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Appendix F

Traffic Impact Assessment

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Appendix F Traffic Impact Assessment

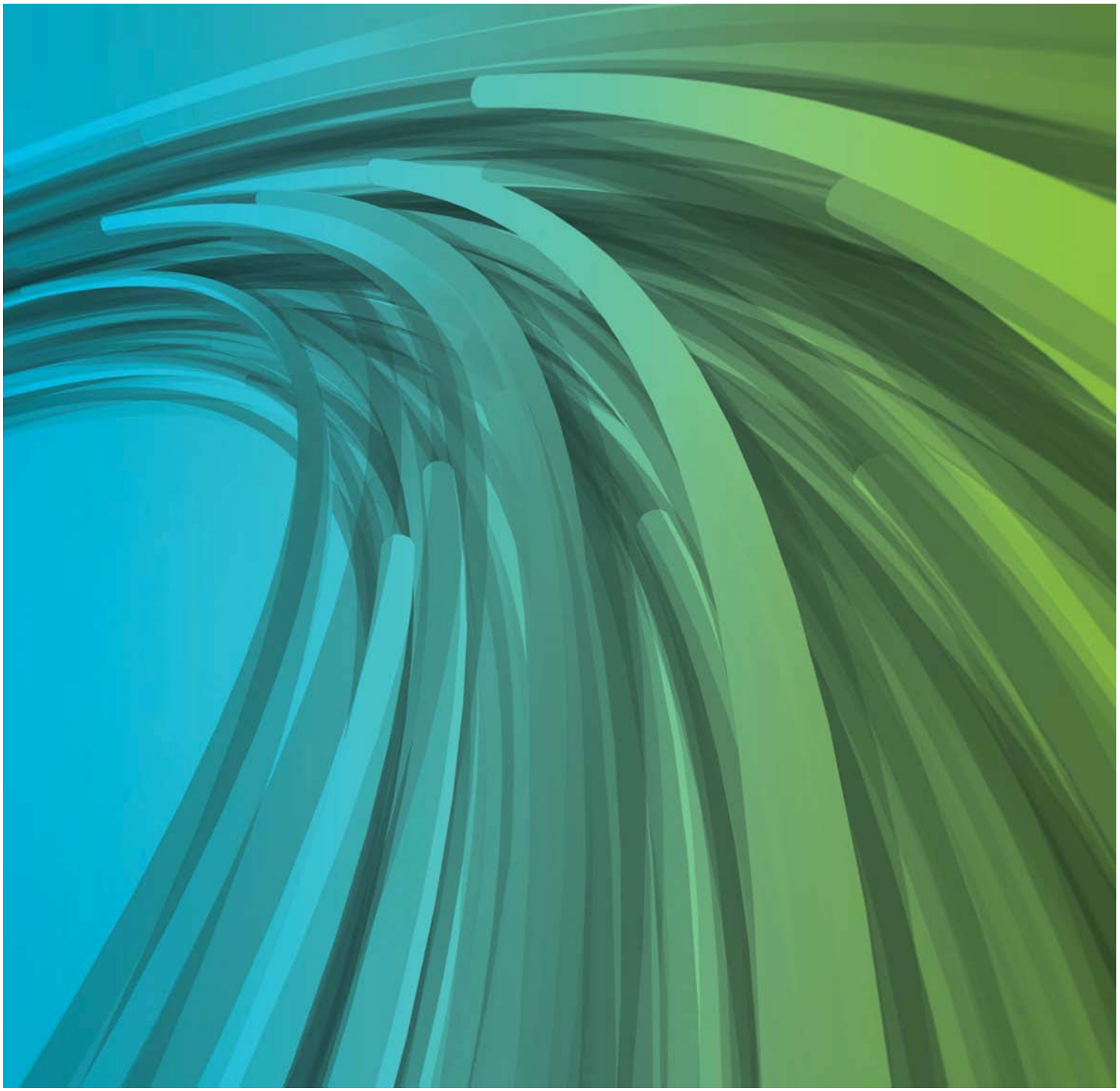
Shepparton North East Growth Corridor Development

Sam Mondus

17 December 2009

Document No. 1007tpe

Traffic Impact Assessment



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Traffic Impact Assessment

Prepared for

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Prepared by Kate Butler

Reviewed by Stephen Pelosi

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
0	17/12/2009	Draft Traffic Impact Assessment	Stephen Pelosi	

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Executive Summary

AECOM has been requested by Sam Mondous to prepare a Traffic Impact Assessment to support the preparation of the Shepparton North East Growth Area Outline Development Plan.

The site is located approximately four kilometres north east of Shepparton town centre and is bordered to the east and west by Verney Road and Grahamvale Road respectively. These roads are proposed to provide access to the development.

The proposed development of the site comprises a residential with a complimentary retail and community component located at the heart of the development. As part of the development, it is also proposed to extend the Grahamvale Primary School (PS).

This assessment provides the findings from a traffic investigation undertaken to determine whether the existing road network can support the proposed development. It also details the improvements that will be necessary in order to minimise the impact of the development on the surrounding road network based upon the likely future development traffic.

The investigation has included:

- Data collection to establish existing AM and PM traffic volumes;
- A review of existing information pertinent to the investigation, including the current road network and capacity, the expected background traffic growth, committed developments in the area, committed road network improvements, the accident history and traffic patterns;
- The future development traffic generation and assignment has been assessed;
- The operation of the forecast road network with and without the proposed development has been analysed; and
- Recommendations have been made based on the current network and improvements necessary to the local road network based on forecast traffic generations.

Turning movement volume surveys were undertaken by Global Workforce on behalf of AECOM on Tuesday 5 August 2008 in the AM peak between 7:30am and 10:30am and in the PM peak between 3:00pm and 6:00pm.

During initial discussions with CGS Engineering Projects department it was agreed that the following four intersections would be most adversely affected by the proposed development (and would require analysis):

- Verney Road and Balaclava Road
- Verney Road and Ford Road
- Grahamvale Road and New Dookie Road
- Grahamvale Road and Ford Road

At the time discussions were carried out it was not apparent that there may be any significant impact on traffic along Hawkins Street and therefore the operation of the intersections of Hawkins Street / Verney Street and Hawkins Street / Goulbourn Valley Highway were not investigated.

However, CGS previously conducted surveys of the Hawkins Street / Goulbourn Valley Highway intersection in 2005 and these surveys have been utilised to analyse an estimation of current (2008) operation and future (2020) operation.

Additional surveys were also carried out by Global Workforce on behalf of AECOM on Thursday 19 November 2009 in the AM peak between 7:30am and 10:30am. The intersections surveyed at this time included:

- Verney Road and Pine Road
- Verney Road and Hawkins Street

Within the local road network the roads that are expected to be most significantly impacted by the development include Verney Road, Grahamvale Road, Hawkins Street, Pine Road and Balaclava Road. Hawkins Street, Pine Road and Balaclava Road form connections to Goulburn Valley Highway.

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Analysis using SIDRA INTERSEECTION 3.2 indicated that currently all the other intersections analysed appear to operate well in the AM and PM peak hours.

The forecast traffic generation rates and distribution for the proposed development has been agreed with the City of Greater Shepparton (CGS) Engineering Projects team and the intersections have been analysed based on these traffic generations.

Analysis of the forecast additional development traffic flows on the network generally indicates that most of the intersections are adequate to accommodate the additional forecast traffic.

Grahamvale Road will operate satisfactorily when Heavy Goods Vehicle (HGV) movements are assessed with 7% HGV. However if the HGV usage was expected to remain as high as 20% in the 2020 design forecast, the Grahamvale Road / Dookie Shepparton Road roundabout would experience operational problems in the peak hours. Due to this, CGS should continue to pursue the construction of the Shepparton Bypass as a matter of priority to ensure that no local problems develop.

Whilst the Hawkins Street / Goulburn Valley Highway intersection is estimated to currently operate satisfactorily as a priority intersection, already movements from Hawkins Street are experiencing significant delays in the AM and PM peaks. Further to this, crash history of four collisions has been recorded in the last five years indicating that there are some safety issues with the current operation. Accordingly analysis with of the forecast traffic for the design year 2020 (with and without the proposed development) indicates that without improvement, Hawkins Street will experience unacceptable delays and inevitably an increased safety risk.

Based on these factors the operation of the Hawkins Street / Goulburn Valley Highway intersection was analysed to understand how it could operate as a signalised intersection in 2020 (with and without the forecast development traffic). It was found that the priority was more evenly distributed resulting in acceptable average delays for all arms of the intersection.

Analysis also indicates that the proposed additional forecast traffic flows at the Hawkins Street / Verney Road intersection are likely to result in the requirement of intersection improvements such as signalisation.

As the base traffic flows for this analysis were collected in 2005 it is recommended that further traffic analysis should be carried out (with recent survey data) to ensure the intersection can cater for the future demands. Notwithstanding this, it is highly probable that the flows along Hawkins Street and Goulburn Valley Highway will necessitate improvements (such as signalisation) to this intersection. Discussions with CGS indicate that this intersection will be upgraded as part of the improvements to the adjacent Northern Neighbourhood Centre.

Based on the forecast traffic flows for the proposed development and the expected background flows along Verney Road and Grahamvale Road, it is recommended that the most suitable entrance treatments will include:

Signalised Intersections

- Verney Road / Pine Road / Site Entrance
- Grahamvale Road Site Entrance

Priority T-Intersections

- Verney Road Site Entrance between Ryeland Drive and Hawkins Street
- Ford Road Site Entrance

This should be taken into consideration during the detail design of the development.

Based on the findings of the investigation the following table summarises the likely nexus for the infrastructure development contributions as a result of developing the NE Growth Corridor area.

Infrastructure Item	Likely Nexus
Verney Road Main Entrance (priority T-intersection)	High
Grahamvale Road Entrance (signalised intersection)	High
Verney Road / Pine Road (signalisation of intersection)	High
Ford Road Entrance (priority T-intersection)	High
Goulburn Valley Highway / Hawkins Street (signalisation of intersection)	Low
General improvements to the surrounding pedestrian and cycle networks	Low

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Further to the findings of this investigation there are issues that may impact the traffic operation of the local road network. These issues include:

- Sustainable Transport Design: Measures to reduce the reliance on the private car should be investigated to encourage a reduction in trips made by private cars which ultimately will reduce the pressure on the local road network and enable more sustainable transport choices.
- Goulburn Valley Highway Intersections: No analysis has been carried out for the intersections of Goulburn Valley Highway with Balaclava Road, Ford Road or Verney Road. Analysis of these intersections may provide a greater understanding of how they will be affected by the proposed development.

These further investigations should be carried out following the completion of a draft ODP. This investigation would include analysis of the existing road network together with the operation of proposed roads within the ODP area.

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1.0 Introduction

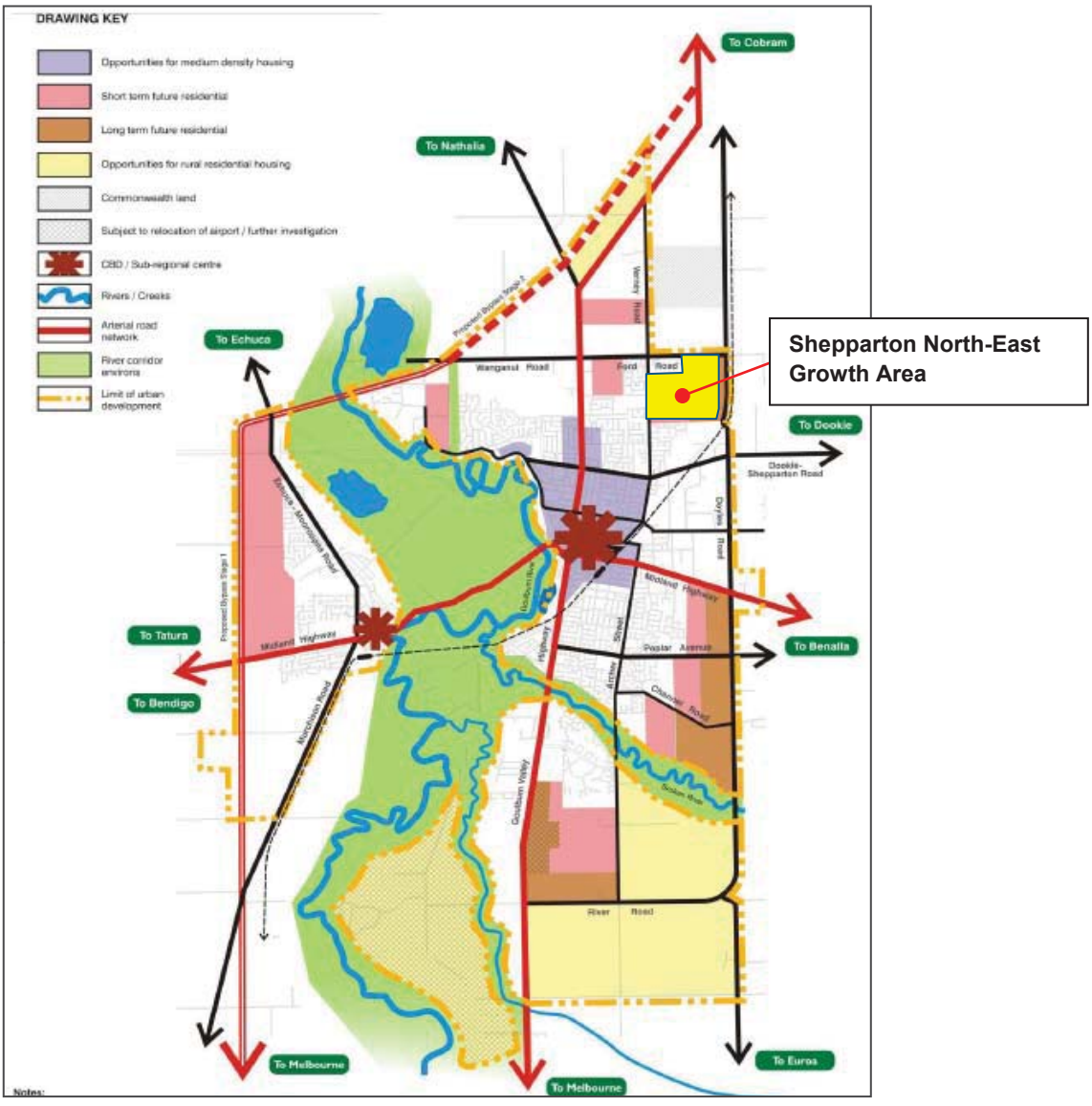
1.1 Project Background

AECOM is undertaking numerous specialist studies required to support the preparation of an Outline Development Plan (ODP) and Development Contributions Plan (DCP) reports for Shepparton North-East Growth Corridor, also to be prepared by AECOM.

The Shepparton North-East Growth Corridor has been earmarked by City of Greater Shepparton to be developed as a residential estate to support the growing town. The North-East Growth Corridor has a site area of 168.5 hectares which will be developed by a private developer. Figure 1.1 identifies the subject site which compromises the entire Shepparton North-East Growth Area.

In order to support the preparation of the ODP and DCP, a technical study assessing the demands for community infrastructure is required.

Figure 1.1: Location of the Shepparton North-East Growth Area



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1.2 Purpose

This report provides the findings from a traffic investigation undertaken to determine whether the existing road network can support the proposed development. It also details the improvements that will be necessary in order to minimise the impact of the development on the surrounding road network based upon the likely future development traffic.

1.3 Outline of Investigations

AECOM's Traffic Engineers have investigated the overall implications of residential expansion on the existing transport network to the north east of Shepparton including the broader sub-region. The following summarises the key components for this investigation:

- Reviewing existing information pertinent to the investigation, including the current road network and capacity, the expected background traffic growth, committed developments in the area, committed road network improvements, the accident history and traffic patterns;
- Assessment of the existing traffic movements in the area and anticipated traffic generated by the development in the growth area;
- Potential capacity constraints on the existing road network;
- Assessment of access requirements to support future residential development in the growth area;
- Recommendations on necessary improvements to the local road network in order to support the proposed development;
- Opportunities to maximise benefits of existing public transport services and infrastructure requirements.

1.4 Report Structure

The remainder of this report is set out as follows:

Chapter 2: Describes the demographic characteristics of Greater Shepparton that influence the development of this site.

Chapter 3: Describes the existing conditions including; site locality, local road network, traffic volume and intersection turning movement volume surveys, local accident history and other committed traffic improvements and developments, cycle network and road network improvements located in the vicinity of the site.

Chapter 4: Assessment of existing intersection operation using SIDRA INTERSECTION software

Chapter 5: Details of the proposed development and car parking rates.

Chapter 6: Details the vehicular traffic generation associated with the site and the expected traffic distribution.

Chapter 7: Includes a description of the expected traffic impact of the development based on the forecast traffic flows on the local road network and the traffic impact conclusions.

Chapter 8: Discusses further traffic issues that should be considered as a part of the development process.

Appendix A details the existing traffic flows, Appendix B includes the summaries for the SIDRA analysis, Appendix C includes the details of the traffic distribution and Appendix D includes the VicRoads Crash History Data.

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2.0 Shepparton in Profile

It is located approximately 200 kilometres north-east of Melbourne and is the fifth largest city in Victoria. In 2008 it was estimated that the City of Greater Shepparton had a usual residential population of 60,528 residents.

Shepparton largest industries include manufacturing, retail and health and social services. Manufacturing industry has evolved to cater for the needs of local primary producers. Australia's largest processor of canned fruits, SPC Ardmona has production facilities in Shepparton, Mooroopna and nearby Kyabram. Shepparton is a major centre for road transport and also has a variety of educational facilities.

As indicated in the *Greater Shepparton Housing Strategy (Final Draft Version 2, 2008)* Greater Shepparton is experiencing strong population growth (approximately 800 persons per year) [1], which is particularly being driven by internal and overseas migration and growth in the agricultural sector. The Shepparton North-East Growth Area is therefore well placed to help cater for Greater Shepparton's population growth. Table 2.1 presents the projected population for City of Greater Shepparton up to 2030.

Table 2.1: Projected Population for City of Greater Shepparton

Year	Population
Usual Resident population 2008	60,528
Projected population 2010	61,905
Projected population 2020	69,480
Projected population 2030	78,214

(Source: forecast.id, City of Greater Shepparton)

As shown in Table 2.1, in 2008 there were 60,528 persons in the City of Greater Shepparton. By 2030, the City of Greater Shepparton's projected population is 78,214 persons.

2.1 Demographic Profile

In order to gain a greater understanding of the travel needs of the future residents of the Shepparton North East Growth Area, the following demographic categories will be analysed: age structure, household size, household types, car ownership type and type and place of employment and travel to work modal share. The demographic information is based on Australia of Bureau Statistic (ABS) Census data from Greater Shepparton's Community ID Profile[2].

2.1.1 Age Structure

Figure 2.1 outlines the age structure in the City of Greater Shepparton in 2001 and 2006. In 2001 15.9% of Greater Shepparton's population was over the age of 60, however in 2006 this had increased to 17.6%. The aging population in Greater Shepparton is a continued trend in Australia, often a result of low fertility and increased life expectancy.[3]

Figure 2.1 presents the age structure of the residents of Greater Shepparton in 2006.

[1] David Lock Associates (2008) *Greater Shepparton Housing Strategy: Final Draft Version 2.* City of Greater Shepparton, Shepparton.

[2](http://profile.id.com.au/Default.aspx?id=272&pg=210&gid=10&type=enum, accessed 25 November 2009)

[3] Australian Bureau of Statistics, 2006 Census QuickStats, Australia, viewed 22 September 2008, <http://www.censusdata.abs.gov.au>.

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Figure 2.1: Age Structure, City of Greater Shepparton 2006

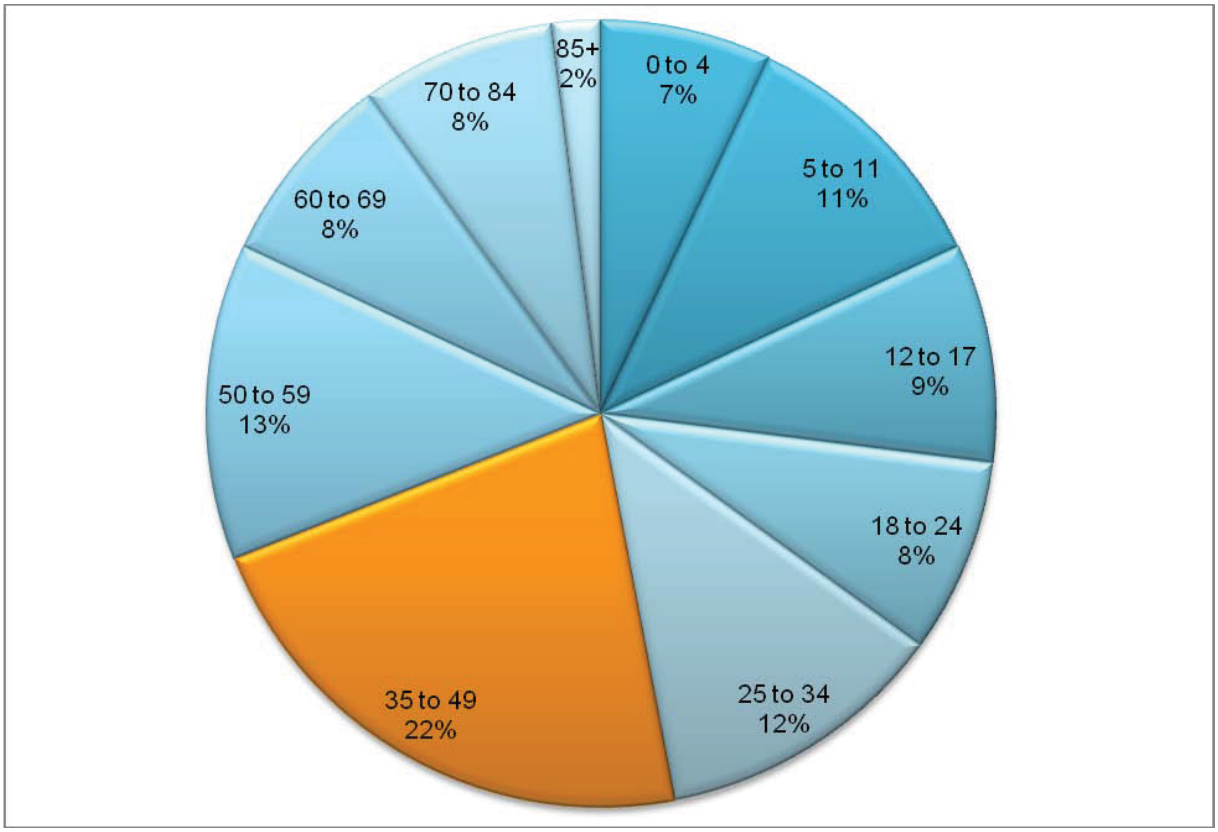

Figure 2.1 illustrates that the age structure of residents within the City of Greater Shepparton in 2006 was rather evenly spread, with the most populace group being the 35 – 49 category, representing 22% of the population.

Children of primary school age constituted 11.0% of the population and children and teenagers of secondary school age constituted 9% of the population.

2.1.2 Household Size

The average household size in the City of Greater Shepparton in 2006 was 2.6 persons. This is reflected below in Table 2.2 which shows 34.2% of household in Greater Shepparton had 2 persons.

Table 2.2: Household Size, City of Greater Shepparton 2006

Household Size	%
1 Person	24.2
2 Persons	34.2
3 Persons	15.2
4 Persons	15.3
5 Persons	7.7
6 or more Persons	3.4
Total	100.0

2.1.3 Household Types

Table 2.3 outlines the household composition types in the City of Greater Shepparton. In 2006 the most common family composition in Greater Shepparton was two parent households with children (45.2%). There were 16.5% one parent families and 37.0% couples without children.

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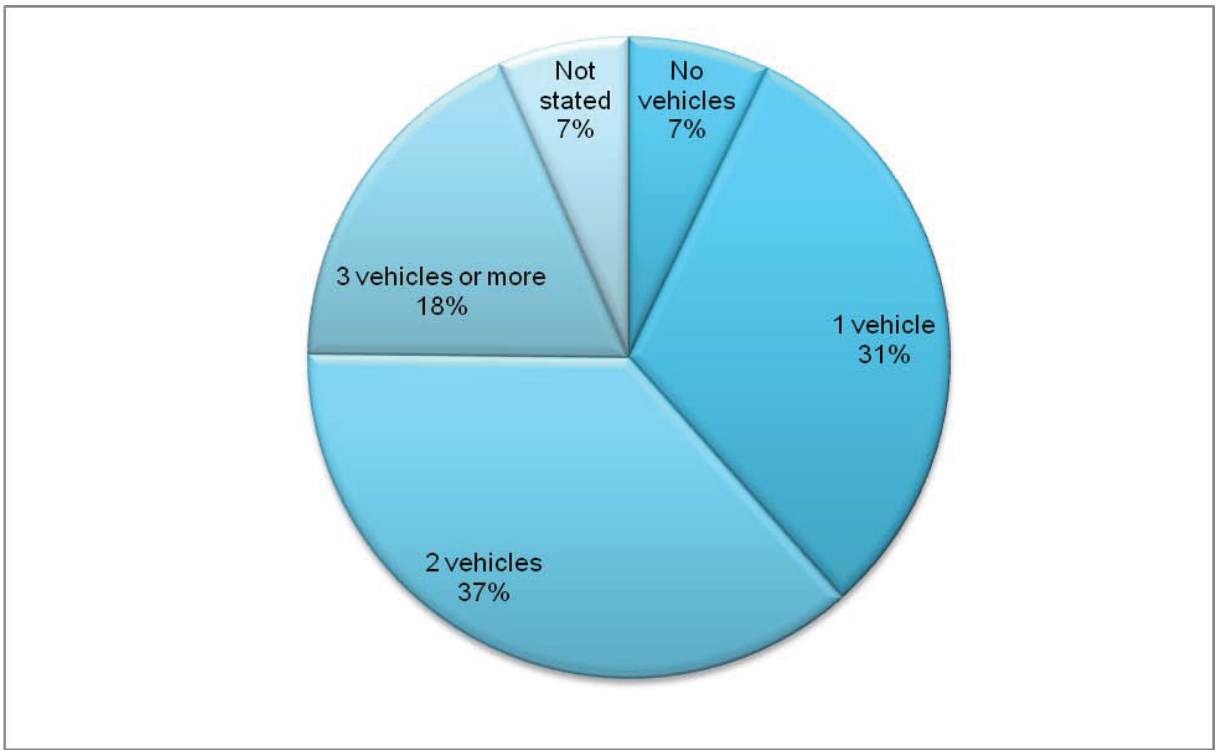
Table 2.3: Family Composition, City of Greater Shepparton 2006

Household Types	%
Couples with child(ren) 15 years and under	32.1
Couples with child(ren) over 15 years	13.1
Total couples with child(ren)	45.2
One parent families with child(ren) 15 years and under	10.6
One parent families with child(ren) over 15 years	5.9
Total one parent families	16.5
Couples without child(ren)	37.0
Other families	1.2
Total families	100.0

2.1.4 Car Ownership

Car ownership at the time of the 2006 census is presented in Figure 2.2.

Figure 2.2: Car Ownership Vehicles per Household, City of Greater Shepparton 2006



(Source: Australian Bureau of Statistics, Census of Population and Housing, 2006)

Figure 2.2 shows that seven percent of households do not have vehicles and that over half of all households have two or more vehicles per household. This indicates that residents of City of Greater Shepparton are highly reliant on private vehicles as a primary mode of transport.

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2.1.5 Type of Employment

Table 2.4 describes the employment industries for residents of Shepparton.

Table 2.4: Employment Industries for Residents, City of Shepparton 2006

Industry	%
Agriculture, Forestry & Fishing	10
Manufacturing	13.4
Construction	7.4
Retail Trade	13.2
Wholesale Trade	4.1
Hospitality	4.9
Transport and Warehousing	4.1
Professional and Technical Services	3.7
Administrative and Support Services	2.7
Public Administration and Safety	4
Education and Training	7.3
Health and Social Care	12
Other	13.2
Total	100.0

(Source: Australian Bureau of Statistics, Census of Population and Housing 2006)

Table 2.4 shows that the three most popular industry sectors of the jobs held by the resident population in the City of Greater Shepparton in 2006 were:

- Manufacturing (3,400 persons or 13.5%)
- Retail Trade (3,326 persons or 13.2%)
- Health Care and Social Assistance (3,033 persons or 12.0%)

In combination, these three industries employed 9,759 people in total or 38.7% of the employed resident population. The majority of industries of employment have the opportunity to provide residents with jobs locally, indicating that there is not a great need to travel outside Greater Shepparton for employment. This is discussed further in the following paragraph.

2.1.6 Place of Employment

Table 2.5 describes the geographic location of work places for residents of Greater Shepparton in 2006.

Table 2.5: Employment Location, City of Greater Shepparton 2006

Employment location of City of Greater Shepparton's residents, 2006	Residents	Percent (%)
Within the City of Greater Shepparton	21,980	86.1
Outside the City of Greater Shepparton	1,596	6.3
Live within the City of Greater Shepparton, work location unknown	1,938	7.6
Employed residents of the City of Greater Shepparton	**25,514**	**100.0**

(Source: Australian Bureau of Statistics, Journey to work, unpublished data, 2006)

As shown in Table 2.5, the majority of residents (86.1%) work within the City of Greater Shepparton. Table 2.5 further describes where the 1,596 (6.3%) of residents that do not work in Shepparton are travelling to work.

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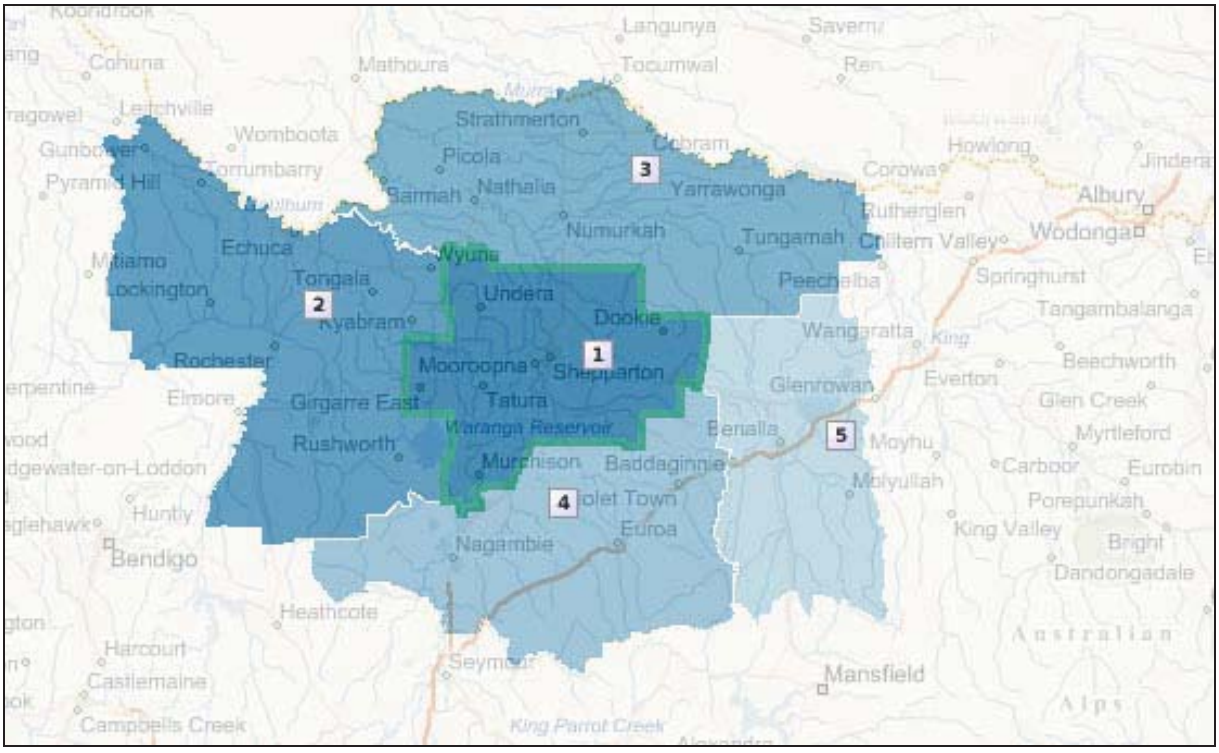
Table 2.6: Top 5 Local Government Areas of Employment for Residents, City of Greater Shepparton, 2006

Rank	Local Government Area	Direction relative to Greater Shepparton	Number of Residents	Percent (%)
1	Greater Shepparton	-	21,980	86.1
2	Campaspe	West	478	1.9
3	Moira	North	339	1.3
4	Strathbogie	South	100	0.4
5	Benalla	East	70	0.3
	Other areas	-	2,547	10.0
Total employed residents in the City of Greater Shepparton			**25,514**	**100.0**

(Source: Australian Bureau of Statistics, Journey to work, unpublished data, 2006.)

Figure 2.3 illustrates the geographic locations of the top employment locations for the City of Greater Shepparton, as detailed in Table 2.6.

Figure 2.3: Map of Top Employment Locations, City of Greater Shepparton 2006



(Map source: http://profile.id.com.au/Default.aspx?id=272&pg=310&gid=10&type=enum, accessed 25 November 2009)

As shown in Table 2.6 and Figure 2.3, the census information concluded that in 2006 there were only a small amount of Greater Shepparton residents that travelled beyond Shepparton to work. This indicates that there are no obvious employers or industries attracting significant volumes of Greater Shepparton residents out of the area for work and the majority (86%) of trips to work are likely to be within the City of Greater Shepparton.

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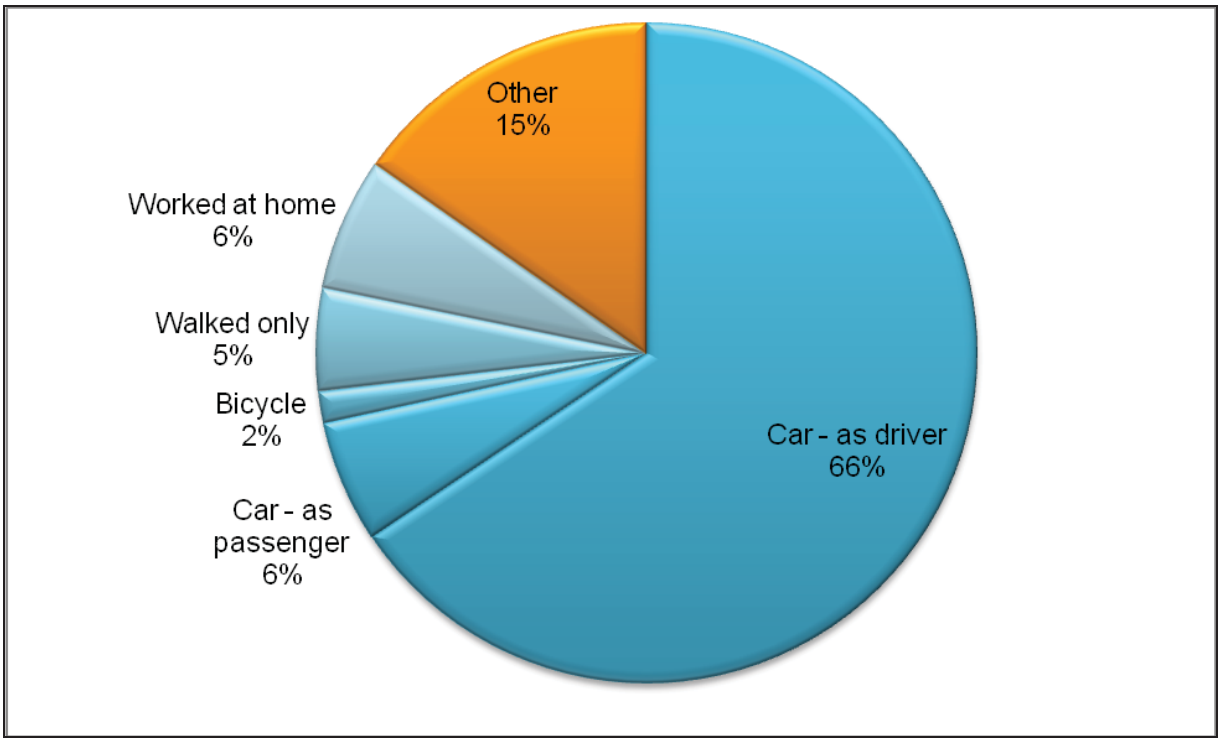
2.1.7 Travel to Work Modal Share

Figure 2.4 outlines the primary travel modes for 'Journeys to Work' for Greater Shepparton residents.

Figure 2.4: Residents Travel to Work Modal Share, City of Greater Shepparton 2006



(Source: Australian Bureau of Statistics, Census of Population and Housing, 2006)

As shown in Figure 2.4, there is a strong reliance on the private vehicle for trips to work. Out of all travel modes travel by private vehicle constitutes 72% of trips.

2.2 Demographic Conclusions

Demographic analysis concludes that the City of Greater Shepparton has a high reliance on private vehicles for transport and a high vehicle ownership per household. The average household size in the City of Greater Shepparton in 2006 was 2.6 persons and 34.2% of households in Greater Shepparton had 2 persons. Notwithstanding this, over half of all households have two or more vehicles per household.

The majority of industries of employment have the opportunity to provide residents with jobs locally, indicating that there is not a great need to travel outside Greater Shepparton for employment. The census information concluded that in 2006 there were only a small amount of Greater Shepparton residents that travelled beyond Shepparton to work. This indicates that there are no obvious employers or industries attracting significant volumes of Greater Shepparton residents out of the area for work and the majority (86%) of trips to work are likely to be within the City of Greater Shepparton.

Children of primary school age constituted 11.0% of the population and children and teenagers of secondary school age constituted 9.6% of the population.

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3.0 Existing Conditions

3.1 Site Locality

The site is located approximately four kilometres north east of Shepparton town centre.

As shown in Figure 3.1, the development site is bordered by Ford Road in the north, Grahamvale Road to the east, private agricultural land to the south and Verney Road to the west.

Figure 3.1: Site Location

(source: maps.google.com)

3.2 Road Network

Verney Road is a local road aligned north south between Goulburn Valley Highway and Balaclava/New Dookie Road. In the vicinity of the site there is one lane in each direction and cycle lanes on both sides. Mainly the shoulders are unsealed, however near some intersections the shoulders are sealed and formal footpaths exist. There is a short length of shared path on the western side of Verney Road in the vicinity of the site.

Balaclava Road is a VicRoads declared road aligned east west between Goulburn Valley Highway (Numurkah Road) and New Dookie Road. There is one lane in each direction, cycle lanes on both sides and parallel car parking on the northern side. There are formal footpaths on both sides.

New Dookie Road is a VicRoads declared road which extends east approximately 400 m where it becomes Dookie Shepparton Road and continues to Dookie. In the vicinity of the site (between Verney Road and Grahamvale Road) this road has one lane in each direction with unsealed shoulders.

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Forming the eastern border of the site, **Grahamvale Road** is a local road aligned north south from Katamatite Shepparton Road to the roundabout at Dookie Shepparton Road. In the vicinity of the site Grahamvale Road has one lane in each direction and a narrow sealed shoulder. Grahamvale Road is the current formal town bypass for Heavy Goods Vehicles (HGVs) and accordingly HGVs comprise approximately 20% of all movements along this route.

Forming the northern border of the site, **Ford Road** is a local road aligned east west between Lemnos North Road, Lemnos and Goulburn Valley Highway. In the vicinity of the site there is one lane in each direction (unmarked) and unsealed shoulders.

Hawkins Street is aligned east west between Verney Road and Goulburn Valley Highway and provides the most direct access to Goulburn Valley Highway from the site. Hawkins Street has been designed to act as a an informal collector road with the Northern Neighbourhood (Retail) Centre located on the corner of Hawkins Street and Goulburn Valley Highway and reduced number of houses with frontages (including 18 crossovers on the North side and 12 crossovers on the South side). It is planned that the intersection with Goulburn Valley Highway will be signalised to improve access and safety.

Pine Road comprises one lane in each direction and is primarily aligned east west between Verney Road and Goulburn Valley Highway apart from a short section which is aligned north south (approximately 400 m west of Verney Road). There are formal footpaths on both sides, and parallel car parking on the northern side, of the eastern section of the street. There is a formal footpath on the north side of the western section of the street. The intersection with Goulburn Valley Highway is signalised.

Goulburn Valley Highway (Numurkah Road) is a VicRoads declared road and is defined as a road of national importance. In the area near the site the Goulburn Valley Highway (Numurkah Road) has two lanes in each direction, sealed shoulders and a series of service roads to cater for active frontages.

3.3 Turning Movement Volume Surveys

Turning movement volume surveys were undertaken by Global Workforce on behalf of AECOM on Tuesday 5 August 2008 in the AM peak between 7:30am and 10:30am and in the PM peak between 3:00pm and 6:00pm.

As shown in Figure 3.2, the intersections assessed include:

- Verney Road / Balaclava Road / New Dookie Road
- Verney Road / Ford Road
- Grahamvale Road / Dookie Shepparton Road
- Grahamvale Road / Ford Road

Additional turning movement volume surveys were undertaken by Global Workforce on behalf of AECOM on Thursday 19 November 2009 in the AM peak between 7:30am and 10:30am.

As shown in Figure 3.2, the intersections assessed include:

- Verney Road / Pine Road
- Verney Road / Hawkins Street

For the Hawkins Road / Goulburn Valley Highway priority intersection turning movement surveys were sourced from City of Greater Shepparton (CGS) surveys. These surveys were conducted in 2005. In order to provide a realistic comparison it was agreed with CGS to apply a compound growth factor of 1% per annum (typical for Goulburn Valley Highway) to create a flow scenario for this intersection.

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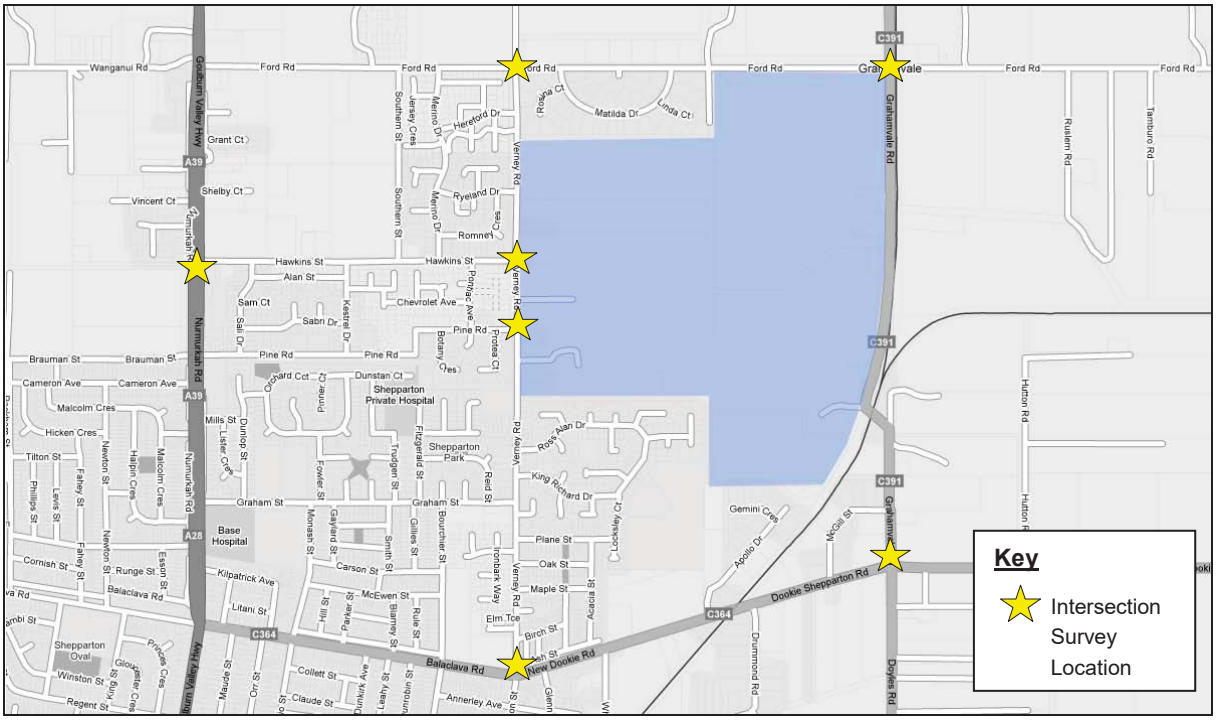
Figure 3.2: Survey Location



(source: maps.google.com)

Figure 3.3 to Figure 3.15 illustrate the AM and PM peak hour traffic volumes for the intersections analysed. Full survey results are contained within Appendix A.

As different roads within the network experience differing AM and PM peak periods each intersection has been analysed based on the intersection specific peak hour as recorded during recent surveys.

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Figure 3.3: Verney Road / Balaclava Road AM Peak Hour

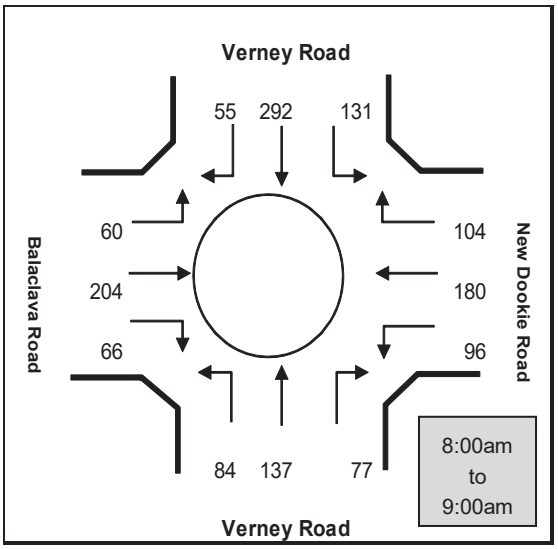

Figure 3.4: Verney Road / Balaclava Road PM Peak Hour

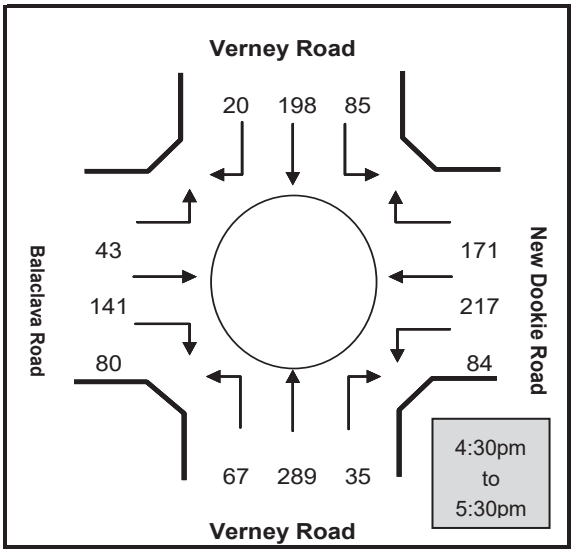

Figure 3.5: Verney Road / Ford Road AM Peak Hour

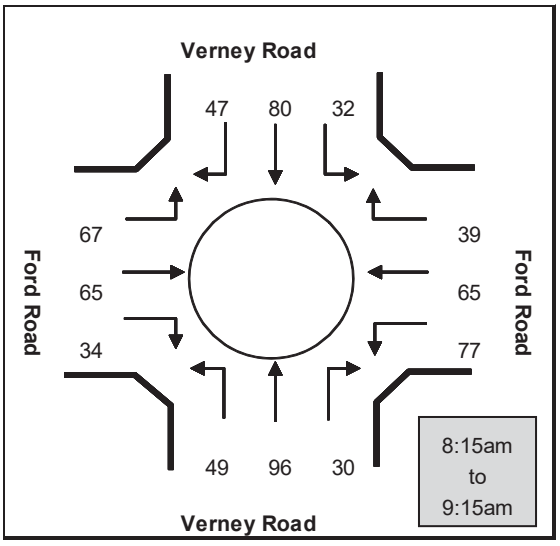

Figure 3.6: Verney Road / Ford Road PM Peak Hour

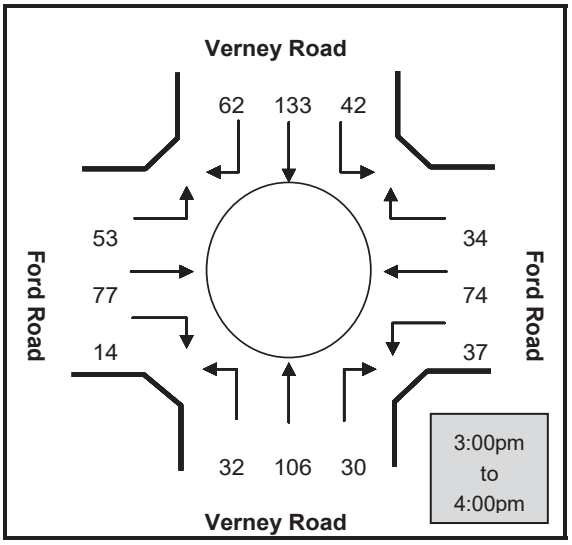

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Figure 3.7: Grahamvale Rd/Dookie Shepprtn Rd AM Pk Hr

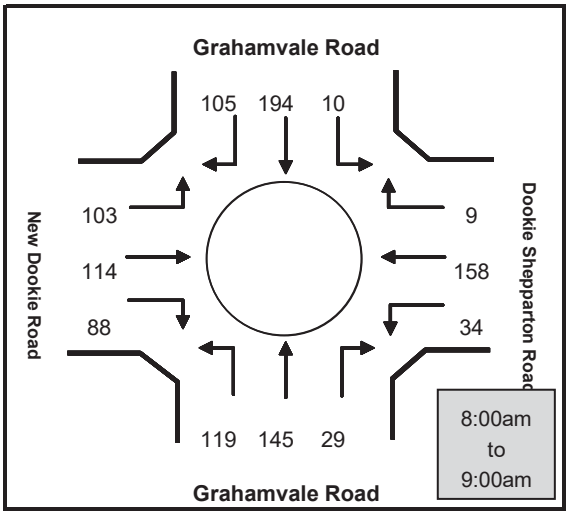

Figure 3.8: Grahamvale Rd/Dookie Shepprtn Rd AM Pk Hr

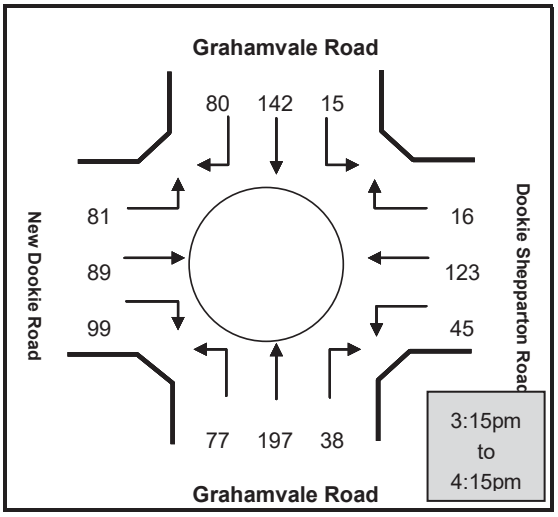

Figure 3.9: Grahamvale Road / Ford Road AM Pk Hr

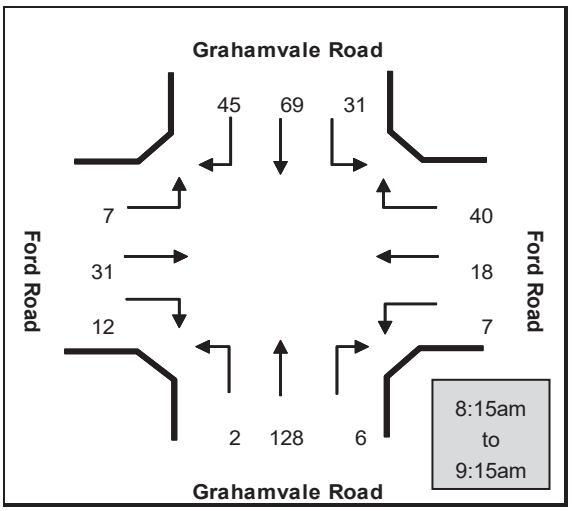

Figure 3.10: Grahamvale Road / Ford Road PM Pk Hr

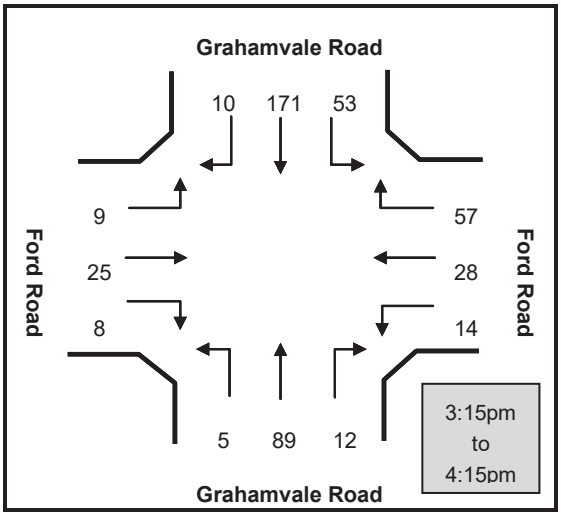

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Figure 3.11: Hawkins Road / GV Hwy AM Pk Hr

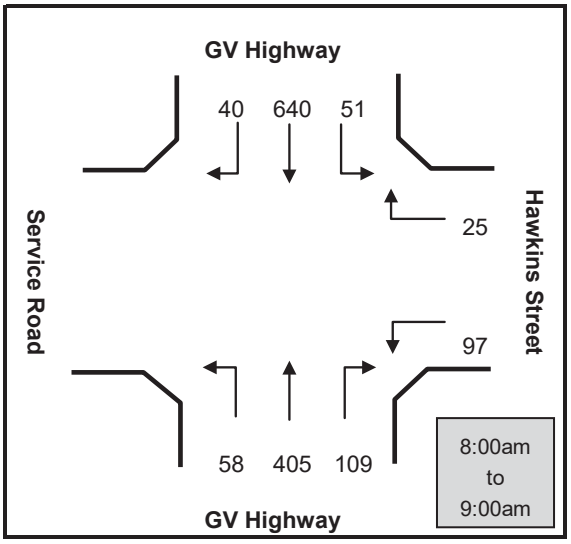

Figure 3.12: Hawkins Road / GV Hwy PM Pk Hr

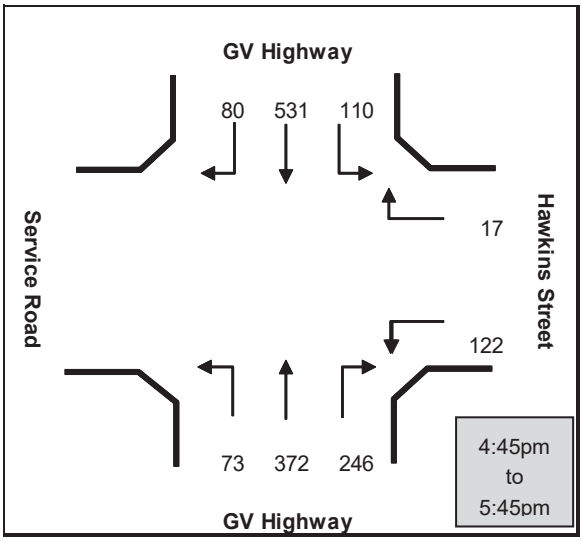

Figure 3.13: Verney Road / Hawkins Street AM Pk Hr

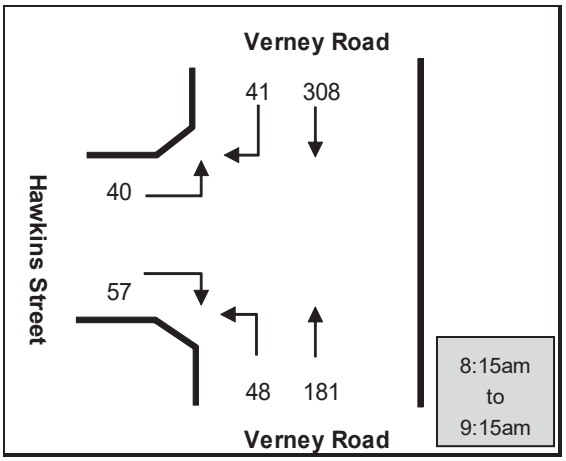

Figure 3.14: Verney Road / Pine Road AM Pk Hr

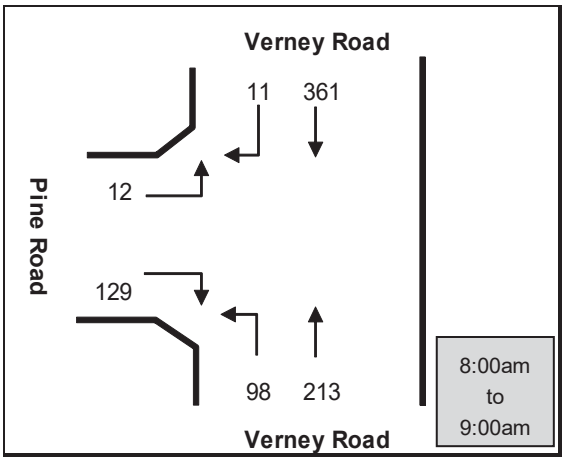

Figure 3.15: Verney Road / Hawkins Street 8:00am to 9:00am

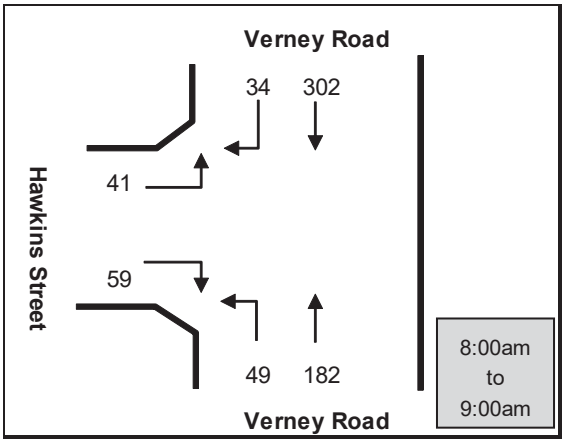

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Figure 3.15 illustrates the 8:00am to 9:00am hourly traffic flows recorded at the Verney Road / Hawkins Street intersection. Comparison of the 8:00am to 9:00am hourly traffic flows at the Verney Road / Pine Road intersection and the Verney Road / Hawkins Street intersection shows that the two-way traffic flow on Pine Road (250 vehicles per hour) is 37% higher than on Hawkins Street (183 vehicles per hour). The higher flows on Pine Road may be attributed to the traffic signals at the Pine Road / Goulburn Valley Highway intersection or to the secondary college located east of Goulburn Valley Highway on Parkside Drive.

It is also observed that these high flows along Pine Road are generally due to the dominant right turns of vehicles turning onto Verney Road (south) and the left turns from Verney Road (south) turning into Pine Road. This indicates a preference for vehicles travelling to/from the south to use Pine Road opposed to using Hawkins Street.

3.4 Crash History

An accident review for the area has been performed using the VicRoads CrashStats database.

The roads reviewed included:

- Verney Road between Balaclava Road and Ford Road
- Grahamvale Road between Dookie Shepparton Road and Ford Road
- Ford Road between Verney Road and Goulburn Valley Highway
- Balaclava Road, New Dookie Road and Dookie Shepparton Road to Grahamvale Road
- Hawkins Street
- Pine Road
- Goulburn Valley Highway at the intersections of Balaclava Road, Hawkins Street, Ford Road, Verney Road and Pine Road.
- Hawdon Street (just south of Verney Road)

In the five year period between January 2004 and December 2008 there were 46 accidents along these roads. This resulted in 16 serious injuries and 30 other injuries. No fatalities were recorded at these locations. Full results can be found in Appendix D.

Between 2004 and 2008 the signalised intersection of Brauman Street (the western extension of Pine Road) and Goulburn Valley Highway experienced seven accidents, which resulted in five serious and two non-serious injuries. Four of these accidents occurred in the twelve month period between January and December 2008. Six of the accidents were collisions between right turning vehicles and vehicles travelling in the lane into which the vehicle was turning. These accidents indicate that there are existing safety issues at this intersection.

Between 2004 and 2008 five accidents were observed at the Goulburn Valley Highway / Goulburn Valley Highway Service Road intersection. The majority of these accidents occurred during light, day and clear conditions and there was no pattern to the classification of these accidents. No serious injuries were sustained.

Between 2004 and 2008 five accidents were observed at the Balaclava Road/ Verney Road roundabout. These accidents comprised cross traffic collisions and incidences where the driver lost control of the vehicle. A serious injury was sustained in one of the accidents. There was no pattern to the time of day or road conditions of these accidents.

3.5 Committed Traffic Improvements and Developments

3.5.1 Shepparton Valley Bypass

The boundaries for the Shepparton Bypass have been finalised and were incorporated into the Greater Shepparton Planning Scheme in late 2006. A program for the construction of the Shepparton Bypass is yet to be agreed with the Australian Federal Government. Figure 3.16 shows the confirmed bypass route which will reduce through traffic on Goulburn Valley Highway and replace the HGV bypass route along Grahamvale Road.

As the timeframe for the Shepparton Bypass has not yet been confirmed it is important to consider that it may not actually be opened prior to completion of the development.

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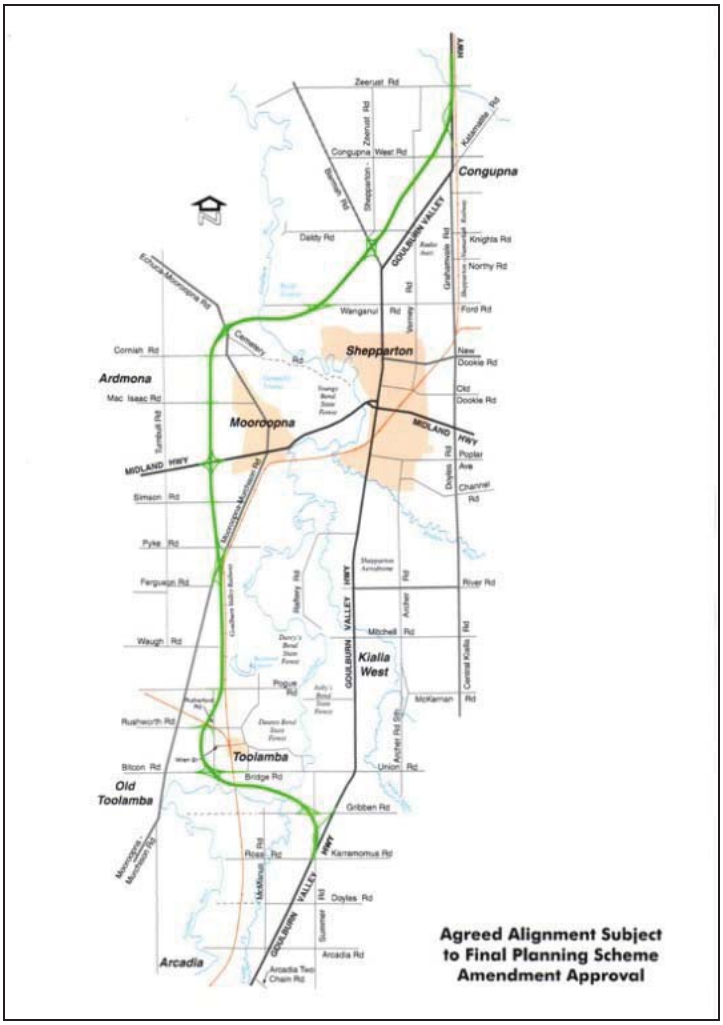
Figure 3.16 Valley Bypass Route



3.5.2 Northern Neighbourhood Centre Extension

The Northern Neighbourhood Centre is a retail development located on the corner of Goulburn Valley Highway and Hawkins Street. It has a committed expansion planned to increase the retail floor space from 3800 sqm to 7300 sqm, resulting in an additional 3500 sqm of retail space.

This is anticipated to place further pressure on the Hawkins Street / Goulburn Valley Highway intersection. Accordingly the intersection will need to be upgraded in the near future as a part of the Northern Neighbourhood extension.

At the time of preparing this report, there were no other known committed developments expected to impact the local traffic network.

3.6 Cycle Network

Shepparton has a well established cycle network that is continuously improving. The Shepparton Cycle network map provided by CGS is included in Figure 3.17: .

As shown in Figure 3.17: , there are currently on-road cycle lanes on Verney Road, Balaclava Road and Goulburn Valley Highway. An on-road cycle lane is proposed to extend from Balaclava Road along Dookie Shepparton Road and past Grahamvale Road.

There is also a shared path along a section of the west side of Verney Road and this is proposed to be extended.

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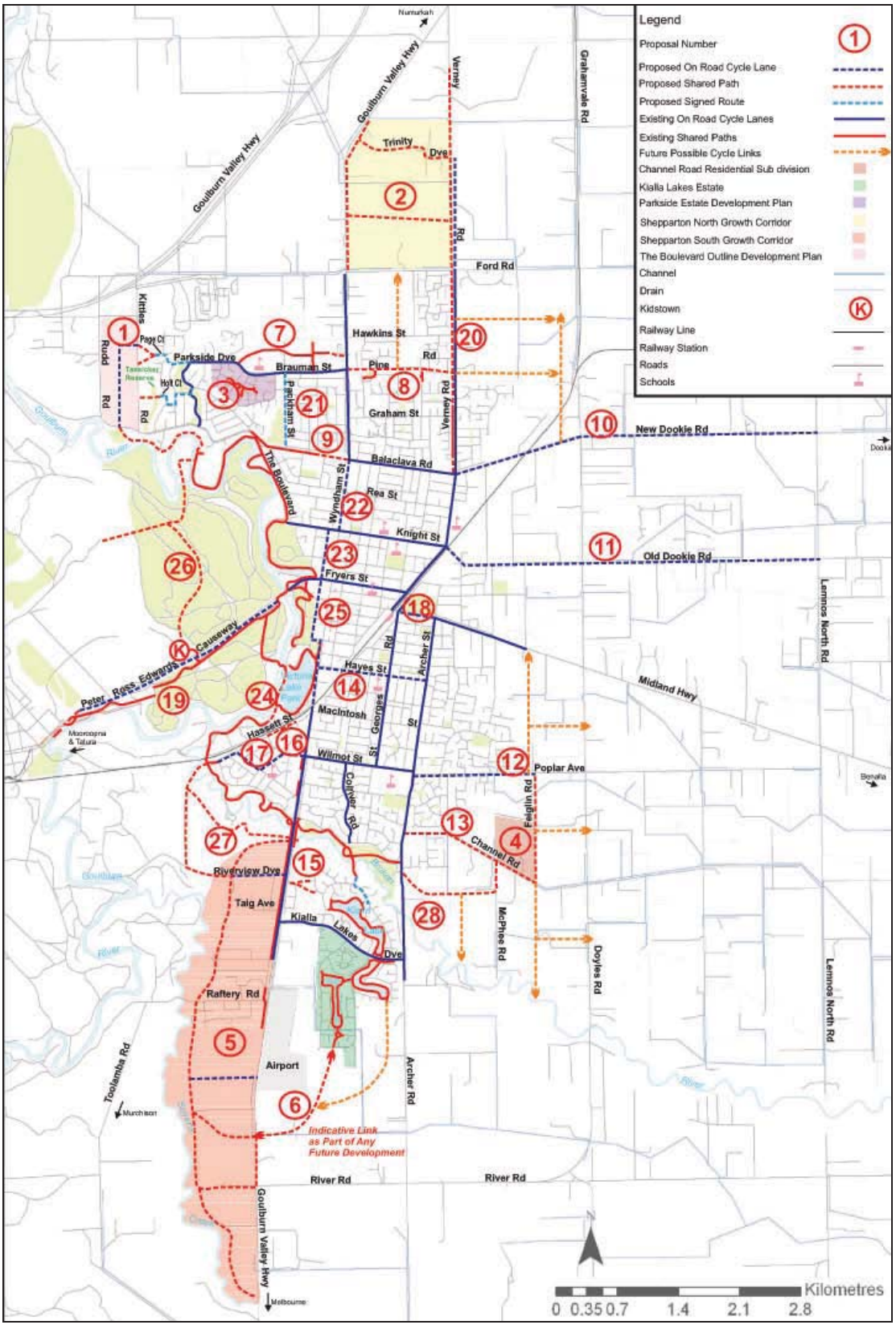
The proposed development is well placed to integrate a safe, convenient cycle network, maximise permeable route and connections to the external road network.

Figure 3.17: Shepparton Cycle Network



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4.0 Existing Traffic Operation

4.1 Overview of Local Road Network

During initial discussions with CGS Engineering Projects department[4] it was agreed that the following four intersections would be most adversely affected by the proposed development and would be sufficient for analysis of impacts on external local road network:

- Verney Road and Balaclava Road
- Verney Road and Ford Road
- Grahamvale Road and Dookie Shepparton Road
- Grahamvale Road and Ford Road

Further to these discussions, in October 2008 further discussions were conducted with CGS Council Officers regarding the likelihood of impacts to Hawkins Street and potentially Pine Road. Additional analysis has been investigated for:

- Goulbourn Valley Highway and Hawkins Street
- Verney Road and Hawkins Street
- Verney Road and Pine Road

The impact of the proposed development on the operation of the Hawkins Street / Goulbourn Valley Highway intersection has been investigated. In 2005 CGS conducted surveys of the intersection to determine whether signalisation was warranted in line with VicRoads requirements. The investigation concluded that signalisation was not warranted, but the intersection was flagged as a potential future location suitable for signalisation. Discussions with CGS suggested that the implementation of signals at this location will be required in the near future to improve existing operational and safety conditions.

Historical traffic growth along Goulburn Valley Highway in this area has averaged 1.0% per annum[5]. Therefore, a growth factor of 1.0% per annum has been applied to the traffic movement flows recorded in 2005 and the Hawkins Street / Goulbourn Valley Highway intersection has been modelled using SIDRA to provide an estimation of current (2008) operation.

4.2 SIDRA INTERSECTION Analysis

The operation of the local intersections described in 4.1 have been analysed using SIDRA INTERSECTION 3.1 (SIDRA).

The SIDRA software package is a computer program that estimates intersection capacity and performance statistics using iterative approximation.

The following three main operational parameters have been detailed to provide a broad understanding of the intersection performance. These are Degree of Saturation, Level of Service and Average Delay. Each is described below.

4.2.1 Degree of Saturation

The level of congestion at an intersection is most commonly measured by the Degree of Saturation (DOS). This is defined as the ratio of arrival flow to capacity and is otherwise known as the volume capacity ratio, and has a theoretical maximum value of one. In practice, a DOS of greater than 0.95 would indicate that the intersection is operating under congested conditions, with lengthening queues and delays. As a guide the operating conditions under various degrees of saturation can be defined as:

[4] Brendan Walsh, Senior Engineer - Engineering Projects Greater Shepparton City Council, 22 August 2008

[5] Source: CGS

- DOS < 0.75 Very good operating conditions;
- 0.75 < DOS < 0.90 Good operating conditions;
- 0.90 < DOS < 0.95 Acceptable operating conditions; and
- DOS < 0.95 Congested operating conditions.

When utilising SIDRA to analyse intersections, it is prudent to compare not only the DOS, but also factors such as queues and delays, which are qualitatively captured through assessment of the level of service.

4.2.2 Level of Service

Austroads have developed standards for level of service for urban streets within Australia. Level of Service (LOS) is based on average through-vehicle travel speed for the segment, section, or entire urban street under consideration.

SIDRA uses average control delay, which is the average delay that the driver will experience when waiting at the intersection as a measure of the "level of service" that the intersection is operating as a whole and/or for each movement. The delay levels that apply to different levels of service under SIDRA are summarised in Table 4.1.

Table 4.1: SIDRA Definition of Levels of Service and Delay

Level of Service	Characteristic Flows	Control delay per vehicle in seconds (d)
A	Primarily free-flow operations at average travel speeds	d<=10
B	Reasonable unimpeded operations at average travel speeds	10<d<=20
C	Stable operations; however, ability to manoeuvre and change lanes in mid block locations may be more restricted	20<d<=35
D	Small increases in flow may cause substantial increases in delay and decreases in travel speed	35<d<=55
E	Significant delays and average travel speeds of 33 percent or less of the free flow speed	55<d<=80
F	Urban street flow at extremely low speeds, typically one-third to one-fourth of the free flow speed	80<d

4.2.3 Average Delay

The delay to a vehicle is the difference between the interrupted and uninterrupted travel time through the intersection. The reported delay includes the deceleration and acceleration delays for the major stop experienced by queued vehicles as well as the geometric delays experienced by all vehicles negotiating the intersection.

4.2.4 Verney Road and Grahamvale Road Intersections

Table 4.2 to Table 4.7 summarise the existing operational characteristics of the following intersections during the AM and PM weekday peak hours:

- Verney Road and Balaclava Road
- Verney Road and Hawkins Street
- Verney Road and Pine Road
- Verney Road and Ford Road
- Grahamvale Road and New Dookie Road
- Grahamvale Road and Ford Road.

Full SIDRA analysis results are included in Appendix B.

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Table 4.2: Verney Road / Balaclava Road Existing Peak Hour Intersection Operation (Roundabout)

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Verney Road (South)	0.289	0.4.4	6.3	5.8	LOS A	LOS A
New Dookie Road (East)	0.444	0.484	7.1	6.9	LOS A	LOS A
Verney Road (North)	0.519	0.310	6.4	4.8	LOS A	LOS A
Balaclava Road (West)	0.352	0.326	5.9	7.6	LOS A	LOS A
All Approaches	0.519	0.484	6.4	6.3	LOS A	LOS A

Table 4.3: Verney Road / Hawkins Street Existing AM Peak Intersection Operation (T-intersection)

Intersection Arm	Degree of Saturation	Average Delay (sec)	Level of Service
Verney Road (South)	0.102	1.8	LOS A
Hawkins Street (West)	0.222	14.6	LOS B
Verney Road (North)	0.174	1.1	LOS A
All Approaches	0.221	3.3	-

Table 4.4: Verney Road / Pine Road Existing AM Peak Intersection Operation (T-intersection)

Intersection Arm	Degree of Saturation	Average Delay (sec)	Level of Service
Verney Road (South)	0.121	2.7	LOS A
Pine Road (West)	0.491	24.7	LOS C
Verney Road (North)	0.204	0.3	LOS A
All Approaches	0.500	5.4	-

Table 4.5: Verney Road / Ford Road Existing Peak Hour Intersection Operation (Roundabout)

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Verney Road (North)	0.157	0.228	6.9	6.7	LOS A	LOS A
Ford Road (East)	0.187	0.155	6.7	6.9	LOS A	LOS A
Verney Road (South)	0.159	0.155	6.4	6.4	LOS A	LOS A
Ford Road (West)	0.174	0.151	7.0	6.5	LOS A	LOS A
All Approaches	0.187	0.228	6.7	6.6	LOS A	LOS A

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Table 4.6: Grahamvale Road / Dookie Shepparton Road Existing Peak Hour Intersection Operation (Roundabout)

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Grahamvale Road (South)	0.264	0.269	4.9	4.6	LOS A	LOS A
Dookie Shepparton Road (East)	0.228	0.193	4.9	4.8	LOS A	LOS A
Grahamvale Road (North)	0.305	0.234	5.9	5.8	LOS A	LOS A
New Dookie Road (West)	0.287	0.272	5.9	6.7	LOS A	LOS A
All Approaches	0.306	0.272	5.5	5.5	LOS A	LOS A

Table 4.7: Grahamvale Road / Ford Road Existing Peak Hour Intersection Operation (Priority Junction)

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Grahamvale Road (South)	0.080	0.072	1.0	2.6	LOS A	LOS A
Ford Road (East)	0.111	0.179	9.3	10.1	LOS A	LOS B
Grahamvale Road (North)	0.095	0.137	4.1	2.3	LOS A	LOS A
Ford Road (West)	0.078	0.071	8.3	8.8	LOS A	LOS A
All Approaches	0.111	0.179	4.4	4.6	-	-

As shown in Table 4.2, Table 4.5 and Table 4.6 all intersections controlled with roundabouts currently operate with an excellent LOS of 'A' in both peak periods and have very low average delays, of less than 8 seconds. This indicates that there is plenty of additional capacity at these intersections.

Table 4.3 reveals that the Verney Road / Hawkins Street T-intersection currently operates with a good level of service and with short delays. Table 4.4 reveals that the Verney Road / Pine Road intersection is mainly operating satisfactorily however there are medium delays for vehicles turning left and right from Pine Road. These vehicles experienced an average delay of 25 seconds in the AM peak. As shown in Figure 2.14 there was a high volume of vehicles (129 vehicles) turning right from Pine Road into Verney Road in the AM peak.

As shown in Table 4.7 the Grahamvale Road / Ford Road priority junction currently operates with a good level of service and with short delays.

4.2.5 Hawkins Street / Goulburn Valley Highway

Table 4.8 displays the results of the Hawkins Street / Goulburn Valley Highway intersection analysis for 2008 scenario based on the CGS 2005 traffic survey.

Table 4.8: Hawkins Street / Goulburn Valley Highway SIDRA Analysis for 2008 Scenario

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (South)	0.180	0.372	3.3	5.6	LOS A	LOS A
Hawkins Street (East)	0.460	0.308	30.0	21.2	LOS D	LOS C
Goulburn Valley Highway (North)	0.195	0.179	1.2	2.4	LOS A	LOS A
All Approaches	0.500	0.372	4.5	5.5	-	-

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Table 4.8 reveals that the intersection is mainly operating satisfactorily however there are significant delays for vehicles turning right from Hawkins Street. These vehicles experienced an average delay of 92 seconds in the AM peak. The delay is considered excessive and potentially increases the risk of collision.

As detailed the Traffic Engineering Manual Volume 1, Chapter 3 – Edition 3, Revision A, (2001) VicRoads recommend that signalisation may be required under the following circumstances:

Traffic signals may be considered subject to detailed analysis; when the major road carries at least 600 vehicles/hour (two way) and the minor road concurrently carries at least 200 vehicles (one way) on one approach over any 4 hours of an average day.

In the AM and PM peak hours the two way traffic on Goulburn Valley Highway is 1303 vehicles and 1412 vehicles respectively. Hawkins Street (westbound) carries 97 vehicles in the AM peak and 122 vehicles in the PM peak.

The SIDRA analysis for the 2008 scenario indicate that signalisation of the intersection may be necessary to provide safe and efficient operation. Accordingly, the intersection has been analysed to provide an understanding of operation with signalisation for the 2008 scenario based on the CGS 2005 traffic survey.

The following phasing sequence was used to construct the phasing operation for the SIDRA model. In both the AM and PM peaks the phasing sequence used for the SIDRA model included:

Phase A Phase B

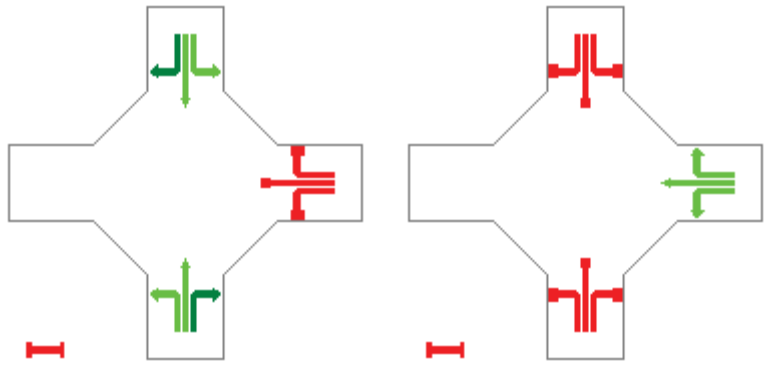

Table 4.9 displays the results of the signalised intersection analysis for the 2008 scenario based on the CGS 2005 traffic survey.

Table 4.9: Hawkins Street / Goulburn Valley Highway Signalised Intersection SIDRA Analysis for 2008 Scenario

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (South)	0.324	0.693	10.0	12.8	LOS A	LOS B
Hawkins Street (East)	0.441	0.545	20.1	20.5	LOS C	LOS C
Goulburn Valley Highway (North)	0.510	0.466	8.8	9.8	LOS A	LOS A
All Approaches	0.510	0.693	10.2	12.1	LOS B	LOS B

As shown in Table 4.9, the results of the signalised intersection analysis indicate a more even distribution of traffic flows. The results indicate higher levels of saturation for Goulburn Valley Highway, however the operation of Hawkins Street indicates significant improvement and acceptable operation in both peak periods with average delays ranging from 11 to 21 seconds.

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5.0 Proposed Development

The proposed mixed use development is primarily residential with a complimentary retail and community component located adjacent to Verney Road. As part of the development, it is also proposed to extend the Grahamvale Primary School (PS).

Four access points are proposed for the development including:

- Verney Road between Ryeland Drive and Hawkins Street
- Verney Road extension of Pine Road
- Grahamvale Road and
- Ford Road

5.1 Land Use

The proposed development is primarily residential, with retail and ancillary community facilities. A total of 1677 residential dwellings are proposed.

It is proposed to develop a retail and community hub including 1350sqm gross floor area (GFA), comprising a convenience supermarket with GFA 900sqm and 450sqm of small tenancies. It is recommended that a preschool, childcare, maternal and child health services are included within the community hub.

The retail and community facilities are proposed to be located north east of the primary Verney Road entrance.

It is proposed to extend the existing Grahamvale Primary School located on the western boundary of the site. The extent of the extension is not yet finalised however, for the purpose of this investigation it has been estimated that the enrolments will double, as explained in Section 6.1.4.

5.2 Car Parking Rates

5.2.1 Residential Car Parking

Residential car parking shall be designed in accordance with the Greater Shepparton Planning Scheme and provision for car parking will include parking within property curtilage. This is not examined as a part of this assessment.

5.2.2 Retail Car Parking

Car parking for the development should be designed in accordance with the most current car parking rates applicable. According to the current Clause 52.06 of the Greater Shepparton Planning Scheme, a provision of 8 car spaces to each 100sqm of leasable floor area is required for the majority of retail developments anticipated to occupy this retail component.

However, recently the Department of Planning and Community Development (DPCD) facilitated a state wide review of planning scheme parking rates. This process culminated in the release of a report by an Advisory Committee (appointed by the Minister for Planning) titled Review of Parking Provisions in the Victoria Planning Provisions, August 2007. This report aims to provide advice on car parking issues and to prepare a new Clause 52.06 suitable for inclusion in the Victoria Planning Provisions (VPP) and planning schemes.

The Advisory Committee report has been prepared following extensive research across Victoria and contribution from numerous stakeholders and experts. If adopted, the report's recommendations will alter the existing parking rates provided in Clause 52.06 of the VPP.

In general the parking rates proposed in the Advisory Committee report are lower or equal to the existing parking rates in Clause 52.06.

However, it is relevant to note that the adoption of this report is, in all likelihood, some months away and there is not necessarily a guarantee that the report's recommendations will be adopted in any form. Comments are currently being sought on the Advisory Committee report and the Advisory Committee is currently analysing the submissions on all the draft documents.

Notwithstanding the uncertainty in respect of the possible adoption of the revised parking rates proposed in the Advisory Committee report, it is still important for the parking rates to be considered for future developments.

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The Advisory Committee Report specifies a proposed parking rate of 4.0 car spaces per 100sqm of leasable floor area for retail developments (for standard retail developments, as in this case).

Therefore, even though the current planning scheme rate is 8 spaces per 100sqm of leasable floor area, it is expected that a lower rate of 4.0 spaces per 100sqm of leasable floor area is in line with the recommendations of the recent Advisory Committee Report and will be considered suitable for this future development.

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6.0 Vehicular Traffic Generation and Distribution

The following traffic investigation has been undertaken to ascertain the levels of traffic that will be generated and assigned to the existing road network as a result of new residential development in the Shepparton North East Growth Area.

6.1 Traffic Generation

Traffic generation rates have been discussed and agreed with the CGS Engineering Projects department and are presented as follows.

6.1.1 Background Traffic Growth

An annual background traffic growth rate of 1.5% per annum has been applied to surveyed traffic movements. This is based on the historical growth rate of the Verney Road area as monitored by CGS. The growth rate takes into account growth in traffic caused by developments in the greater area, such as other residential and retail developments.

6.1.2 Residential

The Greater Shepparton Infrastructure Design Manual requires a traffic generation of 10 vehicle trips per lot per day[6]. This results in a total of 16,770 vehicle trips per day.

Greater Shepparton Infrastructure Design Manual a weekday peak hour vehicle trip rate of 0.9 movements per dwelling. This factor has been developed to take into account all trips typical of peak hour activity and primarily includes trips to work and trips to schools. For parents, one of the attractions of this residential development is the proximity to educational facilities, including the Grahamvale Primary School located on the eastern boundary of the site, the Christian School located on the western boundary the site and a collection of other schools located in close proximity.

To provide an accurate analysis of external trips generated to and from the site it is important to take into consideration that no external trips will be generated for residents aged between four and 11 travelling to and from the Grahamvale Primary School located within the site. As discussed in section 2.1.1, this age group constitutes 11% of the population. Accordingly the peak hour vehicle trip rate has been reduced by approximately 11% to 0.8 movements per dwelling to take into account the reduced demand for trips external to the site.

This results in a total traffic generation of 1342 movements generated by residential traffic in the AM and PM peak hours.

Vehicle trips are defined as a one-way vehicular movement from one point to another excluding the return journey. Therefore a vehicle entering and leaving a land use is counted as two trips. For residential trips the following profile has been assumed:

- AM Peak: 10% of trips in and 90% of trips out
- PM Peak: 70% of trips in and 30% of trips out

6.1.3 Retail

The RTA “Guide to Traffic Generating Developments” (October 2002) is a widely used, comprehensive guide to covering all aspects of traffic generation relating to developments. It was developed in New South Wales and provides good guidance for Australian conditions generally. The Guide commonly provides generation rates for daily (24 hour) and evening peak hour periods for a wide range of land uses.

The rates detailed in Table 6.1 have been discussed with CGS Engineering Projects department and agreed to be suitable for the land uses envisaged within the NE Growth Corridor Residential/Mixed Use Development:

[6] City of Greater Shepparton Infrastructure Design Manual V2.5, 2 Nov 2009

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Table 6.1: RTA Guide Generation Rates (October 2002)

Land Use	Daily Rate (vehicles per 100sqm GLFA)	Peak Hour Rate (vehicles per 100sqm GLFA)
Supermarket	121 vehicle trips per 100sqm of gross leasable floor area	12.5 vehicle trips per 100sqm of gross leasable floor area
Retail	121 vehicle trips per 100sqm of gross leasable floor area	12.5 vehicle trips per 100sqm of gross leasable floor area

Based on the proposed development of 1350sqm supermarket and retail area the traffic generation is estimated to be 1634 per day and 169 movements in the peak hours.

However it is estimated that only 10% of traffic attracted to the retail site will originate from traffic passing outside the development[7]. Therefore the additional traffic on the external road network is estimated to be 164 movements per day and 17 movements in the peak hours. It is important to note that the volume of retail movements is an overestimate for the AM peak as it is unlikely that the AM peak for trips associated with the retail development will align with the AM peak for trips in the surrounding road network. However to provide a robust analysis the peak hour retail traffic generation of 17 movements has been applied.

For retail trips the following profile has been assumed:

- AM Peak: 50% of trips in and 50% of trips out
- PM Peak: 50% of trips in and 50% of trips out

6.1.4 Grahamvale Primary School

All new resident children will be accommodated within the development and do not constitute external trips.

Access to Grahamvale Primary School from outside the development is proposed to remain available via Grahamvale Road. In order to provide a robust analysis it has been assumed that access to the Grahamvale PS will be relocated off Grahamvale Road and into the local road within the site.

As we do not have information regarding the anticipated growth of the school an estimation has been created based on reasonable assumptions. The current school student population is 300 students.

It is estimated that when the development site is fully occupied in 2020 there will be a projected development population of 4084 people. Based on ABS population statistics it is anticipated that the development site would include approximately 449 primary school-aged children[8], who are most suitably located for enrolment at Grahamvale PS.

Discussions with the Department of Education revealed that one of the major attractors to the current school is the “country feel”, which would change as the area is developed. It considered that the school population will draw fewer children from other areas in Shepparton.

Demand for student placements residing off-site is estimated to include approximately half of current student population, 150 placements. This would result in a total primary school population of approximately 600 children.

Students residing within the development site area would not generate any external trips to/from the site. School trips are actually taken into consideration within the standard residential peak hour traffic generation rate of 0.8 trips per dwelling, as discussed in 6.1.2.

The expansion of the school would therefore be likely to result in a reduction in external trips. For the purpose of this investigation the effect of any potential reduction in trips from the external road network has not been analysed.

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[7] *‘Shepparton North East Growth Area Activity Centre Demand’* report prepared by Applied Development Research Pty Ltd, October 2008

[8] Based on Shepparton ABS Population Data (2006) for people aged from 5 to 11.

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6.1.5 Primary School Traffic Generation Methodology

As there are no formal guidelines recommended for calculating traffic generation for primary schools a methodology has been formulated and agreed with the CGS Engineering Projects department. The methodology is described in the following paragraphs.

The traffic generation for Grahamvale PS is based on number of students in each vehicle. The 2006 ABS census data for the Shepparton North ABS catchment area demonstrates the family composition includes a total of:

- 35% family households have one child and
- 65% of family households have two or more children.

AECOM estimate that trips to the school made by the students residing externally to the development site include one trip for families with one child and one trip for families with two or more children each way.

Trips generated by staff are estimated based on the following assumptions:

- 600 students
- 35 staff members including: 30 teachers (1 teacher per 20 students) and 5 support staff

Table 6.2 displays the trip generation estimation of the existing Grahamvale PS and the proposed expansion.

Table 6.2: Total Trips Generated by Students on the External Road Network during the peak hour

Children in Family	Percentage of Total	Existing Children	Existing Trip Generation	Proposed Children	Proposed Trip Generation
1 child	35%	105	210	53	106
2 + children	65%	195	195	97	97
Staff	-	-	-	-	35
Total	-	300	405	150	238

* include 2 or more children in each car trip

Therefore a reduction in 167 trips on the external road network is expected[9]. The proposed 238 trips are expected to be distributed as described in section 6.2.

Due to the set down/pick up nature of primary school trips, for trips from external locations the following profile has been assumed:

Students

- AM Peak: 50% of trips in and 50% of trips out
- PM Peak: 50% of trips in and 50% of trips out

Staff

- AM Peak: 100% of trips in
- PM Peak: 100% of trips out

[9] For the purposes of this assessment the reduced trips will not be reduced from the road network.

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6.1.6 Total Peak Hour Trips

Table 6.3 displays the total trip generation estimation on the external road network during the AM and PM peak hours.

Table 6.3: Total Trips Generated on the External Road Network during the peak hour

Land Use	Trips per Peak Hour	AM Peak		PM Peak	
		Trips In	Trips Out	Trips In	Trips Out
Residential	1342	134	1208	939	403
Retail	17	9	8	8	9
Primary School	238	137	101	101	137
Total	**1597**	**280**	**1317**	**1048**	**549**

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6.2 Vehicular Traffic Distribution

A traffic distribution assignment estimate is based on an assessment of the local attractions including locations of neighbouring towns, proximity to locations of employment and schools and 'travel to work' characteristics of the residents of Greater Shepparton. The estimated traffic distribution has been agreed with the CGS Engineering Projects department. The agreed traffic distribution assignment for the North East Growth Area proposed development is estimated to be:

- 10% north
- 10% east
- 60% south and
- 20% west.

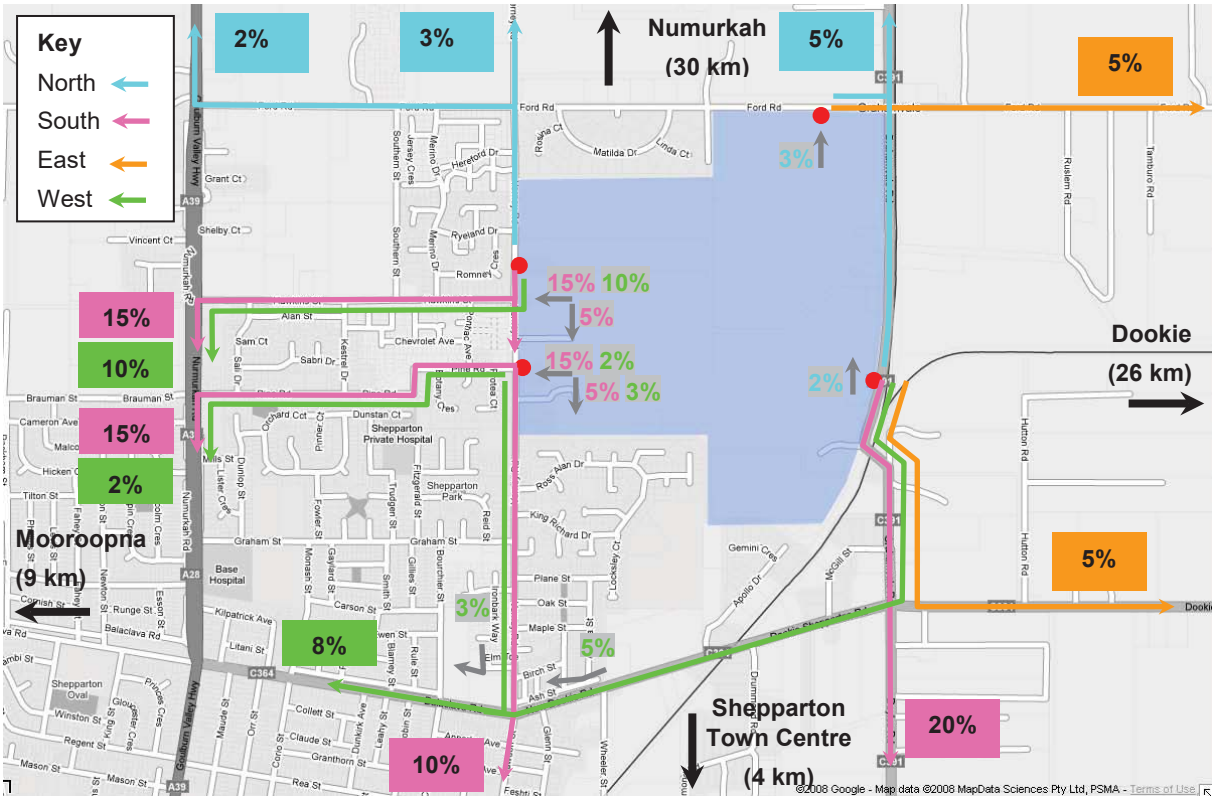
This distribution includes a bias toward Shepparton town centre located approximately four kilometres from the site and slightly increased traffic flows to Mooroopna and other local attractors west of the site.

Traffic distribution out of the development site area is divided with 35% of traffic using the main Verney Street access point north of Hawkins Street, 32% utilising the Grahamvale Road access point, 25% utilising the secondary Verney Street access point at the intersection with Pine Road and 8% utilising the Ford Road access point.

The distribution has been further broken down and assigned to the routes as detailed in Figure 6.1.Figure 6.1

A full summary of the volumes added to each intersection analysed in included in Appendix C.

Figure 6.1: Traffic Movement Distribution



(source: maps.google.com)

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6.3 Summary of Forecast Traffic

Table 6.4 summarises the peak hour forecast traffic generated by the development.

Table 6.4: Summary of Peak Hour Forecast Traffic Generated by the Development

Site Entrance	Percentage	Peak Hour Trips
Verney Road between Ryeland Drive and Hawkins Street (main)	35%	559
Verney Road extension of Pine Road (minor)	25%	399
Grahamvale Road	32%	511
Ford Road	8%	128
Total Trips		**1597**

Table 6.4 details that there is a total forecast of 1597 trips generated by the development in the peak hours. The main Verney Road entrance is forecast to accommodate approximately 559 trips in the AM and PM peaks, while the secondary Verney Road entrance is forecast to accommodate approximately 399 trips in the AM and PM peaks. The Grahamvale Road entrance is forecast to accommodate approximately 511 trips in the AM and PM peaks. The Ford Road entrance is forecast to accommodate approximately 128 trips in the AM and PM peaks. The anticipated trip distribution forecast for the external road network is as illustrated in Figure 6.1.

The forecast traffic generated by the development in the AM and PM peak hour is summarised in Table 6.5 and Table 6.6 respectively. Appendix C details the additional forecast traffic for each intersection analysed.

Table 6.5: Summary of AM Peak Hour Forecast Traffic

Direction	Dist. Share	Access Points							
		Verney Road (main)		Verney Road (minor)		Grahamvale Road		Ford Road	
		Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out
South	60%	56	263	56	263	56	263	0	0
West	20%	28	132	14	66	14	66	0	0
East	10%	0	0	0	0	14	66	14	66
North	10%	14	66	0	0	6	26	8	40
Total		**98**	**461**	**70**	**329**	**90**	**421**	**22**	**105**

Table 6.6: Summary of PM Peak hour Forecast Traffic

Direction	Dist. Share	Access Points							
		Verney Road (main)		Verney Road (minor)		Grahamvale Road		Ford Road	
		Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out
South	60%	210	110	210	110	210	110	0	0
West	20%	105	55	52	27	52	27	0	0
East	10%	0	0	0	0	52	27	52	27
North	10%	52	27	0	0	21	11	31	16
Total		**367**	**192**	**262**	**137**	**335**	**176**	**84**	**44**

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7.0 Traffic Impact

The following paragraphs outline the impact of the proposed development on the surrounding road network. The analysis has been estimated for the year the development is expected to be completed (2020) and assumes full occupancy of residential, retail and educational facilities.

As detailed in Chapter 5, four access points are proposed for the development including:

- Verney Road between Ryeland Drive and Hawkins Street (primary) – anticipated approximately 560 peak hour trips
- Verney Road extension of Pine Road (secondary) – anticipated approximately 400 peak hour trips
- Grahamvale Road and Ford Road (local) – anticipated approximately 510 and 130 peak hour trips respectively

It is anticipated that these access points will affect the following external intersections along Verney Road:

- Ford Road
- Hawkins Street
- Pine Road (site entrance) and
- Balaclava Road.

It is anticipated that along Grahamvale Road the following external intersections will be affected:

- Ford Road and
- New Dookie Road.

The impact on the intersection of Grahamvale Road and Hawkins Street has also been analysed.

These ten intersections have been analysed to provide an understanding of the impact on the surrounding road network and to establish any necessary improvements to the local road network for vehicles.

Full SIDRA analysis results are contained within Appendix B.

Recommendations are also provided in Section 7.3 on appropriate treatments at the entrances to the development site on Verney Road and Grahamvale Road.

7.1 Verney Road and Grahamvale Road Intersections

Table 7.1 to Table 7.5 summarise the likely operational characteristics of the six intersections along Verney Road and Grahamvale Road during the AM and PM weekday peak hours in the design year 2020 based on the traffic generation estimated in the previous chapters.

7.1.1 Verney Road Intersections

Table 7.1 summarises the operation of the Verney Road / Balaclava Road roundabout with the forecast traffic.

Table 7.1: Verney Road / Balaclava Road 2020 Peak Hour Roundabout Operation with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Hawdon Street (South)	0.453	0.688	7.7	10.7	LOS A	LOS B
New Dookie Road (East)	0.857	0.692	23.0	10.7	LOS C	LOS B
Verney Road (North)	0.863	0.499	15.5	6.0	LOS B	LOS A
Balaclava Road (West)	0.487	0.642	7.0	13.6	LOS A	LOS B
All Approaches	0.865	0.692	14.3	10.3	LOS B	LOS B

Table 7.1 indicates that with the inclusion of the development traffic, the roundabout intersection will operate with a satisfactory level of service, but will be highly saturated particularly in the AM peak hour.

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Table 7.2 summarises the operation of the Verney Road / Hawkins Street T-intersection with the forecast traffic. The intersection has been analysed assuming the installation of a 30 m slip lane to accommodate the high number of vehicles turning right out of Hawkins Street. There is a large utility pole approximately 35 m from the intersection which will limit the length of the left hand turn slot.

Table 7.2: Verney Road / Hawkins Street 2020 AM Peak Hour T-intersection Operation with Development Traffic

Intersection Arm	Degree of Saturation	Average Delay (sec)	Level of Service
Verney Road (South)	0.128	1.7	LOS A
Hawkins Street (West)	0.627	28.8	LOS D
Verney Road (North)	0.383	5.0	LOS A
All Approaches	0.628	7.7	-

Table 7.2 reveals that there are significant delays for vehicles turning right from Hawkins Street. The SIDRA analysis shows that these vehicles will experience an average delay of approximately one minute in the AM peak. However, the analysis does not account for the beneficial effects of the platooned arrivals generated by the proposed traffic signals at the Verney Road / Pine Road intersection. It is likely that the platooning of northbound traffic on Verney Road will create gaps for right turning vehicles to exit Hawkins Street and assist vehicles to turn out of Hawkins Street. Furthermore if right turning vehicles do experience significant delays these vehicles are likely to reroute and access Verney Road via the proposed signalised intersection at Pine Road. The assumed 2020 traffic distribution forecasts only 67 right turning vehicles at the Verney Road / Hawkins Street intersection. The Verney Road / Pine Road signalised intersection has adequate capacity to accommodate these additional right turn movements.

Table 7.3 summarises the operation of the Verney Road / Ford Road roundabout with the forecast traffic.

Table 7.3: Verney Road / Ford Road 2020 Peak Hour Roundabout Operation with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Verney Road (North)	0.229	0.286	7.0	6.8	LOS A	LOS A
Ford Road (East)	0.240	0.193	7.3	7.3	LOS A	LOS A
Verney Road (South)	0.222	0.254	6.6	6.6	LOS A	LOS A
Ford Road (West)	0.239	0.201	7.7	7.1	LOS A	LOS A
All Approaches	0.240	0.286	7.1	6.9	LOS A	LOS A

Table 7.3 indicates that the Verney Road / Ford Road intersection has plenty of capacity, even with the additional movements forecast by the development.

7.1.2 Grahamvale Road Intersections

The Grahamvale Road intersections have been assessed with a theoretical HGV profile of 7%. This is based on the assumption that the proportion of HGV movements will decrease due to the increased number of cars movements as a result of the development site and also a reduction in HGV movements as a result of the opening of the Shepparton Bypass.

Table 7.4 summarises the operation of the Grahamvale Road / Dookie Shepparton Road roundabout with the forecast traffic.

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Table 7.4: Grahamvale Road / Dookie Shepparton Road 2020 Peak Hour Roundabout Operation with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Doyles Road (South)	0.414	0.553	5.9	5.8	LOS A	LOS A
Dookie Shepparton Road (East)	0.470	0.346	10.7	7.5	LOS B	LOS A
Grahamvale Road (North)	0.755	0.458	8.7	6.1	LOS A	LOS A
Dookie Shepparton Road (West)	0.398	0.512	6.7	10.1	LOS A	LOS B
All Approaches	0.755	0.554	7.9	7.1	LOS A	LOS A

Table 7.4 indicates that the additional westbound and southbound movements in the AM peak hour (and northbound movements in the PM peak hour) at the Grahamvale Road / Dookie Shepparton Road roundabout result in a high degree of saturation on most arms, however the roundabout is still operating well.

Table 7.5 summarises the operation of the Grahamvale Road / Ford Road priority junction with the forecast traffic.

Table 7.5: Grahamvale Road / Ford Road 2020 Peak Hour Priority Junction Operation with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Grahamvale Road (South)	0.110	0.093	1.0	3.0	LOS A	LOS A
Ford Road (East)	0.210	0.387	12.1	14.3	LOS B	LOS B
Grahamvale Road (North)	0.129	0.202	4.5	2.9	LOS A	LOS A
Ford Road (West)	0.272	0.177	9.5	10.3	LOS A	LOS B
All Approaches	0.273	0.387	5.9	6.5	-	-

Table 7.5 indicates that the Grahamvale Road / Ford Road intersection has plenty of capacity, even with the additional movements forecast by the development.

7.2 Goulburn Valley Highway Intersections

7.2.1 Hawkins Street/ Goulburn Valley Highway Priority Intersection

For the Hawkins Street / Goulburn Valley Highway intersection two scenarios for 2020 have been analysed these include:

- 2020 Scenario without forecast development traffic
- 2020 Scenario with forecast development traffic

2020 Scenario Without Forecast Development Traffic

The estimated 2020 scenario peak hour traffic flows (without forecast development traffic) set out in Table 7.6.

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Table 7.6: Estimated 2020 Traffic Flows [10]

Intersection Arm	Left		Through		Right	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (Southbound)	58	124	721	598	45	90
Goulburn Valley Highway (Northbound)	65	82	456	519	123	277
Hawkins Street	109	137	0	0	28	19

As shown in Table 7.6 in the AM Peak Goulburn Valley Highway is projected to experience 721 southbound and 456 northbound movements in the peak hour. Hawkins Street is expected to experience approximately 181 eastbound and 137 westbound movements in the AM Peak hour.

In the PM Peak Goulburn Valley Highway is projected to experience 598 southbound and 404 northbound movements in the peak hour. Hawkins Street is expected to experience approximately 402 eastbound and 157 westbound movements in the PM Peak hour.

Table 7.7 displays the results of the intersection analysis for a 2020 scenario without forecast traffic for the proposed development. Full SIDRA results are included in Appendix B.

Table 7.7: Hawkins Street / Goulburn Valley Highway SIDRA Analysis for 2020 Scenario without Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (South)	0.229	0.466	3.5	6.3	LOS A	LOS A
Hawkins Street (East)	0.843	0.501	61.0	28.9	LOS F	LOS F
Goulburn Valley Highway (North)	0.220	0.201	1.2	2.4	LOS A	LOS A
All Approaches	1.000	0.500	7.3	6.5	-	-

The results of the 2020 intersection analysis suggest that the intersection would require improvements, especially due to the significant delays for vehicles turning right from Hawkins Street. These vehicles experienced an average delay of almost 4 minutes in the AM peak and over 2 minutes in the PM peak. The delay is considered excessive and warrants signalisation.

As detailed the Traffic Engineering Manual Volume 1, Chapter 3 – Edition 3, Revision A, (2001) VicRoads recommend that signalisation may be required under the following circumstances:

Traffic signals may be considered subject to detailed analysis; when the major road carries at least 600 vehicles/hour (two way) and the minor road concurrently carries at least 200 vehicles (one way) on one approach over any 4 hours of an average day.

Based on the 2020 forecast SIDRA analysis, previous consideration of signalisation and accident history, it is considered that this intersection would operate more efficiently and safely with signalisation even without the proposed development.

2020 Scenario with development traffic

The estimated 2020 scenario peak hour traffic flows with forecast development traffic are set out in Table 7.8.

Table 7.8: Estimated 2020 Traffic Flows 11 with Development Traffic

[10] CGS 2005 survey information plus 1.0% growth per annum (except for movements to the service road which are not expected to attract additional growth

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Intersection Arm	Left		Through		Right	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (Southbound)	58	124	721	598	45	90
Goulburn Valley Highway (Northbound)	65	82	456	519	193	489
Hawkins Street	439	274	0	0	28	19

As shown in Table 7.8 the through movements along Goulburn Valley Highway are expected to remain the same with the addition of the development traffic.

The inclusion of the development traffic is expected to further increase the number of eastbound and westbound movements along Hawkins Street to approximately 251 eastbound and 467 westbound movements in the AM peak and approximately 614 eastbound and 294 westbound movements in the PM peak.

Table 7.9 displays the results of the intersection analysis for a 2020 scenario with forecast flows for the proposed development. Full SIDRA results are included in Appendix B.

Table 7.9: Hawkins Street / Goulburn Valley Highway SIDRA Analysis for 2020 Scenario with Forecast Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (South)	0.360	0.825	4.9	12.3	LOS A	LOS B
Hawkins Street (East)	1.345	0.912	52.8	40.9	LOS F	LOS E
Goulburn Valley Highway (North)	0.220	0.201	1.2	2.4	LOS A	LOS A
All Approaches	1.418	1.000	14.6	12.5	-	-

The results of the 2020 intersection analysis suggest that in the 2020 scenario with development traffic the intersection would require improvements to enable safe and efficient operation, especially due to the significant delays for vehicles turning right from Hawkins Street. These vehicles experienced an average delay of over 9.5 minutes in the AM peak and over 6.0 minutes in the PM peak.

The results of the estimated traffic generation indicate that signalisation of the intersection may be necessary to provide safe and efficient operation. Accordingly, the intersection has been analysed to provide an understanding of operation with signalisation based on the estimated flows.

The following phasing sequence was used to construct the phasing operation for the SIDRA model.

[11] As described for Table 7.6.

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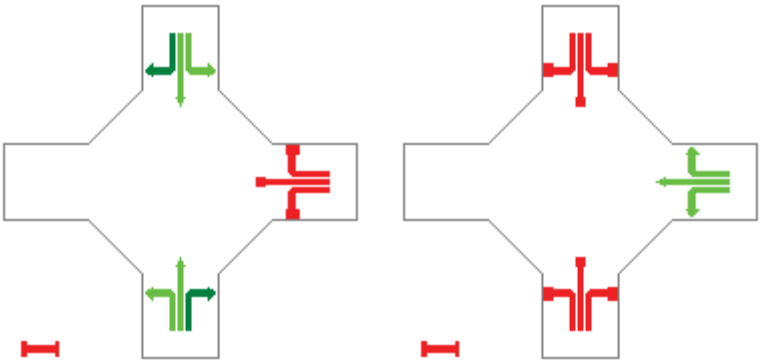
In both the AM and PM peaks the phasing sequence used for the SIDRA model included:

Phase A Phase B



The SIDRA models were set to optimised phase times and the results reflected a reasonable distribution of time for the particular volume of movements.

Table 7.10 displays the results of the intersection analysis for a 2020 scenario with the proposed development estimated traffic flows.

Table 7.10: Hawkins Street / Goulburn Valley Highway Signalised Intersection SIDRA Analysis for 2020 Scenario with Proposed Development

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Goulburn Valley Highway (South)	0.904	1.000	19.3	24.9	LOS B	LOS C
Hawkins Street (East)	1.000	1.000	11.1	16.3	LOS B	LOS B
Goulburn Valley Highway (North)	0.707	0.358	15.9	17.6	LOS B	LOS B
All Approaches	0.999	1.000	16.0	20.9	LOS B	LOS C

As shown in Table 7.10, the results of the signalised intersection analysis indicate a more even distribution of traffic flows. The results indicate higher levels of saturation for Goulburn Valley Highway, however the operation of Hawkins Street indicates significant improvement and acceptable operation in both peak periods with average delays ranging from 19 to 52 seconds.

7.3 Development Entrance Treatments

7.3.1 Verney Road Main Entrance

It is anticipated that the main 'gateway' entrance to the development will be located on Verney Road, north of the Christian School, between Ryeland Drive and Hawkins Street. This will be located adjacent to the local retail and community hub.

Based on the anticipated traffic distribution and flows as estimated in sections 6.2 and 6.3, the main entrance would operate well with a priority T-Intersection as shown in Figure 7.1.

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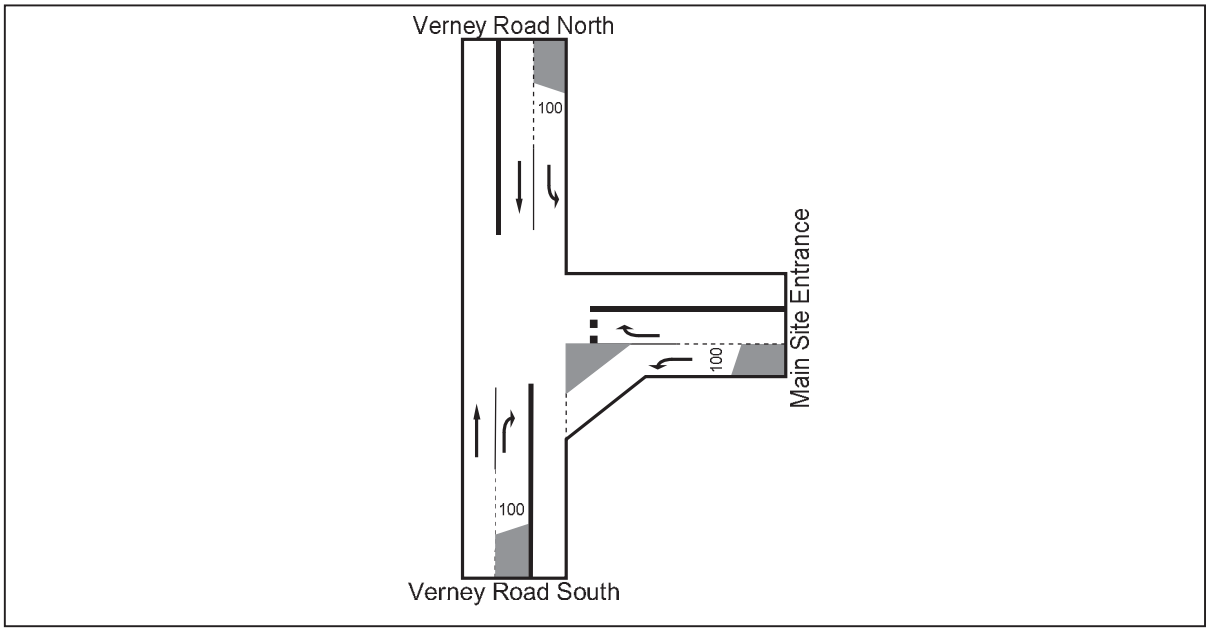
Figure 7.1: Proposed Priority T-Intersection at Verney Road Main Site Intersection



As shown in Figure 7.1, the intersection will require dedicated left turn lanes to promote continuous flow of traffic on Verney Road.

Table 7.11 details the SIDRA analysis for the main Verney Road site entrance located between Ryeland Drive and Hawkins Street.

Table 7.11: Verney Road / Main Site Entrance 2020 Peak Hour Priority T-Intersection, with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Verney Road South	0.147	0.409	2.6	7.0	A	A
Main Site Entrance	0.586	0.261	15.9	15.8	C	C
Verney Road North	0.232	0.247	0.3	0.9	A	A
Total Intersection	**0.586**	**0.409**	**6.8**	**6.0**	**-**	**-**

As shown in Table 7.11, the intersection will operate well in the peak hours with average delays of less than seven seconds and low degrees of saturation.

7.3.2 Verney Road /Pine Road Site Entrance

The Verney Road / Pine Road / site entrance will create a cross intersection with the existing eastern end of Pine Road and provide access to the southern part of the site.

The results of the 2020 intersection analysis of the Verney Road / Pine Road priority intersection (contained within Appendix B) suggest that in the 2020 scenario with development traffic the intersection would require improvements to enable safe and efficient operation, especially due to the significant delays for through and right turning vehicles exiting Pine Road and the development entry. These vehicles experienced an average delay of over 2.5 minutes in the AM peak.

As detailed the Traffic Engineering Manual Volume 1, Chapter 3 – Edition 3, Revision A, (2001) VicRoads recommend that signalisation may be required under the following circumstances:

Traffic signals may be considered subject to detailed analysis; when the major road carries at least 600 vehicles/hour (two way) and the minor road concurrently carries at least 200 vehicles (one way) on one approach over any 4 hours of an average day.

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As detailed in Appendix B, Verney Road is projected to experience 491 southbound and 265 northbound movements in the AM peak hour. Pine Road is expected to experience approximately 214 eastbound movements in the AM Peak hour and the road leading to the development entry is expected to experience approximately 330 westbound movements in the AM Peak hour.

The results of the estimated traffic generation indicate that signalisation of the intersection may be necessary to provide safe and efficient operation. Accordingly, the intersection has been analysed to provide an understanding of operation with signalisation based on the estimated flows. The layout of the proposed signalised intersection analysed is shown in Figure 7.2.

Figure 7.2: Proposed Signalised Intersection at Verney Road / Pine Road Intersection

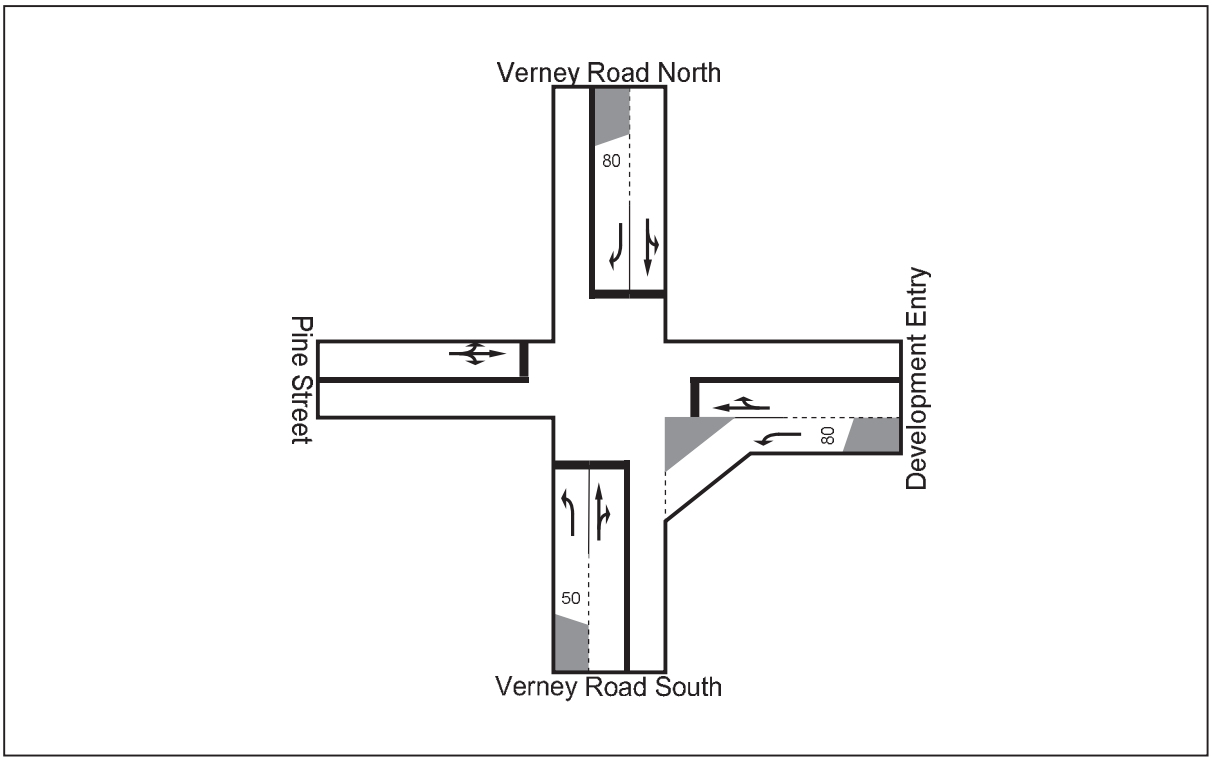

Table 7.12 summarises the SIDRA analysis of the operation of the Verney Road / Pine Road signalised intersection with the forecast traffic.

Table 7.12: Verney Road / Pine Road Site Entrance 2020 Peak Hour Signalised Intersection, with Development Traffic

Intersection Arm	Degree of Saturation	Average Delay (sec)	Level of Service
Verney Road (South)	0.504	11.5	LOS B
Development Entry (East)	0.522	11.8	LOS B
Verney Road (North)	0.757	12.1	LOS B
Pine Road (West)	0.755	21.4	LOS C
All Approaches	0.757	13.2	LOS B

As shown in Table 7.12, the results of the signalised intersection analysis indicate that the signalised intersection will operate with a 'Very Good' to 'Good' Level of Service. The results indicate higher levels of saturation for Verney Road, however the operation of both Pine Road and the development entry indicates significant improvement and acceptable operation in the AM peak period (which is anticipated to be the critical peak period) with average delays ranging from 12 to 24 seconds.

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7.3.3 Grahamvale Road Site Entrance

The Grahamvale Road site entrance is anticipated to be located near Grahamvale Primary School. For the purpose of this investigation, it has been estimated that the Grahamvale Primary School will relocate their entrance to within the site, which would provide a safer access point for the high frequency of children.

Based on the anticipated traffic distribution and flows as estimated in sections 6.2 and 6.3, the results of the 2020 intersection analysis of the Grahamvale Road site entrance priority intersection (contained within Appendix B) suggest that in the 2020 scenario with development traffic the intersection would require an intersection treatment greater than a priority intersection to enable safe and efficient operation, especially due to the significant delays for vehicles travelling south from the site. These vehicles experienced an average delay of seven minutes in the AM peak.

This intersection could potentially operate sufficiently as a roundabout; however the flows are not closely balanced enough to support good operation using a roundabout. Furthermore, as Grahamvale Road is a VicRoads designated road it is not expected that a roundabout would be preferred by VicRoads at this location. In addition to these two factors, there may be space constraints due to the drain on the west side that would prohibit the inclusion of a roundabout at this location.

Accordingly the Grahamvale Road site entrance has been analysed to be controlled by a signalised intersection with a layout as shown in Figure 7.3.

Figure 7.3: Proposed Signalised Intersection at Grahamvale Road Site Entrance Signalised Intersection

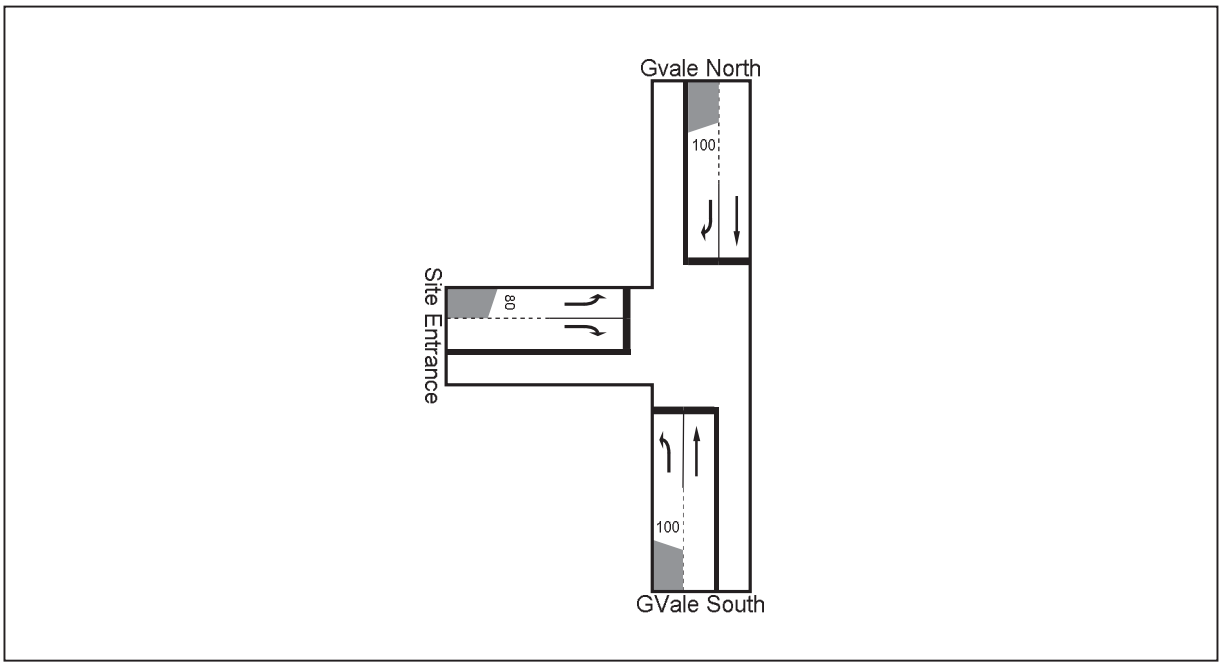

Table 7.13 details the SIDRA analysis for the Grahamvale Road site entrance intersection.

Table 7.13: Grahamvale Road Site Entrance 2020 Peak Hour Signalised Intersection, with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Grahamvale Road South	0.745	0.734	15.5	13.8	B	B
Grahamvale Road North	0.604	0.392	12.7	8.2	B	A
Site Entrance	0.683	0.637	18.6	27.3	B	C
Total Intersection	**0.745**	**0.735**	**16.1**	**14.5**	**B**	**B**

D R A F T

As shown in Table 7.13: , the intersection will operate with a 'Very Good' Level of Service in the peak hours with average delays of less than seventeen seconds.

7.3.4 Ford Road Site Entrance

The Ford Road site entrance is anticipated to be located west of Grahamvale Road. Based on the anticipated traffic distribution and flows as estimated in sections sections 6.2 and 6.3, the Ford Road site entrance would operate well with a priority T-Intersection as shown in Figure 7.4.

Figure 7.4: Proposed Priority T-Intersection at Ford Road Site Entrance Intersection

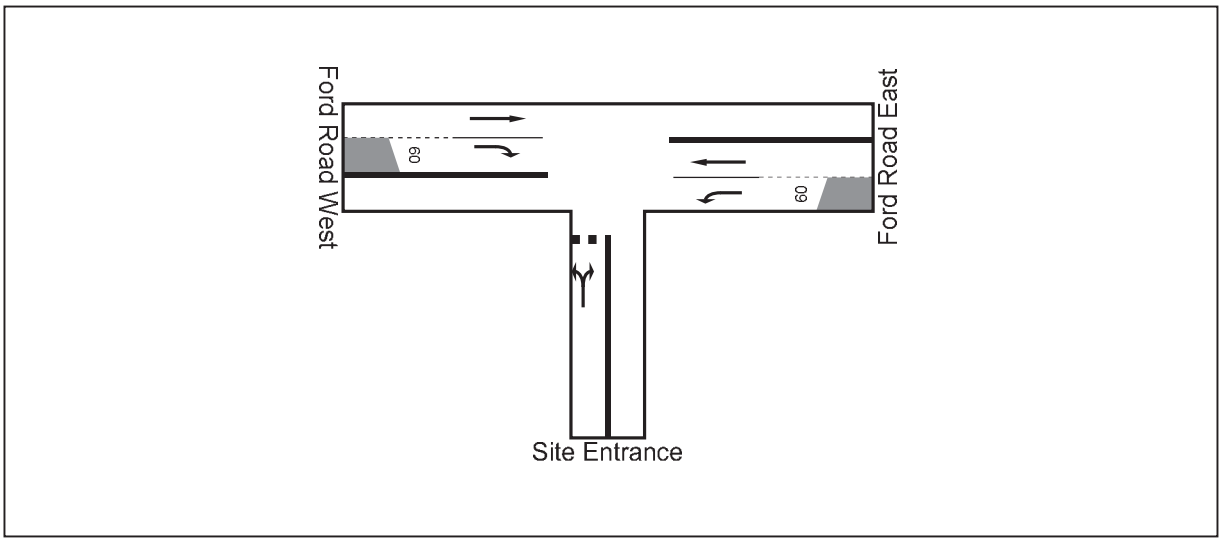

Table 7.14 details the SIDRA analysis for the Ford Road site entrance.

Table 7.14: Verney Road / Main Site Entrance 2020 Peak Hour Priority T-Intersection, with Development Traffic

Intersection Arm	Degree of Saturation		Average Delay (sec)		Level of Service	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Site Entrance	0.163	0.068	10.4	10.1	B	B
Ford Road East	0.044	0.050	1.9	5.2	A	A
Ford Road West	0.034	0.028	0.3	0.4	A	A
Total Intersection	**0.167**	**0.069**	**4.9**	**5.1**	**-**	

As shown in Table 7.14, the intersection will operate very well in the peak hours with average delays of five seconds and a very good Level of Service.

7.4 Conclusions

The following paragraphs discuss the conclusions of the traffic impact on the local road network as a result of the proposed development of the North East Growth Area in Shepparton.

7.4.1 Verney Road and Grahamvale Road Intersections

Generally the intersections are adequate to accommodate the additional forecast traffic as proposed in Chapter 5.

However, the analysis indicates that the proposed additional forecast traffic flows at the Hawkins Street / Verney Road intersection are likely to result in the requirement of intersection improvements such as signalisation.

Grahamvale Road will operate satisfactorily when HGV movements are assessed with 7% HGV. However if the HGV usage was expected to remain as high as 20% in the 2020 design forecast the Grahamvale Road / Dookie Shepparton Road roundabout would experience operational problems. Due to this CGS should continue to pursue the construction of the Shepparton Bypass as a matter of priority to ensure that no local problems develop.

7.4.2 Hawkins Street / Goulburn Valley Highway Intersection

Whilst the Hawkins Street / Goulburn Valley Highway is currently operating generally well as a priority intersection, already movements from Hawkins Street are experiencing significant delays which are potentially dangerous.. CGS are aware of this safety issue and are monitoring the intersection.

Accordingly analysis of the forecast traffic for the design year 2020 (with and without the proposed development) indicate that without improvement, Hawkins Street will experience excessive delays and inevitably an increased safety risk.

Based on these factors the operation of the Hawkins Street / Goulburn Valley Highway intersection was analysed to understand how it could operate as a signalised intersection in 2020 (with the forecast development traffic). It was found that the priority was more evenly distributed resulting in acceptable average delays for all arms of the intersection.

As the base traffic flows for this analysis were collected in 2005 it is recommended that further traffic analysis should be carried out (with recent survey data) to ensure the intersection can cater for the future demands. Notwithstanding this, it is highly probable that the flows along Hawkins Street and Goulburn Valley Highway will necessitate improvements (such as signalisation) to this intersection.

7.4.3 Development Entrance Treatments

Based on the forecast traffic flows for the proposed development and the expected background flows along Verney Road and Grahamvale Road, it is recommended that the most suitable entrance treatments will include:

Signalised Intersections

- Verney Road / Pine Road / Site Entrance
- Grahamvale Road Site Entrance

Priority T-Intersections

- Verney Road Site Entrance between Ryeland Drive and Hawkins Street
- Ford Road Site Entrance

This should be taken into consideration during the detail design of the development.

D R A F T

8.0 Further Issues

Further to the findings of this investigation there are issues that may impact the traffic operation of the local road network. These issues have been summarised in the following paragraphs.

8.1 Sustainable Transport Design

Measures to reduce the reliance on the private car should be investigated for this development. This will enable a reduction in trips made by private cars reducing the pressure on the local road network. This will also enable residents and employers travel options other than the private car.

Well planned and strategically placed bus routes and links to existing services should be explored for trips to Shepparton, Mooroopna, other civic attractions, employment areas and secondary colleges. This will enable sustainable transport choice, reduction in vehicle trips on the local road network and increase the accessibility of residents that do not drive (including senior citizens and teenagers).

A well planned, permeable cycle network with strategic links should also be designed to assist the reduction in vehicle trips on the local road network. There is already a good cyclist network infrastructure established in the local area and there is opportunity to strengthen this as a part of the proposed development.

In addition safe, well planned permeable pedestrian network should be established to encourage local trips by foot and reduce vehicle trips on the local road network.

Other sustainable travel planning initiatives such as local travel plans and car sharing clubs should also be considered to reduce the reliance of the private car, reduce vehicle trips on the local road network and increase accessibility of the future residents and employees of the North East Growth Area development.

The development should be designed in accordance with the Public Transport: Guidelines for Land Use and Development.

8.2 Encouraging Shepparton Bypass Development

The development and opening of the Shepparton Bypass will directly impact the local road network of the North East Growth Area development.

As discussed previously, Grahamvale Road is currently the bypass route for HGVs and accordingly experiences a high proportion of HGV traffic. It is estimated that the traffic operation with forecast development flows is likely fit comfortably within the existing intersections with Ford Road and New Dookie Road however, if Grahamvale Road was to experience 20% HGV traffic these two intersections may experience operational difficulties and increase the risk of accidents.

In addition, there are considerable safety issues as Grahamvale Road will also accommodate the secondary access point for the development likely to carry approximately 32% of all trips to/from the site.

It is recommended that CGS continue to pursue the timely development of the Shepparton Bypass in order to reduce the risk and enable satisfactory traffic operation along Grahamvale Road.

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Appendix A

Existing Traffic Flows

600 282 55 Shepparton NE Growth Development

Location: Verney/Ford Peak Hour Ends: 9:15

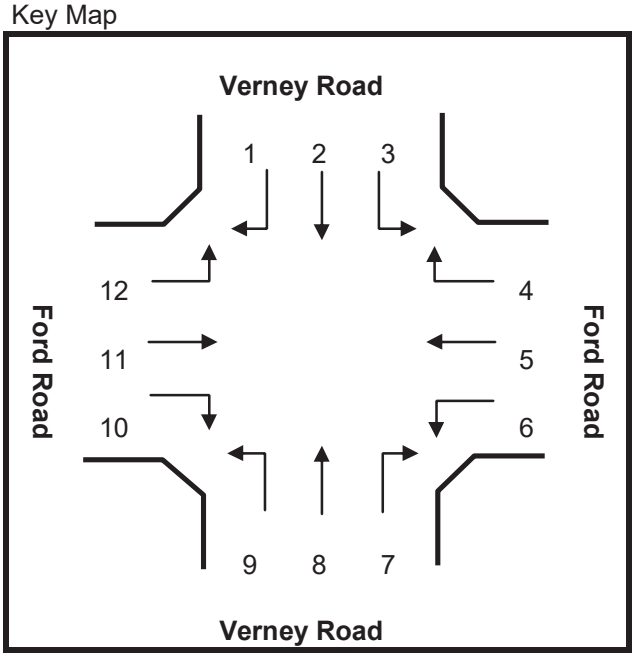
Date: 5 August 2008

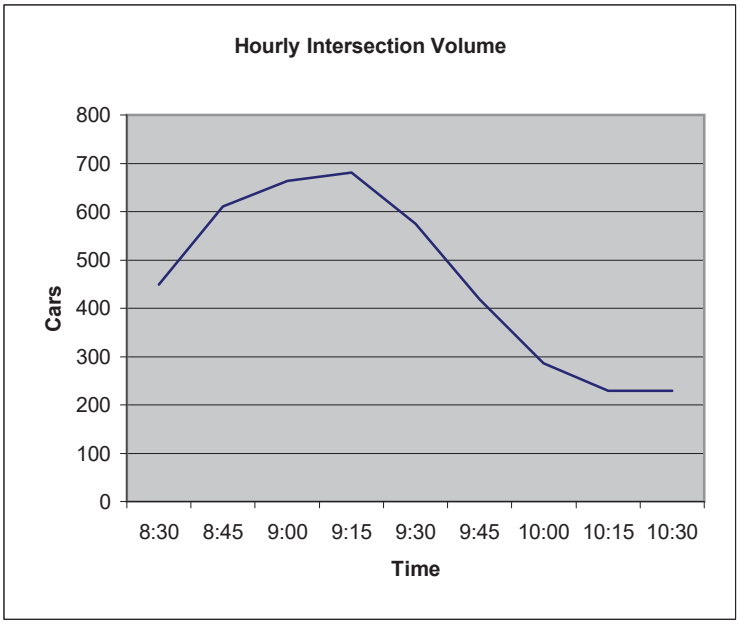
Time: 7:30-10:30

Surveyor:

Weather Conditions:

Key Map





Road	Verney Road				Ford Road				Verney Road				Ford Road				15 min total	hour total
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total		
ID	1	2	3		1	2	3		1	2	3		1	2	3			
7:30 to 7:45	3	11	4	**18**	5	9	0	**14**	1	8	0	**9**	2	6	1	**9**	**50**	-
7:45 to 8:00	2	23	14	**39**	10	24	11	**45**	1	21	3	**25**	3	17	6	**26**	**135**	-
8:00 to 8:15	0	9	3	**12**	7	14	6	**27**	2	21	9	**32**	2	17	5	**24**	**95**	-
8:15 to 8:30	3	21	10	**34**	10	16	21	**47**	7	31	4	**42**	10	25	11	**46**	**169**	**449**
8:30 to 8:45	10	25	5	**40**	10	25	34	**69**	7	34	10	**51**	13	19	19	**51**	**211**	**610**
8:45 to 9:00	27	17	10	**54**	14	18	13	**45**	12	25	9	**46**	8	17	18	**43**	**188**	**663**
9:00 to 9:15	7	17	7	**31**	5	6	9	**20**	4	6	26	**36**	3	4	19	**26**	**113**	**681**
9:15 to 9:30	7	6	11	**24**	6	5	0	**11**	0	17	0	**17**	0	7	4	**11**	**63**	**575**
9:30 to 9:45	1	8	10	**19**	6	3	1	**10**	0	19	1	**20**	0	4	2	**6**	**55**	**419**
9:45 to 10:00	2	8	5	**15**	5	3	1	**9**	0	17	2	**19**	0	9	3	**12**	**55**	**286**
10:00 to 10:15	2	12	5	**19**	5	3	3	**11**	0	15	0	**15**	2	6	3	**11**	**56**	**229**
10:15 to 10:30	5	6	12	**23**	4	10	0	**14**	1	8	7	**16**	1	5	4	**10**	**63**	**229**
AM Peak	47	80	32	**159**	39	65	77	**181**	30	96	49	**175**	34	65	67	**166**	**681**	

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Location: Verney/Ford Peak Hour Ends: 16:00

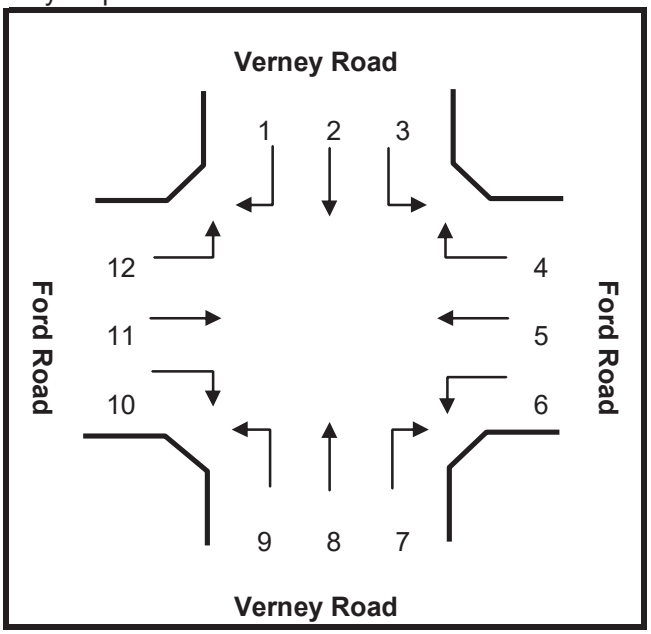
Date: 5 August 2008

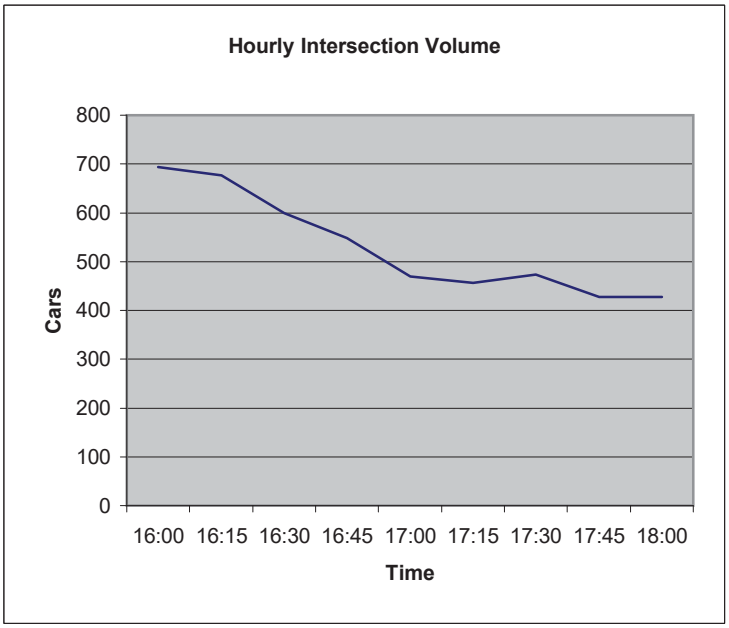
Time: 15:00-18:00

Surveyor:

Weather Conditions:

Key Map





Road	Verney Road				Ford Road				Verney Road				Ford Road					
Movement	R	T	L		R	T	L		R	T	L		R	T	L		15 min total	hour total
ID	1	2	3	Total	1	2	3	Total	1	2	3	Total	1	2	3	Total		
15:00 to 15:15	16	30	6	**52**	15	11	6	**32**	2	13	4	**19**	1	17	9	**27**	**130**	-
15:15 to 15:30	13	40	11	**64**	7	28	16	**51**	8	28	10	**46**	4	9	5	**18**	**179**	-
15:30 to 15:45	18	32	6	**56**	6	18	8	**32**	14	38	13	**65**	3	26	23	**52**	**205**	-
15:45 to 16:00	15	31	19	**65**	6	17	7	**30**	6	27	5	**38**	6	25	16	**47**	**180**	**694**
16:00 to 16:15	4	16	8	**28**	6	8	7	**21**	10	25	3	**38**	1	14	11	**26**	**113**	**677**
16:15 to 16:30	5	6	10	**21**	11	8	7	**26**	10	13	7	**30**	10	6	8	**24**	**101**	**599**
16:30 to 16:45	7	17	10	**34**	18	20	16	**54**	11	10	12	**33**	14	5	14	**33**	**154**	**548**
16:45 to 17:00	7	11	10	**28**	5	11	8	**24**	9	10	6	**25**	8	9	7	**24**	**101**	**469**
17:00 to 17:15	9	18	9	**36**	6	10	3	**19**	3	13	3	**19**	0	11	15	**26**	**100**	**456**
17:15 to 17:30	3	30	6	**39**	9	9	8	**26**	3	13	10	**26**	2	19	6	**27**	**118**	**473**
17:30 to 17:45	6	13	6	**25**	10	7	5	**22**	4	15	4	**23**	18	13	8	**39**	**109**	**428**
17:45 to 18:00	7	22	10	**39**	2	4	6	**12**	3	18	5	**26**	4	12	7	**23**	**100**	**427**
PM Peak	62	133	42	**237**	34	74	37	**145**	30	106	32	**168**	14	77	53	**144**	**694**	

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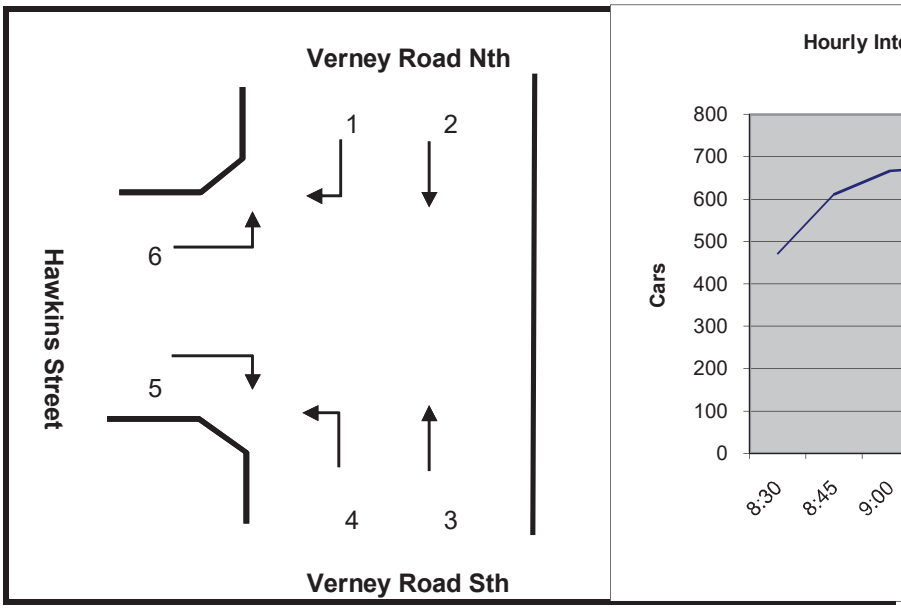
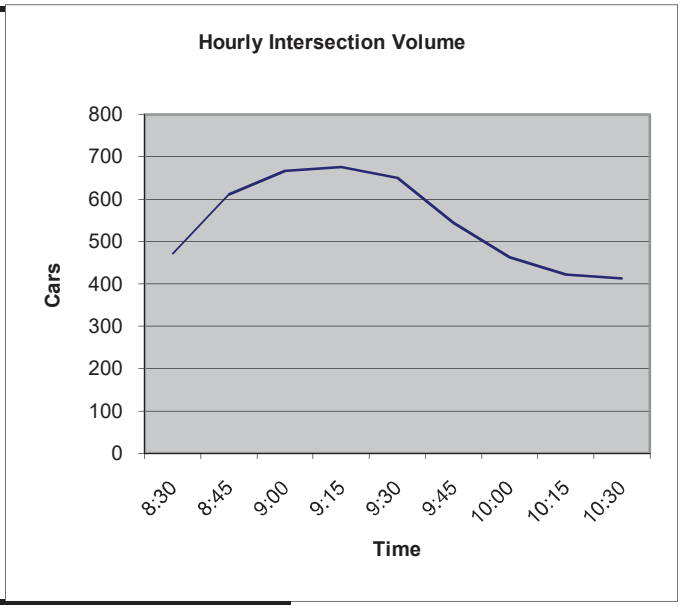
Location:	Verney/Hawkins	Peak Hour Ends:	9:15
Date:	Thursday 19 November 2009		
Time:	7:30 - 10:30am		
Surveyor:	Shirlene Clarke		
Weather Conditions:	34deg		





Road	Verney Road Nth			Verney Road Sth			Hawkins Street			15 min total	hour total
Movement	R	T		T	L		R	L			
ID	1	2	Total	3	4	Total	5	6	Total		
7:30 to 7:45	3	39	**42**	23	8	**31**	4	6	**10**	**83**	-
7:45 to 8:00	4	64	**68**	38	15	**53**	7	6	**13**	**134**	-
8:00 to 8:15	3	46	**49**	38	13	**51**	10	6	**16**	**116**	-
8:15 to 8:30	7	65	**72**	39	8	**47**	11	9	**20**	**139**	**472**
8:30 to 8:45	8	103	**111**	56	19	**75**	22	14	**36**	**222**	**611**
8:45 to 9:00	16	88	**104**	49	9	**58**	16	12	**28**	**190**	**667**
9:00 to 9:15	10	52	**62**	37	12	**49**	8	5	**13**	**124**	**675**
9:15 to 9:30	4	44	**48**	31	18	**49**	10	7	**17**	**114**	**650**
9:30 to 9:45	4	44	**48**	33	18	**51**	13	4	**17**	**116**	**544**
9:45 to 10:00	4	43	**47**	22	18	**40**	15	7	**22**	**109**	**463**
10:00 to 10:15	4	30	**34**	25	13	**38**	9	2	**11**	**83**	**422**
10:15 to 10:30	3	29	**32**	35	19	**54**	13	6	**19**	**105**	**413**
AM Peak	41	308	**349**	181	48	**229**	57	40	**97**	**675**	
8:00 to 9:00	34	302	**336**	182	49	**231**	59	41	**100**	**667**	

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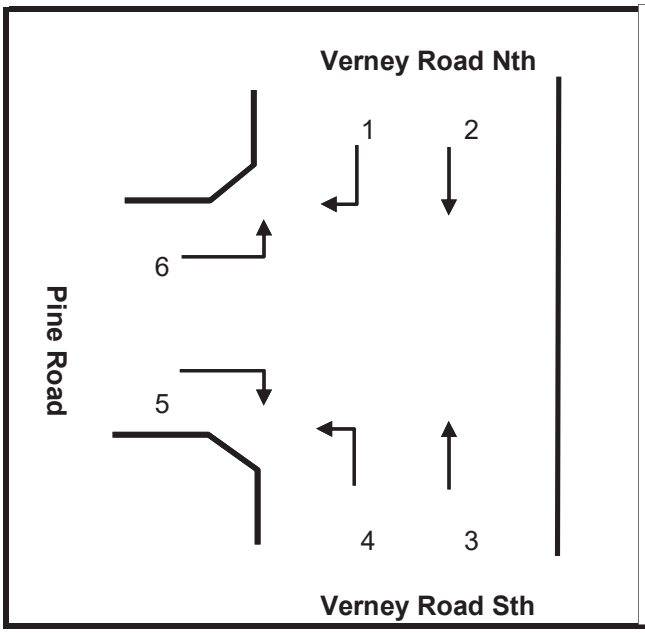
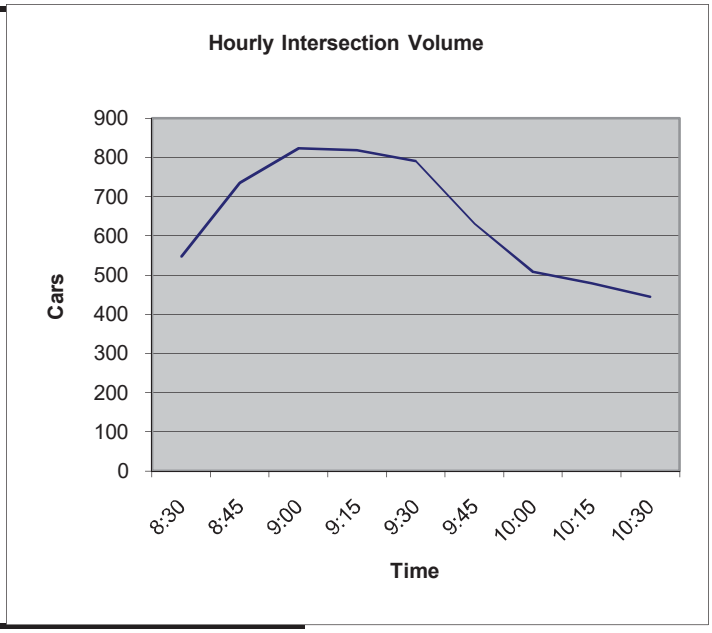
Location:	Verney/Pine	Peak Hour Ends:	9:00
Date:	Thursday 19 November 2009		
Time:	7:30 - 10:30am		
Surveyor:	Dinny Adem		
Weather Conditions:	34deg		





Road	Verney Road Nth			Verney Road Sth			Pine Road			15 min total	hour total
Movement	R	T		T	L		R	L			
ID	1	2	Total	3	4	Total	5	6	Total		
7:30 to 7:45	0	41	**41**	31	2	**33**	4	1	**5**	**79**	-
7:45 to 8:00	0	70	**70**	50	7	**57**	16	1	**17**	**144**	-
8:00 to 8:15	0	58	**58**	53	11	**64**	21	1	**22**	**144**	-
8:15 to 8:30	2	79	**81**	45	20	**65**	31	3	**34**	**180**	**547**
8:30 to 8:45	7	120	**127**	60	35	**95**	42	3	**45**	**267**	**735**
8:45 to 9:00	2	104	**106**	55	32	**87**	35	5	**40**	**233**	**824**
9:00 to 9:15	3	54	**57**	47	18	**65**	14	3	**17**	**139**	**819**
9:15 to 9:30	0	63	**63**	49	11	**60**	25	4	**29**	**152**	**791**
9:30 to 9:45	0	47	**47**	44	9	**53**	7	0	**7**	**107**	**631**
9:45 to 10:00	0	57	**57**	38	10	**48**	5	1	**6**	**111**	**509**
10:00 to 10:15	0	45	**45**	38	15	**53**	10	1	**11**	**109**	**479**
10:15 to 10:30	0	41	**41**	53	9	**62**	13	1	**14**	**117**	**444**
AM Peak	11	361	**372**	213	98	**311**	129	12	**141**	**824**	

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Location: Balaclava/Verney Peak Hour Ends 9:00

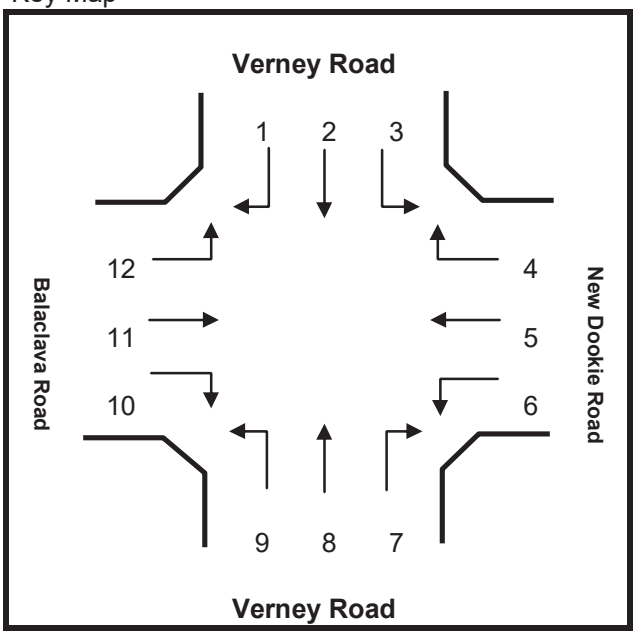
Date: 5 August 2008

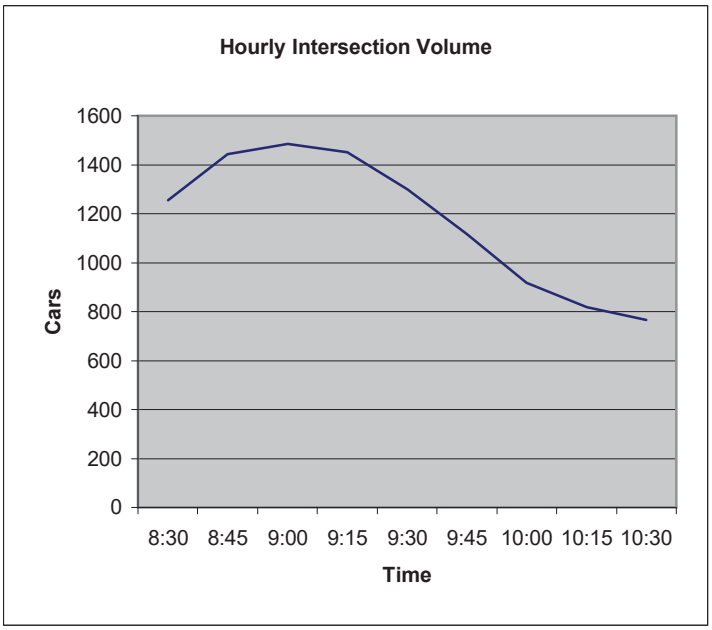
Time: 7:30-10:30

Surveyor:

Weather Conditions:

Key Map





Road	Verney Road				New Dookie Road				Verney Road				Balaclava Road				15 min	hour
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total	total	total
ID	1	2	3		1	2	3		1	2	3		1	2	3			
7:30 to 7:45	6	46	28	**80**	19	18	10	**47**	18	23	2	**43**	7	50	3	**60**	**230**	-
7:45 to 8:00	9	70	47	**126**	17	31	14	**62**	22	24	10	**56**	17	70	1	**88**	**332**	-
8:00 to 8:15	9	46	34	**89**	23	44	19	**86**	13	23	24	**60**	13	51	8	**72**	**307**	-
8:15 to 8:30	14	78	28	**120**	21	55	21	**97**	20	38	25	**83**	24	48	14	**86**	**386**	**1255**
8:30 to 8:45	18	91	32	**141**	28	35	36	**99**	29	35	20	**84**	18	60	16	**94**	**418**	**1443**
8:45 to 9:00	14	77	37	**128**	32	46	20	**98**	15	41	15	**71**	11	45	22	**78**	**375**	**1486**
9:00 to 9:15	12	47	26	**85**	27	50	18	**95**	7	25	18	**50**	12	24	7	**43**	**273**	**1452**
9:15 to 9:30	10	37	20	**67**	15	31	12	**58**	11	36	4	**51**	13	38	6	**57**	**233**	**1299**
9:30 to 9:45	6	41	10	**57**	20	44	8	**72**	6	39	12	**57**	12	29	9	**50**	**236**	**1117**
9:45 to 10:00	8	41	24	**73**	8	19	11	**38**	3	19	7	**29**	8	23	4	**35**	**175**	**917**
10:00 to 10:15	4	26	14	**44**	13	23	7	**43**	11	28	7	**46**	11	23	7	**41**	**174**	**818**
10:15 to 10:30	2	37	16	**55**	16	17	10	**43**	7	24	9	**40**	5	30	7	**42**	**180**	**765**
AM Peak	55	292	131	**478**	104	180	96	**380**	77	137	84	**298**	66	204	60	**330**	**1486**	

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Location: Balaclava/Verney Peak Hour Ends 17:30

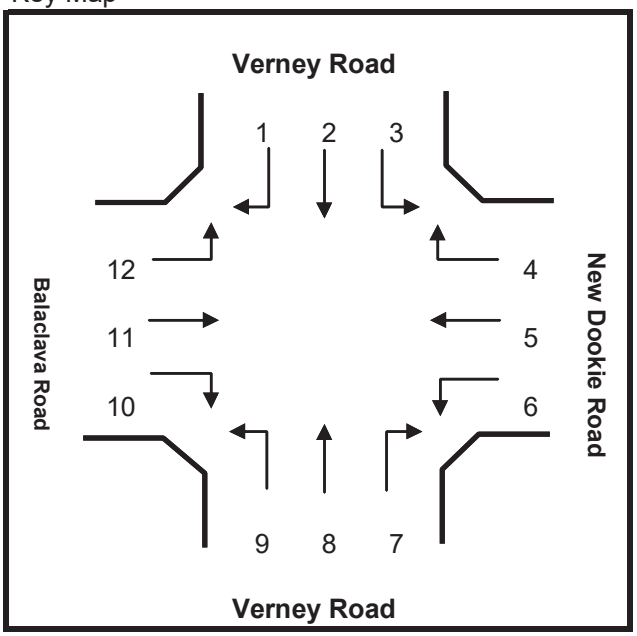
Date: 5 August 2008

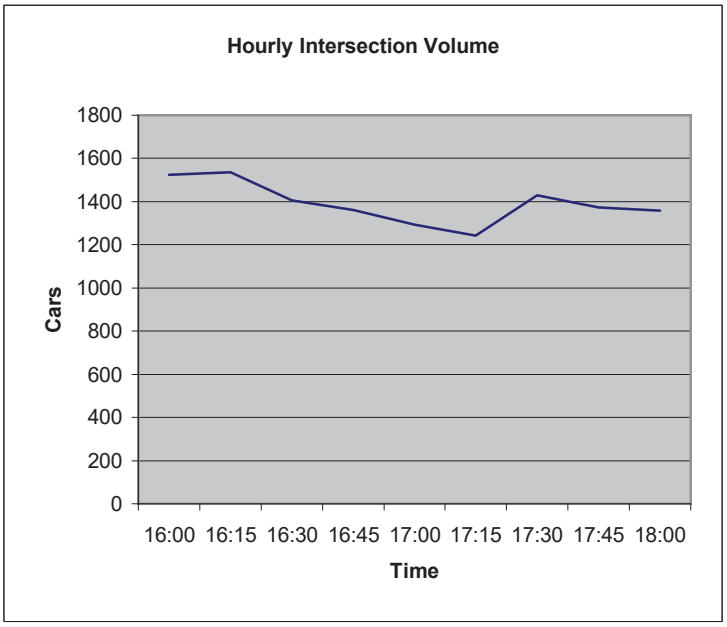
Time: 15:00-18:00

Surveyor:

Weather Conditions:

Key Map





Road	Verney Road				New Dookie Road				Verney Road				Balaclava Road				15 min total	hour total
Movement	R	T	L		R	T	L		R	T	L		R	T	L			
ID	1	2	3	Total	1	2	3	Total	1	2	3	Total	1	2	3	Total		
15:00 to 15:15	9	55	30	**94**	23	50	14	**87**	19	41	17	**77**	21	38	15	**74**	**332**	-
15:15 to 15:30	14	66	35	**115**	40	56	21	**117**	18	49	18	**85**	13	36	13	**62**	**379**	-
15:30 to 15:45	12	68	24	**104**	30	60	29	**119**	15	60	16	**91**	30	42	14	**86**	**400**	-
15:45 to 16:00	9	60	32	**101**	46	48	29	**123**	15	73	15	**103**	26	50	11	**87**	**414**	**1525**
16:00 to 16:15	10	66	19	**95**	32	53	21	**106**	13	48	22	**83**	24	29	6	**59**	**343**	**1536**
16:15 to 16:30	12	41	20	**73**	20	30	13	**63**	14	41	16	**71**	12	23	7	**42**	**249**	**1406**
16:30 to 16:45	7	53	22	**82**	35	56	17	**108**	6	68	18	**92**	21	43	10	**74**	**356**	**1362**
16:45 to 17:00	5	43	28	**76**	41	49	16	**106**	8	69	13	**90**	21	39	12	**72**	**344**	**1292**
17:00 to 17:15	3	39	15	**57**	40	47	27	**114**	8	52	17	**77**	14	26	6	**46**	**294**	**1243**
17:15 to 17:30	5	63	20	**88**	55	65	24	**144**	13	100	19	**132**	24	33	15	**72**	**436**	**1430**
17:30 to 17:45	9	49	13	**71**	27	40	13	**80**	20	76	6	**102**	10	24	11	**45**	**298**	**1372**
17:45 to 18:00	8	57	21	**86**	22	39	10	**71**	14	89	22	**125**	5	28	14	**47**	**329**	**1357**
PM Peak	20	198	85	**303**	171	217	84	**472**	35	289	67	**391**	80	141	43	**264**	**1430**	

600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Ford Peak Hour Ends: 9:15

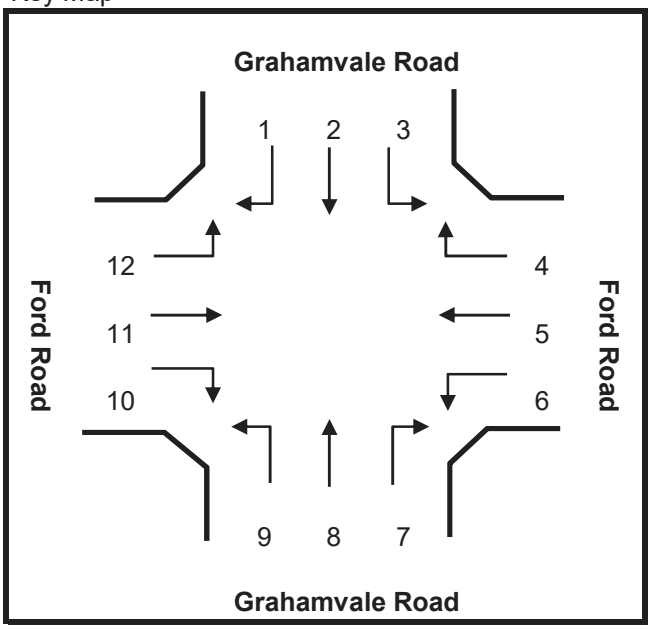
Date: 5 August 2008

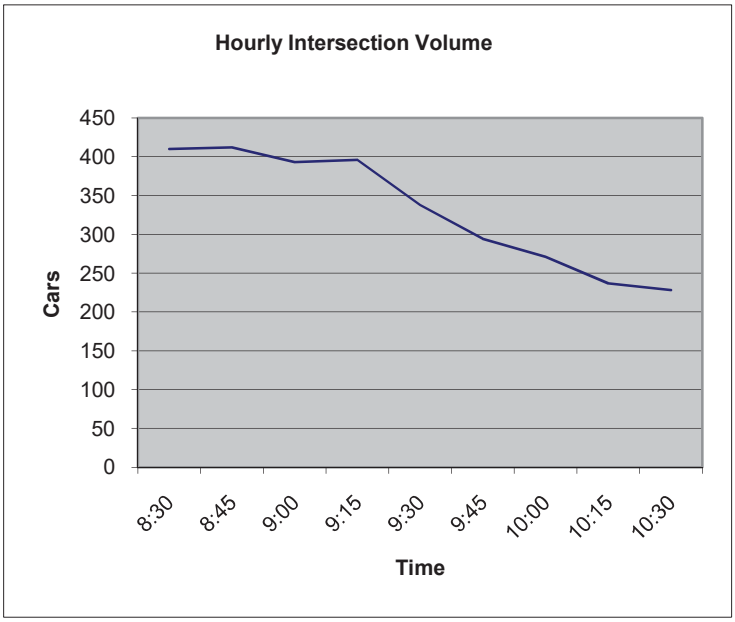
Time: 7:30-10:30

Surveyor:

Weather Conditions:

Key Map





Road	Grahamvale Road				Ford Road				Grahamvale Road				Ford Road				15 min total	hour total
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total		
ID	1	2	3		1	2	3		1	2	3		1	2	3			
7:30 to 7:45	5	21	3	**29**	9	7	2	**18**	4	43	1	**48**	0	4	2	**6**	**101**	-
7:45 to 8:00	2	10	8	**20**	8	11	4	**23**	1	50	0	**51**	2	10	2	**14**	**108**	-
8:00 to 8:15	2	23	4	**29**	5	5	1	**11**	2	30	0	**32**	2	7	0	**9**	**81**	-
8:15 to 8:30	14	24	3	**41**	13	2	1	**16**	3	38	2	**43**	6	11	3	**20**	**120**	**410**
8:30 to 8:45	12	11	10	**33**	17	4	2	**23**	1	32	0	**33**	4	8	2	**14**	**103**	**412**
8:45 to 9:00	12	17	9	**38**	5	6	2	**13**	1	29	0	**30**	1	6	1	**8**	**89**	**393**
9:00 to 9:15	**7**	**17**	**9**	**33**	**5**	**6**	**2**	**13**	**1**	**29**	**0**	**30**	**1**	**6**	**1**	**8**	**84**	**396**
9:15 to 9:30	2	15	4	**21**	2	2	3	**7**	2	20	1	**23**	3	6	2	**11**	**62**	**338**
9:30 to 9:45	2	16	4	**22**	2	4	1	**7**	1	22	1	**24**	1	3	2	**6**	**59**	**294**
9:45 to 10:00	3	13	6	**22**	2	2	2	**6**	1	30	1	**32**	1	4	1	**6**	**66**	**271**
10:00 to 10:15	3	15	1	**19**	3	2	1	**6**	2	16	1	**19**	1	4	1	**6**	**50**	**237**
10:15 to 10:30	1	15	1	**17**	3	3	1	**7**	3	20	1	**24**	1	3	1	**5**	**53**	**228**
AM Peak	45	69	31	**145**	40	18	7	**65**	6	128	2	**136**	12	31	7	**50**	**396**	

600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Ford Peak Hour Ends: 16:15

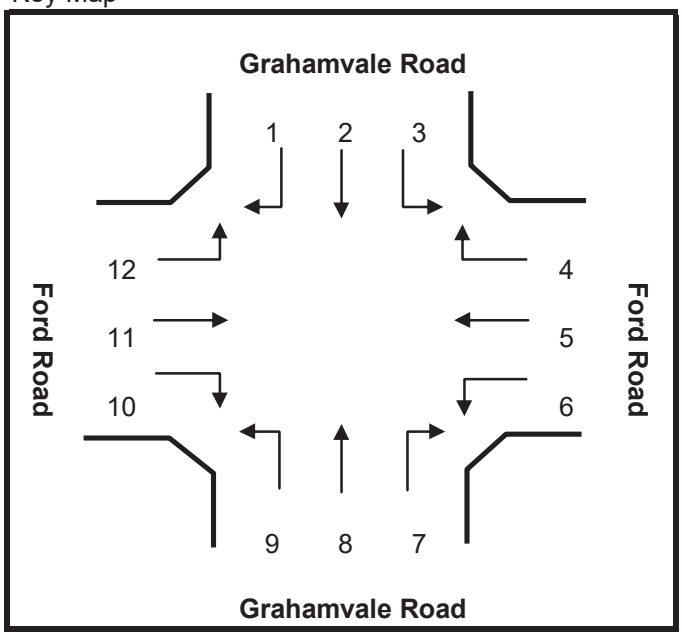
Date: 5 August 2008

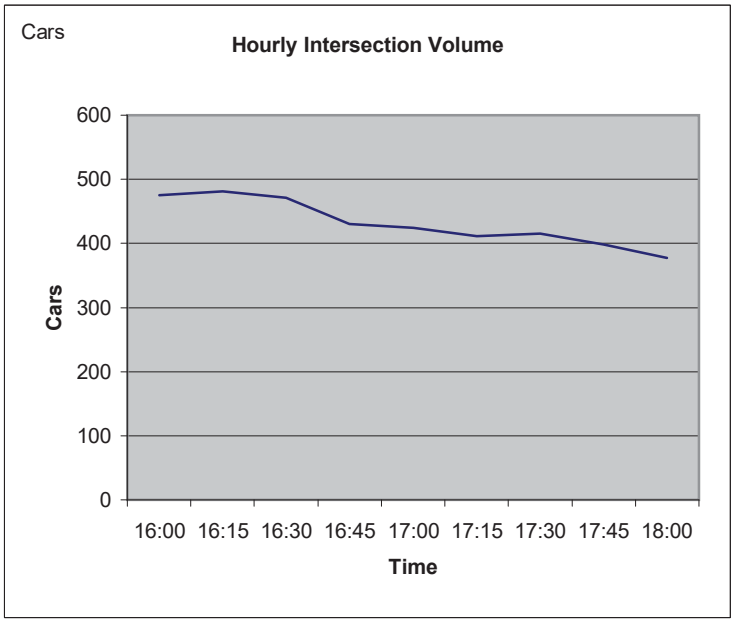
Time: 15:00-18:00

Surveyor:

Weather Conditions:

Key Map





Road	Grahamvale Road				Ford Road				Grahamvale Road				Ford Road				15 min total	hour total
Movement	R	T	L		R	T	L		R	T	L		R	T	L			
ID	1	2	3	Total	1	2	3	Total	1	2	3	Total	1	2	3	Total		
15:00 to 15:15	2	29	7	**38**	15	4	1	**20**	1	26	1	**28**	3	13	5	**21**	**107**	-
15:15 to 15:30	2	30	6	**38**	18	6	3	**27**	1	23	1	**25**	3	7	4	**14**	**104**	-
15:30 to 15:45	6	61	20	**87**	23	9	6	**38**	4	20	1	**25**	2	6	2	**10**	**160**	-
15:45 to 16:00	1	36	21	**58**	6	6	2	**14**	1	24	2	**27**	1	2	2	**5**	**104**	**475**
16:00 to 16:15	1	44	6	**51**	10	7	3	**20**	6	22	1	**29**	2	10	1	**13**	**113**	**481**
16:15 to 16:30	1	36	6	**43**	8	8	5	**21**	2	22	0	**24**	0	5	1	**6**	**94**	**471**
16:30 to 16:45	3	50	5	**58**	10	6	4	**20**	4	22	2	**28**	1	9	3	**13**	**119**	**430**
16:45 to 17:00	1	44	12	**57**	5	11	2	**18**	1	20	0	**21**	0	1	1	**2**	**98**	**424**
17:00 to 17:15	3	51	10	**64**	6	9	3	**18**	1	15	0	**16**	0	2	0	**2**	**100**	**411**
17:15 to 17:30	2	45	8	**55**	7	8	0	**15**	3	17	0	**20**	1	6	1	**8**	**98**	**415**
17:30 to 17:45	4	50	10	**64**	3	6	1	**10**	3	20	0	**23**	0	5	0	**5**	**102**	**398**
17:45 to 18:00	1	30	6	**37**	4	9	1	**14**	0	16	1	**17**	1	6	2	**9**	**77**	**377**
PM Peak	10	171	53	**234**	57	28	14	**99**	12	89	5	**106**	8	25	9	**42**	**481**	

600 282 55 Shepparton NE Growth Development

Location: Grahamvale/New Dookie Peak Hour Ends: 9:00

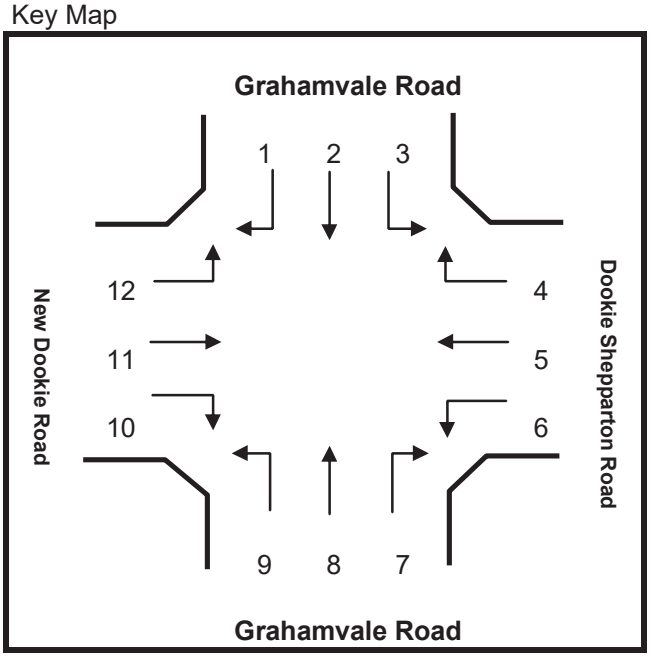
Date: 5 August 2008

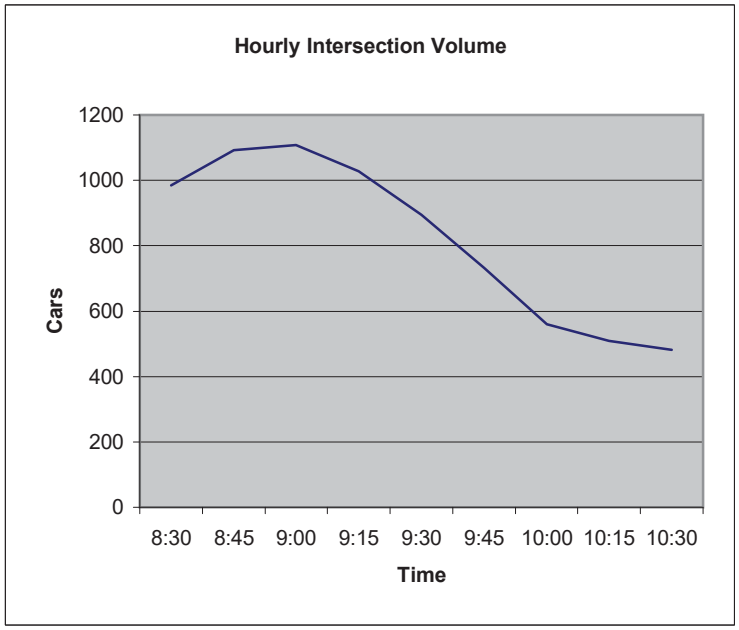
Time: 7:30-10:30

Surveyor:

Weather Conditions:

Key Map





Road	Grahamvale Road				ookie Shepparton Roa				Grahamvale Road				New Dookie Road				15 min total	hour total
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total		
ID	1	2	3		1	2	3		1	2	3		1	2	3			
7:30 to 7:45	15	39	4	**58**	0	28	3	**31**	6	22	25	**53**	15	26	9	**50**	**192**	-
7:45 to 8:00	26	37	4	**67**	2	30	6	**38**	30	37	37	**104**	25	33	14	**72**	**281**	-
8:00 to 8:15	18	32	0	**50**	1	44	7	**52**	11	25	32	**68**	17	28	17	**62**	**232**	-
8:15 to 8:30	19	50	3	**72**	0	43	9	**52**	4	47	27	**78**	20	37	20	**77**	**279**	**984**
8:30 to 8:45	28	54	1	**83**	4	32	11	**47**	5	41	36	**82**	29	24	36	**89**	**301**	**1093**
8:45 to 9:00	40	58	6	**104**	4	39	7	**50**	9	32	24	**65**	22	25	30	**77**	**296**	**1108**
9:00 to 9:15	22	30	2	**54**	0	22	3	**25**	7	21	16	**44**	13	10	6	**29**	**152**	**1028**
9:15 to 9:30	8	26	3	**37**	2	18	8	**28**	2	17	23	**42**	16	14	8	**38**	**145**	**894**
9:30 to 9:45	5	26	6	**37**	1	17	6	**24**	8	19	20	**47**	9	15	7	**31**	**139**	**732**
9:45 to 10:00	8	24	2	**34**	1	20	4	**25**	7	18	14	**39**	10	11	5	**26**	**124**	**560**
10:00 to 10:15	7	13	0	**20**	2	17	3	**22**	4	14	10	**28**	12	12	6	**30**	**100**	**508**
10:15 to 10:30	6	18	1	**25**	1	14	5	**20**	8	18	14	**40**	11	18	4	**33**	**118**	**481**
AM Peak	105	194	10	**309**	9	158	34	**201**	29	145	119	**293**	88	114	103	**305**	**1108**	

600 282 55 Shepparton NE Growth Development

Location: Grahamvale/New Dookie Peak Hour Ends: 16:15

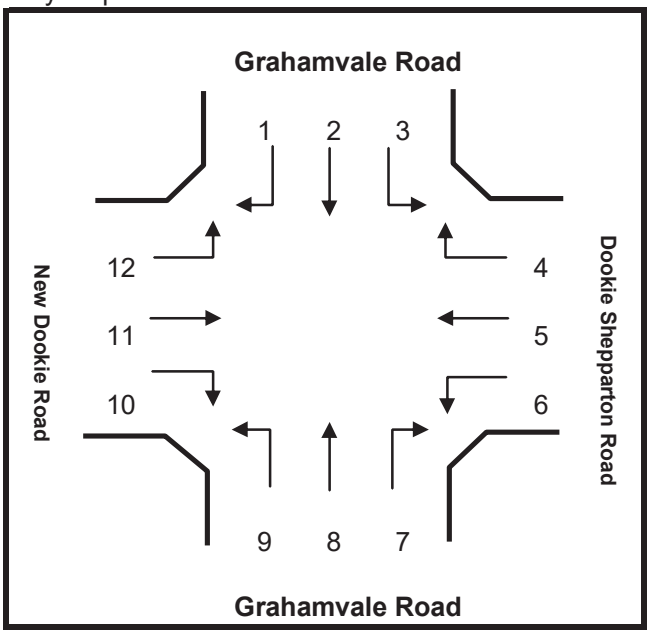
Date: 5 August 2008

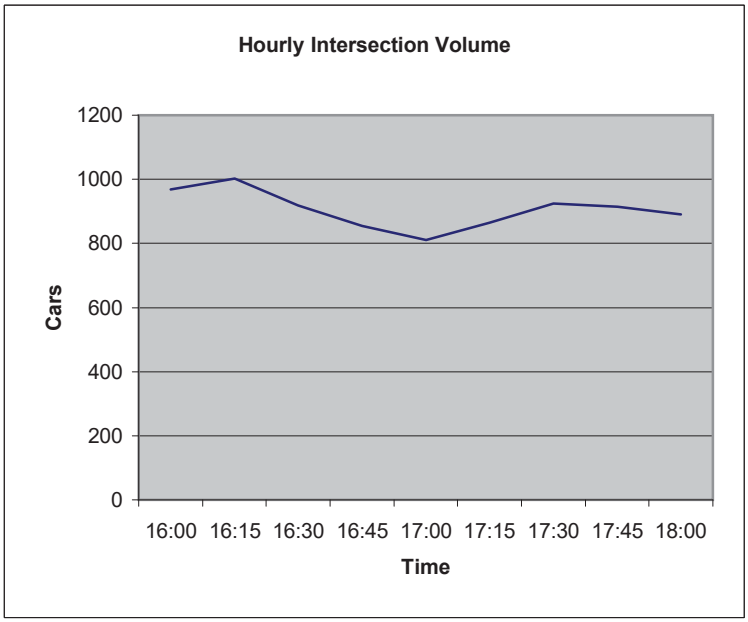
Time: 15:00-18:00

Surveyor:

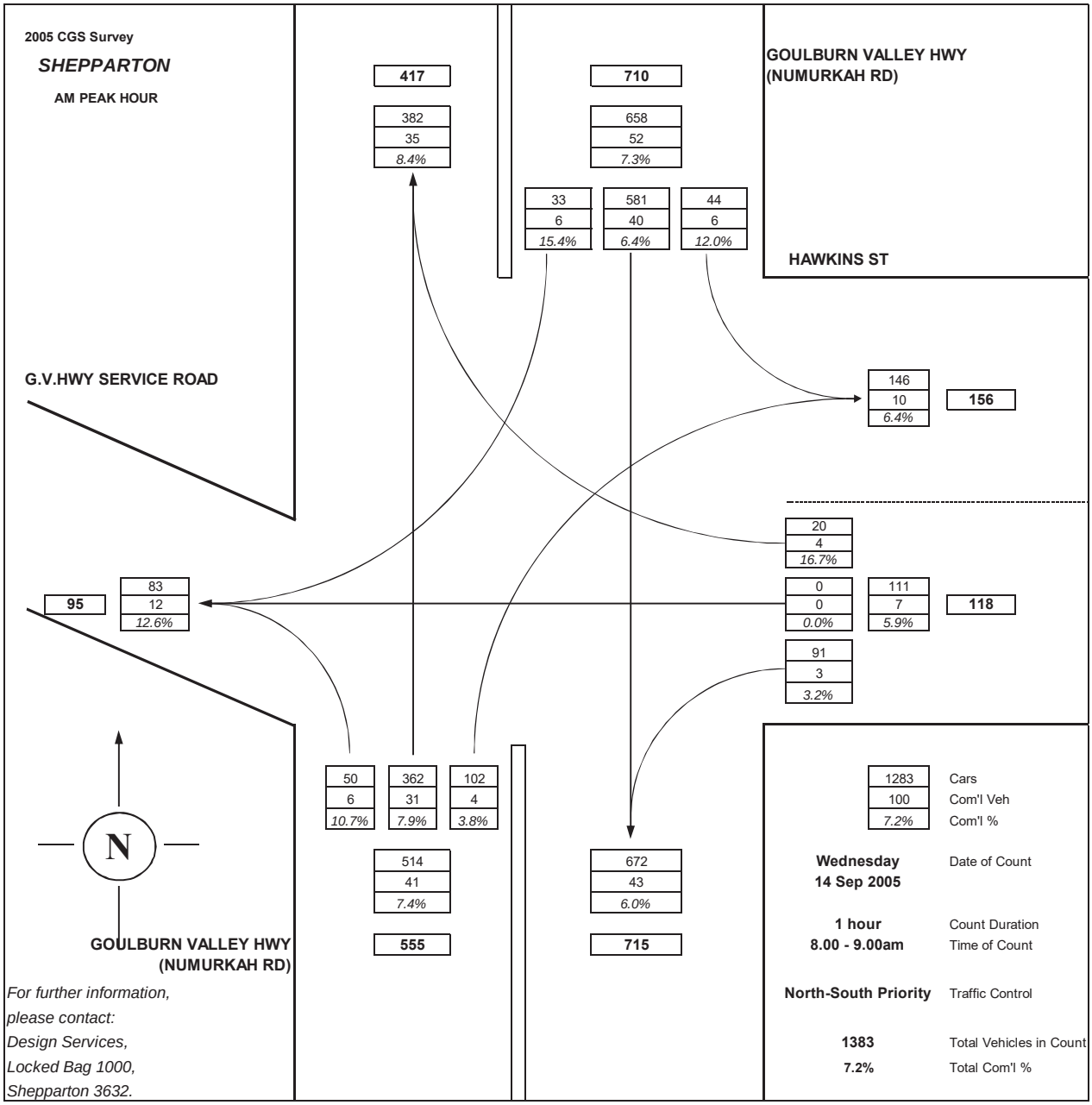
Weather Conditions:

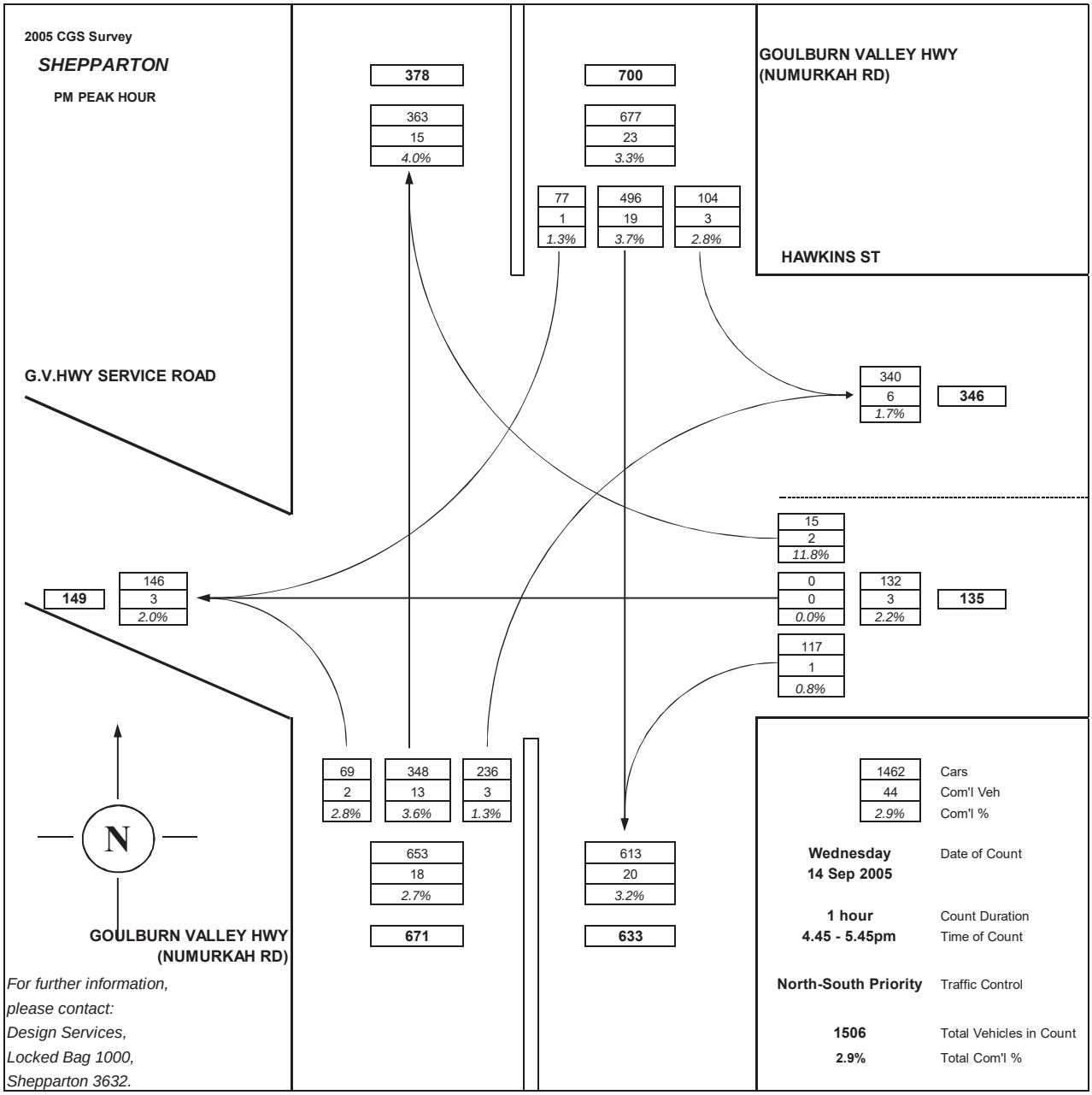
Key Map





Road	Grahamvale Road				ookie Shepparton Roa				Grahamvale Road				New Dookie Road				15 min total	hour total
Movement	R	T	L		R	T	L		R	T	L		R	T	L			
ID	1	2	3	Total	1	2	3	Total	1	2	3	Total	1	2	3	Total		
15:00 to 15:15	10	27	1	**38**	2	37	4	**43**	10	32	17	**59**	15	23	17	**55**	**195**	-
15:15 to 15:30	11	30	2	**43**	5	29	8	**42**	13	55	18	**86**	28	13	24	**65**	**236**	-
15:30 to 15:45	32	46	7	**85**	7	36	9	**52**	7	45	18	**70**	29	32	27	**88**	**295**	-
15:45 to 16:00	28	37	3	**68**	3	25	8	**36**	6	50	25	**81**	21	21	16	**58**	**243**	**969**
16:00 to 16:15	9	29	3	**41**	1	33	20	**54**	12	47	16	**75**	21	23	14	**58**	**228**	**1002**
16:15 to 16:30	9	20	1	**30**	2	22	6	**30**	5	35	14	**54**	16	16	6	**38**	**152**	**918**
16:30 to 16:45	11	14	0	**25**	1	25	9	**35**	17	44	38	**99**	26	30	16	**72**	**231**	**854**
16:45 to 17:00	13	18	1	**32**	3	25	8	**36**	13	36	19	**68**	22	29	12	**63**	**199**	**810**
17:00 to 17:15	12	29	1	**42**	3	31	15	**49**	11	54	22	**87**	34	44	27	**105**	**283**	**865**
17:15 to 17:30	8	20	0	**28**	0	23	18	**41**	9	51	16	**76**	23	33	10	**66**	**211**	**924**
17:30 to 17:45	7	22	4	**33**	0	17	8	**25**	16	61	21	**98**	19	36	10	**65**	**221**	**914**
17:45 to 18:00	4	26	1	**31**	0	27	10	**37**	10	21	27	**58**	16	26	7	**49**	**175**	**890**
PM Peak	80	142	15	**237**	16	123	45	**184**	38	197	77	**312**	99	89	81	**269**	**1002**	


2005 CGS Survey
SHEPPARTON
AM PEAK HOUR
GOULBURN VALLEY HWY
(NUMURKAH RD)
HAWKINS ST
G.V.HWY SERVICE ROAD
417
382
35
8.4%
710
658
52
7.3%
33
6
15.4%
581
40
6.4%
44
6
12.0%
146
10
6.4%
156
20
4
16.7%
95
83
12
12.6%
0
0
0.0%
111
7
5.9%
118
91
3
3.2%
50
6
10.7%
362
31
7.9%
102
4
3.8%
514
41
7.4%
555
672
43
6.0%
715
N
GOULBURN VALLEY HWY
(NUMURKAH RD)
1283 Cars
100 Com'l Veh
7.2% Com'l %
Wednesday
14 Sep 2005
Date of Count
1 hour
Count Duration
8.00 - 9.00am
Time of Count
North-South Priority
Traffic Control
1383
Total Vehicles in Count
7.2%
Total Com'l %
For further information,
please contact:
Design Services,
Locked Bag 1000,
Shepparton 3632.



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

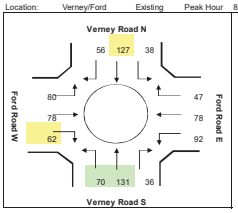
DRAFT

Appendix B

SIDRA Analysis

600 282 55 Shepparton NE Growth Development

Location: Verney/Ford Existing Peak Hour 8:15-9:15am



Growth Rate 1.015

per annum

No Years 12

Road	Verney Road N				Ford Road E				Verney Road S				Ford Road W			
Movement	R	T	L		R	T	L		R	T	L		R	T	L	
ID	1	2	3	Total	4	5	6	Total	7	8	9	Total	10	11	12	Total
8:15-9:15am	47	80	32	**159**	39	65	77	**181**	30	96	49	**175**	34	65	67	**166**
2020 Growth	**56**	**96**	**38**	**190**	**47**	**78**	**92**	**216**	**36**	**115**	**59**	**209**	**41**	**78**	**80**	**198**
Devt Traffic	-	31	-	**31**	-	-	-	**0**	-	16	11	**27**	21	-	-	**21**
2020 + Devt	56	127	38	**221**	47	78	92	**216**	36	131	70	**236**	62	78	80	**219**

Out

In

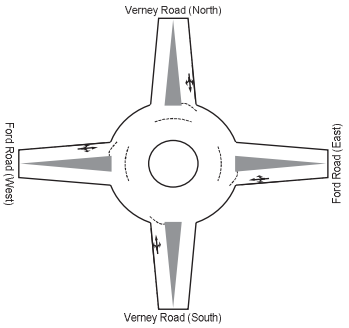
2008 Verney Ford

8:15 - 9:15

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road (South)										
9	L	52	7.7	0.159	6.2	LOS A	8	0.35	0.54	42.9
8	T	101	6.9	0.159	5.4	LOS A	8	0.35	0.49	43.5
7	R	32	6.5	0.159	10.0	LOS A	8	0.35	0.63	40.3
Approach		**184**	**7.1**	**0.159**	**6.4**	**LOS A**	**8**	**0.35**	**0.53**	**42.7**
Ford Road (East)										
6	L	81	7.4	0.187	6.2	LOS A	8	0.33	0.55	43.0
5	T	68	7.2	0.187	5.4	LOS A	8	0.33	0.50	43.6
4	R	41	7.3	0.187	10.0	LOS A	8	0.33	0.65	40.4
Approach		**191**	**7.3**	**0.187**	**6.7**	**LOS A**	**8**	**0.33**	**0.56**	**42.6**
Verney Road (North)										
3	L	34	6.1	0.156	6.8	LOS A	7	0.29	0.56	43.7
2	T	84	7.1	0.157	5.2	LOS A	7	0.29	0.48	43.8
1	R	49	6.1	0.157	9.8	LOS A	7	0.29	0.64	40.5
Approach		**166**	**6.6**	**0.157**	**6.9**	**LOS A**	**7**	**0.29**	**0.54**	**42.7**
Ford Road (West)										
12	L	71	7.0	0.174	7.1	LOS A	7	0.33	0.58	43.5
11	T	68	7.2	0.174	5.4	LOS A	7	0.33	0.50	43.6
10	R	36	8.3	0.174	10.0	LOS B	7	0.33	0.65	40.4
Approach		**176**	**7.4**	**0.174**	**7.0**	**LOS A**	**7**	**0.33**	**0.56**	**42.8**
All Vehicles		**717**	**7.1**	**0.187**	**6.7**	**LOS A**	**8**	**0.33**	**0.55**	**42.7**



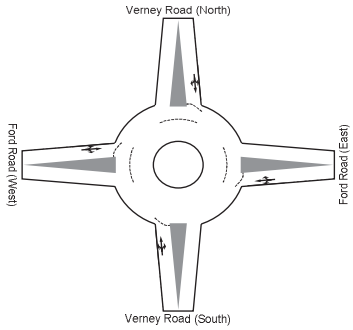
2020 Verney Ford with Devt Traffic AM

8:15 - 9:15

Roundabout

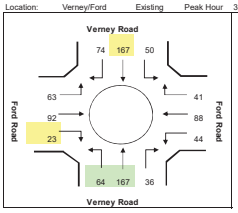
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road (South)										
9	L	74	6.8	0.222	6.4	LOS A	12	0.41	0.56	42.7
8	T	138	7.2	0.222	5.6	LOS A	12	0.41	0.52	43.2
7	R	38	7.9	0.222	10.2	LOS B	12	0.41	0.65	40.2
Approach		**250**	**7.2**	**0.222**	**6.6**	**LOS A**	**12**	**0.41**	**0.55**	**42.5**
Ford Road (East)										
6	L	97	7.2	0.240	6.8	LOS A	11	0.43	0.61	42.6
5	T	82	7.3	0.240	6.0	LOS A	11	0.43	0.57	43.1
4	R	49	6.1	0.240	10.6	LOS B	11	0.43	0.68	40.1
Approach		**228**	**7.0**	**0.240**	**7.3**	**LOS A**	**11**	**0.43**	**0.61**	**42.2**
Verney Road (North)										
3	L	40	7.5	0.229	7.2	LOS A	10	0.36	0.59	43.4
2	T	134	6.8	0.229	5.5	LOS A	10	0.36	0.52	43.4
1	R	59	6.8	0.229	10.1	LOS B	10	0.36	0.66	40.3
Approach		**232**	**6.9**	**0.229**	**7.0**	**LOS A**	**10**	**0.36**	**0.57**	**42.5**
Ford Road (West)										
12	L	84	7.1	0.239	7.4	LOS A	11	0.40	0.61	43.2
11	T	82	7.3	0.239	5.8	LOS A	11	0.40	0.55	43.2
10	R	65	7.6	0.239	10.4	LOS B	11	0.40	0.67	40.2
Approach		**232**	**7.3**	**0.239**	**7.7**	**LOS A**	**11**	**0.40**	**0.61**	**42.3**
All Vehicles		**942**	**7.1**	**0.240**	**7.1**	**LOS A**	**12**	**0.40**	**0.58**	**42.4**



600 282 55 Shepparton NE Growth Development

Location: Verney/Ford Existing Peak Hour 3:00-4:00pm



Growth Rate 1.015

per annum

No Years 12

Road	Verney Road				Ford Road				Verney Road				Ford Road			
Movement	R	T	L		R	T	L		R	T	L		R	T	L	
ID	1	2	3	Total	4	5	6	Total	7	8	9	Total	10	11	12	Total
3:00-4:00pm	62	133	42	**237**	34	74	37	**145**	30	106	32	**168**	14	77	53	**144**
2020 Growth	**74**	**159**	**50**	**283**	**41**	**88**	**44**	**173**	**36**	**127**	**38**	**201**	**17**	**92**	**63**	**172**
Devt Traffic	-	8	-	**8**	-	-	-	**-**	-	40	26	**66**	6	-	-	**6**
2020 + Devt	74	167	50	**291**	41	88	44	**173**	36	167	64	**267**	23	92	63	**178**

Out

In

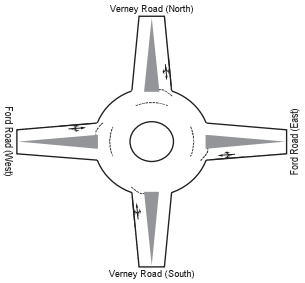
2008 Verney Ford

15:00 - 16:00

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road (South)										
9	L	34	6.1	0.154	6.3	LOS A	8	0.37	0.55	42.8
8	T	112	7.1	0.154	5.5	LOS A	8	0.37	0.50	43.4
7	R	32	6.5	0.154	10.1	LOS B	8	0.37	0.64	40.3
Approach		**176**	**6.8**	**0.155**	**6.4**	**LOS A**	**8**	**0.37**	**0.53**	**42.7**
Ford Road (East)										
6	L	39	7.7	0.155	6.5	LOS A	7	0.37	0.57	42.8
5	T	78	6.5	0.156	5.6	LOS A	7	0.37	0.52	43.4
4	R	36	8.3	0.155	10.2	LOS B	7	0.37	0.66	40.3
Approach		**152**	**7.2**	**0.155**	**6.9**	**LOS A**	**7**	**0.37**	**0.57**	**42.4**
Verney Road (North)										
3	L	44	6.8	0.228	6.8	LOS A	10	0.29	0.56	43.7
2	T	140	7.1	0.228	5.2	LOS A	10	0.29	0.48	43.8
1	R	65	7.6	0.228	9.8	LOS A	10	0.29	0.64	40.5
Approach		**250**	**7.2**	**0.228**	**6.7**	**LOS A**	**10**	**0.29**	**0.54**	**42.8**
Ford Road (West)										
12	L	56	7.1	0.151	7.1	LOS A	6	0.33	0.58	43.5
11	T	81	7.4	0.151	5.4	LOS A	6	0.33	0.50	43.6
10	R	15	6.7	0.150	10.0	LOS B	6	0.33	0.65	40.4
Approach		**152**	**7.2**	**0.151**	**6.5**	**LOS A**	**6**	**0.33**	**0.54**	**43.2**
All Vehicles		**730**	**7.1**	**0.228**	**6.6**	**LOS A**	**10**	**0.34**	**0.54**	**42.8**



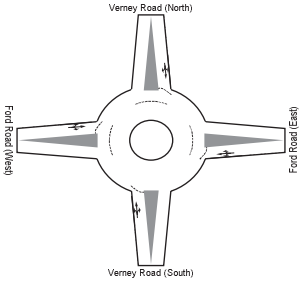
2020 Verney Ford with Devt Traffic PM

15:00 - 16:00

Roundabout

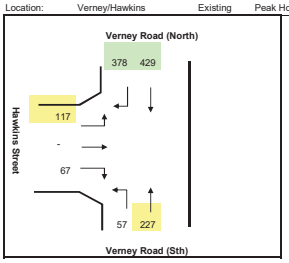
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road (South)										
9	L	67	7.4	0.254	6.6	LOS A	14	0.44	0.58	42.5
8	T	176	6.9	0.254	5.8	LOS A	14	0.44	0.54	43.0
7	R	38	7.9	0.253	10.4	LOS B	14	0.44	0.66	40.1
Approach		**281**	**7.1**	**0.254**	**6.6**	**LOS A**	**14**	**0.44**	**0.56**	**42.5**
Ford Road (East)										
6	L	46	6.5	0.193	6.8	LOS A	9	0.43	0.61	42.6
5	T	93	6.5	0.193	6.0	LOS A	9	0.43	0.57	43.1
4	R	43	7.0	0.193	10.6	LOS B	9	0.43	0.68	40.1
Approach		**181**	**6.6**	**0.193**	**7.3**	**LOS A**	**9**	**0.43**	**0.60**	**42.2**
Verney Road (North)										
3	L	53	7.5	0.286	7.1	LOS A	14	0.35	0.58	43.4
2	T	176	6.9	0.286	5.4	LOS A	14	0.35	0.51	43.5
1	R	78	6.5	0.286	10.0	LOS A	14	0.35	0.65	40.3
Approach		**305**	**6.9**	**0.286**	**6.8**	**LOS A**	**14**	**0.35**	**0.56**	**42.6**
Ford Road (West)										
12	L	66	7.5	0.201	7.6	LOS A	9	0.42	0.62	43.1
11	T	97	7.2	0.200	5.9	LOS A	9	0.42	0.56	43.1
10	R	24	8.0	0.200	10.5	LOS B	9	0.42	0.68	40.1
Approach		**189**	**7.4**	**0.201**	**7.1**	**LOS A**	**9**	**0.42**	**0.60**	**42.7**
All Vehicles		**956**	**7.0**	**0.286**	**6.9**	**LOS A**	**14**	**0.41**	**0.58**	**42.5**



600 282 55 Shepparton NE Growth Development

Location: Verney/Hawkins Existing Peak Hour: 8:15 - 9:15am



Growth Rate 1.015

per annum

No Years 11

Road	Verney Road (North)				Verney Road (Sth)			Hawkins Street			
Movement	R	T		Total	T	L	Total	R	T	L	Total
ID	1	2			8	9		10	11	12	
8:15 - 9:15am	41	308		**349**	181	48	**229**	57	0	40	**97**
2020 Growth	48	363		**411**	213	57	**270**	67	-	47	**114**
Devt Traffic	330	66		**396**	14	-	**14**	-	-	70	**70**
2020 + Devt	378	429	-	**807**	227	57	**284**	67	-	117	**184**

Out

In

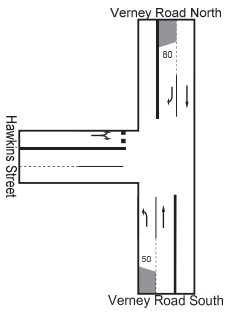
2009 Verney Hawkins

8:15 - 9:15am

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
1	L	51	7.8	0.029	8.4	LOS A	0	0.00	0.67	49.0
2	T	191	6.8	0.102	0.0	LOS A	0	0.00	0.00	60.0
Approach		**241**	**7.1**	**0.102**	**1.8**	**LOS A**		**0.00**	**0.14**	**57.3**
Verney Road North										
8	T	324	7.1	0.174	0.0	LOS A	0	0.00	0.00	60.0
9	R	43	7.0	0.039	9.7	LOS A	1	0.34	0.66	47.3
Approach		**368**	**7.1**	**0.174**	**1.1**	**LOS A**	**1**	**0.04**	**0.08**	**58.2**
Hawkins Street										
10	L	42	7.1	0.221	14.6	LOS B	8	0.53	0.69	43.0
12	R	60	6.7	0.221	14.6	LOS B	8	0.53	0.84	43.0
Approach		**102**	**6.9**	**0.222**	**14.6**	**LOS B**	**8**	**0.53**	**0.78**	**43.0**
All Vehicles		**711**	**7.0**	**0.221**	**3.3**	**Not Applicable**	**8**	**0.10**	**0.20**	**55.1**



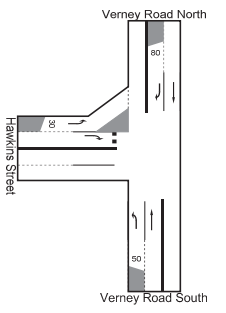
2020 Verney Hawkins with Devt Traffic AM

8:15 - 9:15am

Give-way

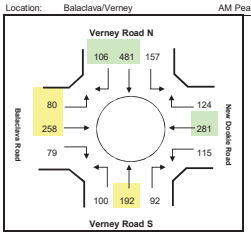
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
1	L	60	6.7	0.034	8.4	LOS A	0	0.00	0.67	49.0
2	T	239	7.1	0.128	0.0	LOS A	0	0.00	0.00	60.0
Approach		**299**	**7.0**	**0.128**	**1.7**	**LOS A**		**0.00**	**0.13**	**57.4**
Verney Road North										
8	T	452	7.1	0.242	0.0	LOS A	0	0.00	0.00	60.0
9	R	398	7.0	0.383	10.7	LOS B	20	0.49	0.76	46.6
Approach		**850**	**7.1**	**0.383**	**5.0**	**LOS A**	**20**	**0.23**	**0.36**	**52.9**
Hawkins Street										
10	L	123	7.3	0.154	9.4	LOS A	5	0.39	0.66	47.7
12	R	71	7.0	0.628	62.7	LOS F	24	0.95	1.12	22.0
Approach		**195**	**7.2**	**0.627**	**28.8**	**LOS D**	**24**	**0.59**	**0.82**	**33.6**
All Vehicles		**1344**	**7.1**	**0.628**	**7.7**	**Not Applicable**	**24**	**0.23**	**0.37**	**49.6**



600 282 55 Shepparton NE Growth Development

Location: Balaclava/Verney AM Peak 8:00 - 9:00am



Growth Rate 1.015

per annum

No Years 12

Road	Verney Road N				New Dookie Road				Verney Road S				Balaclava Road			
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total
ID	1	2	3		4	5	6		7	8	9		10	11	12	
8:00 - 9:00am	55	292	131	**478**	104	180	96	**380**	77	137	84	**298**	66	204	60	**330**
2020 Growth	66	349	157	**572**	124	215	115	**454**	92	164	100	**356**	79	244	72	**395**
Devt Traffic	40	132	-	**172**	-	66	-	**66**	-	28	-	**28**	-	14	8	**22**
2020 + Devt	106	481	157	**744**	124	281	115	**520**	92	192	100	**384**	79	258	80	**417**

Out

In

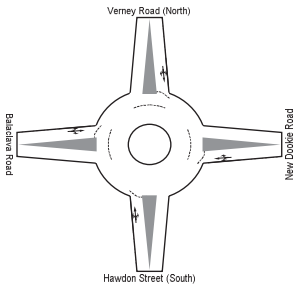
2008 Verney Balaclava

8:00 - 9:00

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Hawdon Street (South)										
9	L	88	6.8	0.289	5.4	LOS A	18	0.58	0.56	42.9
8	T	144	6.9	0.289	4.3	LOS A	18	0.58	0.47	43.6
7	R	81	7.4	0.288	10.8	LOS B	18	0.58	0.68	39.8
Approach		**313**	**7.0**	**0.289**	**6.3**	**LOS A**	**18**	**0.58**	**0.55**	**42.3**
New Dookie Road										
6	L	101	6.9	0.445	6.2	LOS A	26	0.66	0.65	42.5
5	T	189	6.9	0.444	5.1	LOS A	26	0.66	0.56	43.1
4	R	109	7.3	0.444	11.5	LOS B	26	0.66	0.75	39.6
Approach		**400**	**7.0**	**0.444**	**7.1**	**LOS A**	**26**	**0.66**	**0.63**	**41.9**
Verney Road (North)										
3	L	138	7.2	0.519	7.0	LOS A	33	0.64	0.69	43.2
2	T	307	7.1	0.519	5.1	LOS A	33	0.64	0.58	43.2
1	R	58	6.9	0.518	11.5	LOS B	33	0.64	0.75	39.6
Approach		**504**	**7.1**	**0.519**	**6.4**	**LOS A**	**33**	**0.64**	**0.63**	**42.7**
Balaclava Road										
12	L	63	6.3	0.352	6.2	LOS A	18	0.53	0.60	43.7
11	T	215	7.0	0.352	4.2	LOS A	18	0.53	0.47	43.9
10	R	69	7.1	0.352	10.7	LOS B	18	0.53	0.69	40.0
Approach		**348**	**6.9**	**0.352**	**5.9**	**LOS A**	**18**	**0.53**	**0.54**	**43.0**
All Vehicles		**1565**	**7.0**	**0.519**	**6.4**	**LOS A**	**33**	**0.61**	**0.59**	**42.5**



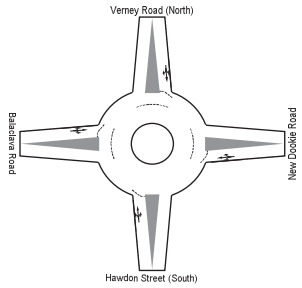
2020 Verney Balaclava with Devt Traffic AM

8:00 - 9:00

Roundabout

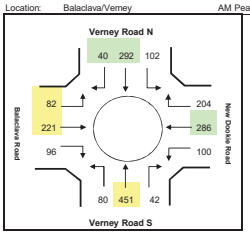
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Hawdon Street (South)										
9	L	105	6.7	0.453	7.0	LOS A	33	0.81	0.74	41.7
8	T	202	6.9	0.453	5.9	LOS A	33	0.81	0.66	42.2
7	R	97	7.2	0.453	12.3	LOS B	33	0.81	0.78	39.1
Approach		**404**	**6.9**	**0.453**	**7.7**	**LOS A**	**33**	**0.81**	**0.71**	**41.3**
New Dookie Road										
6	L	121	6.6	0.858	22.4	LOS C	114	1.00	1.40	32.6
5	T	296	7.1	0.855	21.3	LOS C	114	1.00	1.40	33.2
4	R	131	6.9	0.855	27.7	LOS C	114	1.00	1.32	31.1
Approach		**547**	**6.9**	**0.857**	**23.0**	**LOS C**	**114**	**1.00**	**1.38**	**32.5**
Verney Road (North)										
3	L	165	7.2	0.865	16.2	LOS B	126	1.00	1.24	37.3
2	T	506	6.9	0.863	14.2	LOS B	126	1.00	1.24	37.4
1	R	112	7.1	0.862	20.7	LOS C	126	1.00	1.17	34.4
Approach		**784**	**7.0**	**0.863**	**15.5**	**LOS B**	**126**	**1.00**	**1.23**	**36.9**
Balaclava Road										
12	L	84	7.1	0.488	7.4	LOS A	31	0.68	0.73	43.0
11	T	272	7.0	0.487	5.4	LOS A	31	0.68	0.61	43.0
10	R	83	7.2	0.488	11.9	LOS B	31	0.68	0.77	39.5
Approach		**439**	**7.1**	**0.487**	**7.0**	**LOS A**	**31**	**0.68**	**0.66**	**42.2**
All Vehicles		**2174**	**7.0**	**0.865**	**14.3**	**LOS B**	**126**	**0.90**	**1.06**	**37.3**



600 282 55 Shepparton NE Growth Development

Location: Balaclava/Verney AM Peak 4:30 - 5:30pm



Growth Rate 1.015

per annum

No Years 12

Road	Verney Road N				New Dookie Road				Verney Road S				Balaclava Road			
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total
ID	1	2	3		4	5	6		7	8	9		10	11	12	
4:30 - 5:30pm	20	198	85	**303**	171	217	84	**472**	35	289	67	**391**	80	141	43	**264**
2020 Growth	24	237	102	**362**	204	259	100	**564**	42	346	80	**467**	96	169	51	**316**
Devt Traffic	16	55	-	**71**	-	27	-	**27**	-	105	-	**105**	-	52	31	**83**
2020 + Devt	40	292	102	**433**	204	286	100	**591**	42	451	80	**572**	96	221	82	**399**

Out

In

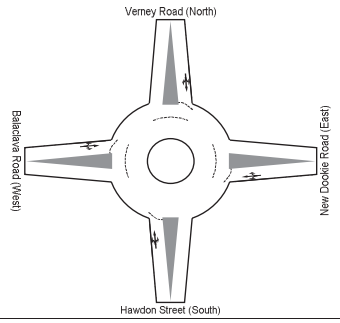
2008 Verney Balaclava

16:30 to 17:30

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Hawdon Street (South)										
9	L	71	7.0	0.403	6.1	LOS A	27	0.69	0.64	42.4
8	T	304	6.9	0.404	5.0	LOS A	27	0.69	0.55	43.0
7	R	37	8.1	0.402	11.4	LOS B	27	0.69	0.73	39.5
Approach		**412**	**7.0**	**0.404**	**5.8**	**LOS A**	**27**	**0.69**	**0.58**	**42.5**
New Dookie Road (East)										
6	L	88	6.8	0.484	5.5	LOS A	28	0.57	0.57	43.0
5	T	228	7.0	0.484	4.4	LOS A	28	0.57	0.48	43.6
4	R	180	7.2	0.484	10.8	LOS B	28	0.57	0.70	39.9
Approach		**496**	**7.1**	**0.484**	**6.9**	**LOS A**	**28**	**0.57**	**0.58**	**42.0**
Verney Road (North)										
3	L	89	6.7	0.310	5.8	LOS A	16	0.48	0.55	44.0
2	T	208	7.2	0.310	3.8	LOS A	16	0.48	0.42	44.2
1	R	21	4.8	0.309	10.3	LOS B	16	0.48	0.66	40.2
Approach		**319**	**6.9**	**0.310**	**4.8**	**LOS A**	**16**	**0.48**	**0.47**	**43.9**
Balaclava Road (West)										
12	L	45	6.7	0.326	7.3	LOS A	17	0.64	0.70	43.2
11	T	148	6.8	0.326	5.3	LOS A	17	0.64	0.59	43.2
10	R	84	7.1	0.327	11.8	LOS B	17	0.64	0.75	39.6
Approach		**277**	**6.9**	**0.326**	**7.6**	**LOS A**	**17**	**0.64**	**0.66**	**42.0**
All Vehicles		**1504**	**7.0**	**0.484**	**6.3**	**LOS A**	**28**	**0.60**	**0.57**	**42.5**



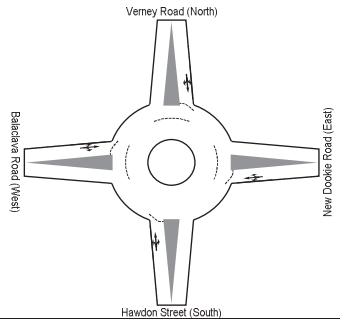
2020 Verney Balaclava with Devt Traffic PM

16:30 to 17:30

Roundabout

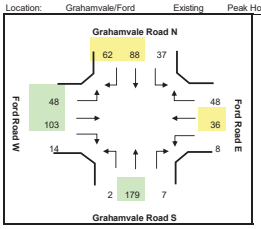
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Hawdon Street (South)										
9	L	84	7.1	0.689	11.1	LOS B	73	0.95	1.03	39.5
8	T	475	6.9	0.687	10.0	LOS B	73	0.95	1.03	40.4
7	R	44	6.8	0.688	16.5	LOS B	73	0.95	0.98	36.7
Approach		**603**	**7.0**	**0.688**	**10.7**	**LOS B**	**73**	**0.95**	**1.02**	**39.9**
New Dookie Road (East)										
6	L	105	6.7	0.691	9.4	LOS A	64	0.83	0.93	40.9
5	T	301	7.0	0.692	8.3	LOS A	64	0.83	0.91	41.8
4	R	215	7.0	0.691	14.7	LOS B	64	0.83	0.92	37.8
Approach		**621**	**6.9**	**0.692**	**10.7**	**LOS B**	**64**	**0.83**	**0.92**	**40.1**
Verney Road (North)										
3	L	107	7.4	0.500	7.0	LOS A	33	0.68	0.68	42.9
2	T	307	7.1	0.499	5.0	LOS A	33	0.68	0.56	43.0
1	R	42	7.1	0.500	11.4	LOS B	33	0.68	0.75	39.5
Approach		**458**	**7.2**	**0.499**	**6.0**	**LOS A**	**33**	**0.68**	**0.61**	**42.6**
Balaclava Road (West)										
12	L	86	7.0	0.642	13.6	LOS B	55	0.93	1.10	39.0
11	T	233	6.9	0.643	11.7	LOS B	55	0.93	1.09	39.1
10	R	101	6.9	0.643	18.1	LOS B	55	0.93	1.03	35.8
Approach		**419**	**6.9**	**0.642**	**13.6**	**LOS B**	**55**	**0.93**	**1.08**	**38.2**
All Vehicles		**2101**	**7.0**	**0.692**	**10.3**	**LOS B**	**73**	**0.85**	**0.91**	**40.2**



600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Ford Existing Peak Hour: 8:15 - 9:15am



Growth Rate 1.015

per annum

No Years 12

Road	Grahamvale Road N				Ford Road E				Grahamvale Road S				Ford Road W			
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total
ID	1	2	3		4	5	6		7	8	9		10	11	12	
8:15 - 9:15am	45	69	31	**145**	40	18	7	**65**	6	128	2	**136**	12	31	7	**50**
2020 Growth	54	82	37	**173**	48	22	8	**78**	7	153	2	**163**	14	37	8	**60**
Devt Traffic	8	6	-	**14**	-	14	-	**14**	-	26	-	**26**	-	66	40	**106**
2020 + Devt	62	88	37	**187**	48	36	8	**92**	7	179	2	**189**	14	103	48	**166**

Out

In

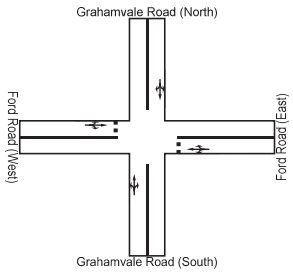
2008 Graham / Ford AM

0815 - 0915

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Grahamvale Road (South)										
9	L	2	33.3	0.079	7.1	LOS A	5	0.26	0.45	42.4
8	T	135	6.7	0.080	0.5	LOS A	5	0.26	0.00	47.7
7	R	6	14.3	0.080	7.3	LOS A	5	0.26	0.59	42.2
Approach		**144**	**7.6**	**0.080**	**1.0**	**LOS A**	**5**	**0.26**	**0.04**	**47.3**
Ford Road (East)										
6	L	7	12.5	0.111	9.5	LOS A	4	0.41	0.56	40.8
5	T	19	5.3	0.111	8.2	LOS A	4	0.41	0.61	41.8
4	R	42	7.1	0.111	9.7	LOS A	4	0.41	0.68	40.6
Approach		**69**	**7.2**	**0.111**	**9.3**	**LOS A**	**4**	**0.41**	**0.65**	**41.0**
Grahamvale Road (North)										
3	L	33	6.2	0.095	7.2	LOS A	5	0.30	0.43	42.2
2	T	73	6.8	0.095	0.6	LOS A	5	0.30	0.00	47.4
1	R	47	6.4	0.095	7.4	LOS A	5	0.30	0.60	42.1
Approach		**152**	**6.6**	**0.095**	**4.1**	**LOS A**	**5**	**0.30**	**0.28**	**44.5**
Ford Road (West)										
12	L	7	12.5	0.078	9.0	LOS A	3	0.41	0.59	41.2
11	T	33	6.2	0.078	7.7	LOS A	3	0.41	0.60	42.3
10	R	13	7.7	0.078	9.2	LOS A	3	0.41	0.66	41.0
Approach		**53**	**7.5**	**0.078**	**8.3**	**LOS A Applicable**	**3**	**0.41**	**0.62**	**41.8**
All Vehicles		**418**	**7.2**	**0.111**	**4.4**		**5**	**0.32**	**0.30**	**44.4**



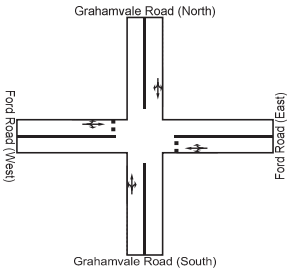
2020 Graham / Ford with Devt Traffic AM

0815 - 0915

Give-way

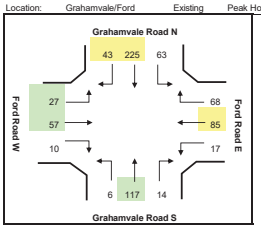
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Grahamvale Road (South)										
9	L	2	33.3	0.111	7.2	LOS A	7	0.30	0.43	42.2
8	T	188	6.9	0.110	0.6	LOS A	7	0.30	0.00	47.3
7	R	7	12.5	0.110	7.5	LOS A	7	0.30	0.60	42.1
Approach		**199**	**7.5**	**0.110**	**1.0**	**LOS A**	**7**	**0.30**	**0.03**	**47.0**
Ford Road (East)										
6	L	8	11.1	0.209	12.5	LOS B	8	0.54	0.58	38.6
5	T	38	7.9	0.210	11.2	LOS B	8	0.54	0.72	39.5
4	R	51	7.8	0.210	12.7	LOS B	8	0.54	0.79	38.4
Approach		**98**	**8.2**	**0.210**	**12.1**	**LOS B**	**8**	**0.54**	**0.74**	**38.9**
Grahamvale Road (North)										
3	L	39	7.7	0.129	7.5	LOS A	7	0.37	0.39	42.0
2	T	93	6.5	0.128	0.9	LOS A	7	0.37	0.00	46.8
1	R	65	7.6	0.129	7.7	LOS A	7	0.37	0.62	41.9
Approach		**197**	**7.1**	**0.129**	**4.5**	**LOS A**	**7**	**0.37**	**0.28**	**44.1**
Ford Road (West)										
12	L	51	7.8	0.273	10.3	LOS B	11	0.51	0.66	40.2
11	T	108	7.3	0.273	9.0	LOS A	11	0.51	0.72	41.2
10	R	15	6.7	0.273	10.5	LOS B	11	0.51	0.76	40.1
Approach		**175**	**7.4**	**0.272**	**9.5**	**LOS A Applicable**	**11**	**0.51**	**0.71**	**40.8**
All Vehicles		**669**	**7.5**	**0.273**	**5.9**		**11**	**0.41**	**0.39**	**43.1**



600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Ford Existing Peak Hour: 3:15 - 4:15pm



Growth Rate 1.015

per annum

No Years 12

Road	Grahamvale Road N				Ford Road E				Grahamvale Road S				Ford Road W			
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total
ID	1	2	3		4	5	6		7	8	9		10	11	12	
3:15 - 4:15pm	10	171	53	**234**	57	28	14	**99**	12	89	5	**106**	8	25	9	**42**
2020 Growth	12	204	63	**280**	68	33	17	**118**	14	106	6	**127**	10	30	11	**50**
Devt Traffic	31	21	-	**52**	-	52	-	**52**	-	11	-	**11**	-	27	16	**43**
2020 + Devt	43	225	63	**332**	68	85	17	**170**	14	117	6	**138**	10	57	27	**93**

Out

In

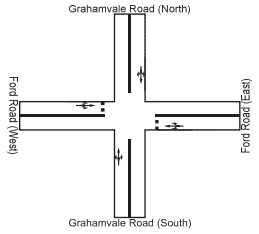
2008 Graham / Ford PM

15:15 - 16:15

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Grahamvale Road (South)										
9	L	5	20.0	0.071	8.4	LOS A	5	0.42	0.35	41.8
8	T	94	20.2	0.072	1.5	LOS A	5	0.42	0.00	46.3
7	R	13	23.1	0.072	8.7	LOS A	5	0.42	0.64	41.7
Approach		**112**	**20.5**	**0.072**	**2.6**	**LOS A**	**5**	**0.42**	**0.09**	**45.5**
Ford Road (East)										
6	L	15	6.7	0.179	10.4	LOS B	7	0.50	0.66	40.2
5	T	29	6.9	0.179	9.1	LOS A	7	0.50	0.68	41.2
4	R	60	6.7	0.179	10.6	LOS B	7	0.50	0.72	40.0
Approach		**104**	**6.7**	**0.179**	**10.1**	**LOS B**	**7**	**0.50**	**0.70**	**40.3**
Grahamvale Road (North)										
3	L	56	7.1	0.137	7.1	LOS A	8	0.30	0.43	42.2
2	T	180	7.2	0.137	0.5	LOS A	8	0.30	0.00	47.4
1	R	11	9.1	0.138	7.3	LOS A	8	0.30	0.59	42.1
Approach		**247**	**7.3**	**0.137**	**2.3**	**LOS A**	**8**	**0.30**	**0.12**	**45.8**
Ford Road (West)										
12	L	9	10.0	0.070	9.5	LOS A	3	0.40	0.57	40.8
11	T	26	7.7	0.070	8.2	LOS A	3	0.40	0.62	41.9
10	R	8	11.1	0.070	9.7	LOS A	3	0.40	0.68	40.6
Approach		**45**	**8.9**	**0.071**	**8.8**	**LOS A Applicable**	**3**	**0.40**	**0.62**	**41.4**
All Vehicles		**508**	**10.2**	**0.179**	**4.6**		**8**	**0.38**	**0.28**	**44.1**



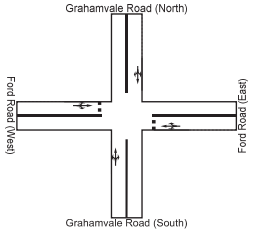
2020 Graham / Ford with devt Traffic PM

15:15 - 16:15

Give-way

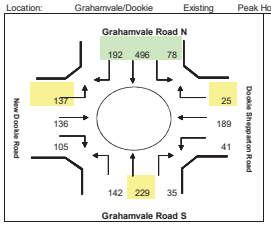
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Grahamvale Road (South)										
9	L	6	16.7	0.092	8.9	LOS A	7	0.48	0.32	41.6
8	T	123	20.2	0.093	2.0	LOS A	7	0.48	0.00	45.9
7	R	15	20.0	0.093	9.2	LOS A	7	0.48	0.68	41.4
Approach		**145**	**20.0**	**0.093**	**3.0**	**LOS A**	**7**	**0.48**	**0.08**	**45.2**
Ford Road (East)										
6	L	18	5.6	0.383	14.9	LOS B	19	0.65	0.86	36.9
5	T	89	6.7	0.387	13.6	LOS B	19	0.65	0.91	37.8
4	R	72	6.9	0.387	15.1	LOS C	19	0.65	0.93	36.8
Approach		**179**	**6.7**	**0.387**	**14.3**	**LOS B**	**19**	**0.65**	**0.92**	**37.3**
Grahamvale Road (North)										
3	L	66	7.5	0.202	7.3	LOS A	12	0.35	0.40	42.0
2	T	237	7.2	0.202	0.7	LOS A	12	0.35	0.00	46.9
1	R	45	6.7	0.202	7.6	LOS A	12	0.35	0.61	41.9
Approach		**349**	**7.2**	**0.202**	**2.9**	**LOS A**	**12**	**0.35**	**0.15**	**45.2**
Ford Road (West)										
12	L	28	7.1	0.177	11.1	LOS B	7	0.47	0.61	39.6
11	T	60	6.7	0.177	9.8	LOS A	7	0.47	0.72	40.6
10	R	11	9.1	0.177	11.3	LOS B	7	0.47	0.78	39.4
Approach		**99**	**7.1**	**0.177**	**10.3**	**LOS B Applicable**	**7**	**0.47**	**0.70**	**40.2**
All Vehicles		**772**	**9.5**	**0.387**	**6.5**		**19**	**0.46**	**0.39**	**42.4**



600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Dookie Existing Peak Hour 8:00 to 9:00am



Growth Rate 1.015

per annum

No Years 12

Road	Grahamvale Road N				Dookie Shepparton Road				Grahamvale Road S				New Dookie Road			
Movement	R	T	L		R	T	L		R	T	L		R	T	L	
ID	1	2	3	Total	4	5	6	Total	7	8	9	Total	10	11	12	Total
8:00 to 9:00am	105	194	10	**309**	9	158	34	**201**	29	145	119	**174**	88	114	103	**305**
2020 Growth	126	232	12	**369**	11	189	41	**240**	35	173	142	**208**	105	136	123	**365**
Devt Traffic	66	264	66	**396**	14	-	-	**14**	-	56	-	**56**	-	-	14	**14**
2020 + Devt	192	496	78	**765**	25	189	41	**254**	35	229	142	**264**	105	136	137	**379**

Out

In

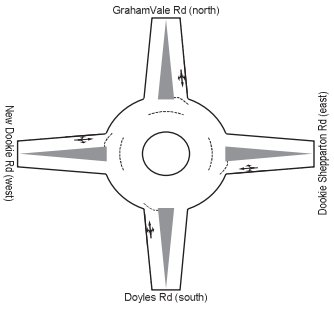
New Dookie / Grahamvale 2008 AM

0800 - 0900

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Doyles Rd (south)										
9	L	125	7.2	0.264	5.0	LOS A	15	0.50	0.52	43.4
8	T	153	7.2	0.264	3.9	LOS A	15	0.50	0.43	44.1
7	R	31	6.7	0.263	10.3	LOS B	15	0.50	0.65	40.1
Approach		**308**	**7.1**	**0.264**	**4.9**	**LOS A**	**15**	**0.50**	**0.49**	**43.4**
Dookie Shepparton Rd (east)										
6	L	36	8.3	0.228	5.5	LOS A	11	0.52	0.58	43.3
5	T	166	7.2	0.228	4.4	LOS A	11	0.52	0.49	44.0
4	R	9	10.0	0.227	10.9	LOS B	11	0.52	0.69	40.0
Approach		**213**	**7.5**	**0.228**	**4.9**	**LOS A**	**11**	**0.52**	**0.51**	**43.6**
GrahamVale Rd (north)										
3	L	11	9.1	0.306	5.6	LOS A	15	0.43	0.54	44.2
2	T	204	6.9	0.305	3.6	LOS A	15	0.43	0.40	44.5
1	R	111	7.2	0.305	10.1	LOS B	15	0.43	0.65	40.4
Approach		**326**	**7.1**	**0.305**	**5.9**	**LOS A**	**15**	**0.43**	**0.49**	**42.9**
New Dookie Rd (west)										
12	L	108	7.3	0.287	5.3	LOS A	14	0.39	0.51	44.5
11	T	120	6.7	0.286	3.3	LOS A	14	0.39	0.37	44.8
10	R	93	6.5	0.287	9.8	LOS A	14	0.39	0.63	40.5
Approach		**321**	**6.9**	**0.287**	**5.9**	**LOS A**	**14**	**0.39**	**0.49**	**43.3**
All Vehicles		**1168**	**7.1**	**0.306**	**5.5**	**LOS A**	**15**	**0.45**	**0.49**	**43.3**



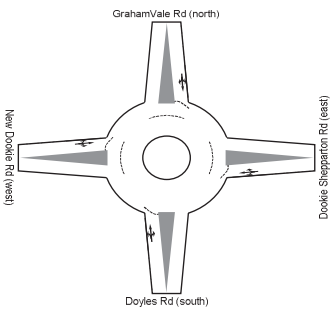
New Dookie / Grahamvale 2020 AM with Devt Traffic

0800 - 0900

Roundabout

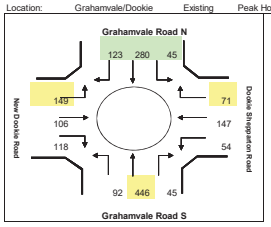
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Doyles Rd (south)										
9	L	149	6.7	0.414	6.1	LOS A	27	0.68	0.64	42.4
8	T	241	7.1	0.414	5.0	LOS A	27	0.68	0.55	43.0
7	R	37	8.1	0.416	11.5	LOS B	27	0.68	0.73	39.5
Approach		**427**	**7.0**	**0.414**	**5.9**	**LOS A**	**27**	**0.68**	**0.60**	**42.4**
Dookie Shepparton Rd (east)										
6	L	43	7.0	0.467	11.0	LOS B	33	0.90	0.99	39.6
5	T	199	7.0	0.469	9.9	LOS A	33	0.90	0.98	40.5
4	R	26	7.7	0.473	16.4	LOS B	33	0.90	0.92	36.8
Approach		**268**	**7.1**	**0.470**	**10.7**	**LOS B**	**33**	**0.90**	**0.98**	**39.9**
GrahamVale Rd (north)										
3	L	82	7.3	0.752	8.9	LOS A	80	0.79	0.81	42.4
2	T	522	7.1	0.755	6.9	LOS A	80	0.79	0.78	42.3
1	R	202	6.9	0.754	13.4	LOS B	80	0.79	0.82	38.7
Approach		**807**	**7.1**	**0.755**	**8.7**	**LOS A**	**80**	**0.79**	**0.79**	**41.3**
New Dookie Rd (west)										
12	L	144	6.9	0.398	6.1	LOS A	23	0.55	0.58	43.6
11	T	143	7.0	0.398	4.1	LOS A	23	0.55	0.46	43.8
10	R	111	7.2	0.398	10.6	LOS B	23	0.55	0.69	39.9
Approach		**398**	**7.0**	**0.398**	**6.7**	**LOS A**	**23**	**0.55**	**0.57**	**42.5**
All Vehicles		**1900**	**7.1**	**0.755**	**7.9**	**LOS A**	**80**	**0.73**	**0.73**	**41.6**



600 282 55 Shepparton NE Growth Development

Location: Grahamvale/Dookie Existing Peak Hour 3:15 to 4:14pm



Growth Rate 1.015

per annum

No Years 12

Road	Grahamvale Road N				Dookie Shepparton Road				Grahamvale Road S				New Dookie Road			
Movement	R	T	L		R	T	L		R	T	L		R	T	L	
ID	1	2	3	Total	4	5	6	Total	7	8	9	Total	10	11	12	Total
3:15 to 4:14pm	80	142	15	**237**	16	123	45	**184**	38	197	77	**312**	99	89	81	**269**
2020 Growth	96	170	18	**283**	19	147	54	**220**	45	236	92	**373**	118	106	97	**322**
Devt Traffic	27	110	27	**164**	52	-	-	**52**	-	210	-	**210**	-	-	52	**52**
2020 + Devt	123	280	45	**447**	71	147	54	**272**	45	446	92	**583**	118	106	149	**374**

Out

In

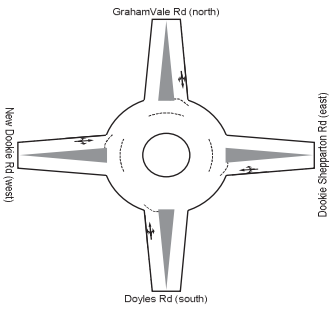
New Dookie / Grahamvale 2008 PM

15:15 to 16:15

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Doyles Rd (south)										
9	L	81	7.4	0.269	4.7	LOS A	15	0.45	0.49	43.7
8	T	207	7.2	0.269	3.6	LOS A	15	0.45	0.39	44.4
7	R	40	7.5	0.268	10.0	LOS B	15	0.45	0.63	40.3
Approach		**329**	**7.3**	**0.269**	**4.6**	**LOS A**	**15**	**0.45**	**0.44**	**43.6**
Dookie Shepparton Rd (east)										
6	L	47	6.4	0.193	5.1	LOS A	9	0.46	0.53	43.6
5	T	129	7.0	0.193	4.0	LOS A	9	0.46	0.44	44.4
4	R	17	5.9	0.193	10.4	LOS B	9	0.46	0.66	40.3
Approach		**193**	**6.7**	**0.193**	**4.8**	**LOS A**	**9**	**0.46**	**0.48**	**43.7**
GrahamVale Rd (north)										
3	L	16	6.3	0.235	5.5	LOS A	11	0.41	0.52	44.4
2	T	149	6.7	0.234	3.5	LOS A	11	0.41	0.39	44.7
1	R	84	7.1	0.234	10.0	LOS A	11	0.41	0.64	40.4
Approach		**249**	**6.8**	**0.234**	**5.8**	**LOS A**	**11**	**0.41**	**0.48**	**43.1**
New Dookie Rd (west)										
12	L	85	7.1	0.272	5.7	LOS A	13	0.45	0.54	44.2
11	T	94	7.4	0.272	3.7	LOS A	13	0.45	0.41	44.4
10	R	104	6.7	0.272	10.2	LOS B	13	0.45	0.65	40.3
Approach		**283**	**7.1**	**0.272**	**6.7**	**LOS A**	**13**	**0.45**	**0.54**	**42.7**
All Vehicles		**1054**	**7.0**	**0.272**	**5.5**	**LOS A**	**15**	**0.44**	**0.48**	**43.3**



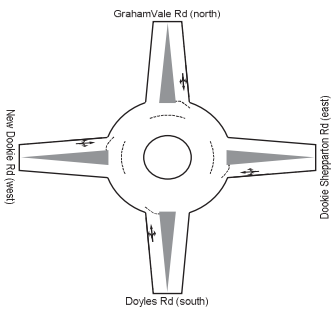
New Dookie / Grahamvale 2020 PM with Devt Traffic

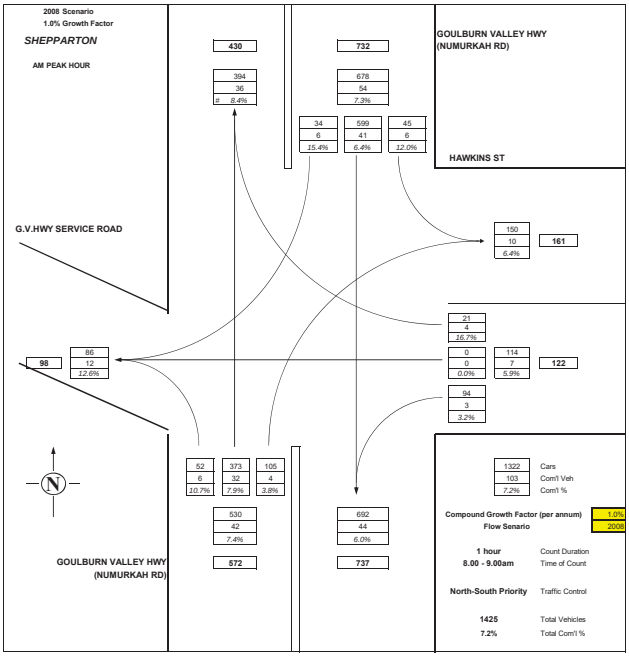
15:15 to 16:15

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Doyles Rd (south)										
9	L	97	7.2	0.554	6.3	LOS A	42	0.71	0.67	42.3
8	T	469	7.0	0.553	5.2	LOS A	42	0.71	0.58	42.8
7	R	47	6.4	0.553	11.6	LOS B	42	0.71	0.73	39.4
Approach		**614**	**7.0**	**0.553**	**5.8**	**LOS A**	**42**	**0.71**	**0.61**	**42.4**
Dookie Shepparton Rd (east)										
6	L	57	7.0	0.345	6.7	LOS A	19	0.66	0.70	42.5
5	T	155	7.1	0.346	5.6	LOS A	19	0.66	0.62	43.1
4	R	75	6.7	0.346	12.0	LOS B	19	0.66	0.76	39.5
Approach		**287**	**7.0**	**0.346**	**7.5**	**LOS A**	**19**	**0.66**	**0.67**	**41.9**
GrahamVale Rd (north)										
3	L	47	6.4	0.456	6.1	LOS A	28	0.57	0.58	43.5
2	T	295	7.1	0.457	4.1	LOS A	28	0.57	0.45	43.7
1	R	129	7.0	0.457	10.6	LOS B	28	0.57	0.68	39.9
Approach		**471**	**7.0**	**0.458**	**6.1**	**LOS A**	**28**	**0.57**	**0.53**	**42.5**
New Dookie Rd (west)										
12	L	157	7.0	0.511	9.3	LOS A	36	0.79	0.89	42.2
11	T	112	7.1	0.511	7.3	LOS A	36	0.79	0.85	42.4
10	R	124	7.2	0.512	13.8	LOS B	36	0.79	0.87	38.4
Approach		**394**	**7.1**	**0.512**	**10.1**	**LOS B**	**36**	**0.79**	**0.87**	**40.9**
All Vehicles		**1766**	**7.0**	**0.554**	**7.1**	**LOS A**	**42**	**0.68**	**0.66**	**42**





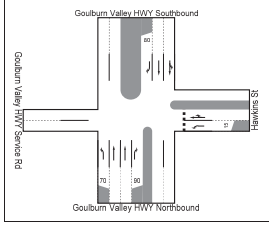
Priority Intersection 2008 Scenario AM Peak

Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	61	9.8	0.035	8.6	LOS A	0	0.00	0.67	49.0
2	T	426	8.0	0.115	0.0	LOS A	0	0.00	0.00	60.0
3	R	115	3.5	0.180	12.6	LOS B	6	0.61	0.86	44.7
Approach		**603**	**7.3**	**0.180**	**3.3**	**LOS A**	**6**	**0.12**	**0.23**	**55.1**
Hawkins St										
4	L	102	2.9	0.198	13.9	LOS B	7	0.62	0.87	43.5
5	T	1	0.0	0.500	91.5	LOS F	15	0.96	1.04	17.2
6	R	26	15.4	0.456	92.4	LOS F	15	0.96	1.04	17.1
Approach		**129**	**5.4**	**0.460**	**30.3**	**LOS D**	**15**	**0.69**	**0.91**	**32.8**
Goulburn Valley HWY Southbound										
7	L	54	11.3	0.196	8.6	LOS A	0	0.00	0.67	49.0
8	T	674	6.4	0.195	0.0	LOS A	0	0.00	0.00	60.0
9	R	42	14.3	0.055	11.3	LOS B	2	0.50	0.72	46.3
Approach		**769**	**7.2**	**0.195**	**1.2**	**LOS A**	**2**	**0.03**	**0.09**	**58.2**
All Vehicles		**1501**	**7.1**	**0.500**	**4.5**	**NA**	**15**	**0.12**	**0.21**	**53.4**



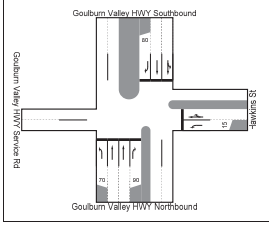
Signalised 2008 Scenario AM Peak

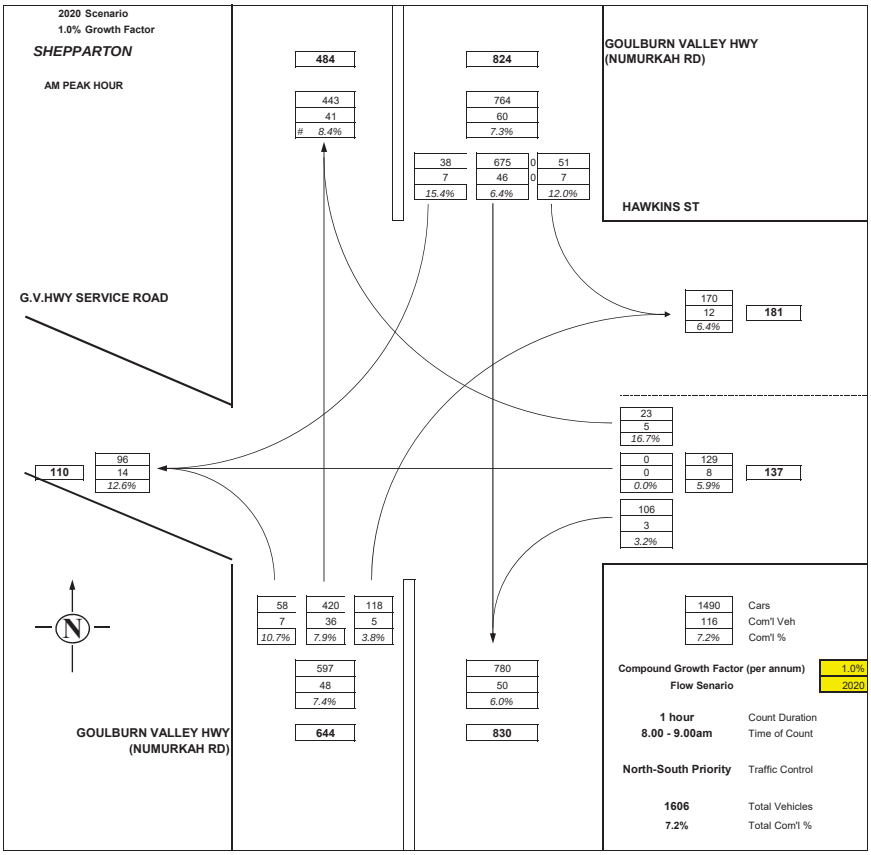
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Signalised - Fixed time Cycle Time = 30 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	61	9.8	0.092	14.9	LOS B	7	0.65	0.73	42.9
2	T	426	8.0	0.300	7.0	LOS A	24	0.72	0.59	50.4
3	R	115	3.5	0.324	18.5	LOS B	16	0.84	0.77	39.9
Approach		**603**	**7.3**	**0.324**	**10.0**	**LOS A**	**24**	**0.74**	**0.64**	**47.2**
Hawkins St										
4	L	102	2.9	0.441	20.3	LOS C	15	0.89	0.76	38.5
5	T	1	0.0	0.083	11.3	LOS B	4	0.84	0.60	45.7
6	R	26	15.4	0.084	19.8	LOS B	4	0.84	0.71	39.2
Approach		**129**	**5.4**	**0.441**	**20.1**	**LOS C**	**15**	**0.88**	**0.75**	**38.7**
Goulburn Valley HWY Southbound										
7	L	54	11.3	0.510	16.4	LOS B	42	0.80	0.81	41.7
8	T	674	6.4	0.510	7.7	LOS A	42	0.80	0.68	49.5
9	R	42	14.3	0.104	16.5	LOS B	6	0.72	0.72	41.7
Approach		**769**	**7.2**	**0.510**	**8.8**	**LOS A**	**42**	**0.80**	**0.69**	**48.4**
All Vehicles		**1501**	**7.1**	**0.510**	**10.2**	**LOS B**	**42**	**0.78**	**0.67**	**46.9**





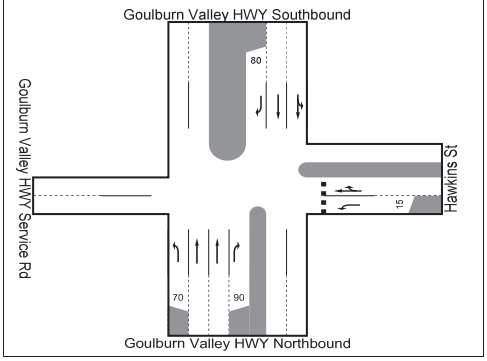
2020 AM Peak

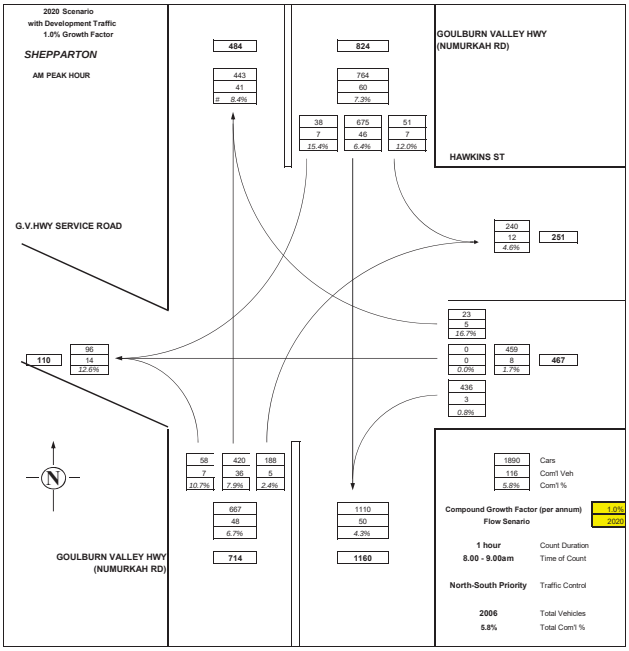
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	68	10.3	0.039	8.6	LOS A	0	0.00	0.67	49.0
2	T	480	7.9	0.129	0.0	LOS A	0	0.00	0.00	60.0
3	R	129	3.9	0.229	13.9	LOS B	8	0.67	0.89	43.5
Approach		**677**	**7.4**	**0.229**	**3.5**	**LOS A**	**8**	**0.13**	**0.24**	**54.8**
Hawkins St										
4	L	115	2.6	0.255	15.7	LOS C	9	0.69	0.92	42.0
5	T	1	0.0	1.000	234.0	LOS F	32	0.99	1.17	8.1
6	R	29	17.2	0.853	234.9	LOS F	32	0.99	1.16	8.1
Approach		**145**	**5.5**	**0.843**	**61.0**	**LOS F**	**32**	**0.75**	**0.97**	**22.4**
Goulburn Valley HWY Southbound										
7	L	61	11.5	0.220	8.6	LOS A	0	0.00	0.67	49.0
8	T	759	6.3	0.220	0.0	LOS A	0	0.00	0.00	60.0
9	R	47	14.9	0.067	11.8	LOS B	3	0.53	0.75	45.8
Approach		**867**	**7.2**	**0.220**	**1.2**	**LOS A**	**3**	**0.03**	**0.09**	**58.1**
All Vehicles		**1689**	**7.1**	**1.000**	**7.3**	**N/A**	**32**	**0.13**	**0.22**	**50.1**





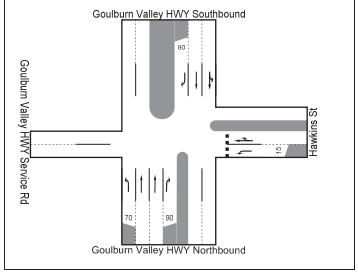
2020 with Devt Traffic AM Peak

Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	68	10.3	0.039	8.6	LOS A	0	0.00	0.67	49.0
2	T	480	7.9	0.129	0.0	LOS A	0	0.00	0.00	60.0
3	R	203	2.5	0.360	15.1	LOS C	15	0.71	0.96	42.5
Approach		**751**	**6.7**	**0.360**	**4.9**	**LOS A**	**15**	**0.19**	**0.32**	**53.0**
Hawkins St										
4	L	462	0.7	0.999#	19.5	LOS C	46	1.00	1.02	39.0
5	T	1	0.0	1.418	50.3	LOS F	100	0.09	0.14	3.6
6	R	29	17.2	1.318	571.8	LOS F	100	1.00	1.57	3.6
Approach		**492**	**1.6**	**1.345**	**52.8**	**LOS F**	**100**	**0.98**	**1.04**	**24.1**
Goulburn Valley HWY Southbound										
7	L	61	11.5	0.220	8.6	LOS A	0	0.00	0.67	49.0
8	T	759	6.3	0.220	0.0	LOS A	0	0.00	0.00	60.0
9	R	47	14.9	0.067	11.8	LOS B	3	0.53	0.75	45.8
Approach		**867**	**7.2**	**0.220**	**1.2**	**LOS A**	**3**	**0.03**	**0.09**	**58.1**
All Vehicles		**2110**	**5.7**	**1.418**	**14.6**	**N/A**	**100**	**0.31**	**0.39**	**42.8**



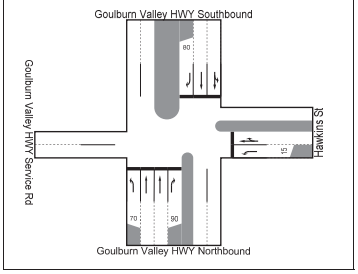
Signalised 2020 with Devt Traffic AM Peak

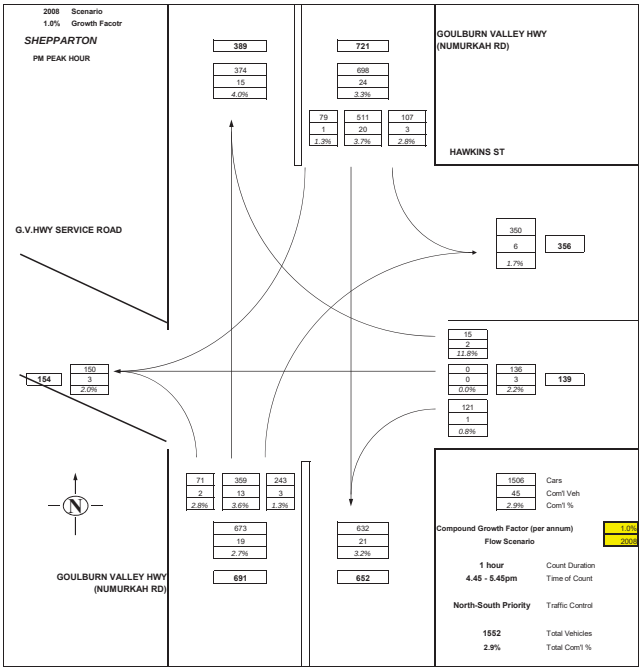
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Signalised - Fixed time Cycle Time = 40 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	68	10.3	0.126	19.2	LOS B	11	0.73	0.74	39.5
2	T	480	7.9	0.415	11.9	LOS B	39	0.82	0.68	45.2
3	R	203	2.5	0.904	36.8	LOS D	49	1.00	1.13	29.9
Approach		**751**	**6.7**	**0.904**	**19.3**	**LOS B**	**49**	**0.86**	**0.81**	**39.3**
Hawkins St										
4	L	462	1.3	0.999#	20.7	LOS C	34	0.94	0.81	38.2
5	T	1	0.0	0.388	0.0	LOS A	37	0.00	0.00	46.8
6	R	29	17.2	0.389	18.8	LOS B	37	0.77	0.79	40.0
Approach		**492**	**1.6**	**1.000**	**11.1**	**LOS B**	**37**	**0.50**	**0.44**	**38.4**
Goulburn Valley HWY Southbound										
7	L	61	11.5	0.708	23.5	LOS C	71	0.93	0.91	36.7
8	T	759	6.3	0.707	14.8	LOS B	71	0.93	0.86	42.6
9	R	47	14.9	0.169	23.1	LOS C	10	0.84	0.74	37.1
Approach		**867**	**7.2**	**0.707**	**15.9**	**LOS B**	**71**	**0.93**	**0.86**	**41.8**
All Vehicles		**2110**	**5.7**	**0.999**	**16.0**	**LOS B**	**71**	**0.81**	**0.74**	**40.3**





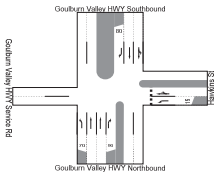
Priority Intersection 2008 Scenario PM Peak

Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flows (veh/h)	% HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	77	2.6	0.042	8.3	LOS A	0	0.00	0.67	49.0
2	T	392	3.6	0.103	0.0	LOS A	0	0.00	0.00	60.0
3	R	259	1.2	0.372	13.3	LOS B	17	0.64	0.93	44.0
Approach		**728**	**2.6**	**0.372**	**5.6**	**LOS A**	**17**	**0.23**	**0.40**	**52.0**
Hawkins St										
4	L	128	0.8	0.243	12.9	LOS B	8	0.58	0.87	44.3
5	T	1	0.0	0.333	76.2	LOS F	9	0.95	1.01	19.5
6	R	18	11.1	0.310	77.0	LOS F	9	0.95	1.01	19.4
Approach		**147**	**2.0**	**0.308**	**21.2**	**LOS C**	**9**	**0.63**	**0.89**	**37.9**
Goulburn Valley HWY Southbound										
7	L	116	2.6	0.179	8.3	LOS A	0	0.00	0.67	49.0
8	T	559	3.8	0.179	0.0	LOS A	0	0.00	0.00	60.0
9	R	84	1.2	0.092	10.2	LOS B	3	0.48	0.72	46.9
Approach		**759**	**3.3**	**0.179**	**2.4**	**LOS A**	**3**	**0.05**	**0.18**	**56.3**
All Vehicles		**1634**	**2.9**	**0.372**	**5.5**	**Not Applicab**	**17**	**0.18**	**0.34**	**52.1**



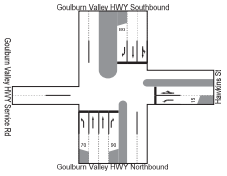
Signalised 2008 Scenario PM Peak

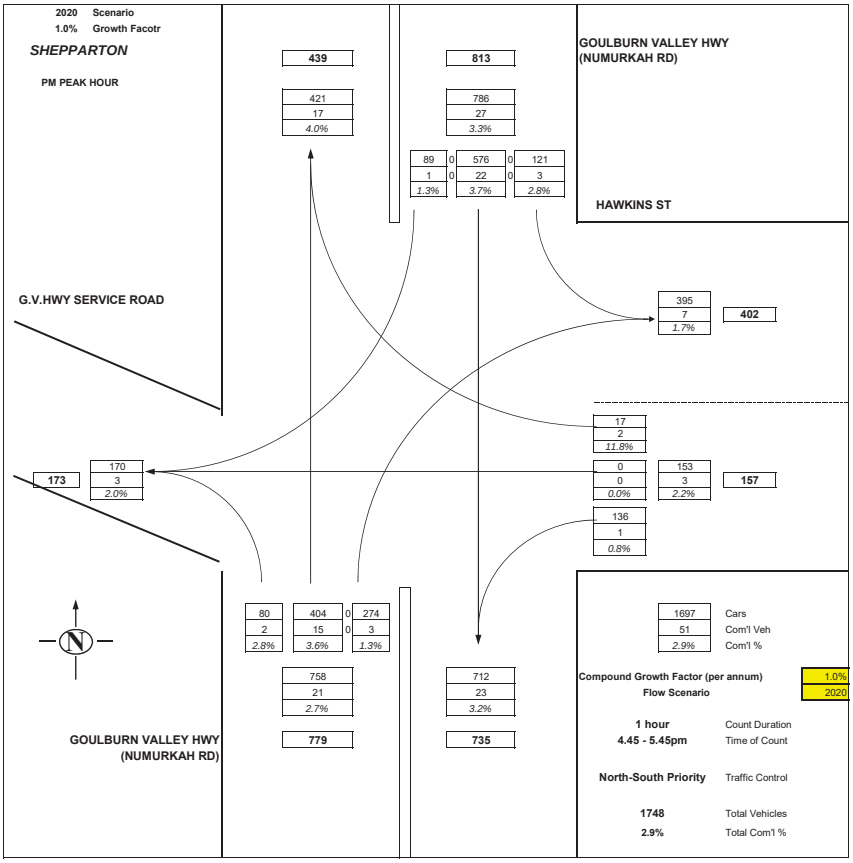
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Signalised - Fixed time Cycle Time = 30 seconds

Vehicle Movements

Mov ID	Turn	Dem Flows (veh/h)	% HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	77	2.6	0.110	14.6	LOS B	8	0.66	0.74	42.8
2	T	392	3.6	0.268	6.8	LOS A	21	0.71	0.58	50.5
3	R	259	1.2	0.693	21.2	LOS C	39	0.95	0.91	38.0
Approach		**728**	**2.6**	**0.693**	**12.8**	**LOS B**	**39**	**0.79**	**0.71**	**44.4**
Hawkins St										
4	L	128	0.8	0.545	20.7	LOS C	19	0.90	0.80	38.2
5	T	1	0.0	0.057	11.2	LOS B	3	0.83	0.59	45.9
6	R	18	11.1	0.057	19.6	LOS B	3	0.83	0.69	39.3
Approach		**147**	**2.0**	**0.545**	**20.5**	**LOS C**	**19**	**0.89**	**0.79**	**38.4**
Goulburn Valley HWY Southbound										
7	L	116	2.6	0.465	15.8	LOS B	38	0.78	0.80	41.8
8	T	559	3.8	0.466	7.5	LOS A	38	0.78	0.66	49.7
9	R	84	1.2	0.181	16.2	LOS B	10	0.74	0.75	41.5
Approach		**759**	**3.3**	**0.466**	**9.8**	**LOS A**	**38**	**0.78**	**0.69**	**47.3**
All Vehicles		**1634**	**2.9**	**0.693**	**12.1**	**LOS B**	**39**	**0.79**	**0.71**	**45.1**





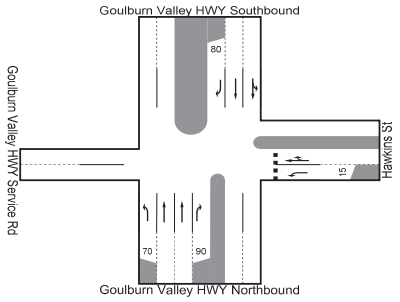
2020 PM Peak

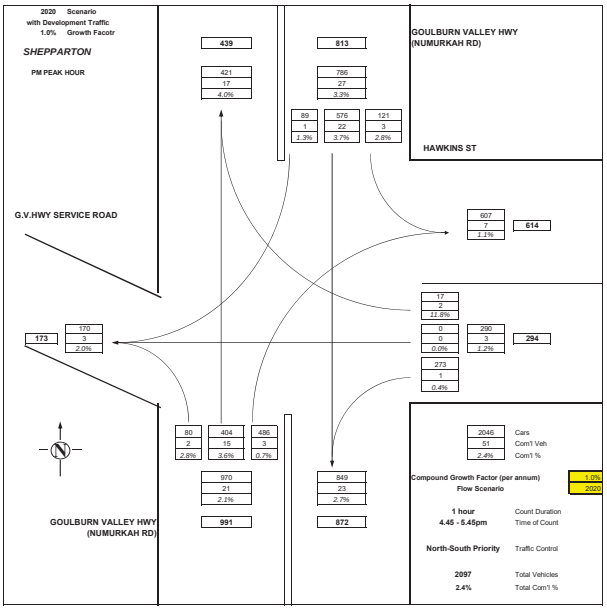
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	86	2.3	0.047	8.3	LOS A	0	0.00	0.67	49.0
2	T	441	3.6	0.116	0.0	LOS A	0	0.00	0.00	60.0
3	R	292	1.0	0.466	15.2	LOS C	23	0.71	1.00	42.4
Approach		**818**	**2.6**	**0.466**	**6.3**	**LOS A**	**23**	**0.25**	**0.43**	**51.2**
Hawkins St										
4	L	144	0.7	0.272	14.2	LOS B	10	0.64	0.90	43.1
5	T	1	0.0	0.500	129.3	LOS F	15	0.98	1.04	13.3
6	R	20	10.0	0.500	130.0	LOS F	15	0.98	1.04	13.2
Approach		**165**	**1.8**	**0.501**	**28.9**	**LOS D**	**15**	**0.68**	**0.92**	**33.4**
Goulburn Valley HWY Southbound										
7	L	131	2.3	0.201	8.3	LOS A	0	0.00	0.67	49.0
8	T	629	3.7	0.201	0.0	LOS A	0	0.00	0.00	60.0
9	R	95	1.1	0.111	10.6	LOS B	4	0.51	0.75	46.5
Approach		**854**	**3.2**	**0.201**	**2.4**	**LOS A**	**4**	**0.06**	**0.18**	**56.3**
All Vehicles		**1837**	**2.8**	**0.500**	**6.5**	**Applicab**	**23**	**0.20**	**0.36**	**50.9**





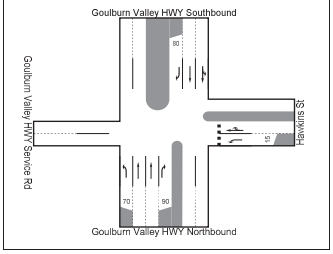
2020 with Devt Traffic PM Peak

Hawkins Street / Goulburn Valley Highway / Numurkah Road

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	86	2.3	0.047	8.3	LOS A	0	0.00	0.67	49.0
2	T	441	3.6	0.116	0.0	LOS A	0	0.00	0.00	60.0
3	R	515	0.6	0.824	23.4	LOS C	78	0.88	1.47	36.5
Approach		**1042**	**2.0**	**0.825**	**12.3**	**LOS B**	**78**	**0.44**	**0.78**	**44.9**
Hawkins St										
4	L	288	0.3	0.544	17.2	LOS C	28	0.74	1.05	40.7
5	T	1	0.0	1.000	366.3	LOS F	31	1.00	1.15	5.5
6	R	20	10.0	0.909	367.1	LOS F	31	1.00	1.15	5.4
Approach		**309**	**1.0**	**0.912**	**40.0**	**LOS E**	**31**	**0.75**	**1.06**	**20.2**
Goulburn Valley HWY Southbound										
7	L	131	2.3	0.201	8.3	LOS A	0	0.00	0.67	49.0
8	T	629	3.7	0.201	0.0	LOS A	0	0.00	0.00	60.0
9	R	95	1.1	0.111	10.6	LOS B	4	0.51	0.75	46.5
Approach		**854**	**3.2**	**0.201**	**2.4**	**LOS A**	**4**	**0.06**	**0.18**	**56.3**
All Vehicles		**2205**	**2.3**	**1.000**	**12.5**	**N/A**	**78**	**0.33**	**0.59**	**44.7**



Signalised 2020 with Devt Traffic PM Peak

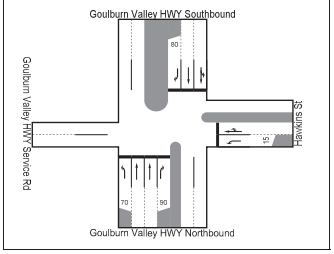
Hawkins Street / Goulburn Valley Highway / Numurkah Road

Signalised - Fixed time

Cycle Time = 130 seconds

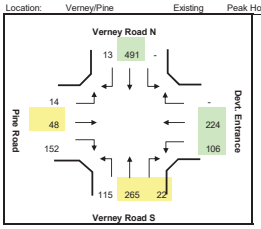
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goulburn Valley HWY Northbound										
1	L	86	2.3	0.187	20.6	LOS C	24	0.46	0.73	38.3
2	T	441	2.6	0.293	14.3	LOS B	82	0.54	0.47	43.1
3	R	515	0.9	1.000#	45.6	LOS D	157	1.00	0.90	26.7
Approach		**1042**	**2.0**	**1.000**	**24.9**	**LOS C**	**157**	**0.68**	**0.63**	**35.7**
Hawkins St										
4	L	288	1.3	1.000#	52.2	LOS D	34	0.99	0.76	24.6
5	T	1	0.0	0.404	0.2	LOS A	91	0.00	0.00	29.9
6	R	20	10.0	0.405	45.0	LOS D	91	0.83	0.81	27.0
Approach		**309**	**1.0**	**1.000**	**16.3**	**LOS B**	**91**	**0.31**	**0.25**	**25.1**
Goulburn Valley HWY Southbound										
7	L	131	2.3	0.358	23.2	LOS C	99	0.56	0.79	36.6
8	T	629	3.7	0.358	15.0	LOS B	100	0.56	0.50	42.5
9	R	95	1.1	0.268	27.6	LOS C	33	0.59	0.75	34.2
Approach		**854**	**3.2**	**0.358**	**17.6**	**LOS B**	**100**	**0.57**	**0.57**	**40.4**
All Vehicles		**2205**	**2.3**	**1.000**	**20.9**	**LOS C**	**157**	**0.58**	**0.55**	**36.7**



600 282 55 Shepparton NE Growth Development

Location: Verney/Pine Existing Peak Hour: 8:00 - 9:00am



Growth Rate 1.015

per annum

No Years 11

Road	Verney Road N				Devt. Entrance				Verney Road S				Pine Road			
Movement	R	T	L	Total	R	T	L	Total	R	T	L	Total	R	T	L	Total
ID	1	2	3		4	5	6		7	8	9		10	11	12	
8:00 - 9:00am	11	361	0	**372**	0	0	0	**0**	0	213	98	**311**	129	0	12	**141**
2020 Growth	13	425	-	**438**	-	-	-	**-**	-	251	115	**366**	152	-	14	**166**
Devt Traffic	-	66	-	**66**	-	224	106	**330**	22	14	-	**36**	-	48	-	**48**
2020 + Devt	13	491	-	**504**	-	224	106	**330**	22	265	115	**402**	152	48	14	**214**

Out

In

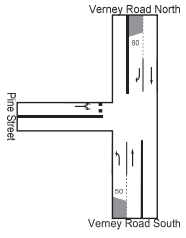
2009 Verney Pine

8:15 - 9:15am

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
1	L	103	6.8	0.058	8.4	LOS A	0	0.00	0.67	49.0
2	T	224	7.1	0.121	0.0	LOS A	0	0.00	0.00	60.0
Approach		**328**	**7.0**	**0.121**	**2.7**	**LOS A**		**0.00**	**0.21**	**56.0**
Verney Road North										
8	T	380	7.1	0.204	0.0	LOS A	0	0.00	0.00	60.0
9	R	12	8.3	0.012	10.1	LOS B	0	0.39	0.66	47.1
Approach		**392**	**7.1**	**0.204**	**0.3**	**LOS A**	**0**	**0.01**	**0.02**	**59.5**
Pine Street										
10	L	13	7.7	0.500	24.6	LOS C	24	0.77	0.99	35.9
12	R	136	7.4	0.491	24.7	LOS C	24	0.77	1.04	35.8
Approach		**149**	**7.4**	**0.491**	**24.7**	**LOS C**	**24**	**0.77**	**1.04**	**35.8**
All Vehicles		**869**	**7.1**	**0.500**	**5.4**	**Applicable**	**24**	**0.14**	**0.27**	**52.4**



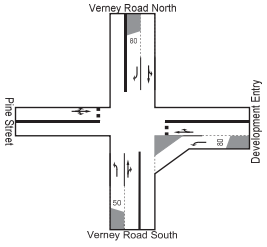
2020 Verney Pine with Devt Traffic AM

8:15 - 9:15am

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
1	L	121	6.6	0.068	8.4	LOS A	0	0.00	0.67	49.0
2	T	279	7.2	0.179	3.5	LOS A	15	0.62	0.00	52.3
3	R	23	0.0	0.178	11.8	LOS B	15	0.62	0.84	45.3
Approach		**423**	**6.6**	**0.179**	**5.3**	**LOS A**	**15**	**0.45**	**0.24**	**50.9**
Development Entry										
4	L	112	0.0	0.180	11.5	LOS B	6	0.55	0.82	45.7
5	T	236	0.0	1.083	191.8	LOS F	216	1.00	2.90	9.5
6	R	1	0.0	1.000	193.2	LOS F	216	1.00	2.93	9.5
Approach		**349**	**0.0**	**1.083**	**133.9**	**LOS F**	**216**	**0.85**	**2.24**	**12.8**
Verney Road North										
7	L	1	0.0	0.250	8.2	LOS A	0	0.00	0.67	49.0
8	T	517	7.0	0.278	0.0	LOS A	0	0.00	0.00	60.0
9	R	14	7.1	0.015	10.5	LOS B	1	0.43	0.68	46.7
Approach		**532**	**7.0**	**0.278**	**0.3**	**LOS A**	**1**	**0.01**	**0.02**	**59.5**
Pine Street										
10	L	15	6.7	1.071	161.5	LOS F	189	1.00	3.43	11.0
11	T	51	0.0	1.041	159.9	LOS F	189	1.00	2.67	11.1
12	R	160	6.9	1.053	161.6	LOS F	189	1.00	2.61	11.0
Approach		**226**	**5.3**	**1.051**	**161.2**	**LOS F**	**189**	**1.00**	**2.68**	**11.0**
All Vehicles		**1530**	**5.0**	**1.083**	**55.9**	**Applicable**	**216**	**0.47**	**0.98**	**23.6**



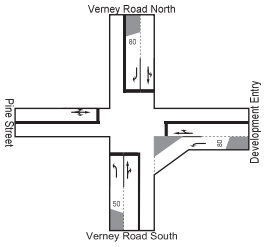
2020 Verney Pine with Devt Traffic AM

8:15 - 9:15am

Signalised - Fixed time Cycle Time = 30 seconds

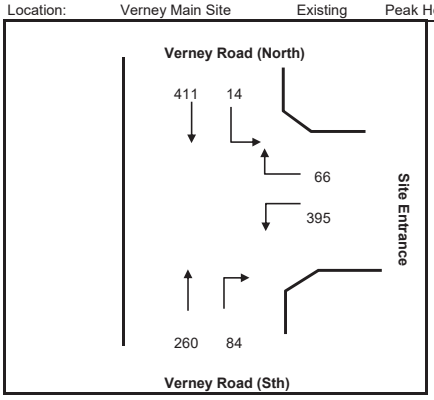
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
1	L	121	6.6	0.186	15.7	LOS B	14	0.71	0.76	42.0
2	T	279	7.2	0.504	9.2	LOS A	38	0.85	0.71	47.9
3	R	23	0.0	0.504	17.5	LOS B	38	0.85	0.81	40.4
Approach		**423**	**6.6**	**0.504**	**11.5**	**LOS B**	**38**	**0.81**	**0.73**	**45.6**
Development Entry										
4	L	112	0.0	0.148	11.8	LOS B	9	0.70	0.72	45.1
5	T	236	0.0	0.522	11.7	LOS B	32	0.92	0.75	45.4
6	R	1	0.0	0.500	20.0	LOS C	32	0.92	0.80	38.6
Approach		**349**	**0.0**	**0.522**	**11.8**	**LOS B**	**32**	**0.85**	**0.74**	**45.3**
Verney Road North										
7	L	1	0.0	0.682	20.1	LOS C	72	0.93	0.97	38.6
8	T	517	7.0	0.757	11.9	LOS B	72	0.93	0.92	45.2
9	R	14	7.1	0.039	18.9	LOS B	2	0.80	0.70	39.6
Approach		**532**	**7.0**	**0.757**	**12.1**	**LOS B**	**72**	**0.93**	**0.92**	**45.1**
Pine Street										
10	L	15	6.7	0.756	24.0	LOS C	39	0.98	0.97	36.3
11	T	51	0.0	0.754	15.6	LOS B	39	0.98	0.96	42.0
12	R	160	6.9	0.755	23.0	LOS C	36	0.92	0.95	36.9
Approach		**226**	**5.3**	**0.755**	**21.4**	**LOS C**	**39**	**0.94**	**0.95**	**37.9**
All Vehicles		**1530**	**5.0**	**0.757**	**13.2**	**LOS B**	**72**	**0.88**	**0.83**	**44**



600 282 55 Shepparton NE Growth Development

Location: Verney Main Site Existing Peak Hour: 8:00 - 9:00am



Growth Rate	1.015
per annum	
No Years	11

Road	Verney Road (Nort			Verney Road (Sth)			Site Entrance		
Movement	R	T		T	L		R	L	
ID	1	2	Total	8	9	Total	10	12	Total
8:00 - 9:00am	0	349	349	221	0	**221**	0	0	**0**
2020 Growth	-	411	411	260	-	260	-	-	-
Devt Traffic	14	-		-	84		66	395	461
2020 + Devt	14	411	411	260	84	260	66	395	461

Movement Summary

Verney Main Entrance

AM Peak

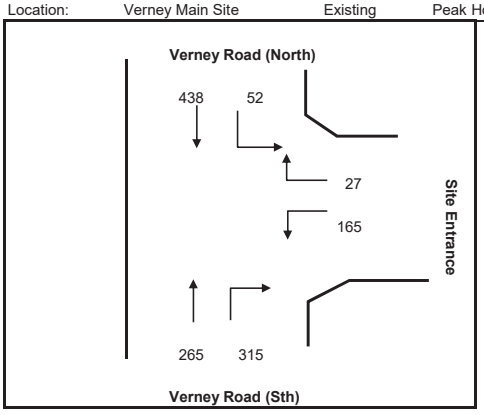
Give-Way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
2	T	274	6.9	0.147	0.0	LOS A	0	0.00	0.00	60.0
3	R	88	6.8	0.100	10.8	LOS B	4	0.48	0.74	46.4
Approach		**362**	**6.9**	**0.147**	**2.6**	**LOS A**	**4**	**0.12**	**0.18**	**56.0**
Main Site Entrance										
4	L	416	7.0	0.586	14.0	LOS B	41	0.67	1.02	43.6
6	R	69	7.1	0.315	27.1	LOS D	12	0.81	0.99	34.4
Approach		**486**	**7.0**	**0.586**	**15.9**	**LOS C**	**41**	**0.69**	**1.02**	**42.0**
Verney Road North										
7	L	15	6.7	0.008	8.4	LOS A	0	0.00	0.67	49.0
8	T	433	6.9	0.232	0.0	LOS A	0	0.00	0.00	60.0
Approach		**447**	**6.9**	**0.232**	**0.3**	**LOS A**		**0.00**	**0.02**	**59.6**
All Vehicles		**1295**	**6.9**	**0.586**	**6.8**	**Not Applicable**	**41**	**0.29**	**0.44**	**50.7**

600 282 55 Shepparton NE Growth Development

Location: Verney Main Site Existing Peak Hour: PM



Growth Rate	1.015	
per annum		
No Years	11	

Road	Verney Road (North)			Verney Road (Sth)			Site Entrance		
Movement	L	T		T	R		R	L	
ID	1	2	Total	8	9	Total	10	12	Total
8:00 - 9:00am	0	372	**372**	225	0	**225**	0	0	**0**
2020 Growth	-	438	**438**	265	-	**265**	-	-	**-**
Devt Traffic	52	-		-	315		27	165	**192**
2020 + Devt	52	438	**438**	265	315	**265**	27	165	**192**

Movement Summary

Verney Main Entrance

PM Peak

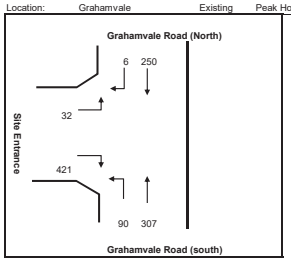
Give-Way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	% HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verney Road South										
2	T	279	7.2	0.150	0.0	LOS A	0	0.00	0.00	60.0
3	R	332	6.9	0.409	12.9	LOS B	22	0.61	0.94	44.5
Approach		**610**	**7.0**	**0.409**	**7.0**	**LOS A**	**22**	**0.33**	**0.51**	**50.5**
Main Site Entrance										
4	L	174	6.9	0.261	11.6	LOS B	10	0.55	0.82	45.9
6	R	28	7.1	0.237	41.9	LOS E	7	0.89	0.99	27.9
Approach		**202**	**6.9**	**0.261**	**15.8**	**LOS C**	**10**	**0.60**	**0.84**	**42.2**
Verney Road North										
7	L	55	7.3	0.031	8.4	LOS A	0	0.00	0.67	49.0
8	T	461	6.9	0.247	0.0	LOS A	0	0.00	0.00	60.0
Approach		**516**	**7.0**	**0.247**	**0.9**	**LOS A**		**0.00**	**0.07**	**58.6**
All Vehicles		**1328**	**7.0**	**0.409**	**6.0**	**Not Applicabl**	**22**	**0.24**	**0.39**	**51.7**

600 282 55 Shepparton NE Growth Development

Location: Grahamvale Existing Peak Hour: 8:15 - 9:15am



Growth Rate 1.015

per annum

No Years 12

Road	Grahamvale Road			Grahamvale Road (s			Site Entrance		
Movement	R	T		T	L		R	L	
ID	1	2	Total	8	9	Total	10	12	Total
8:15 - 9:15am	0	209	**209**	257	0	**257**	0	0	**0**
2020 Growth	-	250	**250**	307	-	**307**	-	-	**0**
Devt Traffic	6	-	**6**	-	90	**90**	421	32	**453**
2020 + Devt	6	250	**256**	307	90	**397**	421	32	**453**

Grahamvale Site Entrance

AM Peak

Signalised - Fixed time **Cycle Time = 40 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow	%HV	Deg of Satn	Aver Delay	LOS	95% BOQ	Prop. Queue	Eff. Stop	Aver Speed
GVale South										
1	L	95	7.4	0.231	19.3	LOS B	14	0.85	0.76	39.4
2	T	323	7.1	0.745	14.4	LOS B	51	0.98	0.93	43.0
Approach		**419**	**7.2**	**0.745**	**15.5**	**LOS B**	**51**	**0.95**	**0.89**	**42.1**
Gvale North										
8	T	263	6.8	0.604	12.4	LOS B	39	0.94	0.81	44.8
9	R	6	14.3	0.029	22.7	LOS C	1	0.92	0.65	37.0
Approach		**270**	**7.0**	**0.604**	**12.7**	**LOS B**	**39**	**0.94**	**0.80**	**44.5**
Site Entrance										
10	L	34	6.1	0.051	15.3	LOS B	4	0.67	0.71	42.4
12	R	443	7.0	0.683	18.8	LOS B	59	0.90	0.90	39.6
Approach		**476**	**6.9**	**0.683**	**18.6**	**LOS B**	**59**	**0.88**	**0.89**	**39.8**
All Vehicles		**1165**	**7.0**	**0.745**	**16.1**	**LOS B**	**59**	**0.92**	**0.87**	**41.7**

Grahamvale Site Entrance - Priority (Unsignalised) Intersection

AM Peak

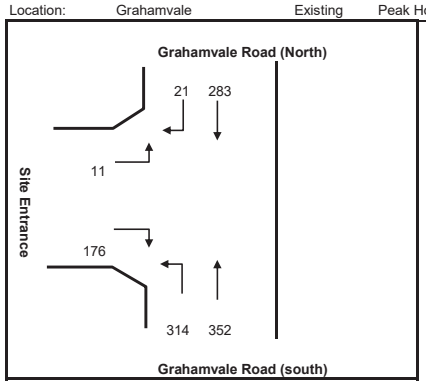
Give-way

Vehicle Movements

GVale South										
1	L	95	7.4	0.054	8.4	LOS A	0	0.00	0.67	49.0
2	T	323	7.1	0.174	0.0	LOS A	0	0.00	0.00	60.0
Approach		**419**	**7.2**	**0.174**	**1.9**	**LOS A**		**0.00**	**0.15**	**57.1**
Gvale North										
8	T	263	6.8	0.141	0.0	LOS A	0	0.00	0.00	60.0
9	R	6	14.3	0.009	10.7	LOS B	0	0.46	0.66	46.5
Approach		**270**	**7.0**	**0.141**	**0.3**	**LOS A**	**0**	**0.01**	**0.02**	**59.6**
Site Entrance										
10	L	34	6.1	0.042	10.5	LOS B	1	0.43	0.70	46.8
12	R	443	7.0	1.462	450.8	LOS F	735	1.00	5.37	4.5
Approach		**476**	**6.9**	**1.462**	**420.2**	**LOS F**	**735**	**0.96**	**5.05**	**4.8**
All Vehicles		**1165**	**7.0**	**1.462**	**172.5**	**licable**	**735**	**0.40**	**2.12**	**10.4**

600 282 55 Shepparton NE Growth Development

Location: Grahamvale Existing Peak Hour: PM



Road	Grahamvale Road			Grahamvale Road (s			Site Entrance		
Movement	R	T		T	L		R	L	
ID	1	2	Total	8	9	Total	10	12	Total
8:15 - 9:15am	0	237	**237**	294	0	**294**	0	0	**0**
2020 Growth	-	283	**283**	352	-	**352**	-	-	**0**
Devt Traffic	21	-	**21**	-	314	**314**	176	11	**187**
2020 + Devt	21	283	**304**	352	314	**666**	176	11	**187**

Growth Rate 1.015

per annum

No Years 12

Grahamvale Site Entrance

AM Peak

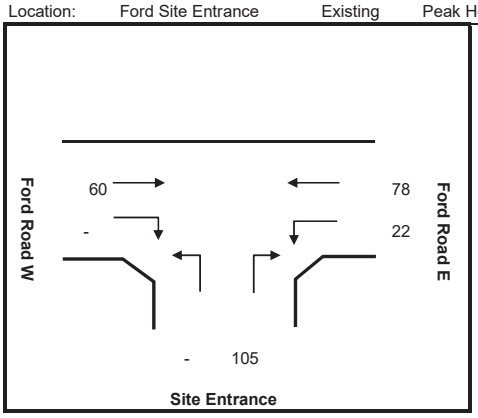
Signalised - Fixed time

Vehicle Movements

Mov ID	Turn	Dem Flow	%HV	Deg of Satn	Aver Delay	LOS	95% BOQ	Prop. Queue	Eff. Stop	Aver Speed
GVale South										
1	L	331	7.0	0.734	18.2	LOS B	99	0.83	0.91	40.1
2	T	371	7.0	0.735	9.8	LOS A	99	0.83	0.80	47.3
Approach		**701**	**7.0**	**0.734**	**13.8**	**LOS B**	**99**	**0.83**	**0.85**	**43.6**
Gvale North										
8	T	298	7.0	0.392	7.5	LOS A	42	0.69	0.58	49.7
9	R	22	8.7	0.391	16.3	LOS B	42	0.69	0.80	41.6
Approach		**321**	**7.2**	**0.392**	**8.2**	**LOS A**	**42**	**0.69**	**0.60**	**49.0**
Site Entrance										
10	L	12	8.3	0.635	27.0	LOS C	40	0.98	0.86	34.5
12	R	185	7.0	0.637	27.3	LOS C	40	0.98	0.86	34.3
Approach		**197**	**7.1**	**0.637**	**27.3**	**LOS C**	**40**	**0.98**	**0.86**	**34.3**
All Vehicles		**1219**	**7.1**	**0.735**	**14.5**	**LOS B**	**99**	**0.82**	**0.79**	**43.0**

600 282 55 Shepparton NE Growth Development

Location: Ford Site Entrance Existing Peak Hour: 8:15 - 9:15am



Growth Rate 1.015

per annum

No Years 12

Road	Ford Road E			Site Entrance			Ford Road W		
Movement	T	L		R	L		R	T	
ID	5	6	Total	7	9	Total	10	11	Total
8:15 - 9:15am	65	0	**65**	0	0	**0**	0	50	**50**
2020 Growth	78	-	**78**	-	-	**-**	-	60	**60**
Devt Traffic	-	22	**22**	105	-	**105**	-		**-**
2020 + Devt	78	22	**100**	105	-	**105**	-	60	**60**

Movement Summary

Ford Road Site Entrance

AM Peak

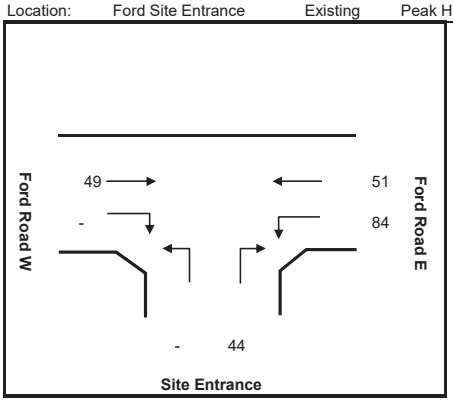
Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow	%HV	Deg of Satn	Aver Delay	LOS	95% BOQ	Prop. Queued	Eff. Stop Rate	Aver Speed
New S leg										
1	L	1	50.0	0.167	10.0	LOS A	7	0.36	0.63	47.0
3	R	111	7.2	0.163	10.4	LOS B	7	0.36	0.68	46.9
Approach		**113**	**8.0**	**0.163**	**10.4**	**LOS B**	**7**	**0.36**	**0.68**	**46.9**
New E leg										
4	L	23	8.3	0.014	8.4	LOS A	0	0.00	0.67	49.0
5	T	82	7.3	0.044	0.0	LOS A	0	0.00	0.00	60.0
Approach		**106**	**7.5**	**0.044**	**1.9**	**LOS A**		**0.00**	**0.15**	**57.1**
New W leg										
11	T	63	6.3	0.034	0.0	LOS A	0	0.00	0.00	60.0
12	R	1	50.0	0.003	9.2	LOS A	0	0.25	0.62	47.6
Approach		**65**	**7.7**	**0.034**	**0.3**	**LOS A**	**0**	**0.01**	**0.02**	**59.5**
All Vehicles		**284**	**7.7**	**0.167**	**4.9**	**Applicable**	**7**	**0.15**	**0.33**	**53**

600 282 55 Shepparton NE Growth Development

Location: Ford Site Entrance Existing Peak Hour: PM



Growth Rate	1.015
per annum	
No Years	11

Road	Ford Road E			Site Entrance			Ford Road W		
Movement	T	L	Total	R	L	Total	R	T	Total
ID	5	6		7	9		10	11	
8:15 - 9:15am	43	0	**43**	0	0	**0**	0	42	**42**
2020 Growth	51	-	**51**	-	-	**-**	-	49	**49**
Devt Traffic	-	84	**84**	44	-	**44**	-		**-**
2020 + Devt	51	84	**135**	44	-	**44**	-	49	**49**

Ford Road Site Entrance

PM Peak

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow	%HV	Deg of Satn	Aver Delay	LOS	95% BOQ	Prop. Queued	Eff. Stop Rate	Aver Speed
Site Entrance										
			50.0							
1	L	1		0.069	9.7	LOS A	3	0.33	0.62	47.3
3	R	46	6.5	0.068	10.1	LOS B	3	0.33	0.66	47.2
			8.3							
Approach		**48**		**0.068**	**10.1**	**LOS B**	**3**	**0.33**	**0.66**	**47.2**
Ford Road East										
4	L	88	6.8	0.050	8.4	LOS A	0	0.00	0.67	49.0
5	T	54	7.4	0.029	0.0	LOS A	0	0.00	0.00	60.0
			7.0							
Approach		**142**		**0.050**	**5.2**	**LOS A**		**0.00**	**0.41**	**52.6**
Ford Road West										
11	T	52	7.7	0.028	0.0	LOS A	0	0.00	0.00	60.0
			50.0							
12	R	1		0.003	9.5	LOS A	0	0.30	0.62	47.5
			9.3							
Approach		**54**		**0.028**	**0.4**	**LOS A**	**0**	**0.01**	**0.02**	**59.4**
			7.8			**Not**				
All Vehicles		**244**		**0.069**	**5.1**	**Applicable**	**3**	**0.07**	**0.38**	**52.8**

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Appendix C

Additional Traffic Movement Distribution

North East Development Growth Area Traffic Generation and Trip Rates

Residential

Peak Hour		
Total Dwellings		1677
Peak hr movements (per dwe	90%	1509

24 Hour			
Total Dwellings			1677
24 Hr Traffic (movements/dwelling)		10	16770

AM Peak		
In	10%	151
Out	90%	1358

1509

PM Peak		
In	70%	1057
Out	30%	453

Retail and Community Uses

Peak Hour		
Total Retail Area	1350	sqm
% of Passing Trade	0	
Peak Hour Trips	13	
Peak Hour Retail Trips	169	
Peak Hour External Retail T	**17**	

24 Hour		
Total Retail Area	1350	sqm
% of Passing Trade	0	
24 Hr Trips	121	
24 Hour Total Retail Trips	1634	
24 Hour Total Trips from Externa	**163**	

AM Peak		
In	50%	8
Out	50%	8

PM Peak		
In	50%	8
Out	50%	8

North East Development Growth Area Traffic Generation and Trip Rates

Total Peak Hour Trips

Land Use	Trips per Peak Hour	AM Peak		PM Peak	
		Trips In	Trips Out	Trips In	Trips Out
Residential	1342	10%	90%	70%	30%
Retail	17	50%	50%	50%	50%
Primary School Staff	35	100%	0%	0%	100%
Primary School Students	203	50%	50%	50%	50%

Land Use	Trips per Peak Hour	AM Peak		PM Peak	
		Trips In	Trips Out	Trips In	Trips Out
Residential	1342	134	1208	939	403
Retail	17	9	8	8	9
Primary School	238	137	101	101	137
Total	**1597**	**280**	**1317**	**1048**	**549**

North East Development Growth Area Trip Distribution

Land Use	Trips per Peak Hour	AM Peak Trips In	AM Peak Trips Out	PM Peak Trips In	PM Peak Trips Out
Residential	1342	134	1208	939	403
Retail	17	9	8	8	9
Primary School	238	137	101	101	137
Total	1597	280	1317	1048	549

		Access Points				
Direction	**Distribution Share**	Verney Mai **1**	Verney 2ndry **2**	Grahamvale **3**	Ford **4**	**check**
South	60%	20%	20%	20%	0%	0%
West	20%	10%	5%	5%	0%	0%
East	10%	0%	0%	5%	5%	0%
North	10%	5%	0%	2%	3%	0%
		35%	25%	32%	8%	

AM Peak Hour

		Access Points							
		Verney Road (Main)		/erney Road (Secondary		Grahamvale Road		Ford Road	
Direction	**Distribution Share**	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out
South	60%	56	263	56	263	56	263	0	0
West	20%	28	132	14	66	14	66	0	0
East	10%	0	0	0	0	14	66	14	66
North	10%	14	66	0	0	6	26	8	40
Total		**98**	**461**	**70**	**329**	**90**	**421**	**22**	**105**
		559		399		511		128	

PM Peak Hour

		Access Points							
		Verney Road (Main)		/erney Road (Secondary		Grahamvale Road		Ford Road	
Direction	**Distribution Share**	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out	Trips In	Trips Out
South	60%	210	110	210	110	210	110	0	0
West	20%	105	55	52	27	52	27	0	0
East	10%	0	0	0	0	52	27	52	27
North	10%	52	27	0	0	21	11	31	16
Total		**367**	**192**	**262**	**137**	**335**	**176**	**84**	**44**
		559		399		511		128	

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Appendix D

Crash History Data

Road Crash Statistics: Victoria Accidents By Site

Location is Town(s): SHEPPARTON, SHEPPARTON NORTH; Query: Casualty accidents; Sites: On Ford Rd between Verney Rd and , Intersection of Goulburn Valley Hwy and Brauman Street, On Dookie-Shepparton Road (2.176 km) between Apollo Drive and Drummond Road, On Dookie-Shepparton Road (2.366 km) between Drummond Road and Mcgill Street, Intersection of Pine Road and Verney Road, Intersection of Dookie-Shepparton Road and Drummond Road, Intersection of Dookie-Shepparton Road and Orr Street, Intersection of Dookie-Shepparton Road and Hawdon Street, Intersection of Goulburn Valley Highway Inbound Cwy and Hawkins Street, Intersection of Goulburn Valley Highway Inbound Cwy and Graham Street, Intersection of Graham Street and Verney Road, Intersection of Oak Street and Verney Road, Intersection of Dookie-Shepparton Road and Shepparton Alternative Rout, Intersection of Clarke Court and Verney Road, Intersection of Goulburn Valley Hwy and Goulburn Valley Hwy, Intersection of Dookie-Shepparton Road and Corio Street, Intersection of Dookie-Shepparton Road and Dunrobin Street, Intersection of Dookie-Shepparton Road and Bourchier Street, Intersection of Goulburn Valley Hwy and Ford Road, Intersection of Ford Road and Verney Road, Intersection of Goulburn Valley Hwy and Brauman Street, Intersection of Dookie-Shepparton Road and Wheeler Street, Intersection of Crestwood Grove and Verney Road, Intersection of Ann Wood Nook and Ford Road, Intersection of Dookie-Shepparton Road and Alamein Street, Intersection of Dookie-Shepparton Road and Maude Street, Intersection of Dookie-Shepparton Road and Kilpatrick Avenue, Intersection of Birch Street and Verney Road, Intersection of Dookie-Shepparton Road and Dunkirk Avenue, Intersection of Dookie-Shepparton Road and Glenn Street, On Hawdon Street (0.798 km) between Dookie-Shepparton Road / Verney Road and Annerley Avenue, On Hawkins Street (1.212 km) between Pontiac Avenue and Verney Road, On Brauman Street (0.7 km) between Fenn Street and Goulburn Valley Hwy, On Verney Road (0.143 km) between Elm Terrace and Birch Street, On Graham Street (0.05 km) between Goulburn Valley Highway Inbound Cwy and Dunlop Street, On Ford Road (1.724 km) between Ann Wood Nook and Matilda Drive, On ...

Map Refs Road Number Km from start		Location (Road names)	SEVERITY ALL injury	Fatal	Serious	Other Injury	DCA GROUPS Pedestrian	Cross Traffic	Right Near	Right Against	Lost Control	Rear End	OBJECT HIT Pole	Tree	Fence	Wall	ROAD Dry	Wet	LIGHT Day	Dark	VEHICLE NUMBERS Car	Truck	Motor Cycle	Bike	YEARLY TREND '04	'05	'06	'07	'08
VCD ED7 673 O4 114190 0.453 Km Shepparton	On btw &	Brauman Street Fenn Street Goulburn Valley Hwy	1	1													1				2					1			
VCD ED7 673 P3 2640 178.406 Km Shepparton	At &	Goulburn Valley Highway Inbound Cwy Hawkins Street	2	1	1				1		1						2		2		4					1			1
VCD ED7 673 P3 151212 0.398 Km Shepparton	On btw &	Hawkins Street Sali Drive Kestrel Drive	1			1											1		1		2					1			
VCD ED7 673 P4 2640 178.037 Km Shepparton	 At &	Complex intersection no. 3056 Goulburn Valley Hwy Brauman Street	7	5	2				6		1						7		4	3	13	1				1	2		4
VCD ED7 673 P5 2640 177.463 Km Shepparton	At &	Goulburn Valley Highway Inbound Cwy Graham Street	3			3											3		2	1	5			1	1	1		1	
VCD ED7 673 P5 146825 0.050 Km Shepparton	On btw &	Graham Street Goulburn Valley Highway Inbound Cwy Dunlop Street	1	1							1		1				1			1	1						1		
VCD ED7 673 P6 2640 176.982 Km Shepparton	At &	Goulburn Valley Hwy Goulburn Valley Hwy	5			5		1	1		2						4	1	4	1	10			1	1	1		1	2
VCD ED7 673 P6 5409 0.243 Km Shepparton	At &	Dookie-Shepparton Road Orr Street	1			1											1		1		1			1	1				
VCD ED7 673 P6 5409 0.268 Km Shepparton	At &	Dookie-Shepparton Road Kilpatrick Avenue	1			1	1										1		1		1							1	

Location is Town(s): SHEPPARTON, SHEPPARTON NORTH; Query: Casualty accidents; Sites: On Ford Rd between Verney Rd and , Intersection of Goulburn Valley Hwy and Brauman Street, On Dookie-Shepparton Road (2.176 km) between Apollo Drive and Drummond Road, On Dookie-Shepparton Road (2.366 km) between Drummond Road and Mcgill Street, Intersection of Pine Road and Verney Road, Intersection of Dookie-Shepparton Road and Drummond Road, Intersection of Dookie-Shepparton Road and Orr Street, Intersection of Dookie-Shepparton Road and Hawdon Street, Intersection of Goulburn Valley Highway Inbound Cwy and Hawkins Street, Intersection of Goulburn Valley Highway Inbound Cwy and Graham Street, Intersection of Graham Street and Verney Road, Intersection of Oak Street and Verney Road, Intersection of Dookie-Shepparton Road and Shepparton Alternative Rout, Intersection of Clarke Court and Verney Road, Intersection of Goulburn Valley Hwy and Goulburn Valley Hwy, Intersection of Dookie-Shepparton Road and Corio Street, Intersection of Dookie-Shepparton Road and Dunrobin Street, Intersection of Dookie-Shepparton Road and Bourchier Street, Intersection of Goulburn Valley Hwy and Ford Road, Intersection of Ford Road and Verney Road, Intersection of Goulburn Valley Hwy and Brauman Street, Intersection of Dookie-Shepparton Road and Wheeler Street, Intersection of Crestwood Grove and Verney Road, Intersection of Ann Wood Nook and Ford Road, Intersection of Dookie-Shepparton Road and Alamein Street, Intersection of Dookie-Shepparton Road and Maude Street, Intersection of Dookie-Shepparton Road and Kilpatrick Avenue, Intersection of Birch Street and Verney Road, Intersection of Dookie-Shepparton Road and Dunkirk Avenue, Intersection of Dookie-Shepparton Road and Glenn Street, On Hawdon Street (0.798 km) between Dookie-Shepparton Road / Verney Road and Annerley Avenue, On Hawkins Street (1.212 km) between Pontiac Avenue and Verney Road, On Brauman Street (0.7 km) between Fenn Street and Goulburn Valley Hwy, On Verney Road (0.143 km) between Elm Terrace and Birch Street, On Graham Street (0.05 km) between Goulburn Valley Highway Inbound Cwy and Dunlop Street, On Ford Road (1.724 km) between Ann Wood Nook and Matilda Drive, On ...

Map Refs Road Number Km from start		Location (Road names)	SEVERITY ALL injury	Fatal	Serious	Other Injury	DCA GROUPS Pedestrian	Cross Traffic	Right Near	Right Against	Lost Control	Rear End	OBJECT HIT Pole	Tree	Fence Wall	ROAD Dry	Wet	LIGHT Day	Dark	VEHICLE NUMBERS Car	Truck	Motor Cycle	Bike	YEARLY TREND '04	'05	'06	'07	'08
VCD ED7 673 P6 5409 0.353 Km Shepparton	At &	Complex intersection no. 3065 Dookie-Shepparton Road Corio Street	1		1		1									1			1	2								1
VCD ED7 673 Q2 141208 0.840 Km Shepparton	On btw &	Ford Road Southdown Street Merino Drive	1		1											1			1	1							1	
VCD ED7 673 R2 252555 2.593 Km Shepparton	On btw &	Verney Road Trinity Drive Ford Road	1		1											1		1			1						1	
VCD ED7 673 R2 141208 1.215 Km Shepparton	At &	Ford Road Verney Road	1		1		1									1				1		1	1					
VCD ED7 673 R3 151212 1.212 Km Shepparton	On btw &	Hawkins Street Pontiac Avenue Verney Road	1	1												1		1		1	1			1				
VCD ED7 673 R5 127686 0.000 Km Shepparton	At &	Crestwood Grove Verney Road	1	1												1		1		1		1			1			
VCD ED7 673 R6 5409 0.917 Km Shepparton	On btw &	Dookie-Shepparton Road Dunrobin Street Bourchier Street	1	1			1									1		1		1						1		
VCD ED7 673 R6 5409 0.938 Km Shepparton	At &	Dookie-Shepparton Road Bourchier Street	2		2			2								1	1	1	1	4				1	1			
VCD ED7 673 R6 5409 0.962 Km Shepparton	On btw &	Dookie-Shepparton Road Bourchier Street Verney Road	1	1			1									1		1		1					1			

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Map Refs Road Number Km from start	Location (Road names)	SEVERITY ALL injury	Fatal	Serious	Other Injury	DCA GROUPS Pedestrian	Cross Traffic	Right Near	Right Against	Lost Control	Rear End	OBJECT HIT Pole	Tree	Fence	Wall	ROAD Dry	Wet	LIGHT Day	Dark	VEHICLE NUMBERS Car	Truck	Motor Cycle	Bike	YEARLY TREND '04	'05	'06	'07	'08
VCD ED7 673 R6 151138 0.808 Km Shepparton	On Hawdon Street btw Dookie-Shepparton Road & Annerley Avenue	2			2						2					2		2		5				1	1			
VCD ED7 673 R6 252555 0.007 Km Shepparton	At Dookie-Shepparton Road & Hawdon Street	5	1		4		2			2				1		5		1	3	4	1	2		1	1	1	1	1
VCD ED7 673 S6 5409 1.595 Km Shepparton	At Dookie-Shepparton Road & Wheeler Street	2			2				1	1						2			1	1		2			1	1		
VCD ED7 673 T6 5409 2.189 Km Shepparton	At Dookie-Shepparton Road & Drummond Road	1			1			1								1			1	1	1			1				
VCD ED7 673 T5 5409 2.366 Km Shepparton	On Dookie-Shepparton Road btw Drummond Road & Mcgill Street	1	1													1		1		1	1							1
VCD ED7 673 T6 133395 1.458 Km Shepparton	On Drummond Road btw Dookie-Shepparton Road & Joseph Baldwin Place	1			1					1			1			1		1		1							1	
VCD ED7 673 U5 5409 2.582 Km Shepparton	On Dookie-Shepparton Road btw Mcgill Street & Shepparton Alternative Rout	1	1							1						1			1	1								1
VCD ED7 673 U5 5409 2.745 Km Shepparton	At Dookie-Shepparton Road & Shepparton Alternative Rout	1	1							1							1	1				1		1				
Totals:		46	16		30	3	7	1	9	7	6	1	1	1		43	3	26	16	65	5	6	5	10	12	6	7	11

Road Crash Statistics: Victoria Accidents By Site

Location is Town(s): SHEPPARTON, SHEPPARTON NORTH; Query: Casualty accidents; Sites: On Ford Rd between Verney Rd and , Intersection of Goulburn Valley Hwy and Brauman Street, On Dookie-Shepparton Road (2.176 km) between Apollo Drive and Drummond Road, On Dookie-Shepparton Road (2.366 km) between Drummond Road and Mcgill Street, Intersection of Pine Road and Verney Road, Intersection of Dookie-Shepparton Road and Drummond Road, Intersection of Dookie-Shepparton Road and Orr Street, Intersection of Dookie-Shepparton Road and Hawdon Street, Intersection of Goulburn Valley Highway Inbound Cwy and Hawkins Street, Intersection of Goulburn Valley Highway Inbound Cwy and Graham Street, Intersection of Graham Street and Verney Road, Intersection of Oak Street and Verney Road, Intersection of Dookie-Shepparton Road and Shepparton Alternative Rout, Intersection of Clarke Court and Verney Road, Intersection of Goulburn Valley Hwy and Goulburn Valley Hwy, Intersection of Dookie-Shepparton Road and Corio Street, Intersection of Dookie-Shepparton Road and Dunrobin Street, Intersection of Dookie-Shepparton Road and Bourchier Street, Intersection of Goulburn Valley Hwy and Ford Road, Intersection of Ford Road and Verney Road, Intersection of Goulburn Valley Hwy and Brauman Street, Intersection of Dookie-Shepparton Road and Wheeler Street, Intersection of Crestwood Grove and Verney Road, Intersection of Ann Wood Nook and Ford Road, Intersection of Dookie-Shepparton Road and Alamein Street, Intersection of Dookie-Shepparton Road and Maude Street, Intersection of Dookie-Shepparton Road and Kilpatrick Avenue, Intersection of Birch Street and Verney Road, Intersection of Dookie-Shepparton Road and Dunkirk Avenue, Intersection of Dookie-Shepparton Road and Glenn Street, On Hawdon Street (0.798 km) between Dookie-Shepparton Road / Verney Road and Annerley Avenue, On Hawkins Street (1.212 km) between Pontiac Avenue and Verney Road, On Brauman Street (0.7 km) between Fenn Street and Goulburn Valley Hwy, On Verney Road (0.143 km) between Elm Terrace and Birch Street, On Graham Street (0.05 km) between Goulburn Valley Highway Inbound Cwy and Dunlop Street, On Ford Road (1.724 km) between Ann Wood Nook and Matilda Drive, On ...

Map Refs / Road Number / Km from start	Location (Road names)	SEVERITY ALL injury	Fatal	Serious Injury	Other	DCA GROUPS Pedes trian	Cross Traffic	Right Near	Right Against	Lost Control	Rear End	OBJECT HIT Pole	Tree	Fence Wall	ROAD Dry	Wet	LIGHT Day	Dark	VEHICLE NUMBERS Car	Truck	Motor Cycle	Bike	YEARLY TREND '04	'05	'06	'07	'08

Note:

Object Hit: Only most common categories listed. An animal or object is not his in every crash.
Road Condition: Only dry and wet provided, other excluded.
Accident numbers are tallied within each category except for VEHICLE subsection where number and type of vehicles within the accident are tallied.

The crashes on roads that make up local government area (lga) borders are allocated to both lgas. Double counting only occurs when two or more lgas are queried separately (not together).