG 11.5 - 19.0	3 AXLE ARTICULATED VEHICLE	3	3
7		4 AXLE ARTICULATED VEHICLE	4	>2
8		5 AXLE ARTICULATED VEHICLE	5	>2
9		6 AXLE ARTICULATED VEHICLE	>5	>2
10	MEDIUM COMBINATION 17.5-36.5	B-DOUBLE	>6	4
11		DOUBLE ROAD TRAIN	>6	5 or 6
12	>33.0	TRIPLE ROAD TRAIN	>6	>6
13	-	ALL OTHER VEHICLES	-	-

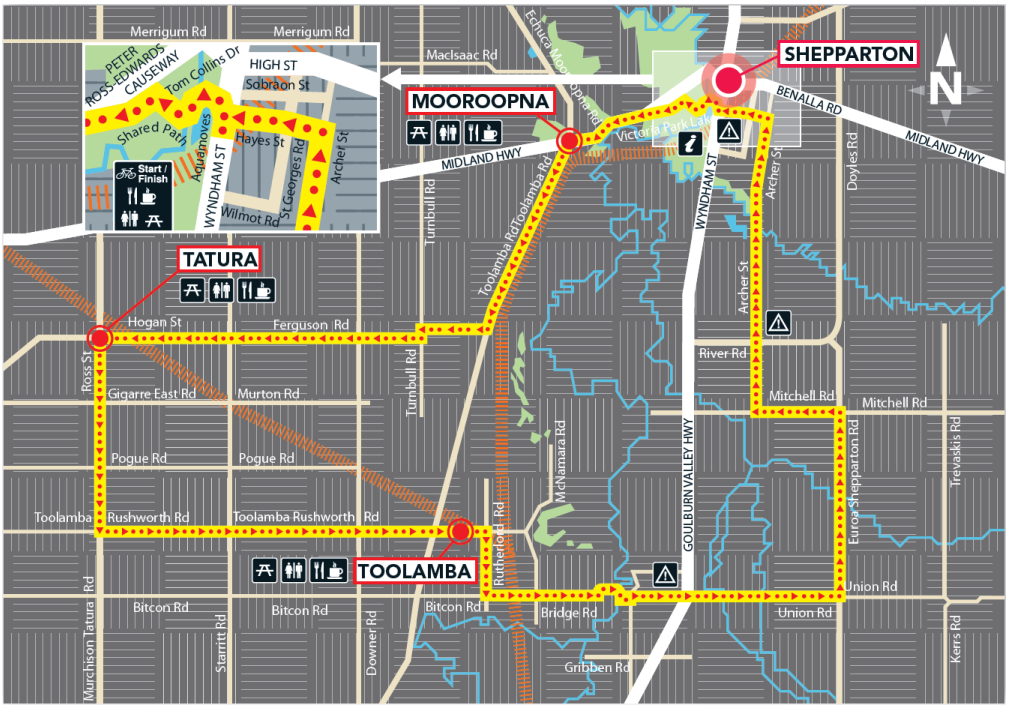
For further information, please contact Design Services at Locked Bag 1000, Shepparton 3632.

APPENDIX D
Proposed Pedestrians and Cyclists Facilities

Toolamba Circuit

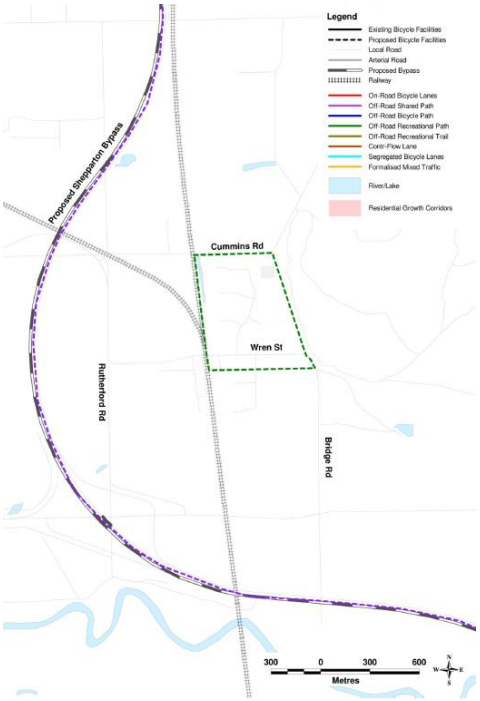


Tatura – Toolamba Circuit

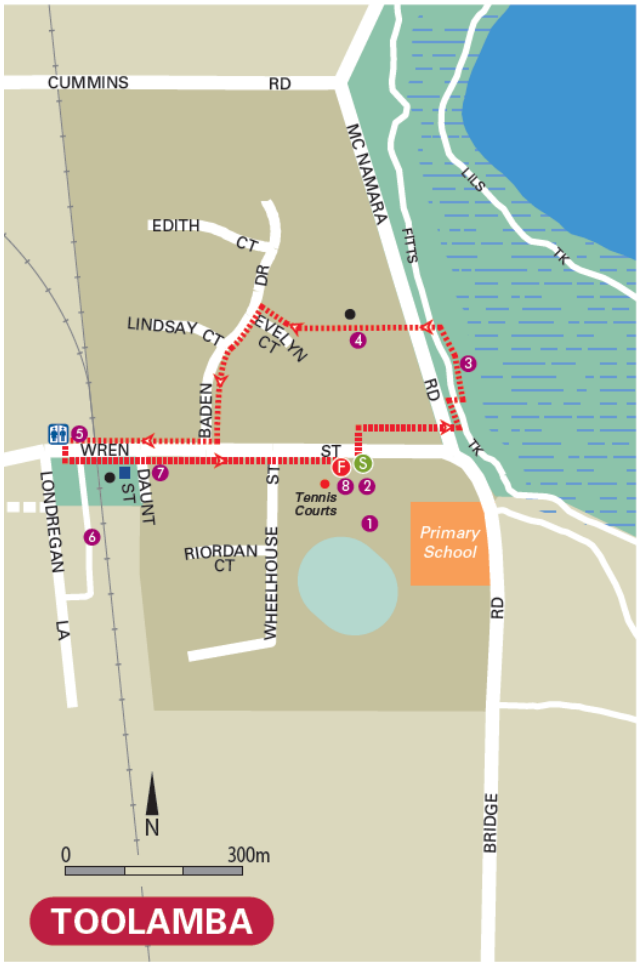


Proposed Toolamba Facilities

Opportunity to provide a 2.6km recreational loop that also accesses the local school and sports grounds.



Proposed Toolamba Walking Track



APPENDIX E
VLimits Report

IndividualReport

VLimits 3.0
Project Report

Suggested Speed Limit:

Rutherford Road

Location: South of Wren Street Intersection
Suburb / place: Toolamba
Local government:SHEPPARTON
VicRoads Region: VicRoads - Kew
Analysed by: Uwe Paffrath
User reference: Residential Development, Rev.1
Review date:4/06/2015

Additional issues to be considered

The measured 85th %ile speed of 90 km/h is significantly higher than the suggested speed limit of 50 km/h. This represents a significant difference between the current behaviour of drivers and the suggested limit. Further investigation should be undertaken to determine the reason for this discrepancy.

A lower speed limit may be appropriate due to the following factors:
recreational or tourist traffic.
access to Goulburn River
The road infrastructure factor(s) listed below may be contributing to the increased risk of crashes. Where

crash rates are high and options to improve the road deficiencies have been exhausted, or are not feasible in the short term, a reduced speed limit may be appropriate.

narrow or unsealed shoulders (rural roads only).

Development type

Partially built-up

85th %ile speed

The 85th %ile speed is **90 km/h.**

Road characteristics

Length of the section of road is **0.92 km**.

The AADT on this road is **1500 vpd**.

The existing posted speed limit on the section of road is **100 km/h.**

Frequency of roadside accesses

	Type of access	**Number**
A	Residences, small commercial establishments, small public buildings and other units which generate light and/or occasional activity. (The weighting for this type of access is 1).	11
B	Average commercial establishment, schools, caravan parks, light industries, public buildings and units generating activity which is either: 1. continuous light 2. moderate at certain times, such as commuting hours 3. substantial at infrequent intervals (The weighting for this type of access is 2).	0
C	Heavy industry, schools, small shopping centres, petrol stations and other units generating continuous moderate activity or substantial activity at certain regular times. (The weighting for this type of access is 3).	0
D	Large shopping centres and other units generating substantial and continuous activity. Some large industries which are tourist attractions or for some other reason generate substantial traffic volumes would be included in this activity. (The weighting for this type of access is 4).	0

E	Unsignalised intersecting roads (including service road connections) of substantially lesser importance than the road being assessed, or intersecting roads where side traffic and turning movements have little effect on the traffic flow pattern of the road being considered. (The weighting for this type of access is 1).	0
F	Unsignalised intersecting roads (including service road connections) of lesser importance than the road being assessed but where the side road traffic and turning movements are such that the intersection has an appreciable effect on the traffic flow pattern of the road being considered. (The weighting for this type of access is 2).	0
G	Unsignalised intersecting roads (including service road connections) of comparable or greater significance than the road being assessed. Intersections which have a pronounced effect on the traffic flow pattern of the road being considered. (The weighting for this type of access is 3).	2
H	Roundabouts, signalised intersecting roads and any at-grade rail crossings. (The weighting for this type of access is 3).	0
	Average number of accesses per 100 m	1.85

Divided/undivided

The road is **undivided.**

Road function

The road's function is **collector.**

Adjacent speed zones

Approach 1: 100 km/h - southern approach

Approach 2: 100 km/h - northern approach