TraffixGroup

Traffic Engineers and Transport Planners

Local Area Traffic Study

Balaclava Road / New Dookie Road, Shepparton

Prepared For

Greater Shepparton City Council

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Balaclava Road / New Dookie Road, Shepparton

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1 Introduction

Traffix Group has been engaged by City of Greater Shepparton to undertake a local area traffic study for Balaclava Road / New Dookie Road, Shepparton.

Council is seeking to upgrade New Dookie Road between Verney Road and Wheeler Street incorporating traffic signals at the intersection of New Dookie Road / Wheeler Street and traffic signals or a metered roundabout at the intersection of Balaclava Road / New Dookie Road / Verney Road / Hawdon Street.

This report provides an assessment of the traffic impacts of the proposed intersection works at the two locations, develops appropriate intersection layouts and details the functional layout plans for each intersection.

2 Background Information

Greater Shepparton City Council has provided background information to assist in undertaking the traffic study. These documents include traffic impact assessments, master plan and development reports, various transport strategies and land use studies.

The following is a summary of background information that has been reviewed with consideration for this traffic study.

2.1 Balaclava Road / New Dookie Road Upgrade (2004)

A report prepared by Coomes Consulting in 2004 investigated proposed design solutions for upgrading a section of Balaclava Road / New Dookie Road between Verney Road and Dookie Railway Line, a length of approximately 850m.

This report referred to a study by John Piper Traffic Pty Ltd which estimated traffic volumes along New Dookie Road will grow to 7,500 vehicles per day and volumes along Wheeler Street will grow to 5,300 vehicles per day in 2024 (20 years from the publication date).

Among other recommendations, the report suggests protected turning facilities to allow access into the intersecting roads and specific sites so as to not affect through traffic, citing a VicRoads indication that no proposed development should have direct access onto New Dookie Road. The report referenced the study by John Piper Traffic Pty Ltd and suggested Type C sheltered right turns and Type B sheltered left turn treatments at the intersections of Apollo Drive, Wheeler Street and at any intersection provided for new development.

The authors of the report held preliminary discussions with the Goulburn Valley Community Road Safety Council and the Goulburn Valley Road Transport Group Inc. and the issues raised are summarised below:

- Provision for signals and turning lanes at Wheeler Street,

- Balaclava Road carriageway should consist of four through lanes and two parking lanes with no bicycle lanes,
- Reconstruct pavement with asphalt to improve ride quality, and
- Relocation of saleyards from the area to reduce heavy vehicle traffic.

The report concluded that further information would be required to allow further investigation and recommended traffic surveys be undertaken at all intersections of New Dookie Road.

2.2 Shepparton Saleyards Redevelopment (2007) – Traffic Impact Assessment

In 2007, John Piper Traffic Pty Ltd conducted a traffic impact assessment to assist the City of Greater Shepparton to develop a Master Plan for the redevelopment of the Shepparton Saleyards on the corner of Wheeler Street and New Dookie Road. The report investigated options for improving the traffic circulation and road safety both within the saleyards site and in the surrounding road network.

The traffic impact report provided two basic options for providing access to the sale yards as follows:

- Option 1 - Recommended to retain the existing traffic orientation and had all truck movements entering the site from Wheeler Street and exiting the site into New Dookie Road.
- Option 2 - Provided a reversal of the existing traffic flow orientation and had all truck movements entering the site from New Dookie Road and exiting the site into Wheeler Street.

The report highlighted the existing access by trucks from Wheeler Street to the sheep pens caused significant traffic disruption to the local road. Option 1 addressed this issue by separating the internal saleyard traffic with the external public traffic.

Traffic in New Dookie Road was disrupted via trucks servicing the saleyards turning right and was causing safety concerns and strongly suggested that this right turn movement be formalised with a separate turning lane. Option 1 encouraged entry to the site from Wheeler Street which removed this movement.

The traffic impact assessment concluded that the preferred alternative for the redevelopment was Option 1. The report also recommended a review of the traffic management in New Dookie Road with an emphasis on limiting the number of access points that permit right turn entry into the saleyards and providing separate right turn and left turn lanes in New Dookie Road at Wheelers Street and at the saleyards entry point(s).

It is noted that the redevelopment of the saleyards has now occurred with Option 1 movements being installed (i.e. ‘in’ at Wheeler Street and ‘out’ at New Dookie Road).

2.3 Master Plan and Development Options for the Shepparton Regional Saleyards (2008)

An excerpt was provided from a 2008 report by Kattle Gear Australia Pty Ltd which provided a review of the 2007 Traffic Impact Assessment by John Piper Traffic Pty Ltd. The excerpt endorsed the general findings of the traffic report, however noted that the provision of an entrance at the southern end of the facility may lead to additional drive through and security issues.

2.4 Greater Shepparton City Council, Cycling Strategy 2013-2017

In 2012, Greater Shepparton City Council undertook a review of their previous Cycling Strategy (2006-2011) in collaboration with GTA Consultants to prepare an update with regards to new technologies, proposals and issues that had arisen since the previous strategy.

One of the outcomes of the cycling strategy was recommendations on proposed bicycle facilities across the Greater Shepparton area.

With regards to the Balaclava Road / New Dookie Road area the following proposals were suggested:

- New Dookie Road (between Verney Road and Doyles Road) – On-road bicycle lanes
- Railway Corridor (between New Dookie Road and Longstaff Street) – Shared path

Nearby bicycle volumes close to the subject site were conducted on Super Tuesday in 2011 and were provided in the report.

2.5 Greater Shepparton Freight and Land Use Study (2013)

City of Greater Shepparton has prepared the Freight and Land Use Study to identify and assess relevant industry, freight and land use trends with a view to inform future infrastructure development in the Greater Shepparton municipal area.

The study included consultation with industry and transport stakeholders and the comments relating to the study area have been summarised in Table 1 below.

Table 1: Greater Shepparton Freight and Land Use Study (Stakeholder Comments)

Stakeholder	Location	Issue
S Sali & Sons Pty Ltd	Improved intersection of Verney Road and New Dookie Road as well as the Balaclava Road roundabout.	These intersections must have roundabouts designed for HPFV use and also the combined use of heavy vehicles and passenger vehicles

The Greater Shepparton Freight and Land Use Study also identified New Dookie Road / Balaclava Road as a key east-west link in the development of a network strategy.

2.6 Shepparton North-East Growth Corridor Development – Traffic Impact Assessment (2014)

Trafficworks Pty Ltd was engaged by Greater Shepparton City Council to undertake a comprehensive Traffic Impact Assessment Report for the Shepparton North-East Growth Corridor Development. This report utilised previous reports on the Shepparton North-East Growth Corridor Development prepared by Maunsell Australia Pty Ltd (2008), AECOM (2009) and Traffix Group (2011).

The Shepparton North-East Growth Corridor is bounded by Grahamvale Road, Verney Road and Ford Road. The area will ultimately provide for approximately 1,635 dwellings and other community uses. The report included an assessment of the expected traffic volume increases along Verney Road with regard to growth related to the development and also to annual increases. These volumes were used to assess intersection configurations around the precinct access points.

The report also detailed the remote impacts that the development would have on the surrounding streets including Verney Road, New Dookie Road, Balaclava Road and Hawdon Street.

The report recommended upgrading a section of Verney Road to a trunk collector with a divided carriageway.

The report noted that the intersection of Balaclava Road / New Dookie Road / Verney Road / Hawdon Street has an ongoing crash history that is expected to require additional treatment for improved operation under the future traffic demands. The report also noted that a large concrete high voltage power pole at the back of the kerb in the northeast section of the roundabout is a hazard and could present a significant cost item if relocation is deemed necessary. The report noted that talks have already taken place between Greater Shepparton City and VicRoads in relation to this intersection.

2.7 Closure of Andrew Fairly Avenue – Traffic Assessment (2014)

Aurecon were commissioned by SPC Ardmona in 2014 to prepare a traffic assessment in relation to a potential road closure of Andrew Fairly Avenue, Shepparton.

The report included an assessment of the existing traffic volumes in the area as well as historical counts adjusted for annual traffic growth volumes. The report adopted a 2% per year increase in traffic volumes as a 'conservative estimate'.

The volume assessment indicated that any closure of Andrew Fairly Avenue would result in changes to traffic conditions in Hawdon Street, Wheeler Street and New Dookie Road.

We understand that in June 2014 Council abandon the proposal to close Andrew Fairly Avenue and therefore no traffic volume impacts are expected for the study area in this project.

2.8 Industrial Development – 37-65 New Dookie Road (2015)

A recent planning application has been lodged with Council for a multi-unit industrial development at 37-65 New Dookie Road. The total size of the site is 17.13ha with the proposal to incorporate 33 lots.

A traffic impact assessment report prepared for the site indicated the following key assumption regarding the proposed development:

- Building floor area yield of 50% of total site area,
- Development to consist 50% warehouse and 50% factory uses,
- AM peak traffic directional split of 80% 'In' and 20% 'Out',
- AM peak traffic directional split of 40% 'In' and 60% 'Out',
- 3,857 daily trips, and
- 643 peak hour trips.

A summary of the expected peak hour traffic generation identified in the traffic impact assessment for the site is presented in Figure 1 below.

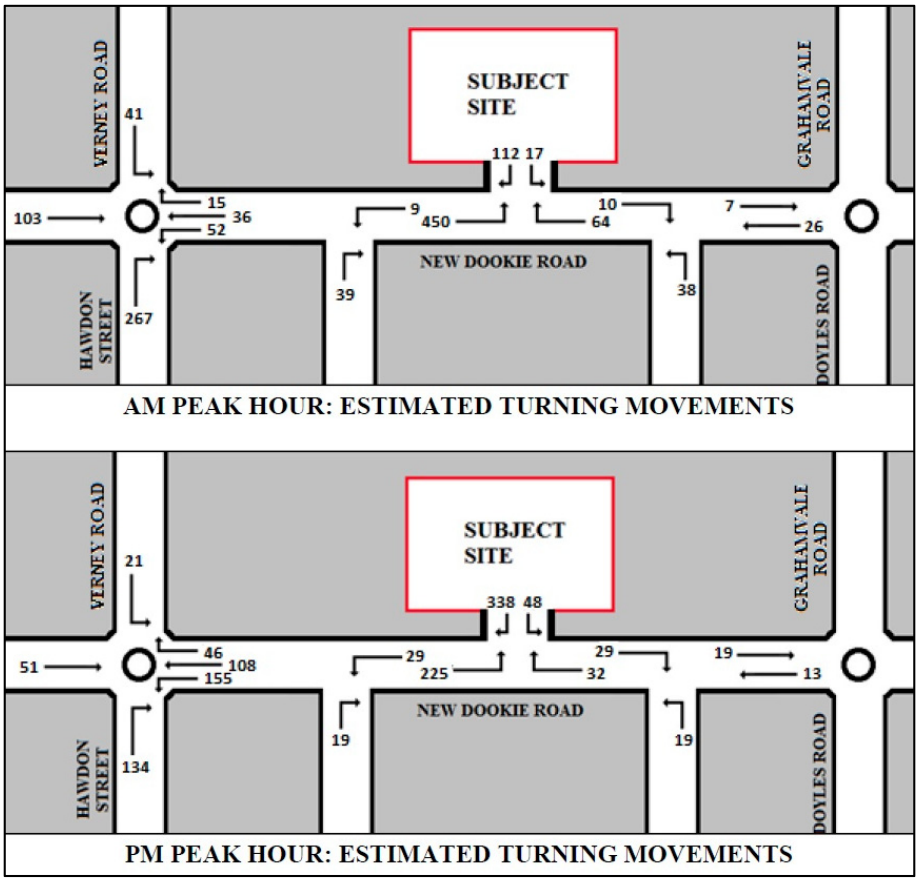


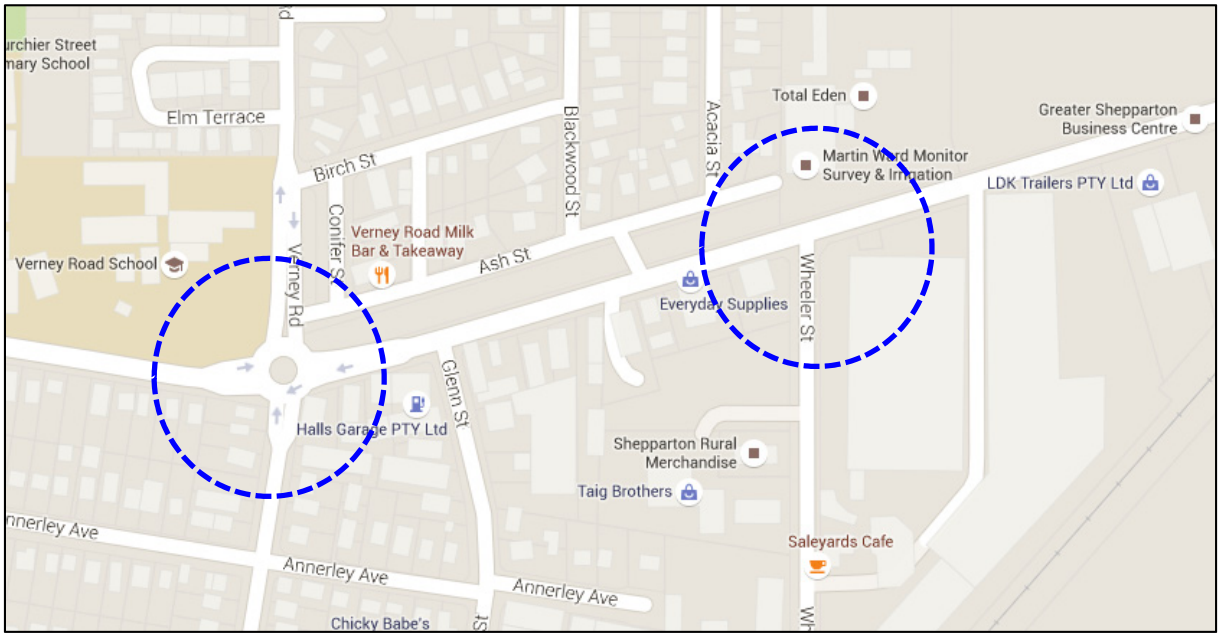
Figure 1: 37-65 New Dookie Road Proposed Development Traffic Distribution

3 Existing Conditions

3.1 Subject Site

The subject site is the section of New Dookie Road between Verney Road and Wheeler Street, in particular the T-intersection at Wheeler Street / New Dookie Road and the roundabout at Balaclava Road / Hawdon Street / New Dookie Road / Verney Road. The subject site is approximately 400m in length and also includes minor intersections with Glenn Street and Ash Street.

A locality plan and aerial photograph of the site is provided below in Figure 2 and Figure 3.



Source: www.maps.google.com.au

Figure 2: Locality Map

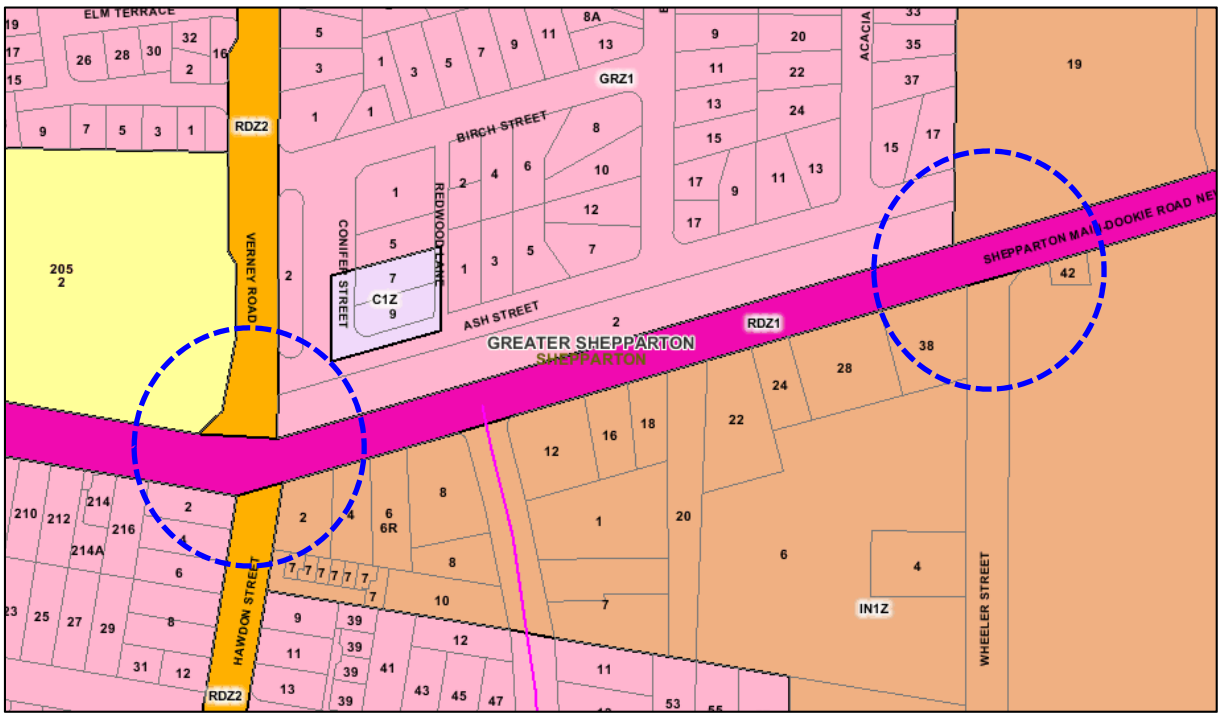
Source: Nearmap

Figure 3: Aerial Photograph

Major land uses in the vicinity of the subject site include:

- Verney Road School (Balaclava Road),
- Shepparton Saleyards (New Dookie Road / Wheeler Street),
- Bourchier Street Primary School (Bourchier Street),
- Shepparton High School (Hawdon Street),
- Verney Road Milk Bar and Takeaway (Conifer Street), and
- Numerous large industrial sites to the east of Wheeler Street.

Under the Planning Scheme, the land to the south and east of the subject site is zoned as 'Industrial 1'. The land to the north of the subject site is primarily zoned as 'General Residential' with a small section zoned as 'Commercial 1' associated with the local shops. The vast majority of land to the east is zoned as 'Industrial 1'. A figure displaying the land use around the subject site is shown below.



Source: www.land.vic.gov.au

Figure 4: Land Use

Figure 5: New Dookie Road / Wheeler Street

Figure 6: Balaclava Road / Hawdon Street / New Dookie Road / Verney Road Roundabout

3.2 Road Network

New Dookie Road is a VicRoads arterial road that extends in a west to east direction from Balaclava Road, Shepparton in the west to McDonald Street, Dookie in the east.

In the vicinity of the subject site, New Dookie Road provides a single lane of traffic in each direction with on-street parallel parking available on either side of the road.

A posted speed limit of 60km/h applies to New Dookie Road in the vicinity of the site.

Balaclava Road is a VicRoads arterial road that extends in a west to east direction from The Boulevard, Shepparton in the west to New Dookie Road, Shepparton in the east.

In the vicinity of the subject site, Balaclava Road provides a single lane of traffic in each direction with on-road bicycle lanes in both directions.

On-street parallel parking is available on the south side of Balaclava Road with a school bus pick up area situated on the north side of the road adjacent to the school.

A posted speed limit of 60km/h applies to Balaclava Road in the vicinity of the site, with a reduction to 40km/h at school times.

Wheeler Street is a Council road that extends in a north to south direction from New Dookie Road in the north to Old Dookie Road in the south.

In the vicinity of the subject site, Wheeler Street provides a single lane of traffic in each direction with parking banned on either side of the road.

A posted speed limit of 60km/h applies to Wheeler Street in the vicinity of the site.

Hawdon Street is a Council road that extends in a north to south direction from Balaclava Road / New Dookie Road in the north to Knight Street / Andrew Fairly Avenue in the south.

In the vicinity of the subject site, Hawdon Street provides a single lane of traffic in each direction with on-road bicycle lanes in both directions.

Verney Road is a Council road that extends in a north to south direction from Nurmukah Road in the north and Balaclava Road / New Dookie Road in the south.

In the vicinity of the subject site, Verney Road provides a single lane of traffic in each direction with on-road bicycle lanes in both directions.

Verney Road has a 2.5m wide median in the vicinity of the roundabout that extends north to Birch Street that contains a school crossing across the whole length.

A posted speed limit of 60km/h applies to Verney Road in the vicinity of the subject site, with a reduction to 40km/h at school times.

Ash Street is a local road that runs parallel to New Dookie Road in an east to west direction from Verney Road in the west to Acacia Street in the east. Ash Street also provides an access to New Dookie Road through the embankment.

Ash Street provides a single lane of traffic in each direction with unmarked parallel parking allowed on either side. The area between Ash Street and New Dookie Road has a dirt surface and is used as a parking reserve.

Glenn Street is a local road that runs north to south from New Dookie Road in the north to Feshti Street in the south.

Glenn Street provides a single lane of traffic in each direction with unmarked parallel parking allowed on both sides of the road.

3.3 Turning Movement Counts

Traffix Group conducted turning movement counts at all intersections in the study area including:

- Balaclava Road / Hawdon Street / New Dookie Road / Verney Road,
- New Dookie Road / Glenn Street,
- New Dookie Road / Ash Street, and
- New Dookie Road / Wheeler Street.

The turning movement counts were conducted on Thursday, 10th December, 2015 between 3:00pm and 6:00pm and on Friday 11th December, 2015 between 7:00am and 9:00am.

The peak hours occurred between 8:00am-9:00am and 4:15pm-5:15pm. The peak hour volumes for the turning movement counts are detailed below in Figure 7 and Figure 8.

A full copy of the turning movement counts are provided in Appendix A.

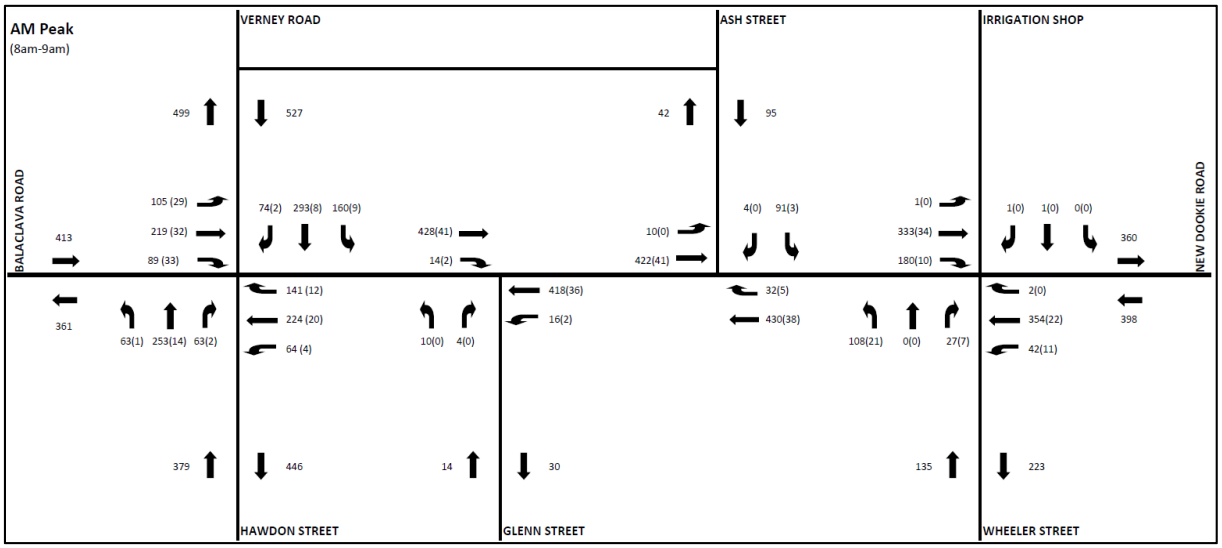


Figure 7: AM Peak Movement Summary (8am-9am)

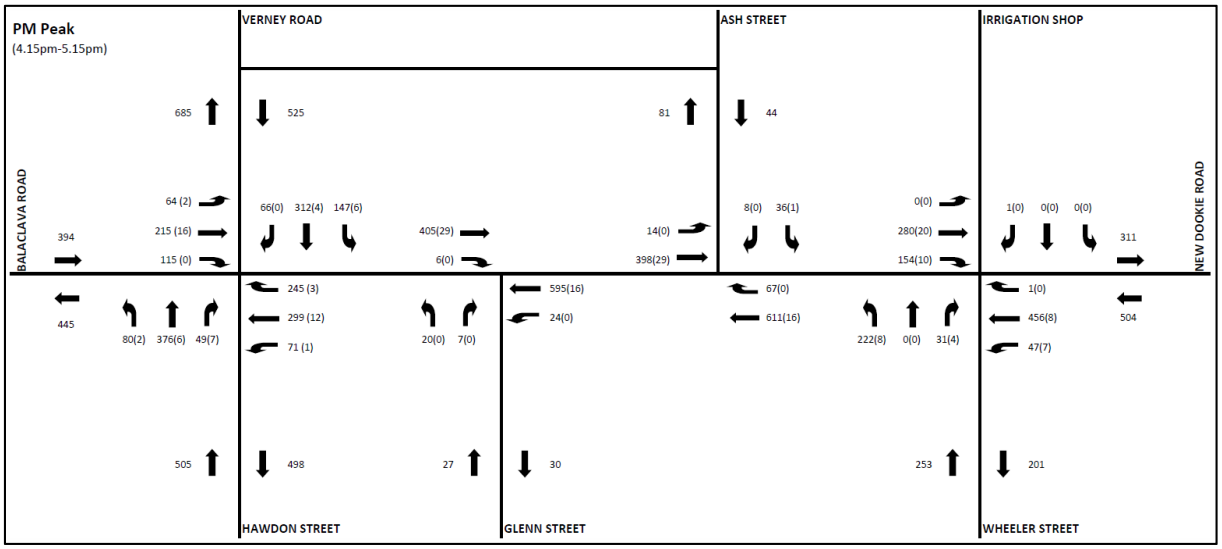


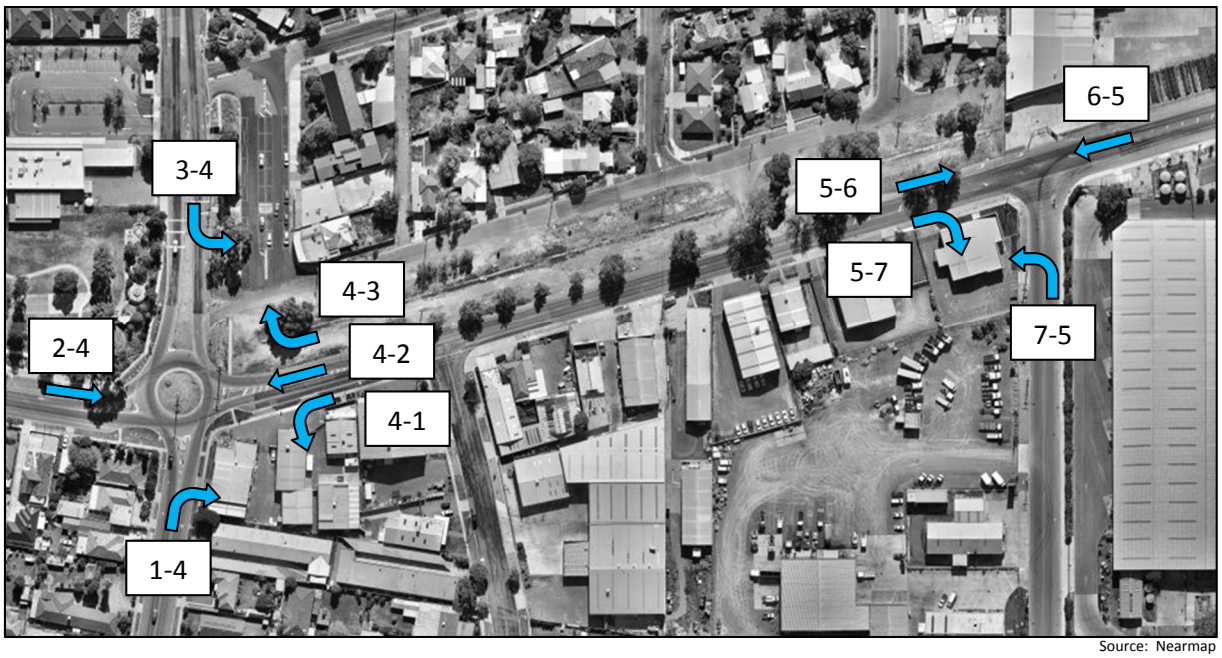
Figure 8: PM Peak Movement Summary (4:15pm-5:15pm)

3.4 Origin-Destination Surveys

Traffix Group conducted Origin-Destination surveys at the intersection of Balaclava Road / Hawdon Street / New Dookie Road / Verney Road and the intersection of Wheeler Street / New Dookie Street on Tuesday, 15th December, 2015 from 3:45pm to 5:45pm and on Wednesday, 16th December, 2015 from 6:30am until 9:00am.

3.4.1 Survey Stations

The location of the survey stations and corresponding movement numbers are shown below in Figure 9.



Source: Nearmap

Figure 9: Origin-Destination Cordon Points

Vehicle movements from the external points to the internal points were recorded and matched to vehicle movements from an internal point to an external point to determine the origins and destinations of vehicles that utilise the middle section of New Dookie Road.

3.4.2 Survey Results

A 15 minute window was selected for the matching criteria, with a match being identified if the same vehicle was registered at another external cordon point in the five minutes preceding the first record or ten minutes after.

A summary of the Origin-Destination surveys are shown below in Table 2 and Table 3.

Table 2: Origin-Destination Summary AM Peak – 8am-9am

		'OUT' Movement Number					Unmatched	Total
		4-1	4-2	4-3	5-6	5-7		
'IN' Movement Number	1-4	0	0	0	13	3	12	**28**
	2-4	0	1	0	50	32	110	**193**
	3-4	0	1	1	36	39	59	**136**
	6-5	11	91	30	9	1	104	**247**
	7-5	0	20	15	1	2	37	**75**
Unmatched		10	40	31	180	78		**339**
Total		**21**	**153**	**77**	**289**	**155**	**322**	**1,017**

Table 3: Origin-Destination Summary PM Peak – 4:15pm-5:15pm

		'OUT' Movement Number					Unmatched	Total
		4-1	4-2	4-3	5-6	5-7		
'IN' Movement Number	1-4	0	2	0	9	0	17	**28**
	2-4	0	0	0	55	33	75	**163**
	3-4	0	1	0	26	25	35	**87**
	6-5	23	113	34	2	1	157	**330**
	7-5	2	34	22	0	3	98	**159**
Unmatched		12	68	91	126	55		**352**
Total		**37**	**218**	**147**	**218**	**117**	**382**	**1,119**

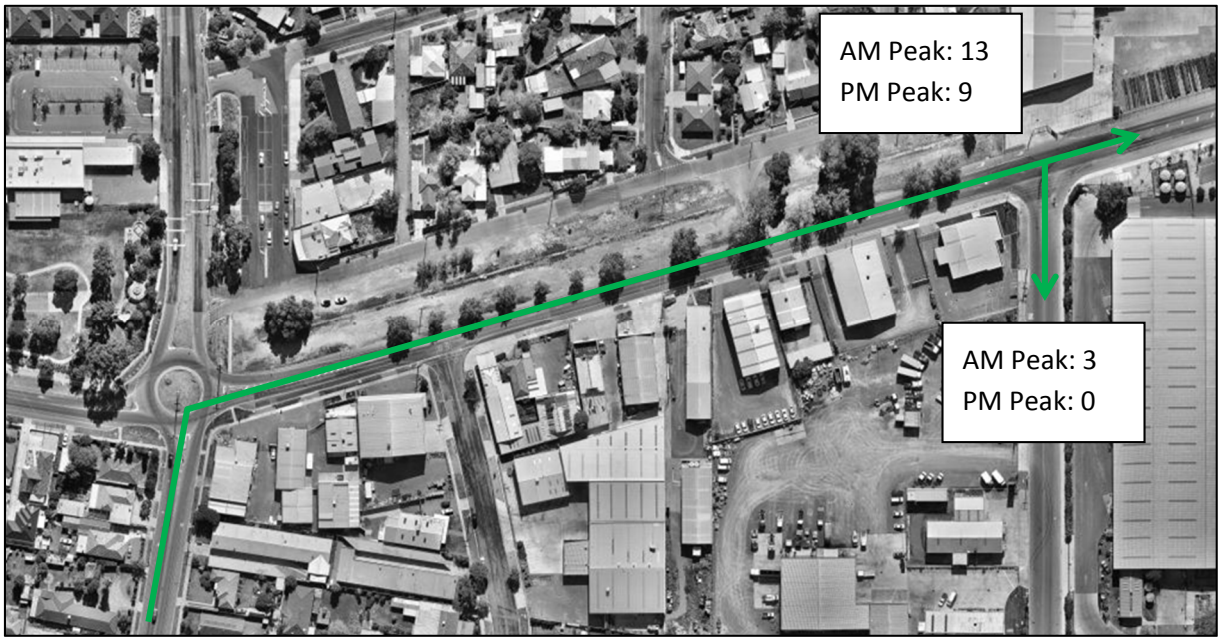
The number of vehicles travelling through the study area are shown in the figures below. Vehicles that entered and then exited the study area from the same intersection were not included in the diagrams.

Source: Nearmap

Figure 10: Verney Road Movements

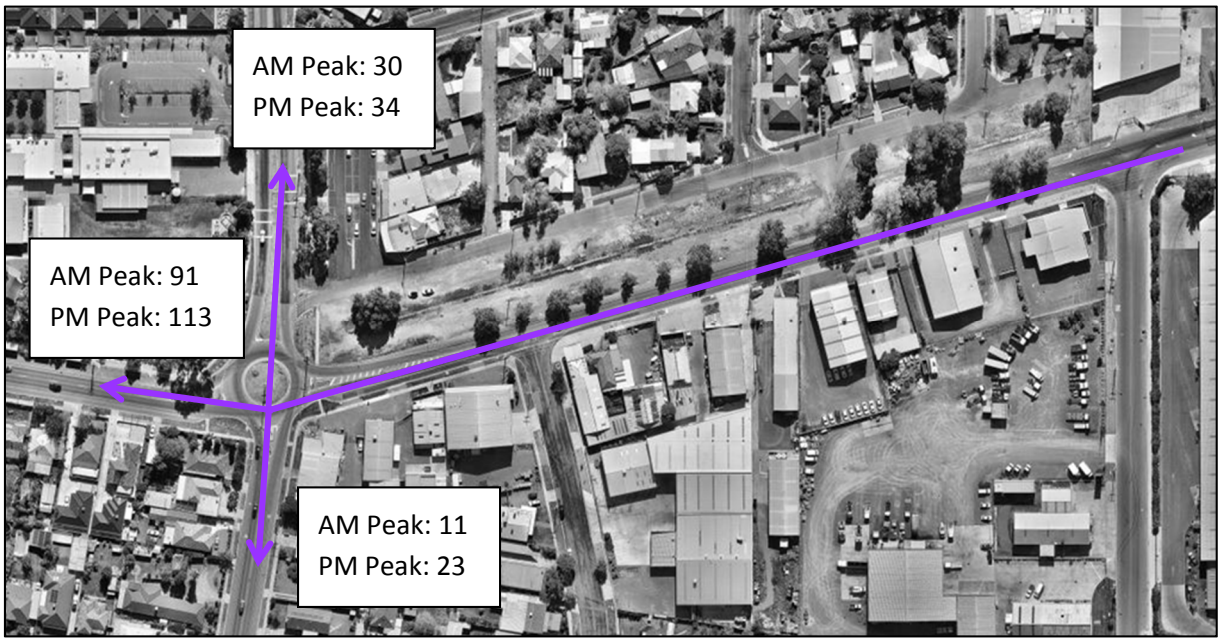
Source: Nearmap

Figure 11: Balaclava Road Movements



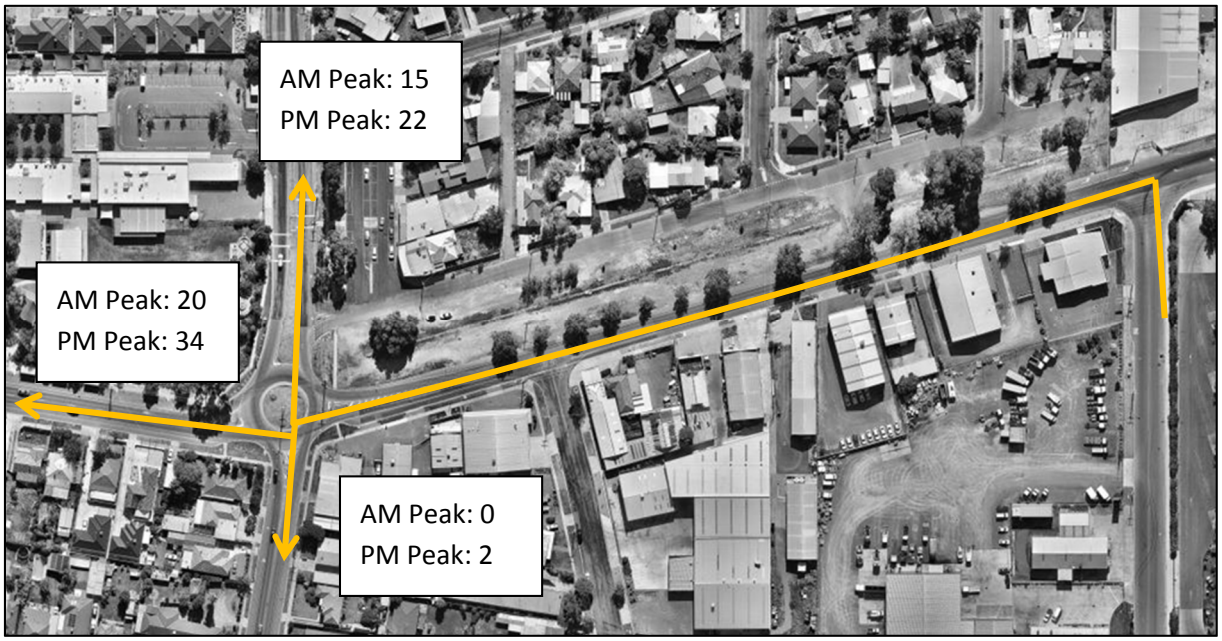
Source: Nearmap

Figure 12: Hawdon Street Movements



Source: Nearmap

Figure 13: New Dookie Road Movements



Source: Nearmap

Figure 14: Wheeler Street Movements

As shown above, the movement of vehicles coming from the north along Verney Road and turning east generally distribute evenly between movements south (Wheeler Street) and movements continuing east (New Dookie Road).

The movement of vehicles east through the roundabout along Balaclava Road primarily continue along New Dookie Road through the T-intersection, with a smaller number turning south (Wheeler Street).

A majority of vehicles that enter the roundabout from the south along Hawdon Street and head east continue through the T-intersection along New Dookie Road with only a few turning south (Wheeler Street).

Vehicles heading west through the T-intersection of New Dookie Road and Wheeler Street primarily continue west through the roundabout and travel down Balaclava Road with a smaller number turning north or south (Hawdon Street).

Vehicle originating from Wheeler Street and turning west down New Dookie Road generally travel west through the roundabout down Balaclava Road with a smaller number turning north up Verney Road. Only a small number of vehicles surveyed travelled south down Hawdon Street.

3.5 Existing Intersection Performance

Intersection capacity has been modelled using SIDRA 6.1 which is a traffic micro-simulating software package. SIDRA provides an assessment of intersection performance through a number of criteria including:

- Degree of Saturation (DOS) – a ratio of demand to capacity,
- Average Delay (in seconds),
- 95th percentile queue length (in metres), and
- The Level of Service (LOS) criteria.

The following sections discuss the capacity of the two intersections analysed in this study.

3.5.1 Level of Service Criteria

The LOS criteria for intersections identified in the RMS Guide to Traffic Generating Developments has been adopted for the intersection assessments as shown below in Table 4.

Table 4: Level of Service Criteria for Intersections

Level of Service	Average Delay	Traffic Signals / Roundabout	Give Way / Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity At signals, incidents would cause excessive delays; roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 70	Unsatisfactory with excessive queueing	Unsatisfactory with excessive queueing; requires other control mode

Generally, intersections should operate with a minimum of LOS C to operate under satisfactory conditions.

3.5.2 Balaclava Road / New Dookie Road / Verney Road / Hawdon Street

The existing intersection layout for the roundabout is shown in Figure 15 below.

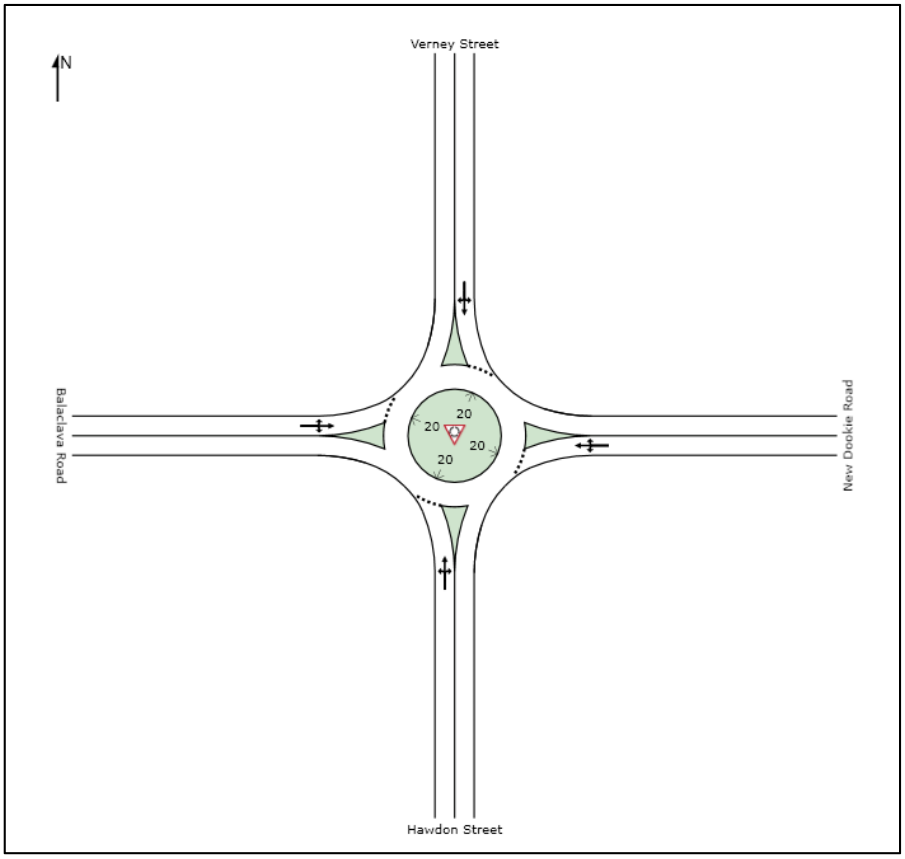


Figure 15: Balaclava Road / New Dookie Road / Verney Road / Hawdon Street – Layout

Queue length observations were undertaken on-site during the collection of the turning movement count information. A summary of the observed maximum queue lengths in both the AM and PM peak are shown below in Table 5.

Table 5: Observed Queue Length Summary

Location		Maximum Observed Queue Length (vehicles)	
		AM Observation	PM Observation
New Dookie Road / Wheeler Street			
Wheeler Street	Left	2	8
	Right	1	6
New Dookie Road (Eastbound)	Through	-	-
	Right	1	3
New Dookie Road (Westbound)	Through	-	-
	Left	-	-

Location	Maximum Observed Queue Length (vehicles)	
	AM Observation	PM Observation
Balaclava Road / New Dookie Road / Verney Road / Hawdon Street		
Balaclava Road	6	23
Hawdon Street	3	16
New Dookie Road	6	24
Verney Road	12	10

To calibrate the model to the observed queue lengths, the environment factor in the PM peak was increased along the western approach to 1.32 and in the eastern approach to 1.10. The environment factor is used to simulate more restrictive roundabout conditions such as large vehicles in the vehicle population. This provided 95th percentile queue lengths that were approximately the same as the maximum queue lengths observed on site.

Table 6 below summarises the key performance parameters for the intersection of Balaclava Road / Hawdon Street / New Dookie Road / Verney Road during the AM and PM peak periods based on the turning movement counts from the previous section.

A more detailed analysis of the SIDRA outputs is provided in Appendix B.

Table 6: Balaclava Road / New Dookie Road / Verney Road / Hawdon Street - Key Intersection Parameters (Existing)

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
South: Hawdon Street						
Left	0.530	9.0	31.9	0.883	28.9	113.8
Through	0.530	9.4	31.9	0.883	29.0	113.8
Right	0.530	13.9	31.9	0.883	34.5	113.8
East: New Dookie Road						
Left	0.582	9.8	40.3	0.940	34.8	166.9
Through	0.582	10.2	40.3	0.940	35.2	166.9
Right	0.582	14.8	40.3	0.940	39.6	166.9
North: Verney Road						
Left	0.713	12.2	60.3	0.705	11.3	58.4
Through	0.713	12.2	60.3	0.705	11.6	58.4
Right	0.713	16.9	60.3	0.705	16.6	58.4

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
West: Balaclava Road						
Left	0.571	10.4	42.1	0.971	62.3	157.5
Through	0.571	10.0	42.1	0.971	63.0	157.5
Right	0.571	15.7	42.1	0.971	66.9	157.5
TOTAL	**0.713**	**11.6**	**60.3**	**0.971**	**33.9**	**166.9**

3.5.3 New Dookie Road / Wheeler Street

The intersection layout for the T-intersection at New Dookie Road / Wheeler Street is shown below in Figure 16.

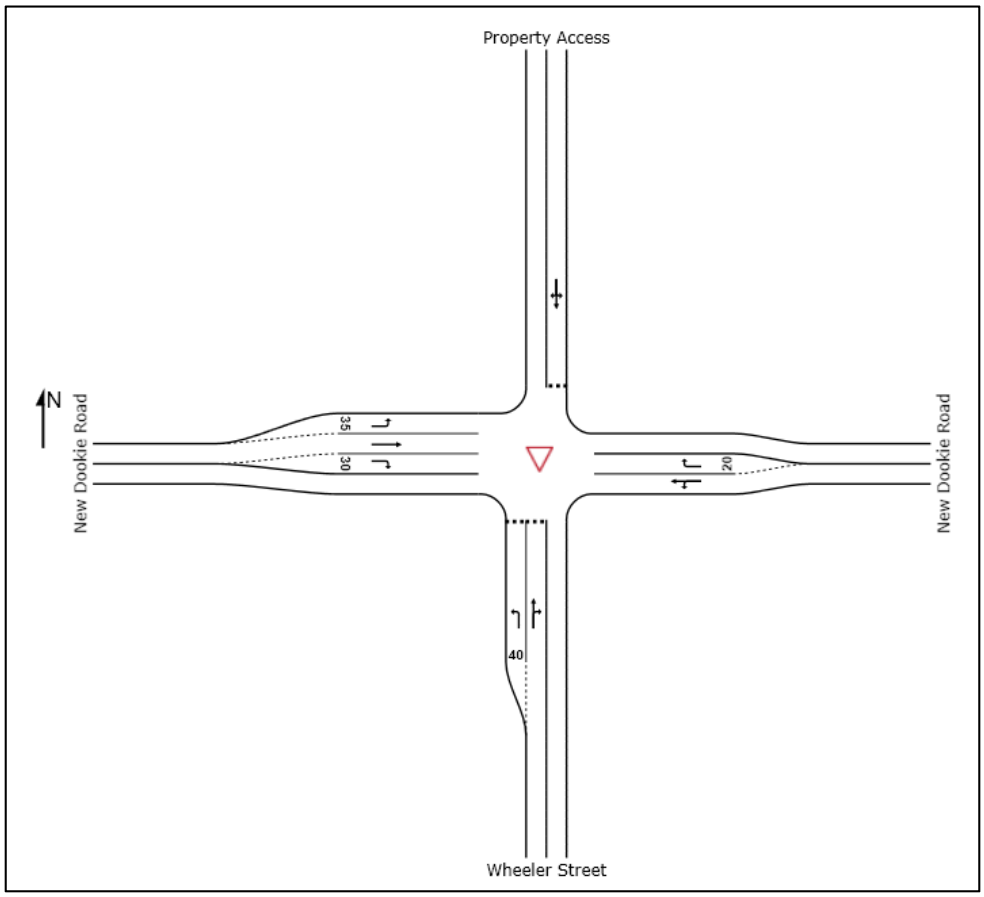


Figure 16: New Dookie Road / Wheeler Street – Layout

Table 7 below summarises the key performance parameters for the T-intersection of New Dookie Road / Wheeler Street during the AM and PM peak periods based on the turning movement counts from the previous section.

A more detailed analysis of the SIDRA outputs is provided in Appendix B.

Table 7: New Dookie Road / Wheeler Street - Key Intersection Parameters (Existing)

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
South: Wheeler Street						
Left	0.147	8.2	5.8	0.594	40.1	56.9
Through	0.287	28.1	11.0	0.342	34.1	10.8
Right	0.287	45.7	11.0	0.342	49.4	10.8
East: New Dookie Road						
Left	0.227	5.9	0.0	0.278	7.2	0.0
Through	0.227	0.0	0.0	0.278	0.0	0.0
Right	0.001	7.0	0.0	0.001	8.0	0.0
North: Property Access						
Left	0.016	7.2	0.3	0.019	6.8	0.4
Through	0.016	23.5	0.3	0.019	24.3	0.4
Right	0.016	33.1	0.3	0.019	42.9	0.4
West: New Dookie Road						
Left	0.001	5.5	0.0	0.001	7.1	0.0
Through	0.192	0.0	0.0	0.158	0.0	0.0
Right	0.179	7.7	6.5	0.176	9.8	6.3
TOTAL	**0.287**	**3.7**	**11.0**	**0.594**	**10.4**	**56.9**

3.6 Road Safety Review

A review of the State Road Accident Records (CrashStats) has been undertaken in the vicinity of the site for the past 5 years of available data (01/01/2010 to 31/12/2015). The review area is presented below in Figure 17.

Source: Nearmap

Figure 17: Road Safety Review Area

In the past 5 years, six (6) casualty crashes have occurred in the review area as summarised in Table 8 below.

Table 8: CrashStats Summary Table

Location	Year	Time	Severity	Type (DCA Code)	Type of Crash
Balaclava Road 50m west of roundabout	2012	8:50	Serious	147	Vehicle from Driveway
Hawdon Street 60m south of Roundabout	2013	17:30	Other	130	Rear End
At New Dookie Road / Balaclava Road / Verney / Hawdon Street	2010	20:20	Serious	174	Straight Off Carriageway
	2015	7:00	Other	111	Right Far
	2015	9:10	Other	130	Rear End
	2015	16:30	Other	130	Rear End

Five of the six casualty crashes can be attributed to the New Dookie Road / Balaclava Road / Verney Road / Hawdon Street intersection. The other crash involved a child on a scooter crashing into the

side of a stationary vehicle exiting the Bourchier Street day care centre and was not directly related to the intersections under review.

Police descriptions are only available for two of the casualty crashes associated with the New Dookie Road / Balaclava Road / Verney Road / Hawdon Street intersection and are summarised below:

- **Hawdon Street (60m south of roundabout)** – Two vehicles travelling north on Hawdon Street were stationary in the queue for the New Dookie Road roundabout, when a vehicle also travelling north failed to stop and collided with the rear of the vehicles in the queue. Minor injuries occurred to one of the drivers, who was conveyed to hospital for observation.
- **At New Dookie Road / Balaclava Road / Verney Road / Hawdon Street** – A solo motorcyclist travelling south in Verney Road was intending to go straight at the New Dookie Road roundabout struck fluid on the road and lost control. The rider crashed onto the road surface and injured shoulder.

Based on the above police descriptions, the motorcycle crash can be attributed to the presence of vehicle fluid on the road. This type of crash cannot easily be remedied through design / engineering redesign of the intersection.

The rear end crash on the southern approach to the roundabout could potentially be a result of variable queue lengths at the roundabout. The driver at fault in this situation may not have expected the long queue at the intersection, which would have been quite long given the crash occurred in the PM peak period. This crash could potentially be avoided through the provision of an intersection control with less variability in the queue length.

The remaining accidents involved two rear end collisions, one northbound through the intersection the other westbound, and a right far collision between a northbound vehicle and an eastbound vehicle.

Without police descriptions the crash patterns for the remaining accidents are difficult to establish. External factors, such as blood alcohol content, vehicle malfunctions or erratic behaviour, cannot be discounted without further information.

3.7 Existing Conditions - Road Safety Deficiencies

Based on site inspections, the existing layout and design of the two key intersections has been reviewed to identify any key deficiencies with the existing design. The following sections outline the review undertaken and the key considerations for the development of new intersection layouts at the two key intersections.

3.7.1 New Dookie Road / Balaclava Road / Verney Road / Hawdon Street

A summary of the key issues identified and the key consideration for the design of traffic signals / metered roundabout at the New Dookie Road / Balaclava Road / Verney Road / Hawdon Street intersection are provided in Table 9 below.

Table 9: New Dookie Road / Balaclava Road / Verney Road / Hawdon Street – Existing Safety Issues & Design Considerations

Existing Issue	Key Design Considerations – Traffic Signals	
	Traffic Signals	Metered Roundabout
Intersection Layout		
Considerably less deflection is provided in the westbound direct compared to the eastbound direction	Change of control to traffic signals would resolve this issue.	Issue largely unresolved without redesign of the roundabout.
Lane Configuration		
Bus stops for the school currently provided on the south approach exit into a single lane.	Layout needs to consider the direction of buses and how a bus may exit the bay and turn right into Hawdon Street if multiple lanes are provided	No change to existing conditions.
Roadside Hazards		
A large electricity pole is located on the north-east corner of the intersection in a vulnerable positon based on the roundabout travel paths.	Design intersection to divert vehicles away from the pole or remove or relocate pole as part of the works.	Issue largely unresolved without consideration for removal or relocation of the pole.
Pedestrian / Bicycle Conditions		
Roundabouts are typically difficult for pedestrians to cross due to the variable moving queues.	Issues largely resolved through the introduction of traffic signals with pedestrian cross-walks.	Issue largely unresolved without improvement works for pedestrian facilities.
Bicycle lanes terminate before the roundabout, forcing bicycles to merge with vehicles.	Consider providing bicycle facilities on all approaches.	Issue largely unresolved.
Linemarking / Delineation		
Some linemarking faded and difficult to see.	The installation of traffic signals will most likely require a full asphalt re-sheet which will resolve this issue.	Consider re-linemarking as part of any metering proposal.

3.7.2 New Dookie Road / Wheeler Street

A summary of the key issues identified and the key consideration for the design of traffic signals at the New Dookie Road / Wheeler Street intersection are provided in Table 10 below.

Table 10: New Dookie Road / Wheeler Street – Existing Safety Issues & Design Considerations

Existing Issue	Key Design Considerations – Traffic Signals
Intersection Operation	
Vehicles regularly queue in two lanes on the Wheeler Street approach which may limit sight distance for vehicles exiting Wheeler Street	This issue will largely be resolved through the installation of traffic signals, as vehicle movements will be separated by time.
Lane Configuration	
Lane lengths of the right turn lanes into Wheeler Street and the Irrigation Shop are short.	Provide turn lane widths appropriate for the speed zoning and expected queue lengths.
A wide parking lane is provided on the east approach and it is unclear if this is intended to operate as a left turn lane.	Provide clear lane designation on all approached to avoid any confusion.
The Wheeler Street approach is wide enough for two lanes, however, no lane designation is provided.	
Roadside Hazards	
An electricity pole is located 0.5m from the back of kerb on the south-west corner of the intersection and a pole is also located close to the back of kerb on the Wheeler Street approach (west side).	Consider the off-set to the pole, particularly if lane configurations direct vehicles closer than the current conditions.
Pedestrian Conditions	
Very long crossing distance across Wheeler Street makes pedestrian movements difficult.	Issues largely resolved through the introduction of traffic signals with pedestrian cross-walks.
No pram ramp on the eastern side of Wheeler Street	Design to incorporate pram ramps for all pedestrian crossings with appropriate DDA provisions.
Linemarking / Delineation	
Previous ‘blacked out’ linemarking can be readily seen at the intersection which could lead to confusion.	The installation of traffic signals will most likely require a full asphalt re-sheet which will resolve this issue.
The linemarking on the Wheeler Street approach is very faded and hard to see.	This issue is largely rectified with the introduction of traffic signals as the linemarking will be renewed.
The intersection has very few RRPMs installed.	Provide RRPMs as required by Standards / Guidelines in the signalised layout.

4 Development of Future Traffic Data Set

The previous sections identified the traffic volumes at both intersections in the AM and PM peaks based on turning movement counts undertaken in December, 2015. The development and design of the intersections will require analysis of a 'future' scenario 10 years into the future (i.e. 2026).

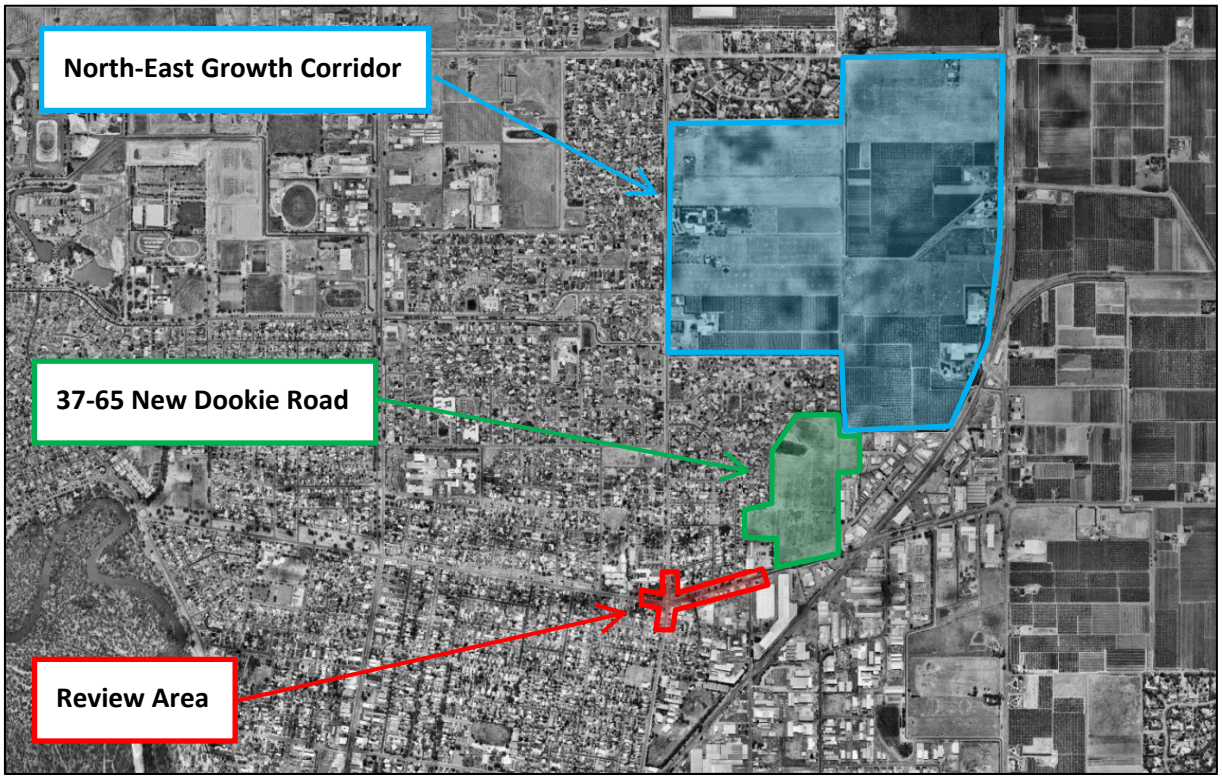
Growth on the road network can generally be attributed to two key areas as follows:

- New development in the immediate vicinity of the site impacting particular roads and movements depending on the location of the development, and
- Development within the broader region growing general traffic volumes on all roads.

The potential for new development in the immediate vicinity of the site has been based on a review of background material provided by Council (summarised in Section 2) and a review of vacant sites in the vicinity of the review area. This review has identified two key development sites as follows:

- 37-65 New Dookie Road – Industrial subdivision incorporating 33 lots, and
- Shepparton North-East Growth Corridor – Residential development incorporating approximately 1,635 dwellings.

An aerial photograph show the location of these key development sites, is presented in Figure 18 below.



Source: Nearmap

Figure 18: Key Development Sites

4.1 North East Growth Corridor Volumes

TrafficWorks (2014) prepared a report for the North-East Growth Corridor. This report indicates that approximately 15% of the traffic from the North East Growth Corridor development would utilise Verney Road and 2% of the traffic would utilised New Dookie Road. A summary of the AM and PM peak traffic volumes predicted for the subject intersection at full buildout of the development are detailed in Table 11 below.

Table 11: North East Growth Corridor – Volumes Predicted for New Dookie Road Area

Movement		AM Peak	PM Peak
New Dookie Road / Wheeler Street			
East Approach	Through	24	12
West Approach	Through	8	20
New Dookie Road / Balaclava Road / Verney Road / Hawdon Street			
North Approach	Through	145	69
	Right	36	17
East Approach	Though	24	12
South Approach	Through	47	123
West Approach	Left	12	31
	Through	8	20

4.2 37-65 New Dookie Road Volumes

A traffic report prepared for the proposed industrial development at 37-65 New Dookie Road indicated that the site will generate 3,857 daily trips, including 643 peak hour trips, when fully developed.

Based on our review of the traffic impact assessment, there are a number of parameters adopted that were conservative and may not reflect likely future volumes. On this basis, a number of factors in the traffic generation / distribution have been modified for this assessment as follows:

- The floor area yield of the industrial development was reduced from 50% to 40% of the overall site area,
- Traffic distribution from the site has been modified as follows:
  - New Dookie Road (east) – Increased to reflect more usage of the Shepparton Alternative Route
  - Wheeler Street (south) – Reduced to reflect more usage of the Shepparton Alternative Route

- Hawdon Street (south) – Volume reduced to account for more usage of the Shepparton Alternative route and more usage of Balaclava Road
- Balaclava Road (west) – Volumes increased to transfer from Hawdon Street.

- The 'IN' / 'OUT' split for the PM peak was changed from 60/40 to 70/30.

A summary of the revised volumes adopted for the proposed development at 37-65 New Dookie Road are shown in Table 12 below.

Table 12: 37-65 New Dookie Road – Volumes Predicted for New Dookie Road Area (Revised)

Movement		AM Peak	PM Peak
New Dookie Road / Wheeler Street			
East Approach	Left	5	18
	Through	66	233
South Approach	Right	20	8
West Approach	Through	266	99
New Dookie Road / Balaclava Road / Verney Road / Hawdon Street			
North Approach	Left	41	15
East Approach	Left	10	36
	Through	46	161
	Right	10	36
South Approach	Right	41	15
West Approach	Through	184	69

4.3 General Road Network Growth

As well as traffic flows from the development of the two key sites outlined above, additional traffic volumes along these roads are likely to be associated with general traffic growth on the road network. For the purposes of this assessment a growth rate of 2% per annum (linear) has been applied to all movements.

It is noted that no additional growth has been added for the volumes in / out of the 'irrigation shop' on the northern leg of the New Dookie Road / Wheeler Street intersection.

These growth values are consistent with the background data provided and the general growth applied by VicRoads to arterial roads.

4.4 Future Traffic Data Set

Based on the traffic volumes detailed above, the future data set for the two key intersections are shown in Figure 19 to Figure 20 below. A full summary of the future data set development is provided at Appendix C.

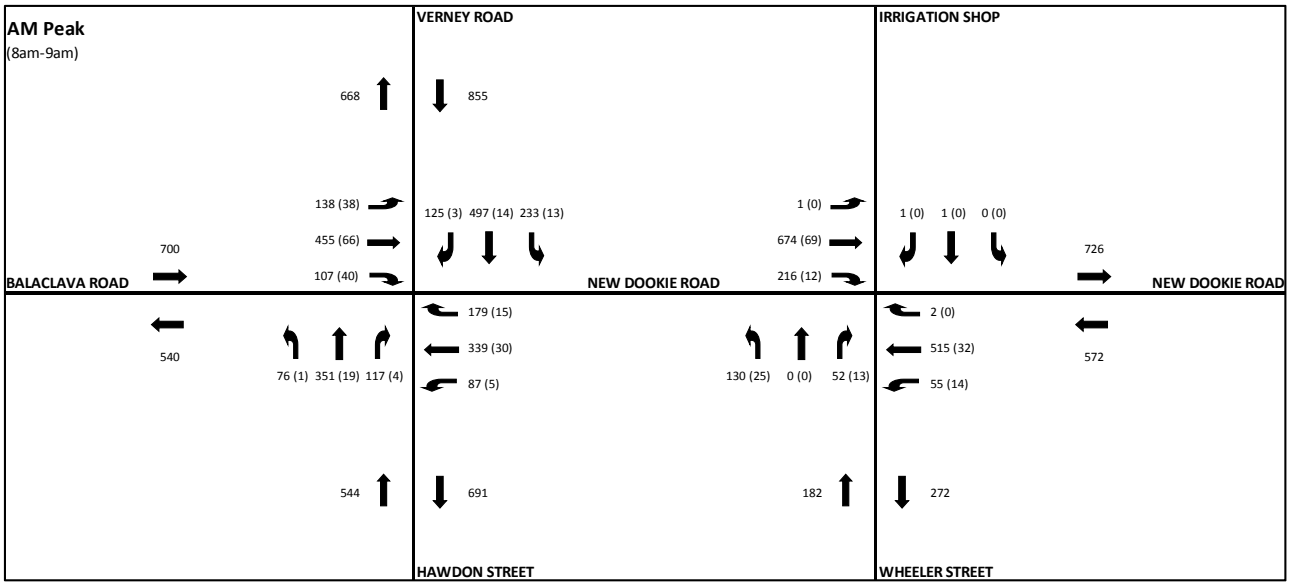


Figure 19: Future Data Set - AM Peak

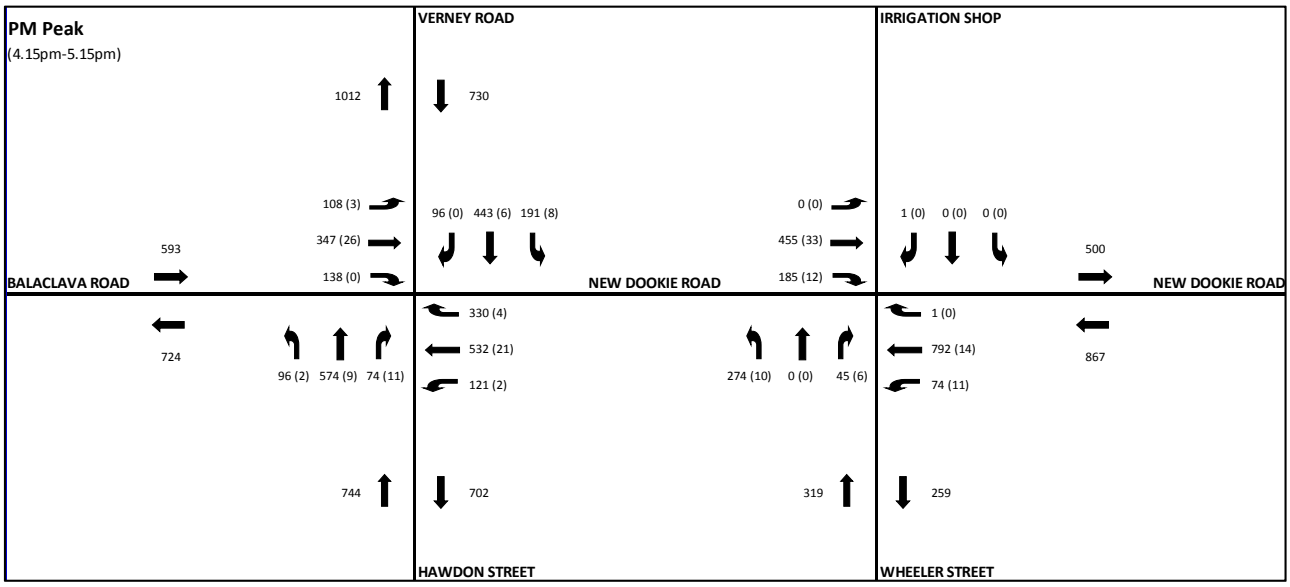


Figure 20: Future Data Set - PM Peak

5 Intersection Control, Capacity and Layout

5.1 Balaclava Road / New Dookie Road / Verney Road / Hawdon Street

5.1.1 Metered Roundabout Option

Preliminary modelling of the Balaclava Road / New Dookie Road / Verney Road / Hawdon Street intersection indicates that for a roundabout to be retained, significant expansion would need to occur to keep the intersection within acceptable operating conditions. At a minimum, a second circulating lane would need to be added and slip lanes would need to be incorporated on all four (4) corners of the intersection as shown in Figure 21 below.

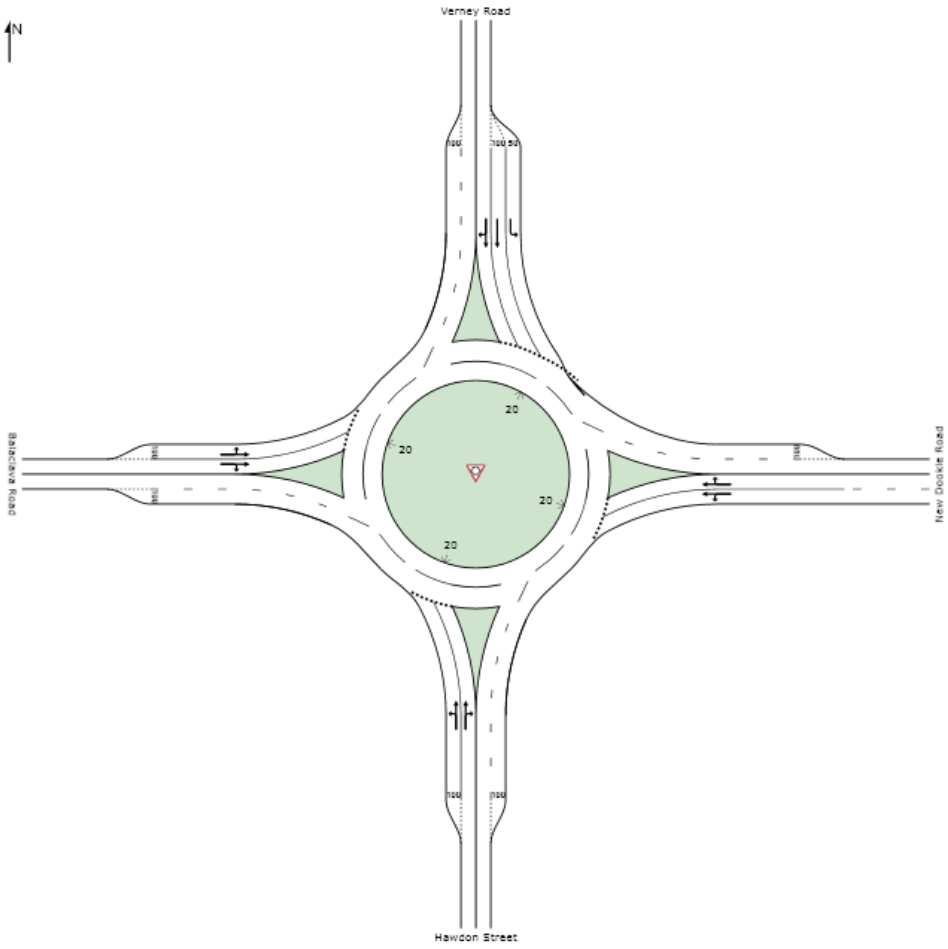


Figure 21: Roundabout Layout Intersection Upgrade Minimum Requirements

The physical size required to accommodate a layout as presented above is significant and could not occur at the subject intersection without property acquisition.

A review of potential roundabout metering has also been undertaken. A metered roundabout wouldn't have a significant impact on the roundabout operation at this location as the approach volumes are generally fairly even between the four (4) legs. Metering typically only works well when one or more approaches can be sacrificed to improve conditions on a poorly performing approach.

In view of the above, a roundabout is not considered to be the optimal solution at this location.

5.1.2 Traffic Signals Option

A traffic signal layout at Balaclava Road / New Dookie Road / Verney Road / Hawdon Street has been developed to generally be accommodated within the existing road reserve.

Based on the existing conditions, the New Dookie Road and Balaclava Road approaches can generally accommodate a five (5) lane cross-section with three approach lanes and two departure lanes. The Hawdon Street approach can generally accommodate a four (4) lane cross-section with two approach lanes and two departure lanes. The Verney Road leg is considerably more flexible given the wide median currently provided.

On the north-east corner of the intersection, the layout extends outside of the existing road reserve. However, Council have indicated that the land is part of a previous irrigation channel which could be acquired as part of this project.

Given the limited number of approach lanes for the Hawdon Street approach, the intersection has been designed to operate in a split phase arrangement from the north and south, with a conventional leading right turn arrangements from the east and west.

A diagram of the general intersection layout and configuration is shown in Figure 22 below.

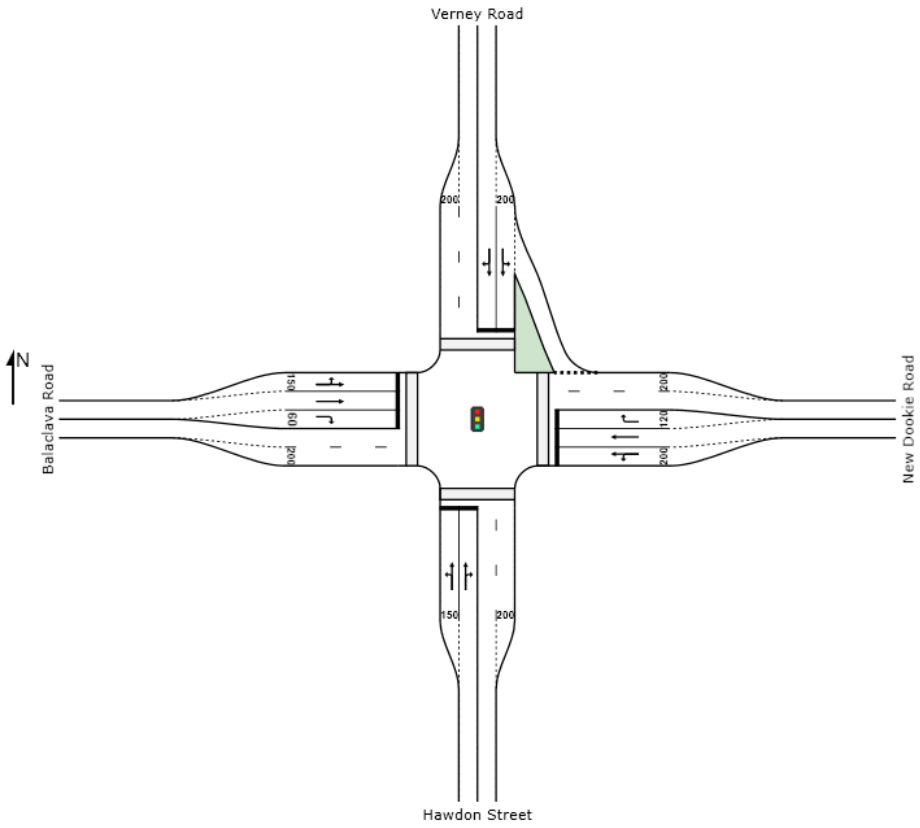


Figure 22: Balaclava Road / New Dookie Road / Verney Road / Hawdon Street – Signal Layout

The short departure lanes on each approach have been set at approximately 200m, with the short approach lanes set at approximately 150m. The length of the right turn lanes on the east and west approaches are sized to accommodate the 95th percentile queue length identified from the SIDRA analysis.

Signal Phasing:

A 120 second cycle time has been adopted for the signal analysis. As discussed previously the intersection will operate with split phase from the north and south with a conventional leading right turn from the east and west. A summary of the phasing adopted is shown in Figure 23 below.

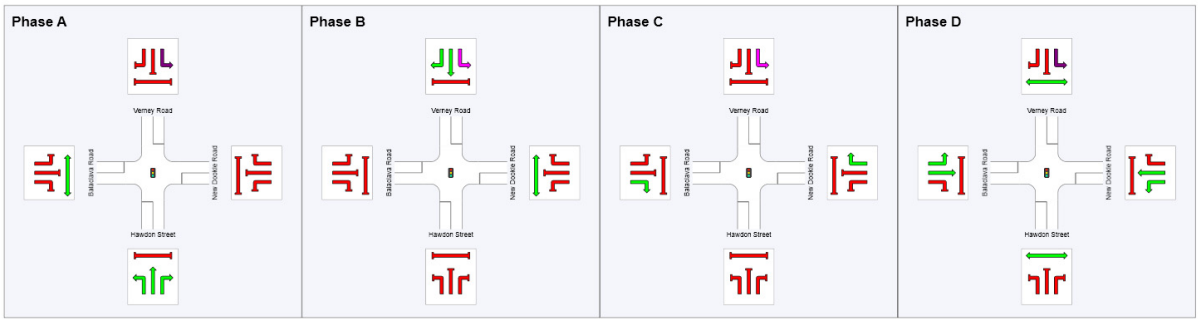


Figure 23: New Dookie Road / Balaclava Road / Verney Road / Hawdon Street – Signal Phasing

The 120 second cycle time has been input into the program, with SIDRA calculating the optimum cycle time based on the capacity results.

Capacity Analysis:

A summary of the SIDRA results for the proposed intersection layout based on the 'future' data set (i.e. 10 years into the future) are presented in Table 13 below.

Table 13: Balaclava Road / Hawdon Street / New Dookie Road / Verney Road - Key Intersection Parameters (Future)

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
South: Hawdon Street						
Left	0.839	63.7	130.3	0.889	65.4	184.0
Through	0.839	58.1	130.3	0.889	59.9	184.0
Right	0.839	63.8	129.4	0.889	65.8	185.3
East: New Dookie Road						
Left	0.545	50.3	86.9	0.753	53.0	137.9
Through	0.545	44.7	88.9	0.753	47.4	140.6
Right	0.861	71.0	92.1	0.905	70.6	167.1
North: Verney Road						
Left	0.849	55.5	195.2	0.875	64.1	175.3
Through	0.849	51.1	195.2	0.875	58.8	175.3
Right	0.849	57.6	187.6	0.875	64.7	165.0

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
West: Balaclava Road						
Left	0.860	63.7	170.0	0.914	76.4	120.3
Through	0.860	57.2	170.0	0.914	70.8	123.6
Right	0.613	62.3	60.6	0.722	65.1	61.2
TOTAL	**0.861**	**56.2**	**195.2**	**0.914**	**61.2**	**185.3**

The SIDRA analysis of the future scenario shows that the proposed traffic signal arrangement will operate at a DOS of approximately 0.9 (acceptable). The PM peak represents the peak critical time period, with the Balaclava Road approach having a DOS of 0.914. Queue lengths at the intersection in the critical PM peak range between 60-185m.

Average delays at the intersection range between 56.2s in the AM peak and 61.2s in the PM peak.

Full results of the SIDRA analysis are provided in Appendix D.

Key Design Features:

Lane widths have generally been adopted at 3.3m in line with AustRoads Guide to Road Design Part 3: Geometric Design. However, lane widths down to 3.0m have been utilised where existing constraints require.

On the north approach to the intersection there is an existing access to Ash Street located approximately 30m north of the intersection. This access is proposed to be closed as part of the signalised layout, with all access to occur via Birch Street to the north. Further, due to the lane configuration on the New Dookie Road east approach (3 lanes), Glenn Street has been converted to left in / left out only.

A slip lane has been incorporated on the north-east corner of the intersection, given the space available in this area. This approach also allows the large electricity pole to be located on this corner to be retained within the island area. The existing pole stay will have to be modified to suit this new arrangement.

Due to the lane reconfiguration on the Balaclava Road leg, the existing indented bus bays on the north side of the road adjacent to the school have been reconfigured. It is proposed that the bus shelters are set back to the edge of the road reserve, with the buses stopping in the kerbside lane when required. We note that this arrangement is now fairly commonplace on urban arterial roads throughout Melbourne and is appropriate for this location. 'Bus Box' linemarking has been shown in the kerbside lane where the bus pick up/set down is proposed to occur.

The design vehicles adopted for this intersection are as follows:

- Balaclava Road / New Dookie Road – 25m B-Double
- Verney Road – 25m B-Double
- Hawdon Street – 19m semi-trailer

Truck movements from the east and west can occur simultaneously, which is required under the proposed leading right turn phasing arrangement. Whereas the truck movements from the north and south cannot occur simultaneously, however, these only operate under a split phase arrangement. There are two of the left turns (New Dookie Road (east) into Hawdon Street (south) & Hawdon Street (South) into Balaclava Road (West)) that can't be undertaken from wholly within the left turn lanes. The kerb lines have been adjusted to best fit within the road reserve, although both corners are constrained by the proximity to the property boundaries and the need to maintain the footpath. Any semi-trailer movements for these turns would need to partially 'straddle' the through lanes on approach to perform the manoeuvre.

A functional layout of the proposed signals at Balaclava Road / New Dookie Road / Verney Road / Hawdon Street is provided at Appendix E.

5.2 New Dookie Road / Wheeler Street

The layout for the New Dookie Road / Wheeler Street intersection currently operates as an unsignalised T-intersection. However, there is a private access to an 'irrigation shop' on the north side of the road within the intersection.

On this basis, the intersection has been developed to operate as a signalised cross intersection. The 'irrigation shop' was observed to have very low movements in/out during the peak hours and therefore the intent for this approach is to operate 'on demand'. Under this operation the phase for movements out of the 'irrigation shop' would only operate when a vehicle is detected on the loop.

Based on preliminary modelling of the intersections, the existing layout can generally accommodate the anticipated future traffic volumes. On this basis, the general proposed intersection layout generally reflects the current configuration as shown in Figure 24 below.

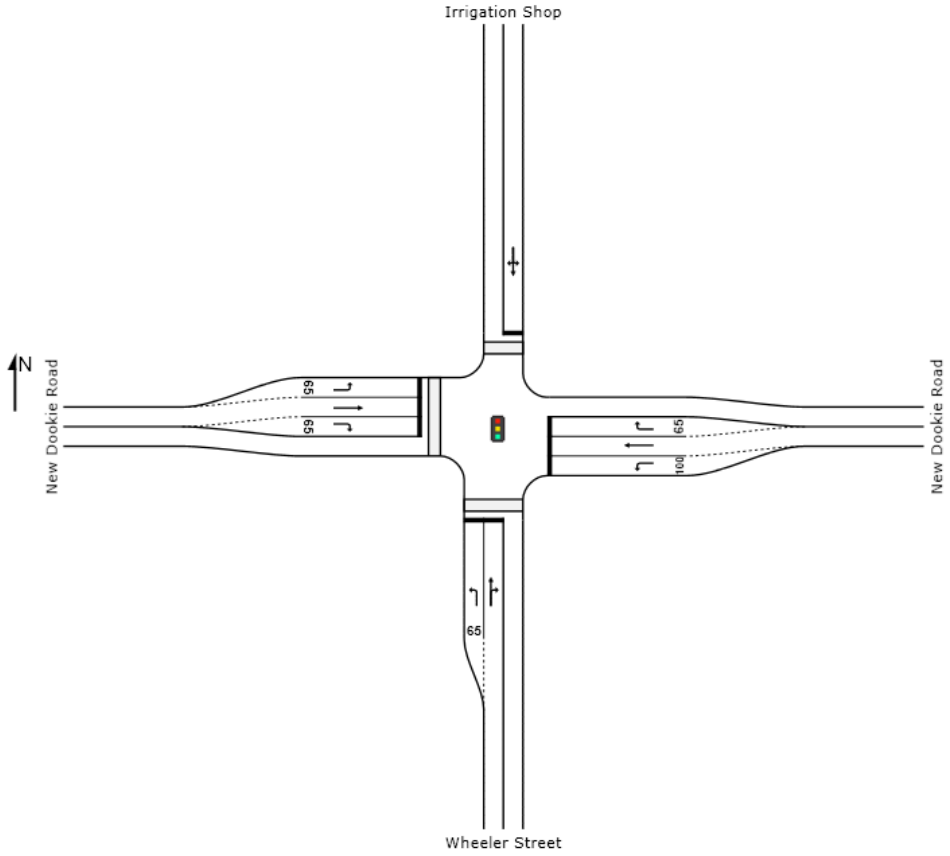


Figure 24: New Dookie Road / Wheeler Street – Signalised Layout

On the east and west New Dookie Road approaches, three (3) approach lanes are provided including a left turn, through and right turn lane. On the southern approach, two approach lanes are provided with a dedicated left turn lane and a through/right turn lane.

Signal Phasing:

The cycle time for the New Dookie Road / Wheeler Street intersection has been set at 120 seconds to match the adopted cycle time at the New Dookie Road / Balaclava Road / Verney Road / Hawdon Street intersection.

The signal phasing will generally operate with a typical 3 phase T-intersection arrangement. The movements out of the 'irrigation shop' will only operate on demand, which based on the existing volumes, would be 2-3 times each hour. This has been modelled by providing Phase D with a time of 2 seconds per cycle, which results in a total allocation of 60 seconds in the peak hour (based on the 120 second cycle time). This would be sufficient to allow Phase D to operate 2-3 times in the peak hour.

A summary of the adopted signal phasing is presented in Figure 25 below.

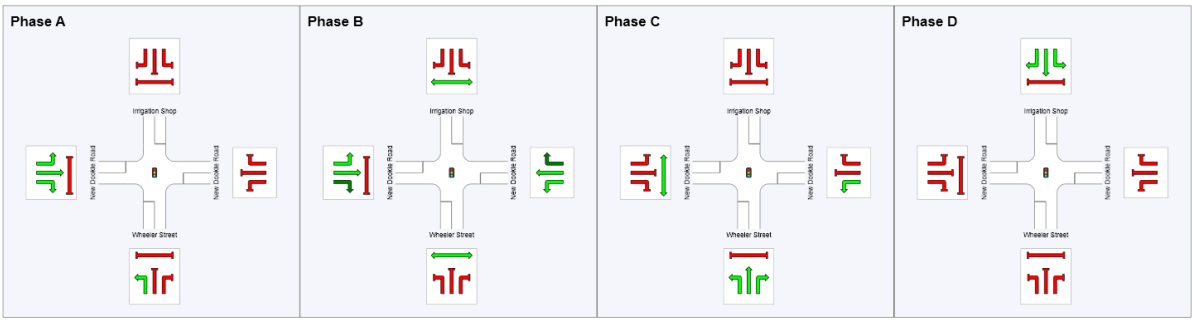


Figure 25: New Dookie Road / Wheeler Street – Signal Phasing

Capacity Analysis:

A summary of the SIDRA results for the proposed intersection layout based on the 'future' data set (i.e. 10 years into the future) are presented in Table 14 below.

Table 14: New Dookie Road / Wheeler Street - Key Intersection Parameters (Future)

Movement	AM Peak			PM Peak		
	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)	Degree of Saturation	Average Delay (Seconds)	95th Percentile Queue Length (m)
South: Wheeler Street						
Left	0.240	31.8	44.7	0.735	53.8	106.0
Through	0.473	60.9	28.4	0.426	61.5	22.5
Right	0.473	66.8	28.4	0.426	67.2	22.5
East: New Dookie Road						
Left	0.061	15.9	11.5	0.063	10.4	9.8
Through	0.601	24.0	168.2	0.722	16.4	230.5
Right	0.007	22.6	0.4	0.002	14.7	0.2
North: Property Access						
Left	0.201	81.9	1.5	0.201	81.9	1.5
Through	0.201	76.3	1.5	0.201	76.3	1.5
Right	0.201	81.9	1.5	0.201	81.9	1.5
West: New Dookie Road						
Left	0.001	7.8	0.1	0.001	7.6	0.1
Through	0.480	3.8	96.8	0.315	2.8	50.1
Right	0.317	14.5	36.5	0.435	20.4	47.1
TOTAL	**0.601**	**16.3**	**168.2**	**0.735**	**20.2**	**230.5**

The New Dookie Road / Wheeler Street intersection will operate well in the future (10 years) scenario. The DOS ranges from 0.601 in the AM peak to 0.735 in the PM peak. These levels are well below the upper limit of 0.9 for a signalised intersection.

Average delays at the intersection range between 16.3 seconds in the AM peak to 20.2 seconds in the PM peak. The maximum queue length at the intersection occurs on the New Dookie Road east approach in both the AM peak (168.2m) and the PM peak (230.5m).

Full results of the SIDRA analysis are provided in Appendix D.

Key Design Features:

Given that the intersection is located within an 'urban' area, the lengths of the short lanes have been sized as the maximum of the following:

- The 95th percentile queue length estimated from the SIDRA models, or
- The storage of one design vehicle plus the deceleration length identified in the AustRoads Guide to Road Design: Part 4A (Approximately 65m for 60 km/h based on the storage for a 25m B-Double and a deceleration length of 40m).

The layout has been designed to accommodate 25m B-Double movements for New Dookie Road and Wheeler Street. The 'hold' lines on both New Dookie Road (east) and Wheeler Street have been set-back to allow for the B-Double right turn movements at the intersection. The movements for the 'irrigation shop' will largely remain unchanged and will therefore cater for the same vehicles as the current conditions.

The existing access point to Ash Street west of the intersection has been converted to left in / left out due to its proximity to the proposed signals. The plans show a physical island to deter right turn movements at the intersection.

A functional layout of the proposed signals at New Dookie Road / Wheeler Street is provided at Appendix F.

6 Stakeholder Consultation

Following the development of the functional layout plans for the proposed signals, various stakeholders in the surrounding areas were provided the plans for feedback. The following stakeholders were consulted:

- VicRoads North Eastern Region,
- Shepparton Regional Saleyards,
- Shepparton High School,
- Bourchier Street Primary School, and
- Verney Road Primary School.

The stakeholders were initially contacted via telephone giving a general overview of the project and then sent a follow up email contained the functional layout plans (VicRoads were sent the full traffic study report in addition to the plans).

The stakeholder responses are summarised below.

Table 15: Stakeholder Consultation

Stakeholder	Comments
VicRoads North Eastern Region	VicRoads reviewed and generally agreed with the findings of the traffic report recommending the installation of signals at the New Dookie Road intersections providing the following comments. As part of the detailed design the following must be reviewed: • Prepare turning templates, right turn clearance and slip lane angle (70 degrees) • Sight line checks, • Signs and poles be properly accommodated within the islands, • The alignment of right turn vehicles against through traffic (especially on the local road) and check traffic movements align with the intersection where no islands are provided (ideally there should be traffic islands) • Cyclist lanes end at the approaches to the intersection at all legs and further investigation is required to detail how cyclists would be provided for through the intersection, • Cyclist treatments should be investigated to ensure they are in accordance with Austroads Guide to Road Design Part 6A and in particular treatments at left turn slip lanes • Review whether a cyclist lane could be included on Verney Road in either direction by reviewing lane widths. • Review needed for skewed stop lines at Wheeler Street intersection. VicRoads will provide further comments once the detailed design is prepared including specific comments regarding the traffic signal design component. A road safety audit of the detailed design will also be requested.
Shepparton Regional Saleyards	The manager of the Shepparton Regional Saleyards provided the following comments regarding the functional layout plans: • Requested a turning lane to allow vehicles to prop and give way safely along New Dookie Road to turn right into the saleyards (east of the Wheeler Street intersection), • Requested a turning lane to allow vehicles to safely turn into the Saleyards Truck Wash off New Dookie Road, and • Turning lane right into Wheeler Street from New Dookie Road allow appropriate provision for the significant truck queues that form for vehicles wanting to access the saleyards via Wheeler Street. The manager also highlighted the levels of truck volumes utilising the saleyards (approximately 100 vehicles from New Dookie Road during the peak time between 8:30am and 10:00am) and the associated carwash (4,726 trucks off New Dookie Road during financial year 2014/15).
Shepparton High School	The Principal and Business Manager did not have any concerns regarding the intersection upgrades but highlighted peak times of 3:30pm and 5:00pm as being particularly problematic.
Bourchier Street Primary School	The Principal noted the high bus volumes throughout the roundabout.

Stakeholder	Comments
Verney Road Primary School	The Principal was supportive of the signalisation of the roundabout at Balaclava Road / New Dookie Road. Stated that with three schools and a childcare in close proximity, the signalisation should relieve the school peak hour congestion. The Principal did not comment on the Wheeler Street / New Dookie Road intersection.

It is a recommended that the concerns expressed by the various stakeholders during the consultation phase be considered during the detailed design stage of the proposed works.

VicRoads email response has been provided in the Appendix G.

7 Conclusions

Having undertaken a traffic assessment of the future design of New Dookie Road / Balaclava Road / Verney Road / Hawdon Street and New Dookie Road / Wheeler Street, we are of the opinion that:

New Dookie Road / Balaclava Road / Verney Road / Hawdon Street:

a) Crash analysis has identified a total of six (6) casualty crashes at the intersection in the past 5 years. As only minimal police descriptions / diagrams are available, definitive conclusions regarding the intersection arrangement are difficult to draw.

b) However, given that the intersection is being reconfigured, a number of the potential issues will be resolved. A safety review has been undertaken of the existing layout to identify the key considerations for the development of the future intersection design.

c) Based on preliminary modelling, the retention of a roundabout control at the intersection would require additional circulating lanes and slip lanes. This arrangement could not be accommodated within the existing road reserve. Furthermore, the intersection has fairly even peak hour flow, which limit the effectiveness of a metered roundabout arrangement. On this basis, a roundabout arrangement is not considered optimal for this location.

d) A signalised layout has been developed for the intersection based on the following key parameters:

   i) Cross-sections have largely been set based on existing conditions, with 5 lane cross-sections possible on New Dookie Road / Balaclava Road and 4 lane cross-sections possible on Verney Road / Hawdon Street,

   ii) Short lanes of approximately 150-200m have been adopted on the approach and departure sides of the intersection,

   iii) To achieve appropriate capacity, split phasing has been adopted for the north-south movements, with conventional leading right turns for New Dookie Road and Balaclava Road approaches,

   iv) The existing bus bays adjacent to the school have been reconfigured to occur within the kerbside lane of the revised layout, consistent with current practice on arterial roads throughout metropolitan Melbourne,

   v) The Ash Street access to Verney Road has been closed and Glenn Street has been converted to left in / left out only due to their proximity to the traffic signals, and

   vi) The design vehicle adopted for the New Dookie Road, Balaclava Road and Verney Road approaches is the 25m B-Double. The design vehicle for the Hawdon Street approach is a 19m semi-trailer.

e) SIDRA Capacity analysis for the 'future' conditions (i.e. 10 years into the future) indicates that the intersection will operate at capacity with the DOS of approximately 0.9.

New Dookie Road / Wheeler Street:

f) No casualty crashes have been recorded at the intersection in the past 5 years of data. In any event a safety review has been undertaken to identify the key considerations for the development of the future intersection design.

g) The layout of the New Dookie Road / Wheeler Street intersection has been developed as follows:

   i) The layout generally follows the existing lane configuration with the addition of traffic signals,

   ii) On the south (Wheeler Street) approach, two approach lanes have been provided to separate the left and through / right movements,

   iii) The 'irrigation shop' on the northern side of the intersection has been incorporated to form a fourth leg of the intersection that will operate on-demand only,

   iv) The access to Ash Street via New Dookie Road has been converted to left in / left out only due to the proximity of the proposed signals.

   v) A 25m B-Double has been adopted as the design vehicle for the New Dookie Road / Wheeler Street approaches. The geometry in/out of the 'irrigation shop' remains relatively unchanged, and access will be maintained for existing vehicles.

h) SIDRA Capacity analysis for the 'future' conditions (i.e. 10 years into the future) indicates that the intersection will operate well within capacity with the DOS of approximately 0.7.

Appendix A:
Turning Movement Counts

AM Peak
(8am-9am)

VERNEY ROAD

ASH STREET

IRRIGATION SHOP

BALACLAVA ROAD

NEW DOOKIE ROAD

499

527

42

95

105 (29)

219 (32)

89 (33)

74(2)

293(8)

160(9)

428(41)

14(2)

10(0)

422(41)

4(0)

91(3)

1(0)

333(34)

180(10)

1(0)

1(0)

0(0)

360

413

361

63(1)

253(14)

63(2)

141 (12)

224 (20)

64 (4)

10(0)

4(0)

418(36)

16(2)

32(5)

430(38)

108(21)

0(0)

27(7)

2(0)

354(22)

42(11)

398

379

446

HAWDON STREET

14

30

GLENN STREET

135

223

WHEELER STREET

G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Balaclava Road / Verney Road

Date: Thursday, 10th December, 2015
Time: 7-9am

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
7:00	7	24	16	4	42	10	0	7	1	19	37	7	**175**	**951**
7:15	10	38	38	8	25	12	1	14	2	36	33	7	**223**	**1083**
7:30	12	20	45	6	27	11	1	5	1	39	36	10	**213**	**1234**
7:45	23	40	58	18	31	21	3	18	4	53	64	9	**341**	**1432**
8:00	13	36	25	8	49	13	12	40	10	41	50	10	**307**	**1576**
8:15	16	55	28	17	52	20	13	35	11	36	76	15	**374**	**1270**
8:30	15	62	44	21	57	15	10	45	9	39	76	19	**411**	**-**
8:45	15	51	33	16	81	13	41	67	23	35	83	28	**485**	**-**
TOTAL	**111**	**324**	**287**	**98**	**364**	**115**	**80**	**231**	**60**	**298**	**455**	**105**	**2528**	**7548**
AM PEAK	**58**	**204**	**130**	**62**	**239**	**61**	**76**	**187**	**52**	**151**	**285**	**72**	**1576**	**2846**

HEAVY VEHICLES

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
7:00	0	2	2	0	0	1	0	6	0	0	1	1	**13**	**71**
7:15	0	1	1	0	0	0	3	6	0	1	1	1	**14**	**94**
7:30	0	2	2	0	4	0	0	4	0	5	2	1	**20**	**146**
7:45	0	6	3	0	2	0	0	6	0	3	4	0	**24**	**159**
8:00	1	11	3	0	2	0	0	6	9	2	1	1	**36**	**167**
8:15	2	4	2	0	6	1	19	12	12	4	4	1	**66**	**-**
8:30	1	2	2	1	4	1	4	9	5	2	2	0	**33**	**-**
8:45	1	4	4	0	2	0	7	5	7	1	1	0	**31**	**-**
TOTAL	**5**	**32**	**17**	**1**	**20**	**3**	**32**	**54**	**33**	**18**	**16**	**5**	**238**	**637**
AM PEAK	**5**	**21**	**10**	**1**	**14**	**2**	**29**	**32**	**33**	**9**	**8**	**2**	**167**	**167**

TOTAL

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
7:00	7	26	18	4	42	11	0	13	1	19	38	8	**188**	**1022**
7:15	10	38	39	8	25	12	4	20	2	37	34	8	**237**	**1177**
7:30	12	22	46	6	31	11	1	9	1	44	38	11	**233**	**1381**
7:45	23	46	61	18	33	21	3	24	4	56	68	9	**365**	**1591**
8:00	14	47	28	8	51	13	12	46	19	43	51	11	**343**	**1743**
8:15	18	59	30	17	58	21	32	47	23	40	80	16	**440**	**-**
8:30	16	64	45	22	61	16	14	54	14	41	78	19	**444**	**-**
8:45	16	55	37	16	83	13	47	72	29	36	84	28	**517**	**-**
TOTAL	**116**	**357**	**304**	**99**	**384**	**118**	**113**	**285**	**93**	**316**	**471**	**110**	**2765**	**6915**
AM PEAK	**63**	**225**	**140**	**63**	**253**	**63**	**105**	**219**	**85**	**160**	**293**	**74**	**1743**	**1743**

G19582: Balaclava Road / New Dookie Road, Shepparton
Turning Movement Count - Glenn Street / New Dookie Road

Date: Thursday, 10th December, 2015
Time: 7-9am

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
7:00	1	2	35	1	2	46	**87**	**587**
7:15	1	1	62	0	1	84	**149**	**673**
7:30	0	2	53	2	2	77	**136**	**718**
7:45	3	2	92	0	0	118	**215**	**804**
8:00	2	1	92	2	4	72	**173**	**809**
8:15	1	0	88	3	4	98	**194**	-
8:30	5	2	95	4	1	115	**222**	-
8:45	2	1	112	3	5	97	**220**	-
TOTAL	**15**	**11**	**629**	**15**	**19**	**707**	**1,396**	**3,591**
AM PEAK	**10**	**4**	**387**	**12**	**14**	**382**	**809**	**809**

HEAVY VEHICLES

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
7:00	1	0	7	0	1	3	**12**	**52**
7:15	0	0	7	0	0	2	**9**	**63**
7:30	0	0	9	0	0	4	**13**	**79**
7:45	0	0	9	0	0	9	**18**	**83**
8:00	0	0	8	0	0	15	**23**	**81**
8:15	0	0	15	2	1	7	**25**	-
8:30	0	0	12	0	0	5	**17**	-
8:45	0	0	6	0	1	9	**16**	-
TOTAL	**1**	**0**	**73**	**2**	**3**	**54**	**133**	**358**
AM PEAK	**0**	**0**	**41**	**2**	**2**	**36**	**81**	**81**

TOTAL

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
7:00	2	2	42	1	3	49	**99**	**639**
7:15	1	1	69	0	1	86	**158**	**736**
7:30	0	2	62	2	2	81	**149**	**797**
7:45	3	2	101	0	0	127	**233**	**887**
8:00	2	1	100	2	4	87	**196**	**890**
8:15	1	0	103	5	5	105	**219**	-
8:30	5	2	107	4	1	120	**239**	-
8:45	2	1	118	3	6	106	**236**	-
TOTAL	**16**	**11**	**702**	**17**	**22**	**761**	**1,529**	**3,949**
AM PEAK	**10**	**4**	**428**	**14**	**16**	**418**	**890**	**890**

G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Ash Street / New Dookie Access Road

Date: Thursday, 10th December, 2015
Time: 7-9am

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	47	5	13	1	0	37	**103**	**657**
7:15	84	3	13	1	1	62	**164**	**742**
7:30	79	5	12	0	0	55	**151**	**803**
7:45	118	4	23	0	2	92	**239**	**893**
8:00	76	8	11	0	4	89	**188**	**902**
8:15	101	11	24	1	4	84	**225**	-
8:30	115	1	27	1	1	96	**241**	-
8:45	100	7	26	2	1	112	**248**	-
TOTAL	**720**	**44**	**149**	**6**	**13**	**627**	**1,559**	**3,997**
AM PEAK	**392**	**27**	**88**	**4**	**10**	**381**	**902**	**902**

HEAVY VEHICLES

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	4	1	0	0	0	7	**12**	**59**
7:15	2	2	0	0	0	7	**11**	**72**
7:30	4	1	2	0	0	9	**16**	**86**
7:45	9	2	0	0	0	9	**20**	**91**
8:00	15	1	1	0	0	8	**25**	**87**
8:15	8	2	0	0	0	15	**25**	-
8:30	5	2	2	0	0	12	**21**	-
8:45	10	0	0	0	0	6	**16**	-
TOTAL	**57**	**11**	**5**	**0**	**0**	**73**	**146**	**395**
AM PEAK	**38**	**5**	**3**	**0**	**0**	**41**	**87**	**87**

TOTAL

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	51	6	13	1	0	44	**115**	**716**
7:15	86	5	13	1	1	69	**175**	**814**
7:30	83	6	14	0	0	64	**167**	**889**
7:45	127	6	23	0	2	101	**259**	**984**
8:00	91	9	12	0	4	97	**213**	**989**
8:15	109	13	24	1	4	99	**250**	-
8:30	120	3	29	1	1	108	**262**	-
8:45	110	7	26	2	1	118	**264**	-
TOTAL	**777**	**55**	**154**	**6**	**13**	**700**	**1,705**	**4,392**
AM PEAK	**430**	**32**	**91**	**4**	**10**	**422**	**989**	**989**

G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Wheeler Street / New Dookie Road

Date: Thursday, 10th December, 2015
Time: 7-9am

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	27	23	4	2	8	48	**112**	**695**
7:15	35	40	10	4	3	77	**169**	**775**
7:30	34	33	11	3	7	73	**161**	**838**
7:45	61	54	15	5	11	107	**253**	**928**
8:00	66	34	22	7	1	62	**192**	**939**
8:15	67	41	28	2	10	84	**232**	**-**
8:30	76	47	17	6	6	99	**251**	**-**
8:45	90	48	20	5	14	87	**264**	**-**
TOTAL	**456**	**320**	**127**	**34**	**60**	**637**	**1,634**	**4,175**
AM PEAK	**299**	**170**	**87**	**20**	**31**	**332**	**939**	**939**

HEAVY VEHICLES

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	6	1	3	1	0	2	**13**	**68**
7:15	5	2	3	1	1	1	**13**	**85**
7:30	5	6	1	0	2	4	**18**	**102**
7:45	6	3	4	1	3	7	**24**	**109**
8:00	9	0	9	2	3	7	**30**	**105**
8:15	12	3	3	2	3	7	**30**	**-**
8:30	9	5	2	2	2	5	**25**	**-**
8:45	4	2	7	1	3	3	**20**	**-**
TOTAL	**56**	**22**	**32**	**10**	**17**	**36**	**173**	**469**
AM PEAK	**34**	**10**	**21**	**7**	**11**	**22**	**105**	**105**

TOTAL

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
7:00	33	24	7	3	8	50	**125**	**763**
7:15	40	42	13	5	4	78	**182**	**860**
7:30	39	39	12	3	9	77	**179**	**940**
7:45	67	57	19	6	14	114	**277**	**1037**
8:00	75	34	31	9	4	69	**222**	**1044**
8:15	79	44	31	4	13	91	**262**	**-**
8:30	85	52	19	8	8	104	**276**	**-**
8:45	94	50	27	6	17	90	**284**	**-**
TOTAL	**512**	**342**	**159**	**44**	**77**	**673**	**1,807**	**4,644**
AM PEAK	**333**	**180**	**108**	**27**	**42**	**354**	**1044**	**1044**

G19582: Balaclava Road / New Dookie Road, Shepparton
Turning Movement Count - Wheeler Street / New Dookie Road / Business Access

Date: Friday the 11th of December 2015
Time: 7-9am

STANDARD VEHICLES

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
7:00	0	0	1	0	0	0	1	4
7:15	1	1	1	0	0	0	3	4
7:30	0	0	0	0	0	0	0	1
7:45	0	0	0	0	0	0	0	1
8:00	0	1	0	0	0	0	1	3
8:15	0	0	0	0	0	0	0	-
8:30	0	0	0	0	0	0	0	-
8:45	0	0	2	0	1	1	2	-
TOTAL	**1**	**2**	**4**	**0**	**1**	**1**	**7**	**13**
AM PEAK	**0**	**1**	**2**	**0**	**1**	**1**	**3**	**3**

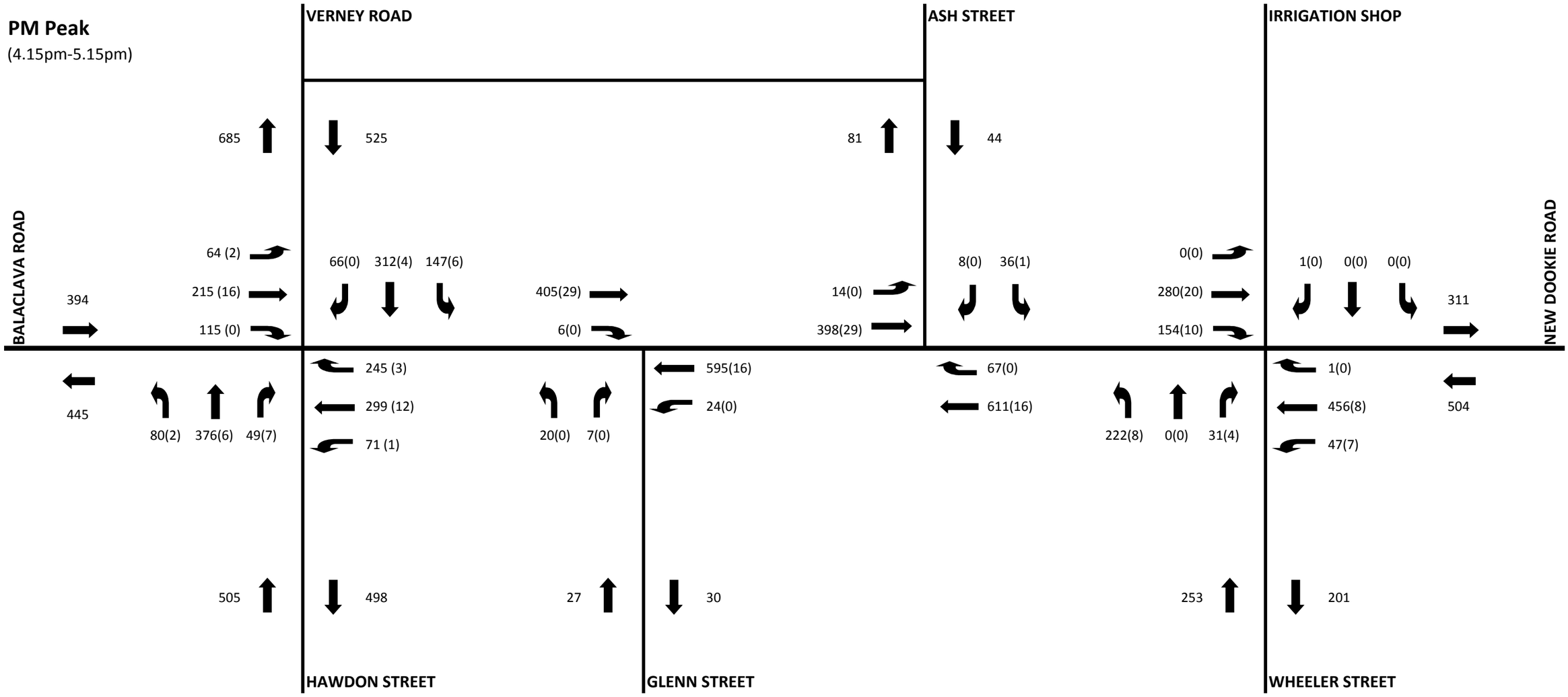
HEAVY VEHICLES

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
7:00	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	-
8:30	0	0	0	0	0	0	0	-
8:45	0	0	0	0	0	0	0	-
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AM PEAK	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TOTAL

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
7:00	0	0	1	0	0	0	1	4
7:15	1	1	1	0	0	0	3	4
7:30	0	0	0	0	0	0	0	1
7:45	0	0	0	0	0	0	0	1
8:00	0	1	0	0	0	0	1	3
8:15	0	0	0	0	0	0	0	-
8:30	0	0	0	0	0	0	0	-
8:45	0	0	2	0	1	1	2	-
TOTAL	**1**	**2**	**4**	**0**	**1**	**1**	**7**	**13**
AM PEAK	**0**	**1**	**2**	**0**	**1**	**1**	**3**	**3**

PM Peak
(4.15pm-5.15pm)



G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Balaclava Road / Verney Road

TraffixGroup
Traffic Engineers and Transport Planners

Date: Wednesday, 9th December, 2015
Time: 3-6pm

STANDARD VEHICLES

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
15:00	14	57	36	34	71	17	12	57	15	43	81	14	**450**	**1874**
15:15	11	58	53	27	68	18	19	53	35	39	84	12	**476**	**1883**
15:30	17	74	58	20	99	13	15	52	18	35	82	18	**500**	**1876**
15:45	13	52	47	21	88	14	16	42	22	44	76	13	**447**	**1876**
16:00	12	59	52	25	85	22	16	38	22	38	80	11	**459**	**1882**
16:15	17	66	45	19	84	13	12	54	24	39	82	15	**469**	**1975**
16:30	18	61	65	16	99	8	11	53	26	44	82	17	**500**	**1960**
16:45	18	71	53	28	77	14	16	47	28	26	61	16	**454**	**1916**
17:00	18	90	79	17	110	12	22	38	33	32	83	18	**552**	**1874**
17:15	10	70	57	17	99	7	16	41	26	33	65	14	**454**	**-**
17:30	18	55	56	20	103	12	20	35	29	30	71	8	**456**	**-**
17:45	13	51	44	12	88	13	18	42	22	23	72	15	**412**	**-**
TOTAL	**176**	**761**	**642**	**256**	**1071**	**163**	**193**	**552**	**300**	**426**	**919**	**171**	**5631**	**17116**
PM PEAK	**70**	**287**	**242**	**80**	**370**	**47**	**61**	**192**	**111**	**141**	**308**	**66**	**1975**	**7725**

HEAVY VEHICLES

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
15:00	2	6	7	0	2	2	0	5	0	2	5	2	**33**	**109**
15:15	0	4	3	0	0	1	0	5	2	2	4	1	**22**	**95**
15:30	0	1	0	0	5	0	1	4	15	3	0	0	**29**	**93**
15:45	0	4	1	1	5	1	2	3	6	2	1	0	**26**	**76**
16:00	0	2	1	0	0	0	0	9	1	3	1	2	**19**	**65**
16:15	1	7	1	0	2	1	1	4	0	1	1	0	**19**	**52**
16:30	0	0	2	0	3	0	0	4	0	2	1	0	**12**	**41**
16:45	0	4	0	0	0	1	1	6	0	2	1	0	**15**	**35**
17:00	0	1	0	0	1	0	0	2	0	1	1	0	**6**	**25**
17:15	0	2	0	0	1	1	0	2	0	2	1	0	**9**	**-**
17:30	0	0	1	0	2	0	0	2	0	0	1	0	**6**	**-**
17:45	0	1	0	1	0	0	0	2	0	0	0	0	**4**	**-**
TOTAL	**3**	**30**	**16**	**2**	**21**	**7**	**5**	**48**	**24**	**20**	**17**	**5**	**198**	**591**
PM PEAK	**1**	**12**	**3**	**0**	**6**	**2**	**2**	**16**	**0**	**6**	**4**	**0**	**52**	**154**

TOTAL

Time	New Dookie Rd East Approach			Hawdon St South Approach			Balaclava Rd West Approach			Verney Rd North Approach			TOTAL	PEAK
	1 - Left	2 - Through	3 - Right	4 - Left	5 - Through	6 - Right	7 - Left	8 - Through	9 - Right	10 - Left	11 - Through	12 - Right		
15:00	16	62	43	34	73	19	12	62	15	45	86	16	**483**	**1983**
15:15	11	61	56	27	68	19	19	58	37	41	88	13	**498**	**1978**
15:30	17	75	58	20	104	13	16	56	33	38	82	18	**529**	**1968**
15:45	13	56	48	22	93	15	18	45	28	46	77	13	**473**	**1952**
16:00	12	61	53	25	85	22	16	47	23	41	81	13	**478**	**1947**
16:15	18	73	46	19	86	14	13	58	24	40	83	15	**489**	**2027**
16:30	18	61	67	16	102	8	11	57	26	46	83	17	**512**	**2001**
16:45	18	74	53	28	77	15	17	53	28	28	62	16	**469**	**1952**
17:00	18	91	79	17	111	12	22	40	33	33	84	18	**558**	**1899**
17:15	10	72	57	17	100	8	16	43	26	35	66	14	**463**	**-**
17:30	18	55	57	20	105	12	20	37	29	30	72	8	**462**	**-**
17:45	13	52	44	13	88	13	18	44	22	23	72	15	**416**	**-**
TOTAL	**179**	**792**	**658**	**258**	**1092**	**170**	**198**	**600**	**324**	**446**	**936**	**176**	**5829**	**17707**
PM PEAK	**71**	**299**	**245**	**80**	**376**	**49**	**63**	**208**	**111**	**147**	**312**	**66**	**2027**	**7879**

G19582: Balaclava Road / New Dookie Road, Shepparton
Turning Movement Count - Glenn Street / New Dookie Road

Date: Wednesday, 9th December, 2015
Time: 3-6pm

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
15:00	5	1	105	0	6	107	**224**	**924**
15:15	6	2	93	2	5	112	**220**	**919**
15:30	3	4	110	2	16	142	**277**	**917**
15:45	4	2	76	3	5	113	**203**	**902**
16:00	3	0	98	2	2	114	**219**	**947**
16:15	3	0	98	1	5	111	**218**	**1012**
16:30	2	3	97	2	5	153	**262**	**1000**
16:45	4	2	98	2	6	136	**248**	**947**
17:00	11	2	83	1	8	179	**284**	**884**
17:15	2	0	72	4	5	123	**206**	**-**
17:30	5	0	83	4	2	115	**209**	**-**
17:45	3	2	73	1	2	104	**185**	**-**
TOTAL	**51**	**18**	**1,086**	**24**	**67**	**1,509**	**2,755**	**8,452**
PM PEAK	**20**	**7**	**376**	**6**	**24**	**579**	**1012**	**3843**

HEAVY VEHICLES

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
15:00	1	0	10	0	0	11	**22**	**68**
15:15	0	0	11	0	0	7	**18**	**62**
15:30	0	1	7	1	2	2	**13**	**61**
15:45	0	1	7	0	1	6	**15**	**56**
16:00	0	0	10	0	0	6	**16**	**54**
16:15	0	0	9	0	0	8	**17**	**45**
16:30	0	0	6	0	0	2	**8**	**37**
16:45	0	0	9	0	0	4	**13**	**36**
17:00	0	0	5	0	0	2	**7**	**26**
17:15	0	0	6	0	0	3	**9**	**-**
17:30	0	0	2	0	0	5	**7**	**-**
17:45	0	0	2	0	0	1	**3**	**-**
TOTAL	**1**	**2**	**84**	**1**	**3**	**57**	**148**	**445**
PM PEAK	**0**	**0**	**29**	**0**	**0**	**16**	**45**	**144**

TOTAL

Time	Glenn St South Approach		New Dookie Rd West West Approach		New Dookie Rd East East Approach		TOTAL	PEAK
	1 - Left	2 - Right	3 - Through	4 - Right	5 - Left	6 - Through		
15:00	6	1	115	0	6	118	**246**	**992**
15:15	6	2	104	2	5	119	**238**	**981**
15:30	3	5	117	3	18	144	**290**	**978**
15:45	4	3	83	3	6	119	**218**	**958**
16:00	3	0	108	2	2	120	**235**	**1001**
16:15	3	0	107	1	5	119	**235**	**1057**
16:30	2	3	103	2	5	155	**270**	**1037**
16:45	4	2	107	2	6	140	**261**	**983**
17:00	11	2	88	1	8	181	**291**	**910**
17:15	2	0	78	4	5	126	**215**	**-**
17:30	5	0	85	4	2	120	**216**	**-**
17:45	3	2	75	1	2	105	**188**	**-**
TOTAL	**52**	**20**	**1,170**	**25**	**70**	**1,566**	**2,903**	**8,897**
PM PEAK	**20**	**7**	**405**	**6**	**24**	**595**	**1057**	**3987**

G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Ash Street / New Dookie Access Road

Date: Wednesday, 9th December, 2015
Time: 3-6pm

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	112	8	18	1	1	105	**245**	**1023**
15:15	113	10	13	4	5	90	**235**	**1011**
15:30	155	28	21	3	4	110	**321**	**1013**
15:45	115	13	13	3	4	74	**222**	**977**
16:00	115	9	10	1	4	94	**233**	**1010**
16:15	114	10	13	2	3	95	**237**	**1088**
16:30	154	18	9	4	3	97	**285**	**1064**
16:45	141	7	6	1	2	98	**255**	**996**
17:00	186	32	7	1	6	79	**311**	**936**
17:15	125	8	5	3	2	70	**213**	**-**
17:30	115	10	7	2	0	83	**217**	**-**
17:45	105	8	6	1	3	72	**195**	**-**
TOTAL	**1,550**	**161**	**128**	**26**	**37**	**1,067**	**2,969**	**9,118**
PM PEAK	**595**	**67**	**35**	**8**	**14**	**369**	**1088**	**4084**

HEAVY VEHICLES

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	11	0	0	0	0	10	**21**	**67**
15:15	7	0	1	0	0	11	**19**	**62**
15:30	4	0	0	0	0	8	**12**	**60**
15:45	7	0	0	0	0	8	**15**	**57**
16:00	6	0	0	0	0	10	**16**	**55**
16:15	8	0	0	0	0	9	**17**	**46**
16:30	2	0	1	0	0	6	**9**	**38**
16:45	4	0	0	0	0	9	**13**	**36**
17:00	2	0	0	0	0	5	**7**	**26**
17:15	3	0	0	0	0	6	**9**	**-**
17:30	5	0	0	0	0	2	**7**	**-**
17:45	1	0	0	0	0	2	**3**	**-**
TOTAL	**60**	**0**	**2**	**0**	**0**	**86**	**148**	**447**
PM PEAK	**16**	**0**	**1**	**0**	**0**	**29**	**46**	**146**

TOTAL

Time	New Dookie Rd East		Ash - New Dookie Access Rd		New Dookie Rd West		TOTAL	PEAK
	East Approach		North Approach		West Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	123	8	18	1	1	115	**266**	**1090**
15:15	120	10	14	4	5	101	**254**	**1073**
15:30	159	28	21	3	4	118	**333**	**1073**
15:45	122	13	13	3	4	82	**237**	**1034**
16:00	121	9	10	1	4	104	**249**	**1065**
16:15	122	10	13	2	3	104	**254**	**1134**
16:30	156	18	10	4	3	103	**294**	**1102**
16:45	145	7	6	1	2	107	**268**	**1032**
17:00	188	32	7	1	6	84	**318**	**962**
17:15	128	8	5	3	2	76	**222**	
17:30	120	10	7	2	0	85	**224**	
17:45	106	8	6	1	3	74	**198**	**-**
TOTAL	**1,610**	**161**	**130**	**26**	**37**	**1,153**	**3,117**	**9,565**
PM PEAK	**611**	**67**	**36**	**8**	**14**	**398**	**1134**	**4230**

G19582: Balaclava Road / New Dookie Road, Shepparton

Turning Movement Count - Wheeler Street / New Dookie Road

Date: Wednesday, 9th December, 2015
Time: 3-6pm

TraffixGroup
Traffic Engineers and Transport Planners

STANDARD VEHICLES

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	88	35	48	8	16	72	**267**	**1081**
15:15	69	34	39	6	8	84	**240**	**1061**
15:30	82	49	44	14	19	139	**347**	**1067**
15:45	63	24	48	2	10	80	**227**	**1017**
16:00	62	42	48	8	11	76	**247**	**1060**
16:15	70	38	51	6	8	73	**246**	**1133**
16:30	70	36	52	9	10	120	**297**	**1109**
16:45	60	44	44	8	10	104	**270**	**1036**
17:00	60	26	67	4	12	151	**320**	**965**
17:15	50	25	49	8	6	84	**222**	
17:30	71	19	39	5	4	86	**224**	
17:45	53	25	43	4	4	70	**199**	**-**
TOTAL	**798**	**397**	**572**	**82**	**118**	**1,139**	**3,106**	**9,529**
PM PEAK	**260**	**144**	**214**	**27**	**40**	**448**	**1133**	**4243**

HEAVY VEHICLES

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	7	3	4	1	5	7	**27**	**84**
15:15	10	2	3	1	4	4	**24**	**77**
15:30	5	3	2	3	1	2	**16**	**75**
15:45	6	2	2	1	1	5	**17**	**70**
16:00	8	2	0	2	2	6	**20**	**69**
16:15	6	3	5	2	3	3	**22**	**57**
16:30	5	2	2	1	1	0	**11**	**46**
16:45	5	4	1	1	2	3	**16**	**44**
17:00	4	1	0	0	1	2	**8**	**32**
17:15	5	1	1	0	2	2	**11**	**-**
17:30	2	0	1	1	1	4	**9**	**-**
17:45	2	0	0	0	1	1	**4**	**-**
TOTAL	**65**	**23**	**21**	**13**	**24**	**39**	**185**	**554**
PM PEAK	**20**	**10**	**8**	**4**	**7**	**8**	**57**	**179**

TOTAL

Time	New Dookie Rd West		Wheeler St		New Dookie Rd East		TOTAL	PEAK
	West Approach		South Approach		East Approach			
	1 - Through	2 - Right	3 - Left	4 - Right	5 - Left	6 - Through		
15:00	95	38	52	9	21	79	**294**	**1165**
15:15	79	36	42	7	12	88	**264**	**1138**
15:30	87	52	46	17	20	141	**363**	**1142**
15:45	69	26	50	3	11	85	**244**	**1087**
16:00	70	44	48	10	13	82	**267**	**1129**
16:15	76	41	56	8	11	76	**268**	**1190**
16:30	75	38	54	10	11	120	**308**	**1155**
16:45	65	48	45	9	12	107	**286**	**1080**
17:00	64	27	67	4	13	153	**328**	**997**
17:15	55	26	50	8	8	86	**233**	**-**
17:30	73	19	40	6	5	90	**233**	**-**
17:45	55	25	43	4	5	71	**203**	**-**
TOTAL	**863**	**420**	**593**	**95**	**142**	**1,178**	**3,291**	**10,083**
PM PEAK	**280**	**154**	**222**	**31**	**47**	**456**	**1190**	**4422**

G19582: Balaclava Road / New Dookie Road, Shepparton
Turning Movement Count - Wheeler Street / New Dookie Road / Business Access

Date: Thursday the 10th of December 2015
Time: 3-6pm

STANDARD VEHICLES

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
15:00	0	0	0	0	0	0	**0**	**0**
15:15	0	0	0	0	0	0	**0**	**1**
15:30	0	0	0	0	0	0	**0**	**2**
15:45	0	0	0	0	0	0	**0**	**2**
16:00	0	0	1	0	0	0	**1**	**2**
16:15	0	0	0	0	0	1	**1**	**2**
16:30	0	0	0	0	0	0	**0**	**1**
16:45	0	0	0	0	0	0	**0**	**2**
17:00	0	0	0	1	0	0	**1**	**3**
17:15	0	0	0	0	0	0	**0**	**-**
17:30	0	0	0	1	0	0	**1**	**-**
17:45	0	0	0	0	0	1	**1**	**-**
TOTAL	**0**	**0**	**1**	**2**	**0**	**2**	**5**	**15**
PM PEAK	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**10**

HEAVY VEHICLES

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
15:00	0	0	0	0	0	0	**0**	**0**
15:15	0	0	0	0	0	0	**0**	**0**
15:30	0	0	0	0	0	0	**0**	**0**
15:45	0	0	0	0	0	0	**0**	**0**
16:00	0	0	0	0	0	0	**0**	**0**
16:15	0	0	0	0	0	0	**0**	**0**
16:30	0	0	0	0	0	0	**0**	**0**
16:45	0	0	0	0	0	0	**0**	**0**
17:00	0	0	0	0	0	0	**0**	**0**
17:15	0	0	0	0	0	0	**0**	**-**
17:30	0	0	0	0	0	0	**0**	**-**
17:45	0	0	0	0	0	0	**0**	**-**
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PM PEAK	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TOTAL

Time	Wheeler St	New Dookie Rd West	New Dookie Rd East	Business Access			TOTAL	PEAK
	South Approach	West Approach	East Approach	North Approach				
	1 - Through	2 - Left	3 - Right	4 - Left	5 - Through	6 - Right		
15:00	0	0	0	0	0	0	**0**	**0**
15:15	0	0	0	0	0	0	**0**	**1**
15:30	0	0	0	0	0	0	**0**	**2**
15:45	0	0	0	0	0	0	**0**	**2**
16:00	0	0	1	0	0	0	**1**	**2**
16:15	0	0	0	0	0	1	**1**	**2**
16:30	0	0	0	0	0	0	**0**	**1**
16:45	0	0	0	0	0	0	**0**	**2**
17:00	0	0	0	1	0	0	**1**	**3**
17:15	0	0	0	0	0	0	**0**	**-**
17:30	0	0	0	1	0	0	**1**	**-**
17:45	0	0	0	0	0	1	**1**	**-**
TOTAL	**0**	**0**	**1**	**2**	**0**	**2**	**5**	**15**
PM PEAK	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**7**

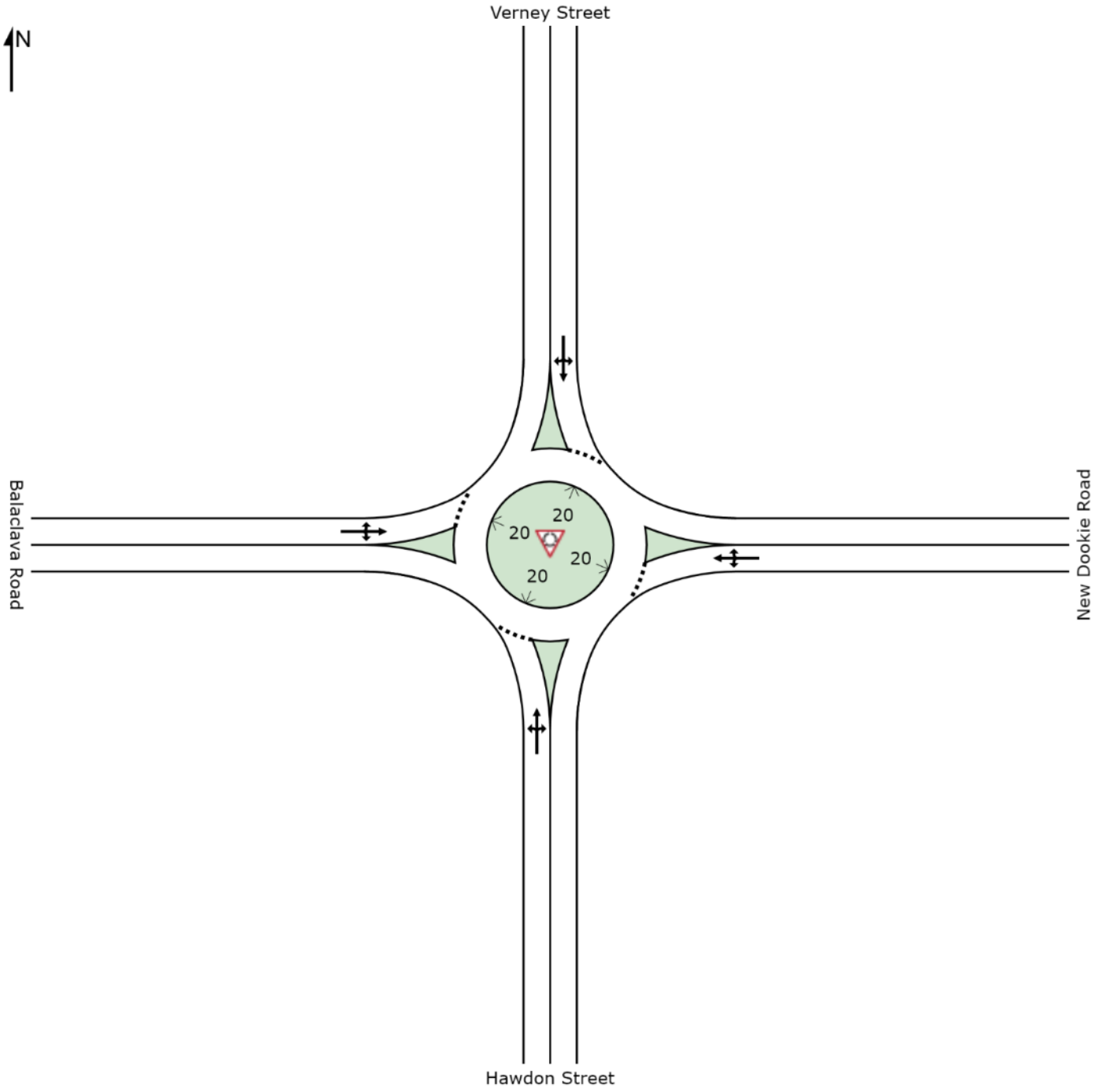
Appendix B:
Existing Conditions SIDRA

SITE LAYOUT

Site: Balaclava Road / New Dookie Road - AM Existing

Shepparton

Roundabout



MOVEMENT SUMMARY

Site: Balaclava Road / New Dookie Road - AM Existing

Shepparton

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hawdon Street											
1	L2	66	1.6	0.530	9.0	LOS A	4.4	31.9	0.81	0.87	51.0
2	T1	266	5.5	0.530	9.4	LOS A	4.4	31.9	0.81	0.87	52.1
3	R2	66	3.2	0.530	13.9	LOS B	4.4	31.9	0.81	0.87	52.0
Approach		399	4.5	0.530	10.1	LOS B	4.4	31.9	0.81	0.87	51.9
East: New Dookie Road											
4	L2	67	6.3	0.582	9.8	LOS A	5.4	40.3	0.85	0.93	49.8
5	T1	236	8.9	0.582	10.2	LOS B	5.4	40.3	0.85	0.93	50.9
6	R2	148	8.5	0.582	14.8	LOS B	5.4	40.3	0.85	0.93	50.8
Approach		452	8.4	0.582	11.6	LOS B	5.4	40.3	0.85	0.93	50.7
North: Verney Street											
7	L2	168	5.6	0.713	12.2	LOS B	8.4	60.3	0.91	1.00	49.0
8	T1	308	2.7	0.713	12.2	LOS B	8.4	60.3	0.91	1.00	50.1
9	R2	78	2.7	0.713	16.9	LOS B	8.4	60.3	0.91	1.00	50.1
Approach		555	3.6	0.713	12.9	LOS B	8.4	60.3	0.91	1.00	49.8
West: Balaclava Road											
10	L2	111	27.6	0.571	10.4	LOS B	5.0	42.1	0.83	0.92	49.7
11	T1	231	14.6	0.571	10.0	LOS B	5.0	42.1	0.83	0.92	51.2
12	R2	94	37.1	0.571	15.7	LOS B	5.0	42.1	0.83	0.92	50.2
Approach		435	22.8	0.571	11.3	LOS B	5.0	42.1	0.83	0.92	50.6
All Vehicles		1840	9.5	0.713	11.6	LOS B	8.4	60.3	0.86	0.94	50.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Balaclava Road / New Dookie Road - PM Existing

Shepparton

Roundabout

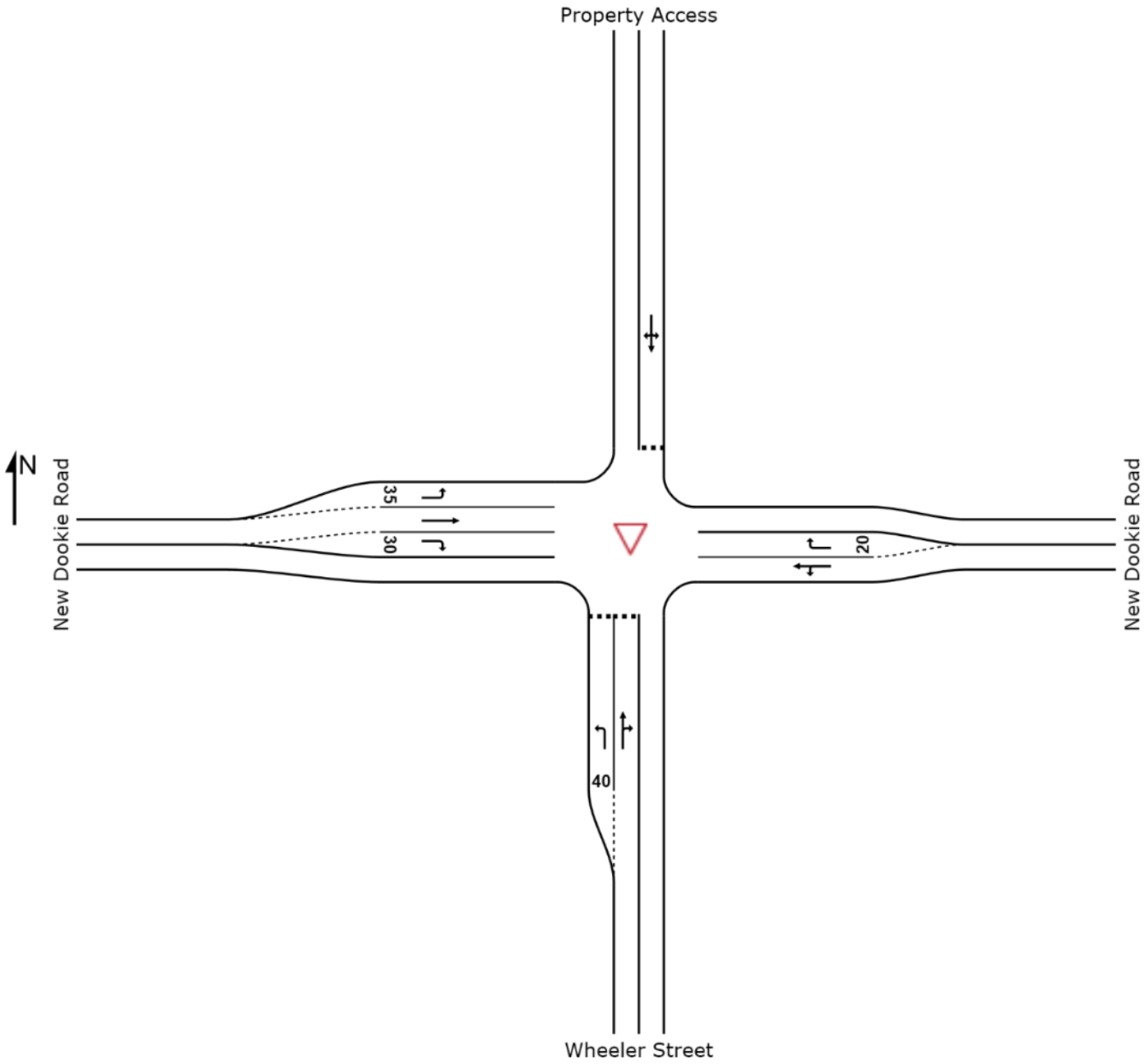
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hawdon Street											
1	L2	84	3.0	0.880	28.4	LOS C	15.7	112.4	1.00	1.42	40.4
2	T1	396	3.0	0.880	28.6	LOS C	15.7	112.4	1.00	1.42	41.2
3	R2	52	3.0	0.880	33.3	LOS C	15.7	112.4	1.00	1.42	41.1
Approach		532	3.0	0.880	29.1	LOS C	15.7	112.4	1.00	1.42	41.0
East: New Dookie Road											
4	L2	75	2.6	0.941	35.1	LOS D	23.4	167.7	1.00	1.62	37.2
5	T1	315	2.6	0.941	35.3	LOS D	23.4	167.7	1.00	1.62	37.9
6	R2	258	2.6	0.941	39.9	LOS D	23.4	167.7	1.00	1.62	37.8
Approach		647	2.6	0.941	37.1	LOS D	23.4	167.7	1.00	1.62	37.8
North: Verney Street											
7	L2	155	2.0	0.703	11.3	LOS B	8.2	58.1	0.91	0.97	49.6
8	T1	328	2.0	0.703	11.5	LOS B	8.2	58.1	0.91	0.97	50.7
9	R2	69	2.0	0.703	16.1	LOS B	8.2	58.1	0.91	0.97	50.7
Approach		553	2.0	0.703	12.0	LOS B	8.2	58.1	0.91	0.97	50.4
West: Balaclava Road											
10	L2	67	4.6	0.972	63.2	LOS E	21.9	159.0	1.00	1.82	29.1
11	T1	226	4.6	0.972	63.5	LOS E	21.9	159.0	1.00	1.82	29.5
12	R2	121	4.6	0.972	68.1	LOS E	21.9	159.0	1.00	1.82	29.5
Approach		415	4.6	0.972	64.8	LOS E	21.9	159.0	1.00	1.82	29.5
All Vehicles		2146	2.9	0.972	34.0	LOS C	23.4	167.7	0.98	1.44	38.9

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: New Dookie Road / Wheeler Street - AM Existing

Shepparton
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: New Dookie Road / Wheeler Street - AM Existing

Shepparton
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wheeler Street											
1	L2	114	19.4	0.147	8.2	LOS A	0.5	5.8	0.47	0.71	51.0
2	T1	1	0.0	0.287	28.1	LOS D	0.9	11.0	0.90	0.99	34.2
3	R2	28	25.9	0.287	45.7	LOS E	0.9	11.0	0.90	0.99	33.5
Approach		143	20.6	0.287	15.8	LOS C	0.9	11.0	0.56	0.77	46.0
East: New Dookie Road											
4	L2	44	26.2	0.227	5.9	LOS A	0.0	0.0	0.00	0.06	56.6
5	T1	373	6.2	0.227	0.0	LOS A	0.0	0.0	0.00	0.06	59.5
6	R2	1	0.0	0.001	7.0	LOS A	0.0	0.0	0.42	0.56	51.9
Approach		418	8.3	0.227	0.7	NA	0.0	0.0	0.00	0.06	59.1
North: Property Access											
7	L2	1	0.0	0.016	7.2	LOS A	0.0	0.3	0.75	0.80	43.6
8	T1	1	0.0	0.016	23.5	LOS C	0.0	0.3	0.75	0.80	43.9
9	R2	1	0.0	0.016	33.1	LOS D	0.0	0.3	0.75	0.80	43.6
Approach		3	0.0	0.016	21.3	LOS C	0.0	0.3	0.75	0.80	43.7
West: New Dookie Road											
10	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	351	10.2	0.192	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	189	5.6	0.179	7.7	LOS A	0.8	6.5	0.52	0.72	51.6
Approach		541	8.6	0.192	2.7	NA	0.8	6.5	0.18	0.25	56.7
All Vehicles		1105	10.0	0.287	3.7	NA	0.9	11.0	0.16	0.25	55.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: New Dookie Road / Wheeler Street - PM Existing

Shepparton
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wheeler Street											
1	L2	234	3.6	0.594	40.1	LOS E	7.4	56.9	0.91	1.34	35.5
2	T1	1	4.7	0.342	34.1	LOS D	1.1	10.8	0.91	1.01	32.9
3	R2	33	12.9	0.342	49.4	LOS E	1.1	10.8	0.91	1.01	32.5
Approach		267	4.7	0.594	41.2	LOS E	7.4	56.9	0.91	1.30	35.1
East: New Dookie Road											
4	L2	49	14.9	0.278	7.2	LOS A	0.0	0.0	0.00	0.06	67.7
5	T1	480	1.8	0.278	0.0	LOS A	0.0	0.0	0.00	0.06	78.9
6	R2	1	3.0	0.001	8.0	LOS A	0.0	0.0	0.39	0.58	62.6
Approach		531	3.0	0.278	0.7	NA	0.0	0.0	0.00	0.06	77.7
North: Property Access											
7	L2	1	0.0	0.019	6.8	LOS A	0.1	0.4	0.76	0.80	41.9
8	T1	1	0.0	0.019	24.3	LOS C	0.1	0.4	0.76	0.80	42.2
9	R2	1	0.0	0.019	42.9	LOS E	0.1	0.4	0.76	0.80	41.9
Approach		3	0.0	0.019	24.7	LOS C	0.1	0.4	0.76	0.80	42.0
West: New Dookie Road											
10	L2	1	6.9	0.001	7.1	LOS A	0.0	0.0	0.00	0.63	63.1
11	T1	295	7.1	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
12	R2	162	6.5	0.176	9.8	LOS A	0.8	6.3	0.57	0.79	60.2
Approach		458	6.9	0.176	3.5	NA	0.8	6.3	0.20	0.28	71.6
All Vehicles		1259	4.8	0.594	10.4	NA	7.4	56.9	0.27	0.41	60.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C:
Future Data Set Development

G19582: Balaclava Road / New Dookie Road, Shepparton
Future Data Set

Future Data Set
AM Peak

Movement	Existing Volumes	Background Growth Rate (per year)	Volume Growth (10 years)	Shepparton North East Development	37-65 New Dookie Road	2026 Future Data Set		
						Estimated 2026 Volume	HV%	No.
Wheeler Street / New Dookie Road								
North Approach								
Left	0	0%	0	0	0	0	0.0%	0
Through	1	0%	0	0	0	1	0.0%	0
Right	1	0%	0	0	0	1	0.0%	0
East Approach								
Left	42	2%	8	0	5	55	26.2%	14
Through	354	2%	71	24	66	515	6.2%	32
Right	2	0%	0	0	0	2	0.0%	0
South Approach								
Left	108	2%	22	0	0	130	19.4%	25
Through	0	0%	0	0	0	0	0.0%	0
Right	27	2%	5	0	20	52	25.9%	13
West Approach								
Left	1	0%	0	0	0	1	0.0%	0
Through	333	2%	67	8	266	674	10.2%	69
Right	180	2%	36	0	0	216	5.6%	12
Balaclava Road / New Dookie Road								
North Approach								
Left	160	2%	32	0	41	233	5.6%	13
Through	293	2%	59	145	0	497	2.7%	14
Right	74	2%	15	36	0	125	2.7%	3
South Approach								
Left	63	2%	13	0	0	76	1.6%	1
Through	253	2%	51	47	0	351	5.5%	19
Right	63	2%	13	0	41	117	3.2%	4
East Approach								
Left	64	2%	13	0	10	87	6.3%	5
Through	224	2%	45	24	46	339	8.9%	30
Right	141	2%	28	0	10	179	8.5%	15
West Approach								
Left	105	2%	21	12	0	138	27.6%	38
Through	219	2%	44	8	184	455	14.6%	66
Right	89	2%	18	0	0	107	37.1%	40

G19582: Balaclava Road / New Dookie Road, Shepparton
Future Data Set

Future Data Set
PM Peak

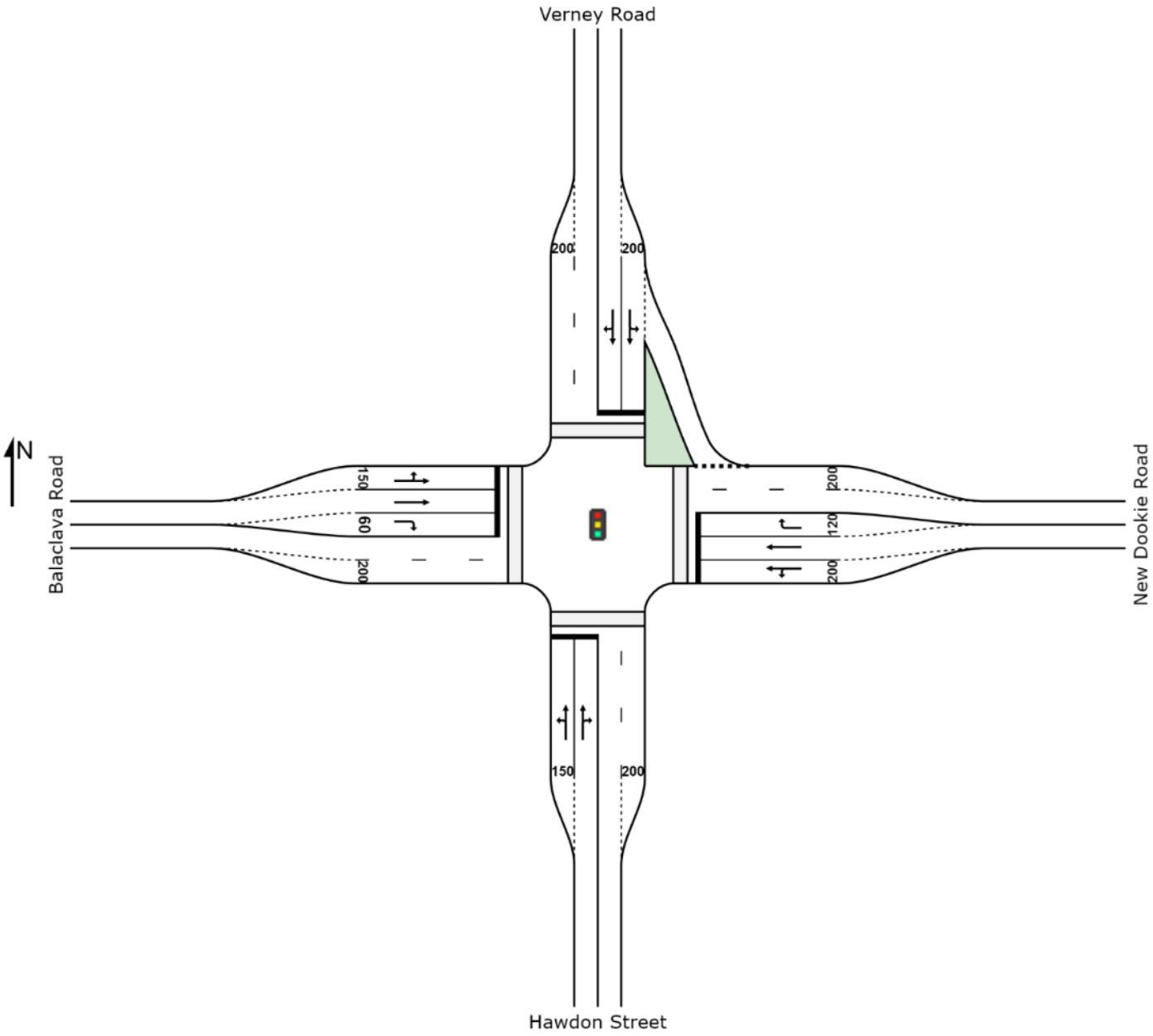
Movement	Existing Volumes	Background Growth Rate (per year)	Volume Growth (10 years)	Shepparton North East Development	37-65 New Dookie Road	2026 Future Data Set		
						Estimated 2026 Volume	HV%	No.
Wheeler Street / New Dookie Road								
North Approach								
Left	0	0%	0	0	0	0	0.0%	0
Through	0	0%	0	0	0	0	0.0%	0
Right	1	0%	0	0	0	1	0.0%	0
East Approach								
Left	47	2%	9	0	18	74	14.9%	11
Through	456	2%	91	12	233	792	1.8%	14
Right	1	0%	0	0	0	1	0.0%	0
South Approach								
Left	228	2%	46	0	0	274	3.6%	10
Through	0	0%	0	0	0	0	0.0%	0
Right	31	2%	6	0	8	45	12.9%	6
West Approach								
Left	0	0%	0	0	0	0	0.0%	0
Through	280	2%	56	20	99	455	7.1%	33
Right	154	2%	31	0	0	185	6.5%	12
Balaclava Road / New Dookie Road								
North Approach								
Left	147	2%	29	0	15	191	4.1%	8
Through	312	2%	62	69	0	443	1.3%	6
Right	66	2%	13	17	0	96	0.0%	0
South Approach								
Left	80	2%	16	0	0	96	2.5%	2
Through	376	2%	75	123	0	574	1.6%	9
Right	49	2%	10	0	15	74	14.3%	11
East Approach								
Left	71	2%	14	0	36	121	1.4%	2
Through	299	2%	60	12	161	532	4.0%	21
Right	245	2%	49	0	36	330	1.2%	4
West Approach								
Left	64	2%	13	31	0	108	3.1%	3
Through	215	2%	43	20	69	347	7.4%	26
Right	115	2%	23	0	0	138	0.0%	0

Appendix D:
Future Conditions SIDRA

SITE LAYOUT

Site: Traffic Signals - AM

New Site
Signals - Fixed Time Isolated



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Organisation: TRAFFIX GROUP PTY LTD | Created: Wednesday, 16 March 2016 12:15:47 PM
Project: P:\Synergy\Projects\GRP1\GRP19582\07-Analysis\SIDRA\Future Layout - Balaclava.sip6

MOVEMENT SUMMARY

Site: Traffic Signals - AM

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hawdon Street											
1	L2	80	1.6	0.839	63.7	LOS E	17.9	130.3	1.00	0.97	29.9
2	T1	369	5.5	0.839	58.1	LOS E	17.9	130.3	1.00	0.97	30.3
3	R2	123	3.2	0.839	63.8	LOS E	17.8	129.4	1.00	0.97	29.7
Approach		573	4.5	0.839	60.1	LOS E	17.9	130.3	1.00	0.97	30.1
East: New Dookie Road											
4	L2	92	6.3	0.545	50.3	LOS D	11.6	86.9	0.94	0.80	33.3
5	T1	357	8.9	0.545	44.7	LOS D	11.8	88.9	0.94	0.79	34.4
6	R2	188	8.5	0.861	71.0	LOS E	12.3	92.1	1.00	0.94	27.3
Approach		637	8.4	0.861	53.3	LOS D	12.3	92.1	0.95	0.84	31.8
North: Verney Road											
7	L2	245	5.6	0.849	55.5	LOS E	26.9	195.2	1.00	1.05	32.0
8	T1	523	2.7	0.849	51.1	LOS D	26.9	195.2	1.00	1.01	32.1
9	R2	132	2.7	0.849	57.6	LOS E	26.2	187.6	1.00	0.97	31.5
Approach		900	3.5	0.849	53.2	LOS D	26.9	195.2	1.00	1.01	32.0
West: Balaclava Road											
10	L2	145	27.6	0.860	63.7	LOS E	20.7	170.0	1.00	0.99	29.4
11	T1	479	14.6	0.860	57.2	LOS E	20.7	170.0	0.99	1.00	30.7
12	R2	113	37.1	0.613	62.3	LOS E	6.6	60.6	1.00	0.81	28.9
Approach		737	20.6	0.860	59.2	LOS E	20.7	170.0	1.00	0.97	30.2
All Vehicles		2846	9.2	0.861	56.2	LOS E	26.9	195.2	0.99	0.95	31.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.2	0.2	0.86	0.86
P2	East Full Crossing	53	42.6	LOS E	0.2	0.2	0.84	0.84
P3	North Full Crossing	53	44.3	LOS E	0.2	0.2	0.86	0.86
P4	West Full Crossing	53	51.5	LOS E	0.2	0.2	0.93	0.93
All Pedestrians		211	45.7	LOS E			0.87	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

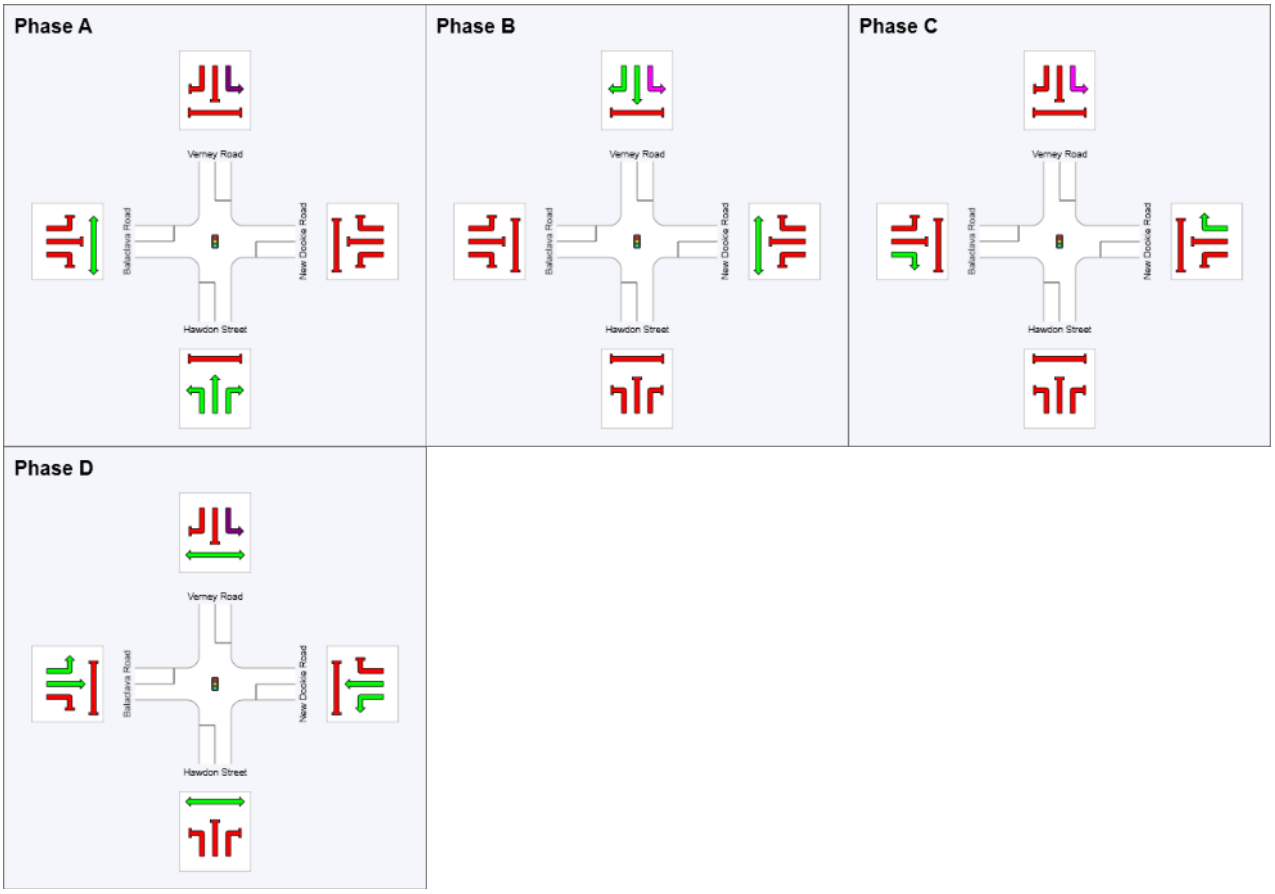
Site: Traffic Signals - AM

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Leading Right Turn (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, C1, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	92	0	38	59
Green Time (sec)	22	32	15	27
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	28	38	21	33
Phase Split	23 %	32 %	18 %	28 %



MOVEMENT SUMMARY

Site: Traffic Signals - PM

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hawdon Street											
1	L2	101	2.5	0.889	65.4	LOS E	25.9	184.0	1.00	1.03	29.5
2	T1	604	1.6	0.889	59.9	LOS E	25.9	184.0	1.00	1.04	30.0
3	R2	78	14.3	0.889	65.8	LOS E	25.6	185.3	1.00	1.04	29.5
Approach		783	3.0	0.889	61.2	LOS E	25.9	185.3	1.00	1.04	29.9
East: New Dookie Road											
4	L2	127	1.4	0.753	53.0	LOS D	19.2	137.9	0.99	0.88	32.6
5	T1	560	4.0	0.753	47.4	LOS D	19.4	140.6	0.99	0.88	33.5
6	R2	347	1.2	0.905	70.6	LOS E	23.6	167.1	1.00	0.98	27.4
Approach		1035	2.7	0.905	55.9	LOS E	23.6	167.1	0.99	0.92	31.1
North: Verney Road											
7	L2	201	4.1	0.875	64.1	LOS E	24.5	175.3	1.00	1.09	29.8
8	T1	466	1.3	0.875	58.8	LOS E	24.5	175.3	1.00	1.05	30.1
9	R2	101	0.0	0.875	64.7	LOS E	23.4	165.0	1.00	1.02	29.8
Approach		768	1.9	0.875	61.0	LOS E	24.5	175.3	1.00	1.05	30.0
West: Balaclava Road											
10	L2	114	3.1	0.914	76.4	LOS E	16.4	120.3	1.00	1.07	26.8
11	T1	365	7.4	0.914	70.8	LOS E	16.6	123.6	1.00	1.07	27.6
12	R2	145	0.0	0.722	65.1	LOS E	8.7	61.2	1.00	0.85	28.6
Approach		624	4.9	0.914	70.5	LOS E	16.6	123.6	1.00	1.02	27.7
All Vehicles		3211	3.0	0.914	61.2	LOS E	25.9	185.3	1.00	1.00	29.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	42.6	LOS E	0.2	0.2	0.84	0.84
P2	East Full Crossing	53	47.8	LOS E	0.2	0.2	0.89	0.89
P3	North Full Crossing	53	53.3	LOS E	0.2	0.2	0.94	0.94
P4	West Full Crossing	53	46.0	LOS E	0.2	0.2	0.88	0.88
All Pedestrians		211	47.4	LOS E			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

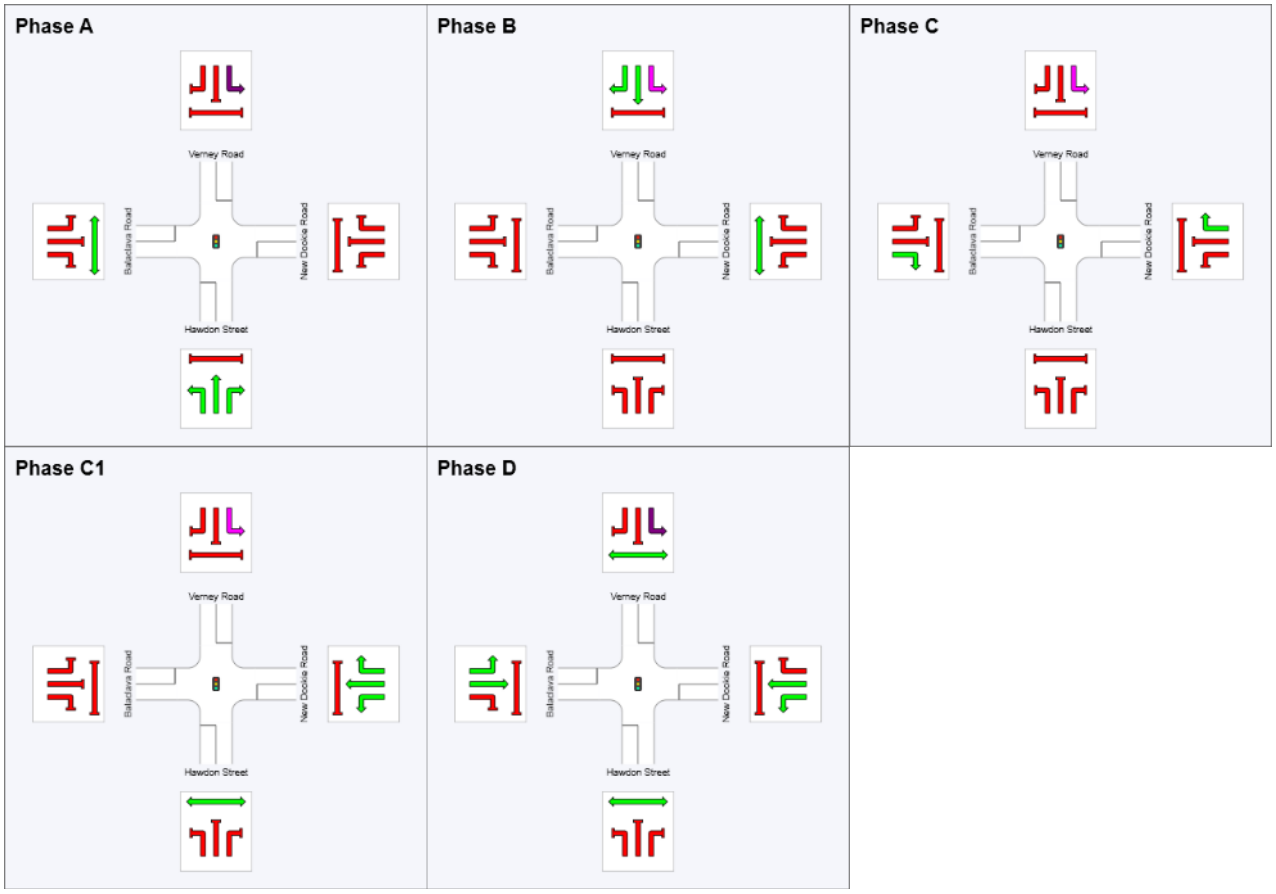
Site: Traffic Signals - PM

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Leading Right Turn
Movement Class: All Movement Classes
Input Sequence: A, B, C, C1, D
Output Sequence: A, B, C, C1, D

Phase Timing Results

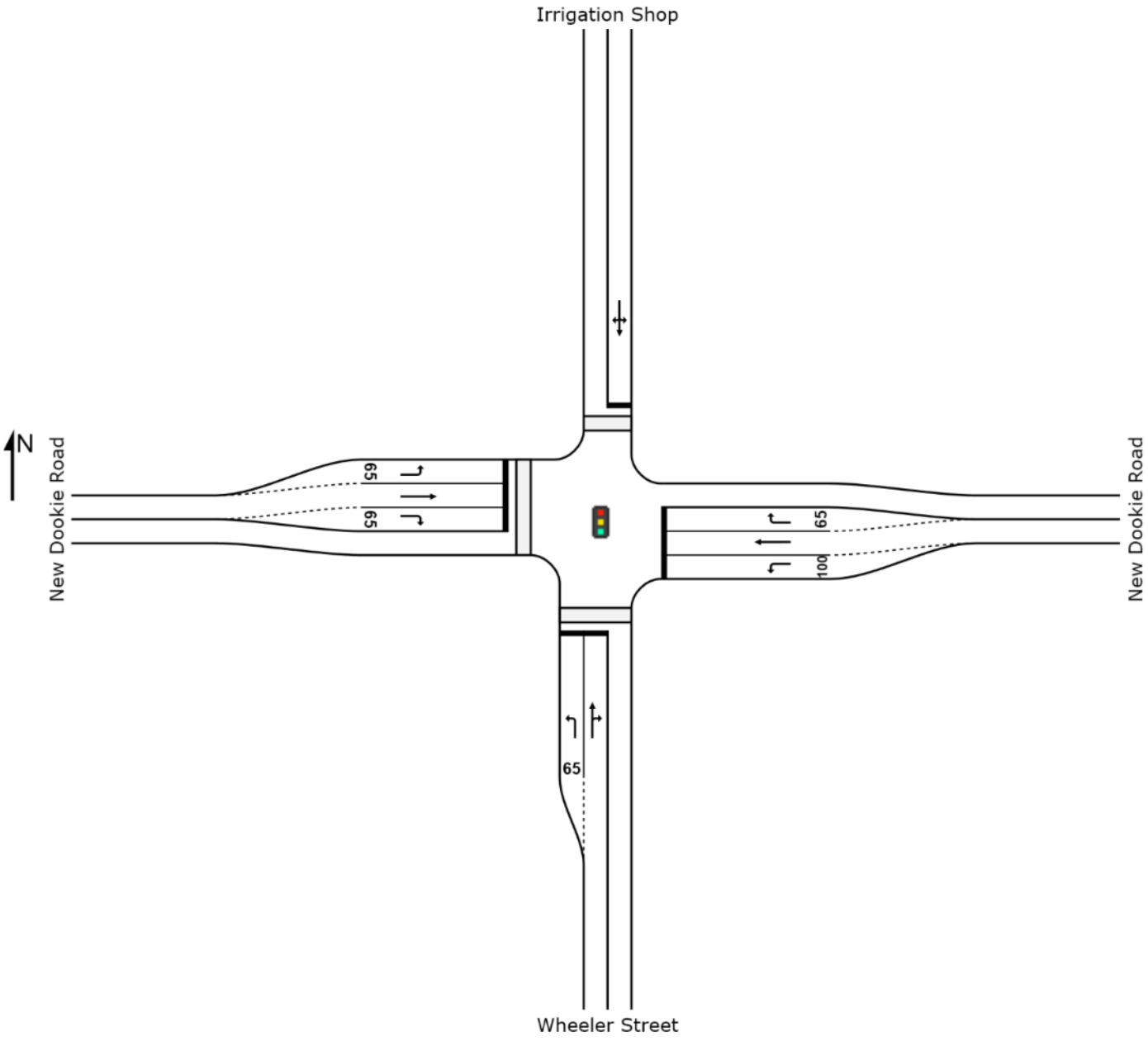
Phase	A	B	C	C1	D
Reference Phase	No	Yes	No	No	No
Phase Change Time (sec)	86	0	32	51	63
Green Time (sec)	28	26	13	6	17
Yellow Time (sec)	4	4	4	4	4
All-Red Time (sec)	2	2	2	2	2
Phase Time (sec)	34	32	19	12	23
Phase Split	28 %	27 %	16 %	10 %	19 %



SITE LAYOUT

Site: Wheeler Street / New Dookie Road - AM Future

New Site
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Wheeler Street / New Dookie Road - AM Future

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wheeler Street											
1	L2	137	19.4	0.240	31.8	LOS C	5.5	44.7	0.74	0.74	38.4
2	T1	1	0.0	0.473	60.9	LOS E	3.3	28.4	1.00	0.76	28.7
3	R2	55	25.9	0.473	66.8	LOS E	3.3	28.4	1.00	0.76	28.1
Approach		193	21.1	0.473	41.9	LOS D	5.5	44.7	0.82	0.75	34.7
East: New Dookie Road											
4	L2	58	26.2	0.061	15.9	LOS B	1.3	11.5	0.43	0.67	45.9
5	T1	542	6.2	0.601	24.0	LOS C	22.8	168.2	0.78	0.70	43.0
6	R2	2	0.0	0.007	22.6	LOS C	0.1	0.4	0.53	0.64	42.5
Approach		602	8.1	0.601	23.2	LOS C	22.8	168.2	0.75	0.70	43.3
North: Irrigation Shop											
7	L2	1	0.0	0.201	81.9	LOS F	0.2	1.5	1.00	0.61	25.6
8	T1	1	0.0	0.201	76.3	LOS E	0.2	1.5	1.00	0.61	25.9
9	R2	1	0.0	0.201	81.9	LOS F	0.2	1.5	1.00	0.61	25.7
Approach		3	0.0	0.201	80.0	LOS F	0.2	1.5	1.00	0.61	25.7
West: New Dookie Road											
10	L2	1	0.0	0.001	7.8	LOS A	0.0	0.1	0.20	0.58	51.9
11	T1	709	10.2	0.480	3.8	LOS A	12.7	96.8	0.34	0.31	56.5
12	R2	227	5.6	0.317	14.5	LOS B	5.0	36.5	0.61	0.75	47.0
Approach		938	9.1	0.480	6.4	LOS A	12.7	96.8	0.41	0.42	53.8
All Vehicles		1736	10.1	0.601	16.3	LOS B	22.8	168.2	0.57	0.55	46.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	19.9	LOS B	0.0	0.0	0.58	0.58
P3	North Full Crossing	21	18.7	LOS B	0.0	0.0	0.56	0.56
P4	West Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		63	30.9	LOS D			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

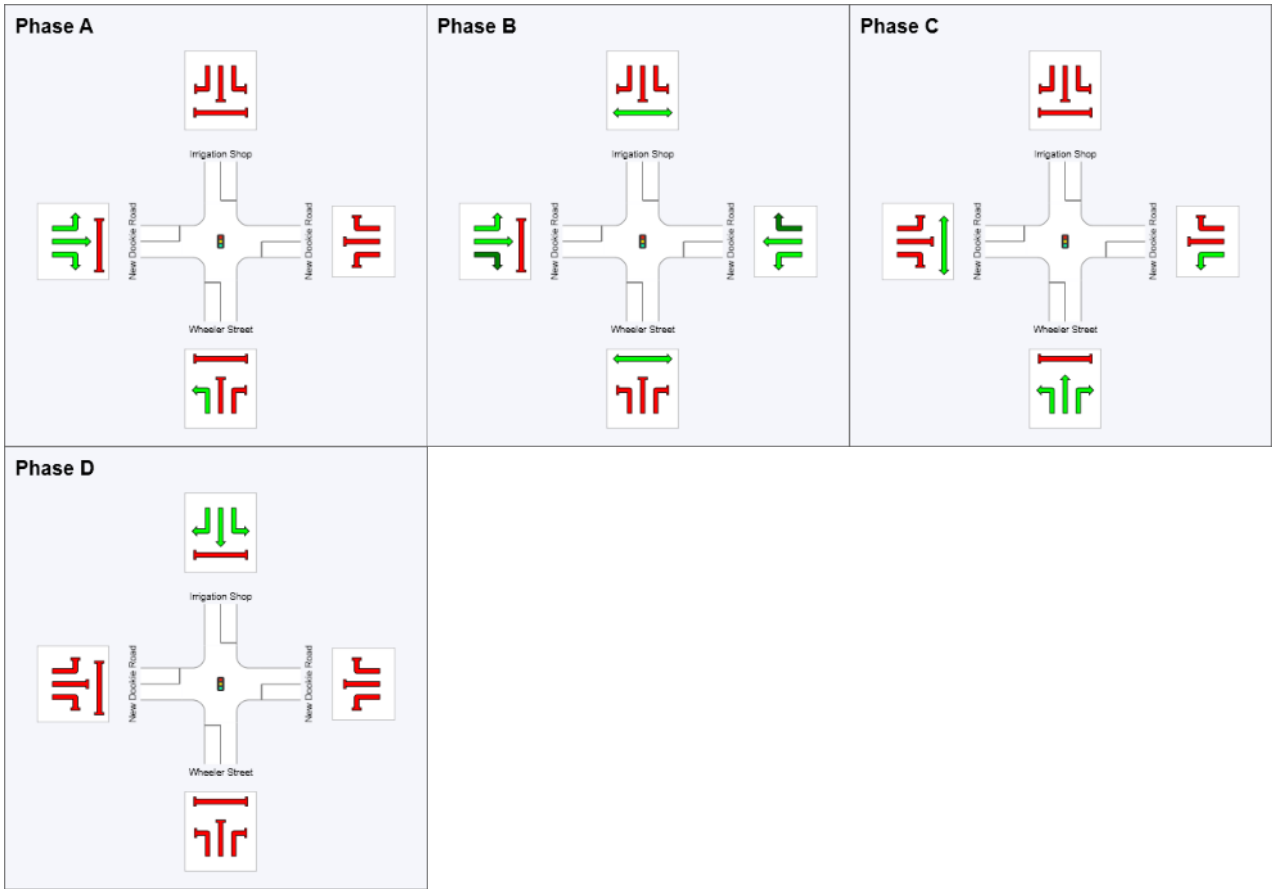
Site: Wheeler Street / New Dookie Road - AM Future

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: Leading Right Turn
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	81	0	64	79
Green Time (sec)	33	58	9	1
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	39	64	10	7
Phase Split	33 %	53 %	8 %	6 %



MOVEMENT SUMMARY

Site: Wheeler Street / New Dookie Road - PM Future

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wheeler Street											
1	L2	288	3.6	0.735	53.8	LOS D	14.7	106.0	0.99	1.00	31.4
2	T1	1	0.0	0.426	61.5	LOS E	2.9	22.5	1.00	0.75	28.6
3	R2	47	12.9	0.426	67.2	LOS E	2.9	22.5	1.00	0.75	28.1
Approach		337	4.9	0.735	55.7	LOS E	14.7	106.0	0.99	0.96	30.8
East: New Dookie Road											
4	L2	78	14.9	0.063	10.4	LOS B	1.2	9.8	0.29	0.64	49.6
5	T1	834	1.8	0.722	16.4	LOS B	32.4	230.5	0.73	0.68	47.2
6	R2	1	0.0	0.002	14.7	LOS B	0.0	0.2	0.39	0.62	46.8
Approach		913	2.9	0.722	15.9	LOS B	32.4	230.5	0.70	0.67	47.4
North: Irrigation Shop											
7	L2	1	0.0	0.201	81.9	LOS F	0.2	1.5	1.00	0.61	25.6
8	T1	1	0.0	0.201	76.3	LOS E	0.2	1.5	1.00	0.61	25.9
9	R2	1	0.0	0.201	81.9	LOS F	0.2	1.5	1.00	0.61	25.7
Approach		3	0.0	0.201	80.0	LOS F	0.2	1.5	1.00	0.61	25.7
West: New Dookie Road											
10	L2	1	0.0	0.001	7.6	LOS A	0.0	0.1	0.19	0.58	52.0
11	T1	479	7.1	0.315	2.8	LOS A	6.7	50.1	0.27	0.24	57.3
12	R2	195	6.5	0.435	20.4	LOS C	6.4	47.1	0.78	0.80	43.7
Approach		675	6.9	0.435	7.9	LOS A	6.7	50.1	0.41	0.40	52.6
All Vehicles		1927	4.7	0.735	20.2	LOS C	32.4	230.5	0.65	0.63	44.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	21	11.7	LOS B	0.0	0.0	0.44	0.44
P3	North Full Crossing	21	10.8	LOS B	0.0	0.0	0.43	0.43
P4	West Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		63	25.6	LOS C			0.61	0.61

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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PHASING SUMMARY

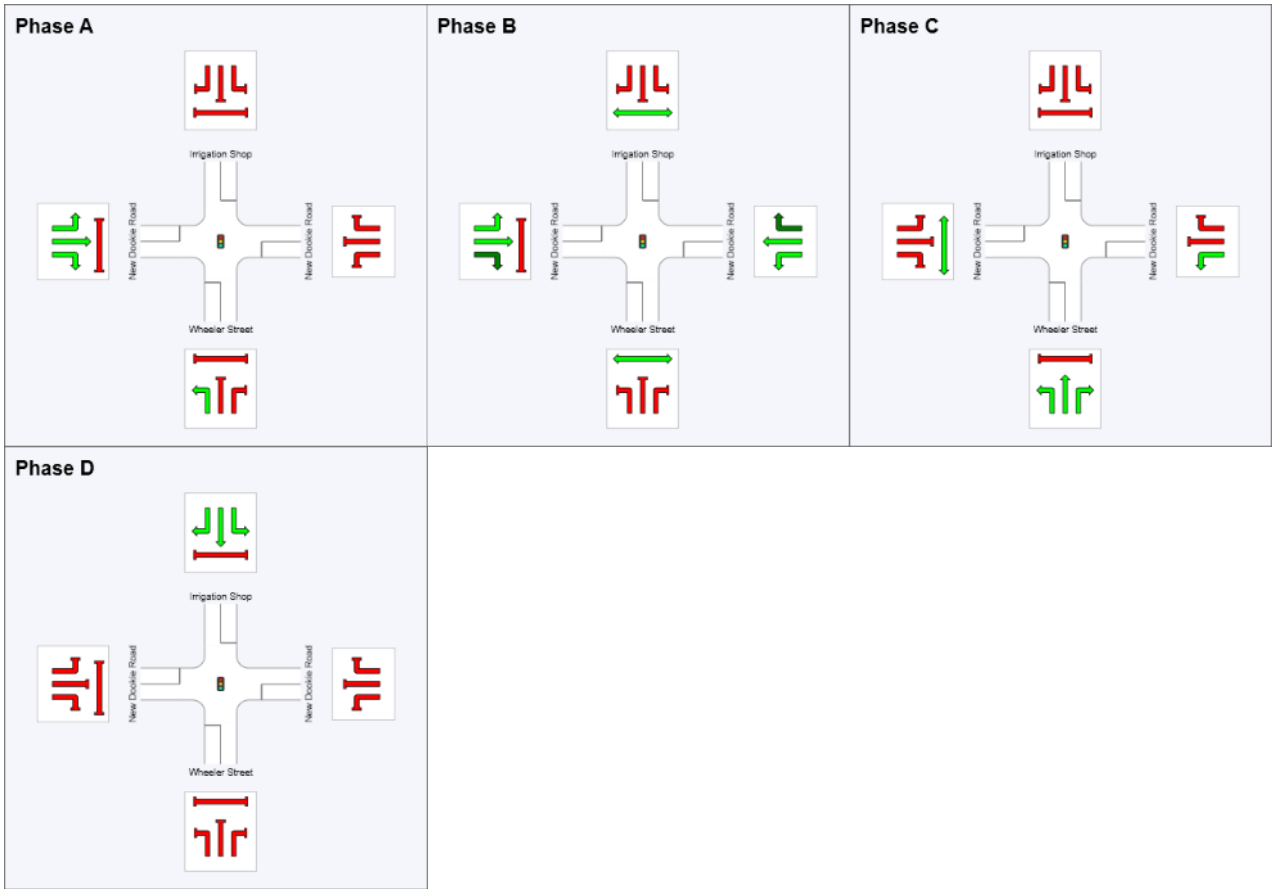
Site: Wheeler Street / New Dookie Road - PM Future

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: Leading Right Turn
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Reference Phase	No	Yes	No	No
Phase Change Time (sec)	96	0	80	94
Green Time (sec)	18	74	8	1
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	24	80	9	7
Phase Split	20 %	67 %	8 %	6 %



Appendix E: Functional Layout – New Dookie Road / Balaclava Road / Verney Road / Hawdon Street

FOR CONTINUATION REFER TO DRAWING No. G19582-02

REVISION	REVISION NOTES	REVISION DATE

GENERAL NOTES

1. BASE INFORMATION FROM AERIAL PHOTOGRAPHY (SOURCE NEARMAP APR 2015).
2. ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL.
3. MAIN ROAD - DOOKIE ROAD (SPEED ZONE 60km/h).
4. ALL PROPOSED FOOTPATHS AND PRAM CROSSINGS ARE TO BE CONSTRUCTED WITH TACTILE GROUND SURFACE INDICATORS TO DDA COMPLIANCE GUIDELINES. REFER TO AS 1428.4:2009.

DESIGNED R.CARBARNS 15 MAR 2016

CHECKED/APPROVED B.HODGES 15 MAR 2016

FILE NAME G19582-01-A.dgn | ISSUE A

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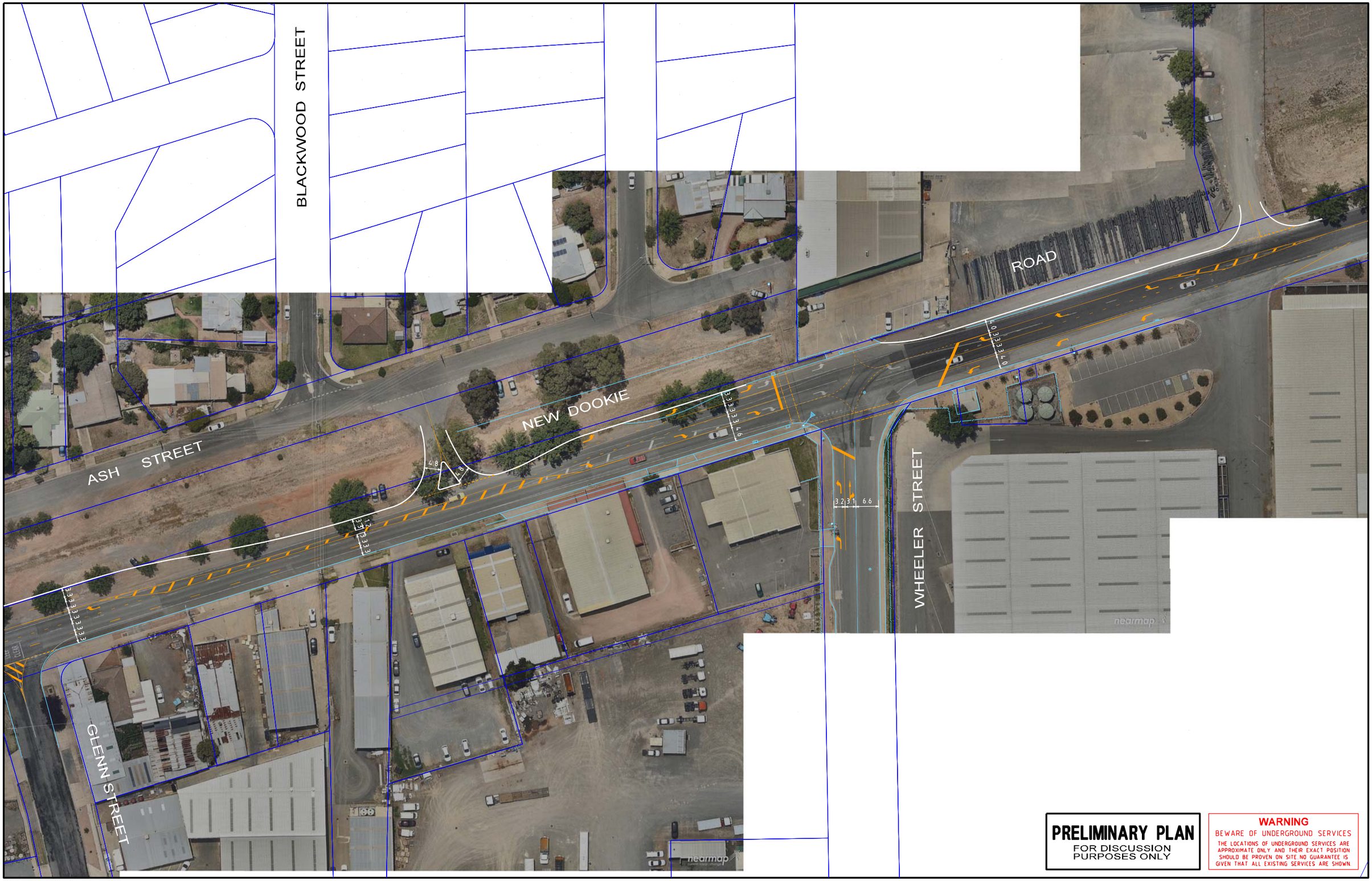
NEW DOOKIE ROAD - SHEPPARTON
VERNEY ROAD TO WHEELER STREET
GREATER SHEPPARTON CITY
FUNCTIONAL LAYOUT PLAN

SCALE 0 5 10 15 20 | SHEET No. | DWG No.

Appendix F: Functional Layout – New Dookie Road / Wheeler Street



FOR CONTINUATION REFER TO DRAWING No. G19582-01

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

REVISION	REVISION NOTES	REVISION DATE

GENERAL NOTES

1. BASE INFORMATION FROM AERIAL PHOTOGRAPHY (SOURCE NEARMAP APR 2015).
2. ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL.
3. MAIN ROAD - DOOKIE ROAD (SPEED ZONE 60km/h).
4. ALL PROPOSED FOOTPATHS AND PRAM CROSSINGS ARE TO BE CONSTRUCTED WITH TACTILE GROUND SURFACE INDICATORS TO DDA COMPLIANCE GUIDELINES. REFER TO AS 1428.4:2009.

DESIGNED	R CARBARNS 15 MAR 2016
CHECKED/APPROVED	B HODGES 15 MAR 2016
FILE NAME	G19582-01-A.dgn
ISSUE	A

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NEW DOOKIE ROAD - SHEPPARTON
VERNEY ROAD TO WHEELER STREET
GREATER SHEPPARTON CITY
FUNCTIONAL LAYOUT PLAN

SCALE 0 5 10 15 20 | SHEET No. 2 OF 2 | DWG No. G19582-02

Appendix G: VicRoads North Eastern Region Consultation Response