ATTACHMENT 2

Transport Generation Assessment

TTM Group

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Report

Crawford Land, Lismore NSW
Residential/Mixed-Use Development

STAGE 2
TRANSPORT GENERATION ASSESSMENT

Prepared for:

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May 2011

Reference: 34299

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06 June 2011

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1. Introduction

This report presents the findings of a transport generation assessment carried out by TTM Group for the proposed development of the Crawford Land, Lismore NSW.

The report covers traffic generated only by the residential use of the development.

1.1 Site Locality

The development site is illustrated in Figure 1 and described as follows:

- East of Military Road, Lismore
- Administered by Lismore City Council
- Covers 738,834m^2 including the following lots:
  - Lots 3 and 4 DP 365665
  - Lot 1 DP 772604
  - Lots 471 to 474 DP 755718
  - Lots 1 and 2 DP 1027540
  - Lot 1 DP 118533
  - Lot 1 DP 772605
  - Lots 102 and 103 DP 1009551

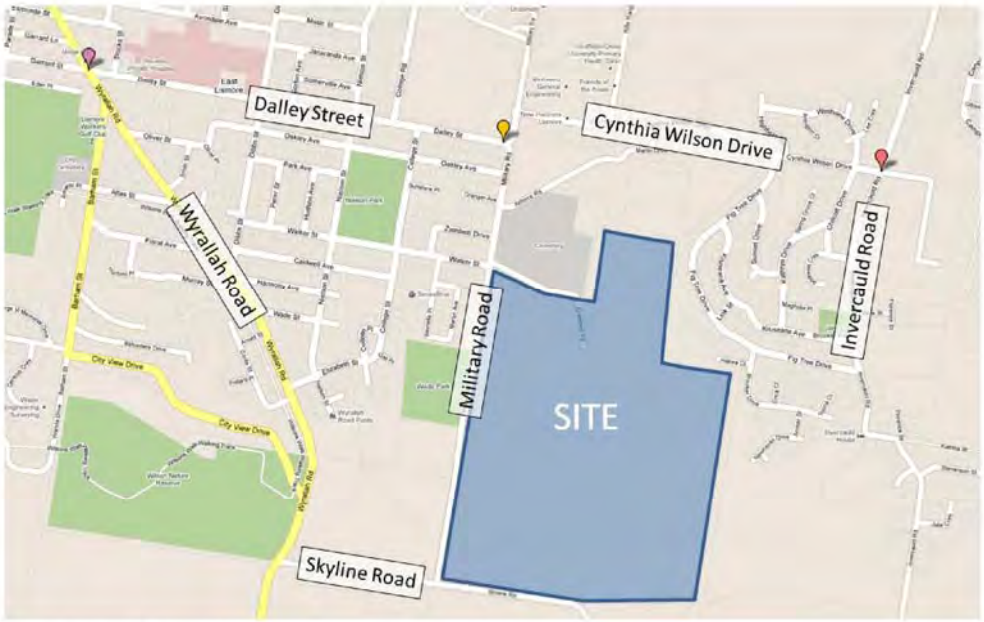

Figure 1: Site Location

1.2 Relevant Authorities

Military Road, Dalley Street, Cynthia Wilson Drive, Invercauld Road and Wyrallah Road are all administered by the Lismore City Council.

1.3 Current Use of Development Site

The majority of the site is currently undeveloped. The site was originally zoned primarily for the Southern Cross University technology park in the Lismore Urban Strategy 2003.

1.4 Proposed Development Plan

The development plan proposes a mixture of residential, commercial and recreational land uses as shown in Figure 2.

The development site is proposed to be divided as such:

- 214 Residential Lots
- A Mixed-Use area containing Neighbourhood Commercial and Shop-Top Housing
- Display Village Precinct
- The Asia Pacific Football Institute (APFI) Centre containing Sports Grounds, Practice Fields and Training and Conference Centre.

Figure 2: Site Development Plan

2. Development Traffic Analysis

2.1 Land Use Assumptions

The total additional traffic generation of the site is largely variable based on the assumptions made and trip generation rates utilised.

The site proposes 214 residential lots of differing lot sizes. Of the 214 lots, 60% are proposed to be detached dwelling homes, with the remaining 40% being multi-unit duplexes. The proposed lot configuration is subject to change and in order to be conservative it is assumed that there are a total of 220 residential lots with 132 detached houses and 88 duplexes (176 units).

The mixed-use area is proposed to contain approximately 2,000 m^2 GFA of low intensity neighbourhood commercial with shop-top housing. The shop-top housing is assumed to be included at a rate of 50 m^2 floor area per unit, giving a total of 40 units over the 2,000 m^2 of commercial GFA. The commercial area is likely to contain a variety of office, grocery, shopping and medical uses and hence requires a generalised commercial trip generation rate. The low intensity and neighbourhood nature of the commercial shops indicates that the majority of patrons will originate from within the development, i.e. it is unlikely that many customers will travel to the development from other parts of Lismore to shop. Due to the expected internal usage, it is appropriate to reduce the number of trips generated by the commercial use.

The display village precinct is proposed to contain approximately 4 display homes for the purposes of selling the residential lots. The display homes are proposed to be reverted into residential properties as their ultimate use. The eventual residential use of the display village is used during the assessment as the homes will not continue to operate as display homes once all lots have been sold.

The proposed Asia Pacific Football Institute is incomparable to other soccer complexes due to the proposed training nature and relative exclusiveness of the fields. The institute is not envisaged to have a large spectator capacity, instead focusing on player centric training. The centre intends to include accommodation and amenities for visiting national and international teams. A Futsal Centre and a third practice field are potential future additions to the institute. The relative exclusiveness and self-contained nature of the institute will reduce the expected number of external trips.

2.2 Trip Generation Rates

Trip generation rates for land uses are available from a number of traffic authorities, including the RTA in their "Guide to Traffic Generating Developments" (2002) and the Institute of Transportation Engineers in their "ITE Trip Generation Rates 8th Edition" (2008).

Considering the assumptions from Section 2.1 and trip generation rates from the RTA and ITE traffic authorities, the AM and PM peak hour trip generation for the development is shown in Table 1.

Table 1: Peak Hour Trip Generation

Land Use	Peak Hour Trip Generation Rate	Unit	Internal Trips Reduction	Peak Hour Generated Trips	Authority
Single Family Homes (Detached Homes)	AM: 0.75 PM: 1.01 Trips Per Dwelling	132 Dwellings	0%	AM: 99.0 Trips PM: 133.3 Trips	ITE (2008)
Apartments (Duplexes)	AM: 0.51 PM: 0.62 Trips Per Unit	176 Units	0%	AM: 89.8 Trips PM: 109.1 Trips	ITE (2008)
Apartments (Shop Top Housing)	AM: 0.51 PM: 0.62 Trips Per Unit	40 Units	0%	AM: 20.4 Trips PM: 24.8 Trips	ITE (2008)
Dwelling Houses (Display Village)	AM: 0.75 PM: 1.01 Trips Per Dwelling	4 Dwellings	0%	AM: 3.0 Trips PM: 4.04 Trips	ITE (2008)
Mixed-Use Neighbourhood Commercial	2.5 Trips per 100 m^2 GFA	2000 m^2 GFA	50%	25 Trips	Assumed (based on ITE (2008) and RTA (2002) rates)
Soccer Complex (APSI)	20.67 Trips per Field	6 Fields 3 Half Fields 1 Futsal Court	50%	98.2 Trips	ITE (2008)
			Total Trips	**AM: 336 Trips PM: 395 Trips**	

From Table 1, it is calculated that the fully developed site will generate **336 AM and 395 PM peak hour trips.**

2.3 Traffic Distributions

ITE (2008) further documents typical AM and PM peak hour distributions of residential trips as seen in Table 2.

Table 2: ITE (2008) Peak Hour Trip Distribution

Land Use	Peak Hour	Percentage IN	Percentage OUT
Single Family Homes	AM	25%	75%
	PM	63%	37%
Apartments	AM	20%	80%
	PM	65%	35%

Non-residential traffic is assumed to have a distribution split of 50% in and 50% out during both peak hours, leading to the distributions in Table 3.

Table 3: Development Trip Distribtion

Peak Hour	Trips IN	Trips OUT
AM	110	226
PM	235	160

The development traffic has been distributed assuming 10% of the development traffic will utilise the proposed Military Road / Skyline Road intersection. Trips using Military Road are split in a 60:40 ratio of travelling to or origination from the west and east of the site respectively. The development's assumed impact on the surrounding network is summarised in Figure 3 and Figure 4.

Crawford Land, Lismore

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10 March 2011

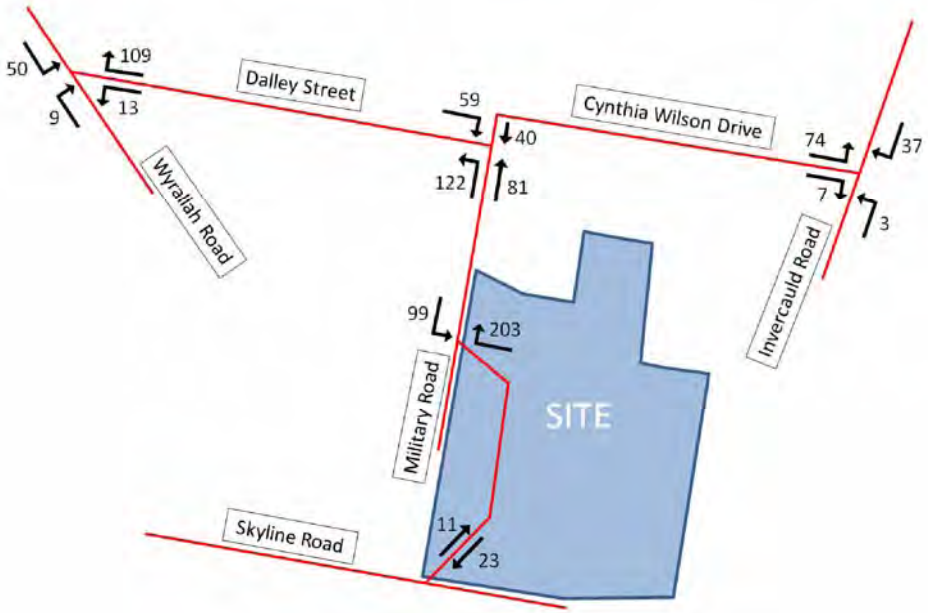


Figure 3: AM Peak Development Traffic Distributions

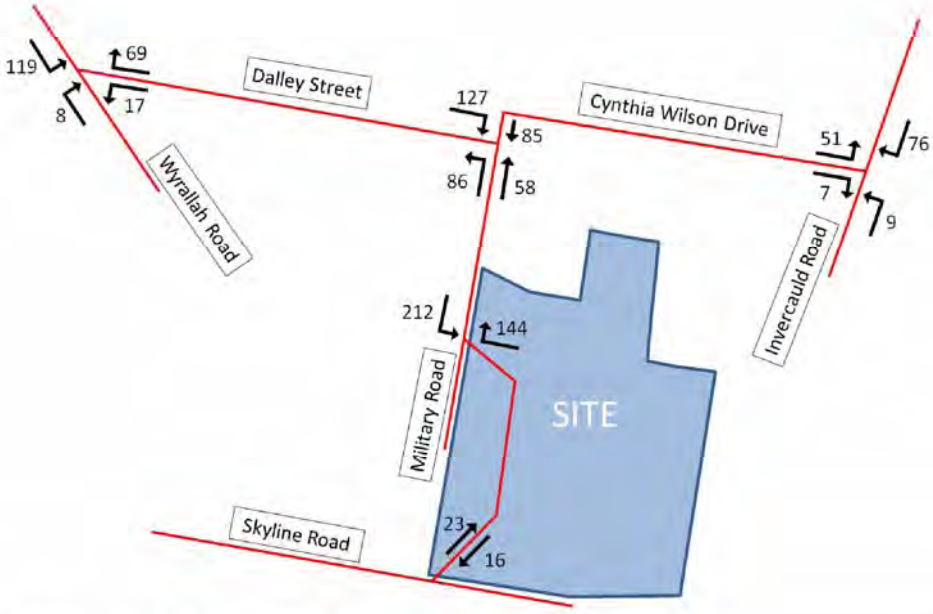


Figure 4: PM Peak Development Traffic Distributions

2.4 Background Growth Rate

Historical average annual daily traffic (AADT) volumes on Wyrrallah Road and the Bruxner Highway from the RTA from 1982 to 2004 and 2007 TTM Data, shown in Figure 5, reveals a compound growth of between 2.1% and 2.6% per annum. In order to be conservative, a compound background growth rate of 3% per annum has been applied to the existing volumes in the analysis to calculate future traffic volumes.

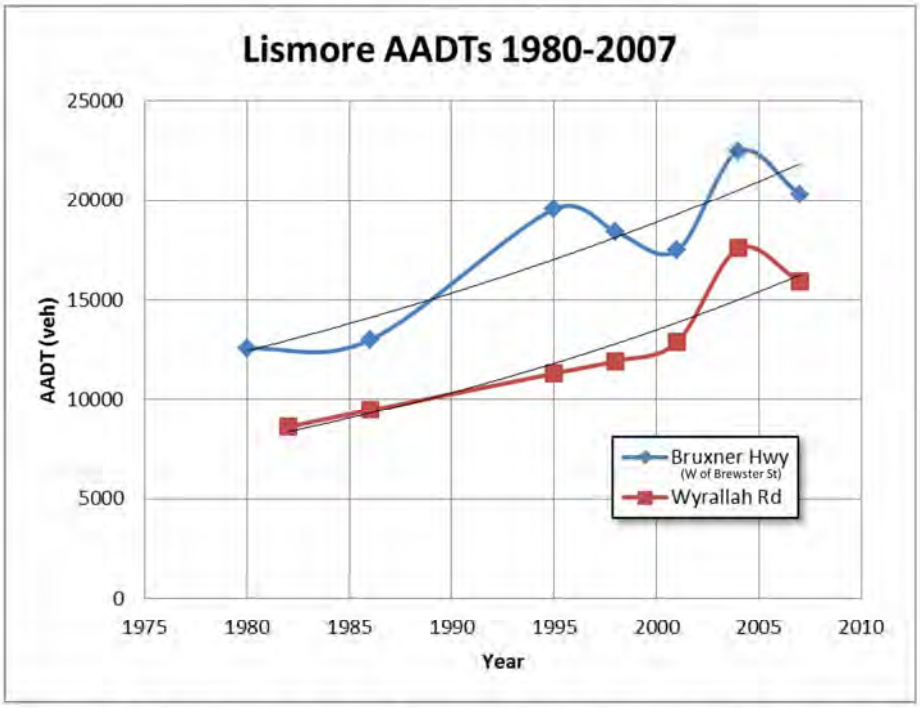


Figure 5: Traffic Growth on the Bruxner Highway and Wyrallah Road (RTA 1980-2004, TTM 2007)

2.5 Impacts Analysis

Potential impacts from the development have been assessed for each intersection using SIDRA Intersection 5.0.

The 3 intersections analysed for this report are:

- Military Road / Dalley Street
- Invercauld Road / Cynthia Wilson Drive
- Dalley Street / Wyrallah Road

It must be noted that that the intersections that give access to the site along Military Road and Skyline Road have not been assessed in regards to their performance as part of this assessment due to the low existing and assigned volumes.

TTM Group has undertaken surveys at the three intersections in order to facilitate the impact analysis of the development generated traffic. The full tabular survey data can be found in Appendix A.

The following sections contain detailed tables describing the SIDRA model output, split in two cases, the future with only base traffic, and the future with base traffic plus additional traffic generated by the site. The impact is assessed at the predicted year of opening, and again 10 years after opening, giving a 10 year design horizon. For the purposes of the assessment, and opening year of 2015 is assumed.

The performance of an intersection can be measured in multiple ways. The degree of saturation (DoS) is a measurement of the current volume of traffic along a section of road compaired to its theoretical volume capacity. If an intersection exceeds practical levels of the degree of saturation, ameliorative works may be required in order to obtain acceptable performance.

The ability for an unsignalised intersection to absorb right turns can also be assessed by determining the absorption capacity of the intersection. Austroads provides a formula that can be used to determine the practical amount of right turn movements can be completed during an hour based on the volume of traffic at the intersection.

The results of the impact analysis help to determine if ameliorative works are needed in the future and hence who should burden the costs of such works.

All movement summary tables for the intersections can be found in Appendix B.

2.5.1 Dalley Street / Military Road

The Dalley Street / Military Road intersection is currently a 3 armed give-way intersection to the north of the development site. It is assumed that the majority of traffic generated by the site will utilise this intersection. Generated traffic distributions have been distributed based on the ITE In/Out percentages for the corresponding peak and the surveyed traffic volumes on the intersection.

The peak times observed at the intersection are as follows:

- AM Peak hour: 8:00-9:00am
- PM Peak hour: 4:30-5:30pm

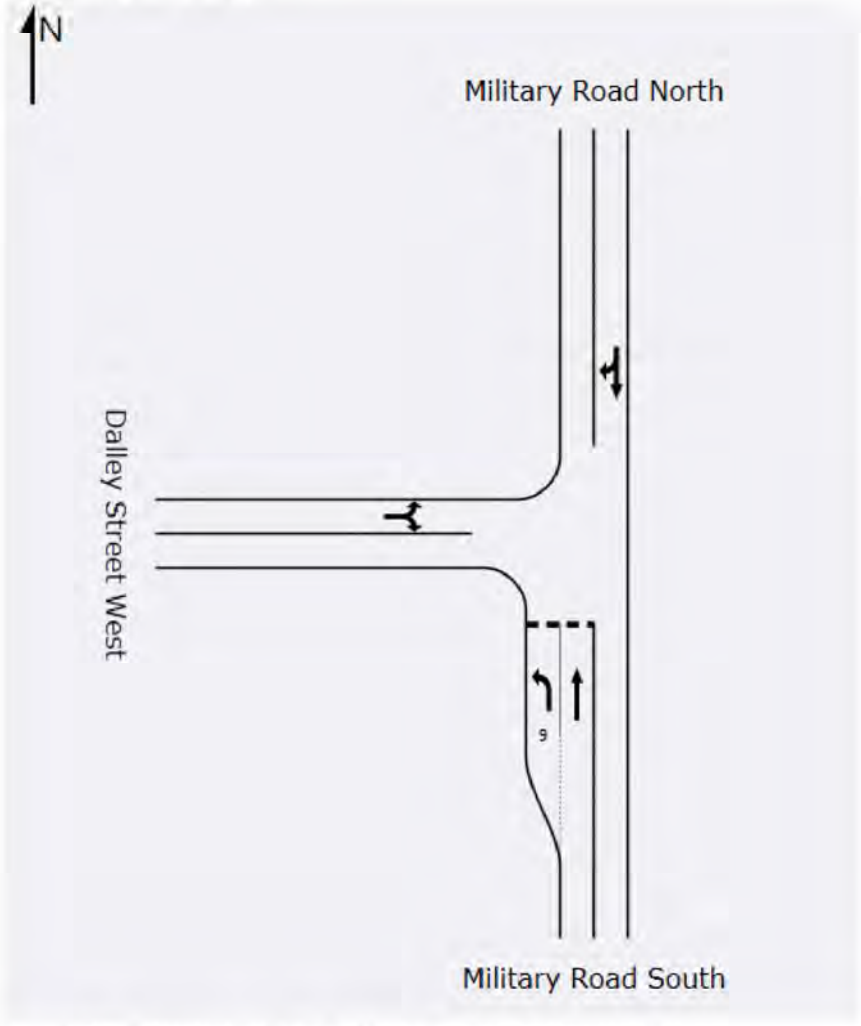


Figure 6: SIDRA Representation of Dalley Street / Military Road Intersection

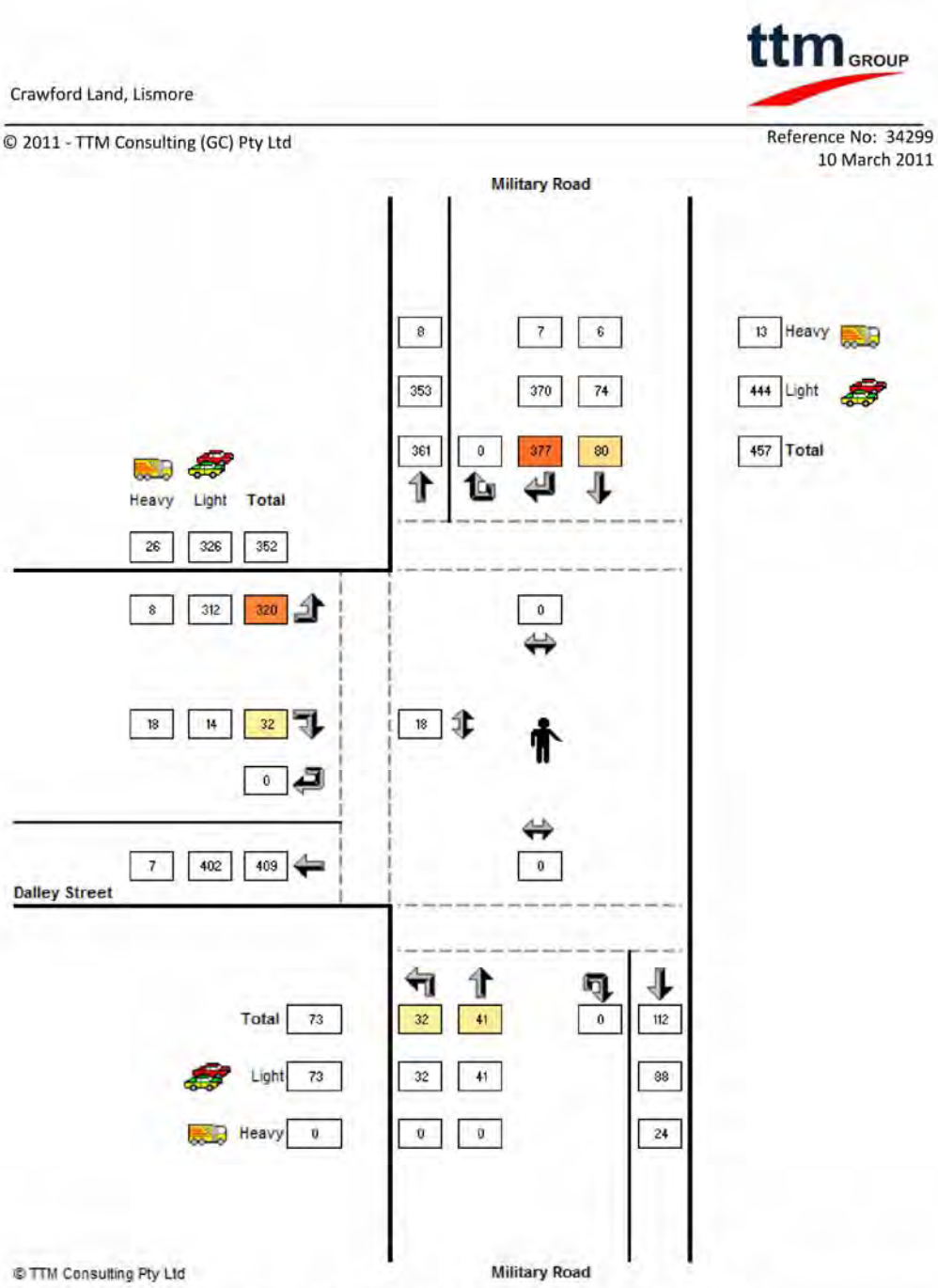


Figure 7: AM Peak Dalley Street / Military Road Volumes (8:00-9:00am 10/02/11)

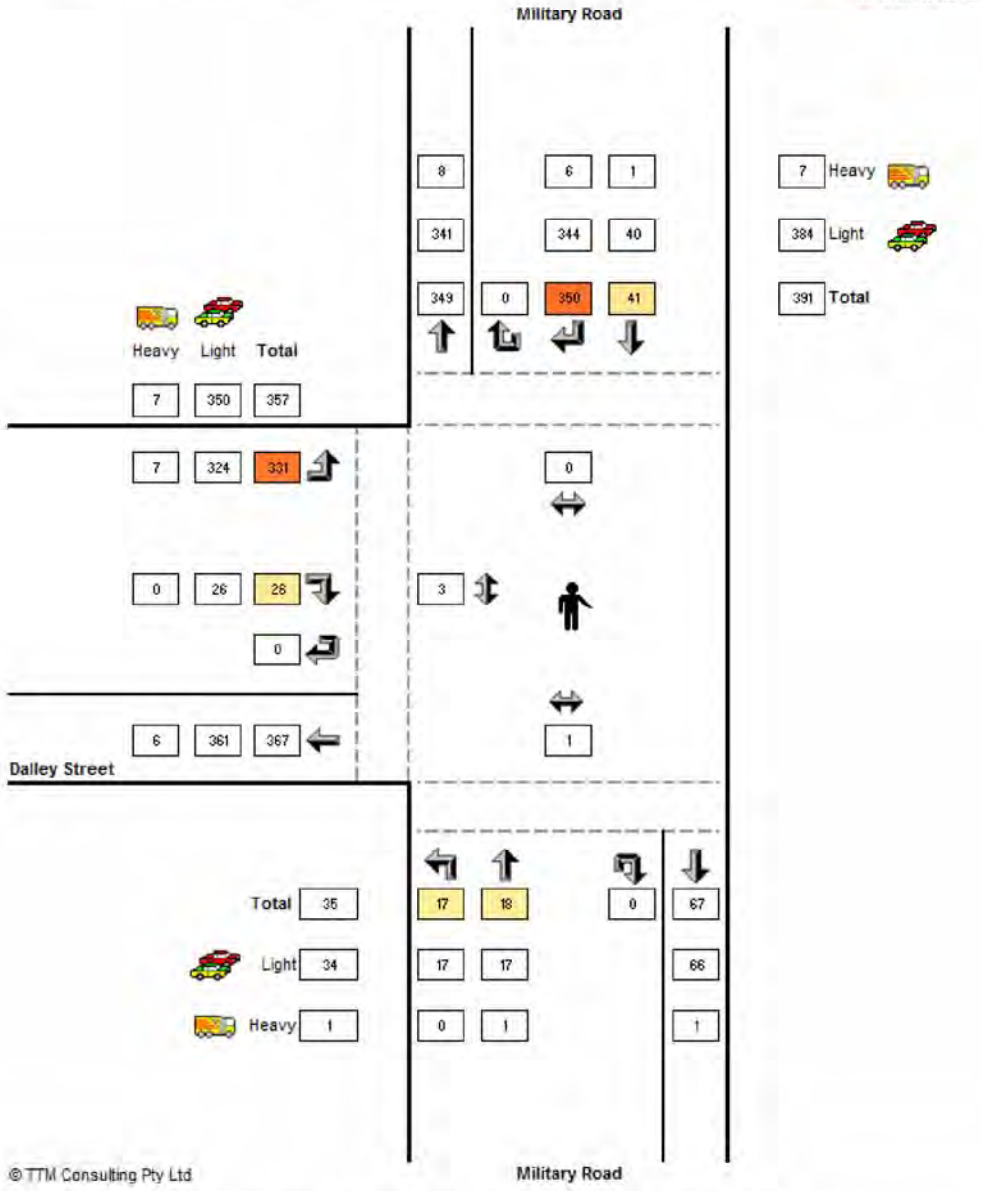


Figure 8: PM Peak Dalley Street / Military Road Volumes (4:30-5:30pm 09/02/11)

Table 4: SIDRA Output – Dalley Street / Military Road – 2025 AM (Base)

MOVEMENT SUMMARY

Site: 2025 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	48	0.0	0.124	10.5	LOS B	0.4	2.5	0.54	0.80	39.9
2	T	62	0.0	0.154	12.7	LOS B	0.7	5.1	0.65	0.83	38.2
Approach		110	0.0	0.154	11.8	LOS B	0.7	5.1	0.60	0.81	38.9
North: Military Road North											
8	T	121	7.5	0.367	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	570	1.9	0.367	6.8	LOS A	0.0	0.0	0.00	0.70	43.0
Approach		691	2.9	0.367	5.6	LOS A	0.0	0.0	0.00	0.57	44.0
West: Dalley Street West											
10	L	484	2.5	0.294	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	48	56.3	0.294	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		532	7.4	0.294	6.6	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1333	4.4	0.367	6.5	NA	0.7	5.1	0.05	0.61	43.3

Table 5: SIDRA Output – Dalley Street / Military Road – 2025 AM (Development)

MOVEMENT SUMMARY

Site: Development 2025 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	170	0.0	0.436	12.6	LOS B	1.7	11.9	0.60	0.92	38.3
2	T	143	0.0	0.437	19.5	LOS C	2.7	18.6	0.79	1.01	34.0
Approach		313	0.0	0.437	15.8	LOS C	2.7	18.6	0.69	0.96	36.2
North: Military Road North											
8	T	161	7.5	0.388	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	570	1.9	0.388	6.8	LOS A	0.0	0.0	0.00	0.71	43.0
Approach		731	3.1	0.388	5.3	LOS A	0.0	0.0	0.00	0.55	44.3
West: Dalley Street West											
10	L	484	2.5	0.338	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	107	56.3	0.338	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		591	12.2	0.337	6.7	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1635	5.8	0.437	7.8	NA	2.7	18.6	0.13	0.65	42.2

Table 6: SIDRA Output – Dalley Street / Military Road – 2025 PM (Base)

MOVEMENT SUMMARY

Site: 2025 PM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	26	0.0	0.065	9.9	LOS A	0.2	1.2	0.51	0.74	40.3
2	T	27	5.9	0.068	12.5	LOS B	0.3	2.3	0.62	0.79	38.5
Approach		53	3.0	0.068	11.2	LOS B	0.3	2.3	0.57	0.77	39.4
North: Military Road North											
8	T	62	2.5	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	529	1.7	0.313	6.8	LOS A	0.0	0.0	0.00	0.68	43.0
Approach		591	1.8	0.313	6.1	LOS A	0.0	0.0	0.00	0.61	43.6
West: Dalley Street West											
10	L	501	2.1	0.287	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	39	0.0	0.287	6.6	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		540	1.9	0.287	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1184	1.9	0.313	6.5	NA	0.3	2.3	0.03	0.62	43.3

Table 7: SIDRA Output – Dalley Street / Military Road – 2025 PM (Development)

MOVEMENT SUMMARY

Site: Development 2025 PM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	112	0.0	0.277	10.7	LOS B	0.9	6.1	0.55	0.84	39.8
2	T	85	5.9	0.289	18.7	LOS C	1.5	10.8	0.78	0.94	34.5
Approach		197	2.5	0.289	14.2	LOS C	1.5	10.8	0.65	0.88	37.3
North: Military Road North											
8	T	147	2.5	0.356	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	529	1.7	0.356	6.8	LOS A	0.0	0.0	0.00	0.71	43.0
Approach		676	1.9	0.356	5.3	LOS A	0.0	0.0	0.00	0.55	44.3
West: Dalley Street West											
10	L	501	2.1	0.354	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	166	0.0	0.354	6.6	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		667	1.6	0.354	6.5	LOS A	0.0	0.0	0.00	0.62	43.3
All Vehicles		1540	1.8	0.356	7.0	NA	1.5	10.8	0.08	0.62	42.8

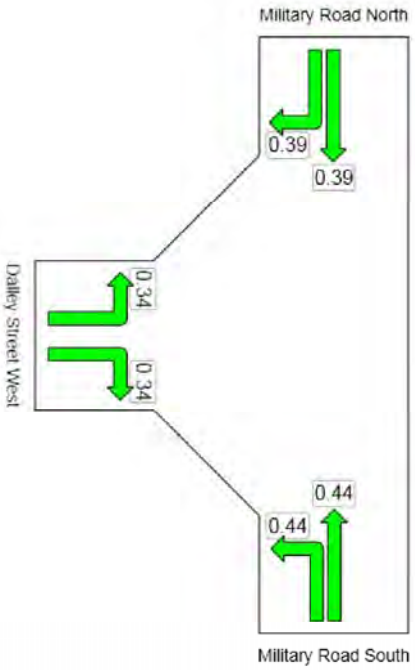


Figure 9: SIDRA Output – Dalley Street / Military Road – 2025 AM (Development DoS)

Analysis of the cases reveals that the Degree of Saturation (DoS) for all movements for the development cases both in 2015 and 2025 remains low, even during the largest volumes in the 2025 AM Development case.

The practical absorption capacity of Dalley Street for right turn movements from Military Road is well above the predicted right turns in both the 2025 AM and PM cases, as shown in Table 8.

Table 8: Military Road Right Turn into Dalley Street Absorption Capacity

Military Road Right Turn into Dalley Street	2025 AM Peak Hour		2025 PM Peak Hour	
	Practical Capacity	Predicted Right Turns	Practical Capacity	Predicted Right Turns
With Development	311	143	288	85
Without Development	317	62	328	27

The intersection remains well below the practical limits of performance, therefore the development is considered to have minimal impact on the intersection; hence no ameliorative works would be required within the 10 year design horizon.

2.5.2 Invercauld Road / Cynthia Wilson Drive

The Invercauld Road / Cynthia Wilson Drive intersection is currently a 3 armed give-way intersection to the north-east of the development site. It is connected to the site via the Military Road / Dalley Street intersection to the west. To the north of the Military Road / Dalley Street intersection is the Southern Cross University; a conservative assumption is that the all of the traffic generated by the site utilising the northern leg of Military Road / Dalley Street will also use the Invercauld Road / Cynthia Wilson Drive intersection. Generated traffic distributions have been distributed based on the ITE In/Out percentages for the corresponding peak and the surveyed traffic volumes on the intersection.

The peak times observed at the intersection are as follows:

- AM Peak hour: 8:00-9:00am
- PM Peak hour: 5:00-6:00pm

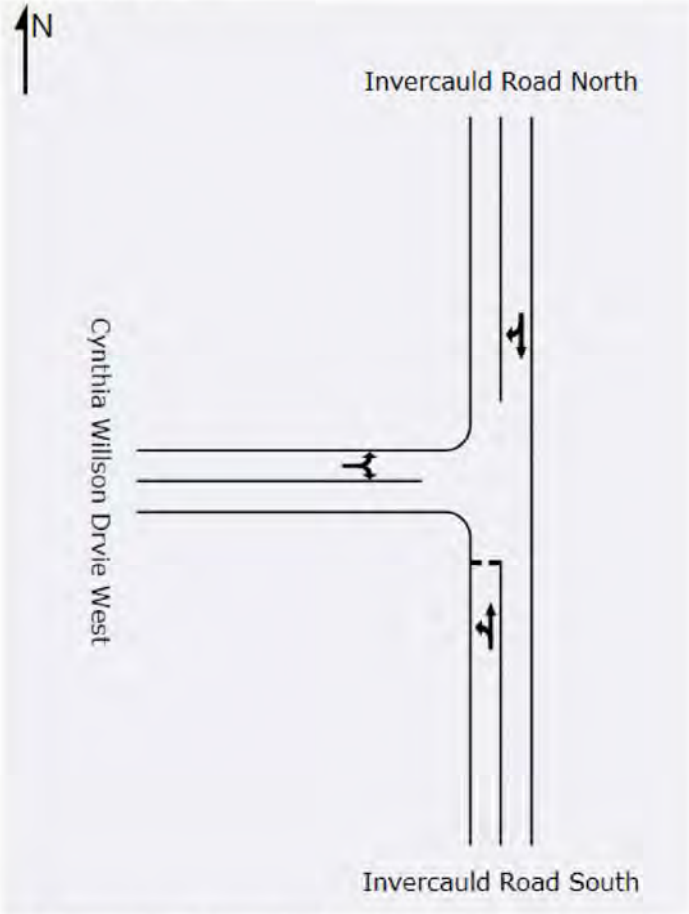


Figure 10: SIDRA Representation of Invercauld Road / Cynthia Wilson Drive Intersection

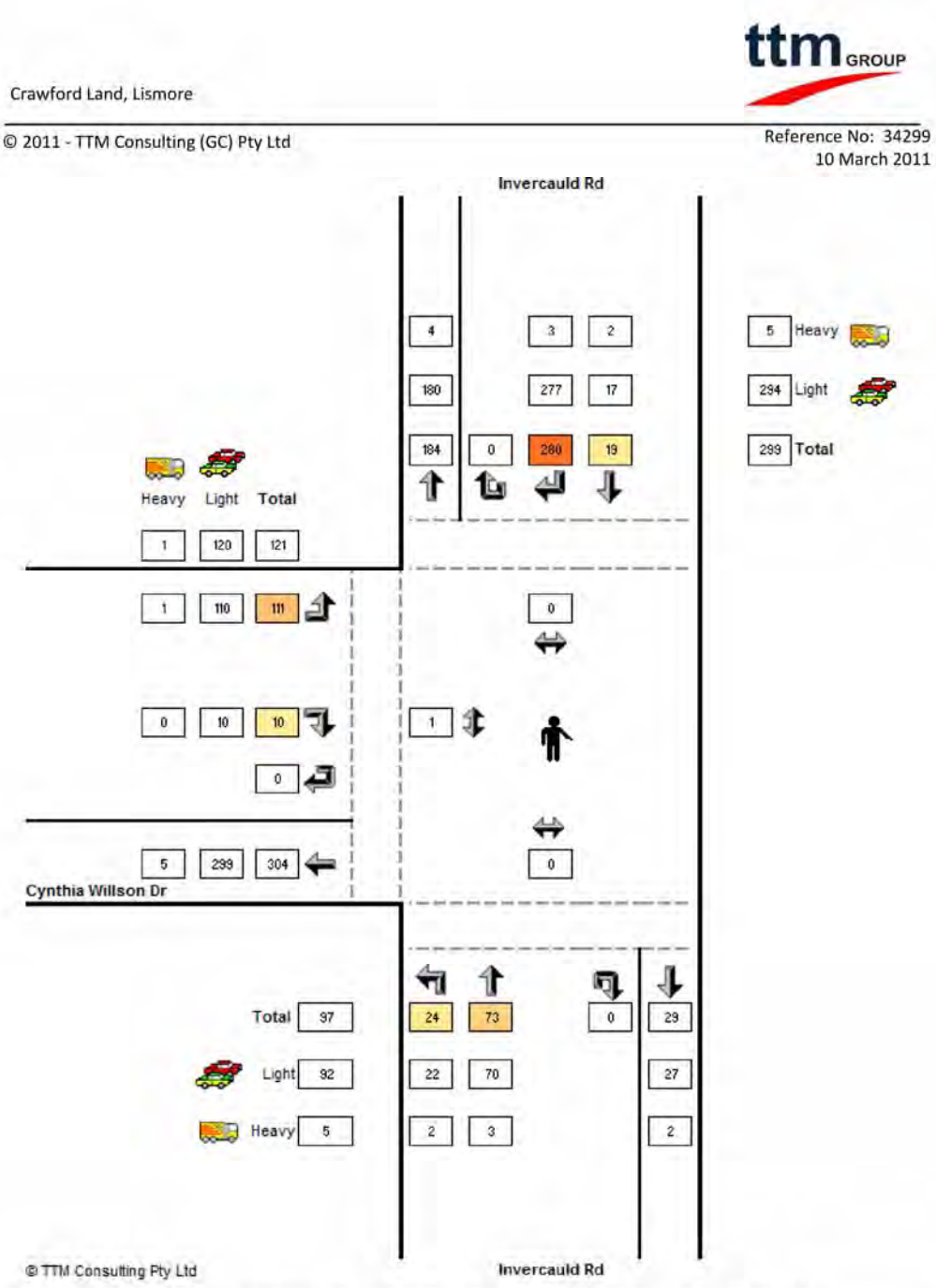


Figure 11: AM Peak Invercauld Road / Cynthia Wilson Drive Volumes (8:00-9:00am 09/02/10)

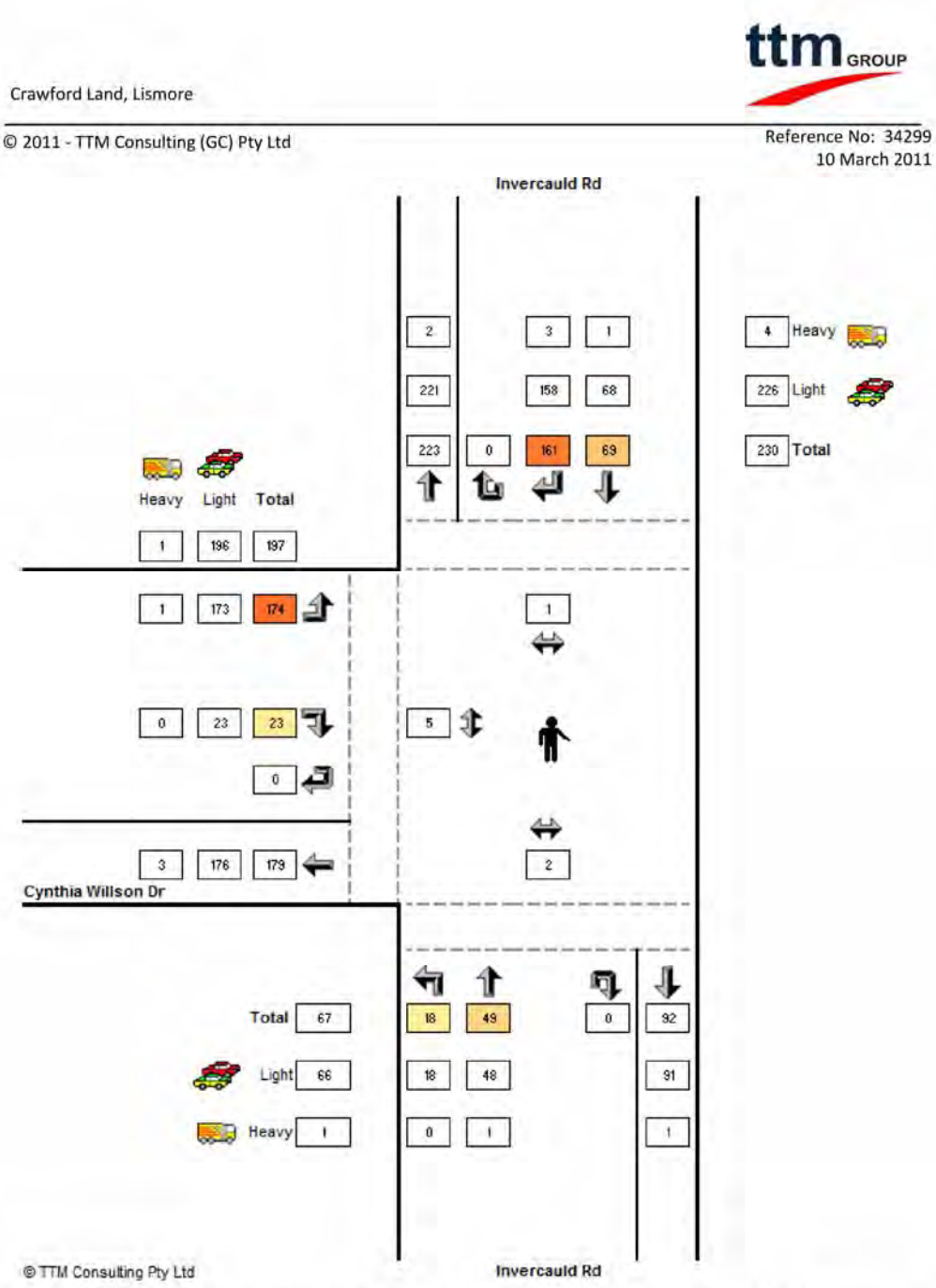


Figure 12: PM Peak Invercauld Road / Cynthia Wilson Drive Volumes (5:00-6:00pm 09/02/10)

Table 9: SIDRA Output – Invercauld Road / Cynthia Wilson Drive – 2025 AM (Base)

MOVEMENT SUMMARY

Site: AM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Invercauld Road South											
1	L	37	8.3	0.139	9.7	LOS A	0.7	5.2	0.33	0.76	47.7
2	T	114	4.1	0.139	8.3	LOS A	0.7	5.2	0.33	0.59	48.5
Approach		151	5.1	0.139	8.6	LOS A	0.7	5.2	0.33	0.63	48.3
North: Invercauld Road North											
8	T	30	10.5	0.246	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	436	1.1	0.247	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		466	1.7	0.247	7.9	LOS A	0.0	0.0	0.00	0.67	49.2
West: Cynthia Willson Drvie West											
10	L	173	0.9	0.100	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	16	0.0	0.100	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		189	0.8	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		806	2.1	0.247	8.1	NA	0.7	5.2	0.06	0.66	49.0

Table 10: SIDRA Output – Invercauld Road / Cynthia Wilson Drive – 2025 AM (Development)

MOVEMENT SUMMARY

Site: Development AM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Invercauld Road South											
1	L	41	8.3	0.155	10.1	LOS B	0.6	5.8	0.41	0.78	47.4
2	T	114	4.1	0.154	8.7	LOS A	0.6	5.8	0.41	0.63	48.1
Approach		155	5.2	0.155	9.1	LOS B	0.6	5.8	0.41	0.67	47.9
North: Invercauld Road North											
8	T	30	10.5	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	473	1.1	0.266	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		503	1.7	0.266	8.0	LOS A	0.0	0.0	0.00	0.68	49.2
West: Cynthia Willson Drvie West											
10	L	247	0.9	0.142	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	22	0.0	0.142	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		269	0.8	0.142	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		927	2.0	0.266	8.2	NA	0.6	5.8	0.07	0.67	48.9

Table 11: SIDRA Output – Invercauld Road / Cynthia Wilson Drive – 2025 PM (Base)

MOVEMENT SUMMARY

Site: PM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	28	0.0	0.097	9.5	LOS A	0.5	3.4	0.38	0.69	47.5
2	T	76	2.0	0.097	8.3	LOS A	0.5	3.4	0.38	0.63	48.2
Approach		104	1.5	0.097	8.6	LOS A	0.5	3.4	0.38	0.64	48.0
North: Invercauld Road North											
8	T	107	1.4	0.187	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	251	1.9	0.188	8.5	LOS A	0.0	0.0	0.00	0.80	48.6
Approach		358	1.8	0.188	6.0	LOS A	0.0	0.0	0.00	0.56	51.6
West: Cynthia Willson Drvie West											
10	L	271	0.6	0.162	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	36	0.0	0.161	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		307	0.5	0.162	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		769	1.2	0.188	7.2	NA	0.5	3.4	0.05	0.61	50.0

Table 12: SIDRA Output – Invercauld Road / Cynthia Wilson Drive – 2025 PM (Development)

MOVEMENT SUMMARY

Site: Development PM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	37	0.0	0.113	9.9	LOS A	0.6	4.0	0.43	0.72	47.4
2	T	76	2.0	0.113	8.7	LOS A	0.6	4.0	0.43	0.66	47.9
Approach		113	1.3	0.114	9.1	LOS A	0.6	4.0	0.43	0.68	47.7
North: Invercauld Road North											
8	T	107	1.4	0.228	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	327	1.9	0.228	8.5	LOS A	0.0	0.0	0.00	0.78	48.6
Approach		434	1.8	0.228	6.4	LOS A	0.0	0.0	0.00	0.59	51.0
West: Cynthia Willson Drvie West											
10	L	322	0.6	0.192	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	43	0.0	0.192	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		365	0.5	0.192	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		912	1.2	0.228	7.5	NA	0.6	4.0	0.05	0.63	49.7

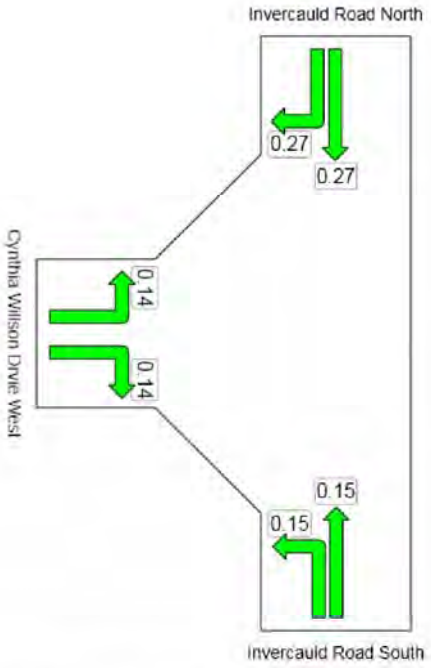


Figure 13: SIDRA Output – Invercauld Road / Cynthia Wilson Drive – 2025 AM (Development DoS)

Analysis of the cases reveals that the Degree of Saturation (DoS) for all movements for the development cases both in 2015 and 2025 remains low, even during the largest volumes in the 2025 AM Development case.

The practical absorption capacity of Invercauld Road for right turn movements from Cynthia Wilson Drive is well above the predicted right turns in both the 2025 AM and PM cases, as shown in Table 13.

Table 13: Cynthia Wilson Drive Right Turn into Invercauld Road Absorption Capacity

Cynthia Wilson Drive Right Turn into Invercauld Road	2025 AM Peak Hour		2025 PM Peak Hour	
	Practical Capacity	Predicted Right Turns	Practical Capacity	Predicted Right Turns
With Development	506	25	556	44
Without Development	540	16	626	36

The intersection remains well below the practical limits of performance, therefore the development is considered to have minimal impact on the intersection; hence no ameliorative works would be required within the 10 year design horizon.

2.5.3 Wyrallah Road / Dalley Street

The Wyrallah Road / Dalley Street intersection is currently a 3 armed give-way intersection to the north-west of the development site. It is connected to the site via the Military Road / Dalley Street intersection to the east. In order to be conservative, it is assumed that the all of the traffic generated by the site utilising the western leg of Military Road / Dalley Street will also use the Wyrallah Road / Dalley Street intersection.

TTM Group understands that Lismore City Council has plans to upgrade the Wyrallah Road / Dalley Street intersection from the existing give-way situation to a roundabout. This upgrade was originally expected to be completed by the end of 2010, but as of the time of the surveys being taken, no works had been completed. TTM Group contacted Lismore City Council concerning the upgrade and Council have confirmed that the upgrade is still to take place, but the exact timeframe is uncertain.

Generated traffic distributions have been distributed based on the ITE In/Out percentages for the corresponding peak and the surveyed traffic volumes on the intersection.

The peak times observed at the intersection are as follows:

- AM Peak hour: 8:00-9:00am
- PM Peak hour: 4:30-5:30pm

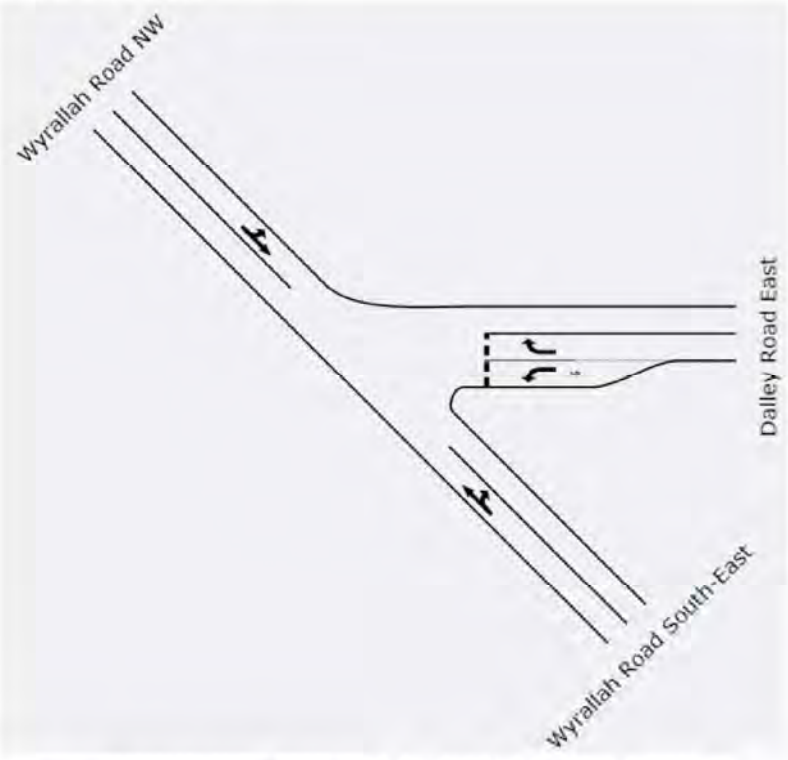


Figure 14: SIDRA Representation of Current Wyrallah Road / Dalley Street Intersection

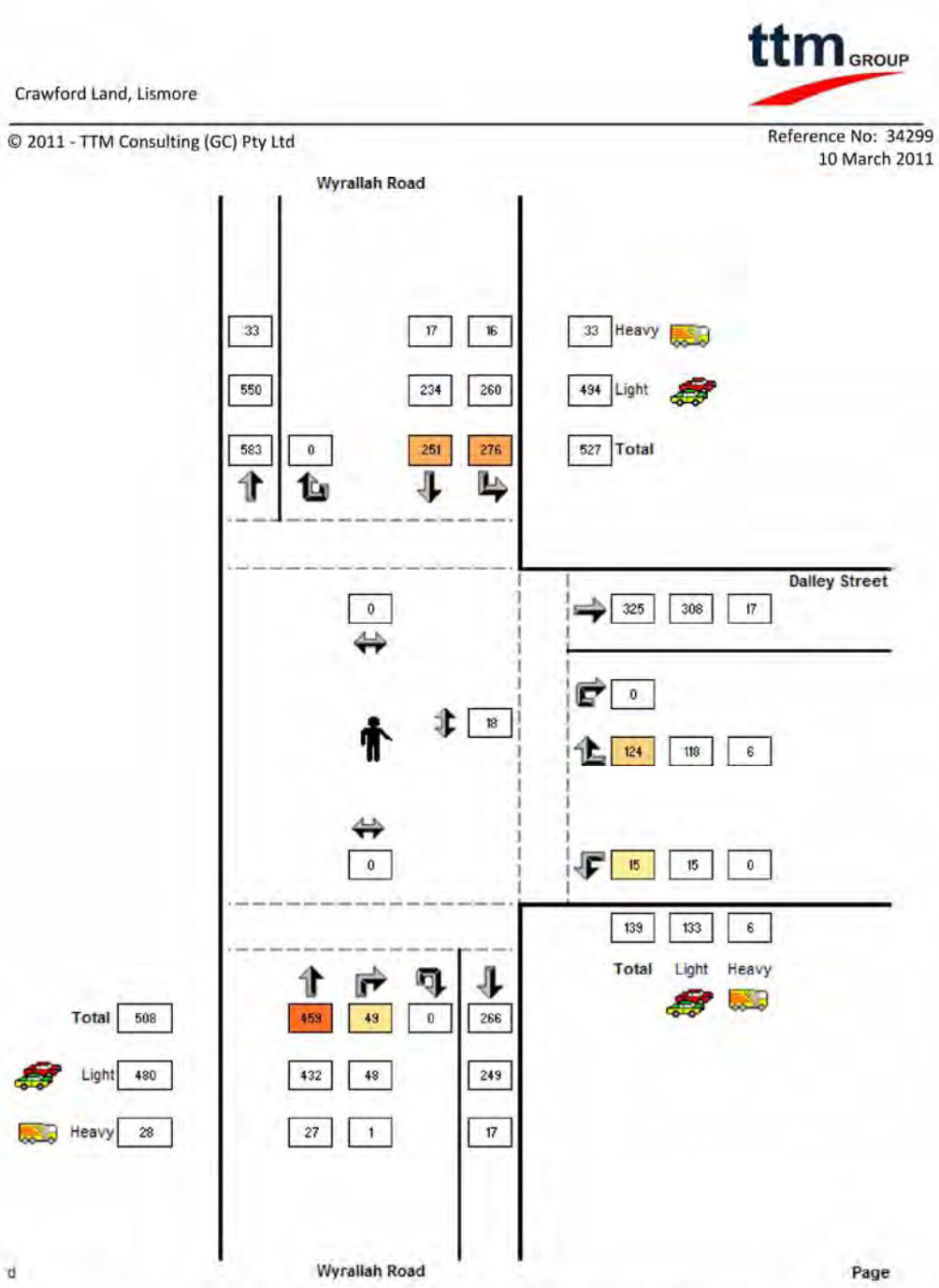


Figure 15: AM Peak Wyrallah Road / Dalley Street Volumes (8:00-9:00am 10/02/11)

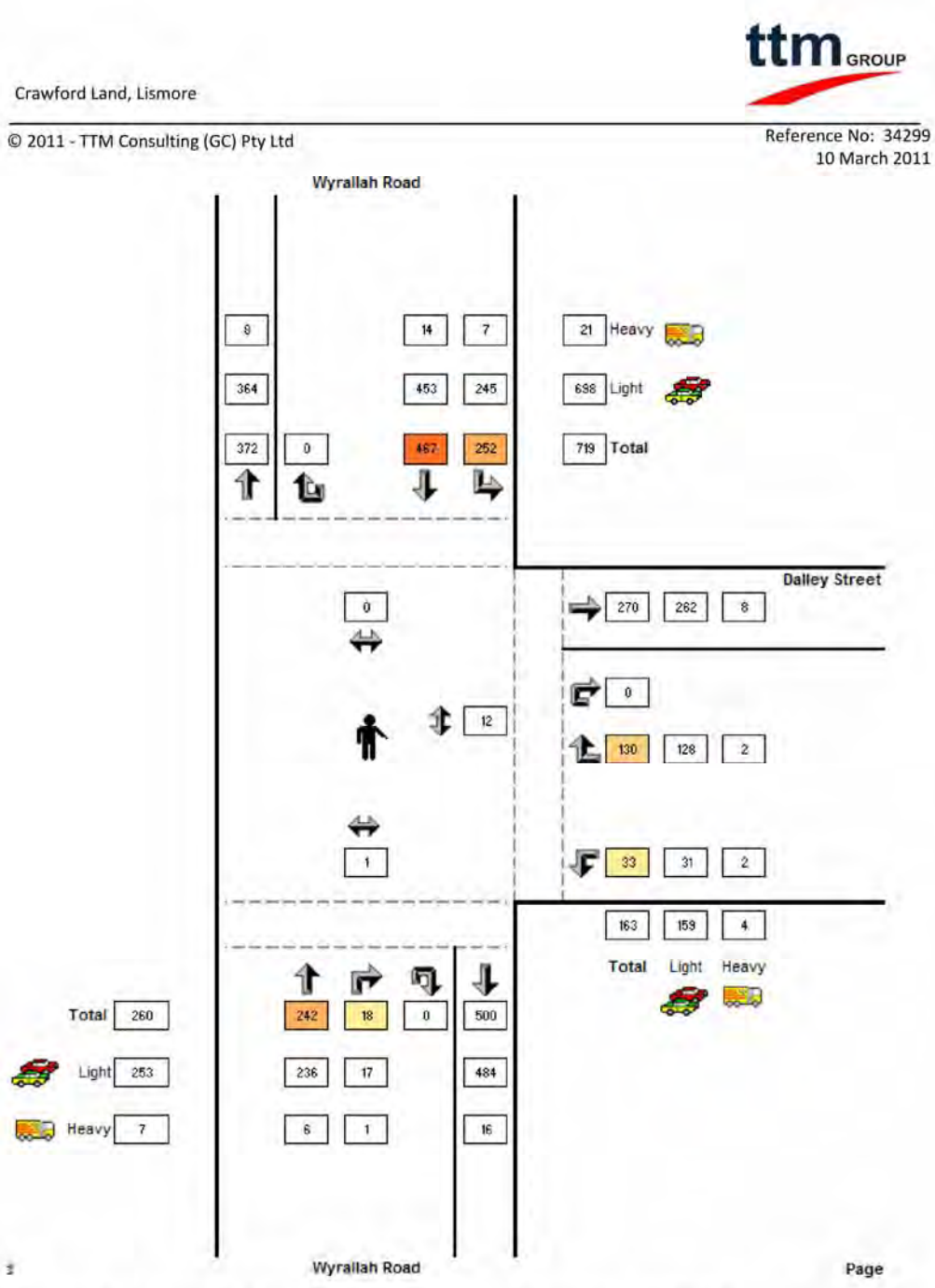


Figure 16: PM Peak Wyrallah Road / Dalley Street Volumes (4:30-5:30pm 09/02/11)

Table 14: SIDRA Output – Wyrallah Road / Dalley Street – 2011 AM (Existing)

MOVEMENT SUMMARY

Site: AM PEAK 2011

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	459	5.9	0.307	4.5	LOS A	4.3	31.5	0.72	0.00	48.0
3	R	49	2.0	0.306	13.8	LOS B	4.3	31.5	0.72	1.09	46.5
Approach		508	5.5	0.307	5.4	LOS B	4.3	31.5	0.72	0.11	47.9
East: Dalley Road East											
4	L	15	0.0	0.044	11.3	LOS B	0.1	0.6	0.44	0.70	45.9
6	R	124	4.8	0.725	50.7	LOS F	4.8	35.0	0.94	1.22	25.0
Approach		139	4.3	0.725	46.5	LOS F	4.8	35.0	0.88	1.17	26.3
North West: Wyrallah Road NW											
7	L	275	5.8	0.289	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	251	6.8	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		526	6.3	0.289	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1173	5.7	0.725	9.7	NA	4.8	35.0	0.42	0.37	45.7

Table 15: SIDRA Output – Wyrallah Road / Dalley Street – 2011 PM (Existing)

MOVEMENT SUMMARY

Site: PM PEAK 2011

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	242	2.5	0.157	5.9	LOS A	2.2	15.9	0.71	0.00	48.2
3	R	18	5.6	0.158	15.2	LOS C	2.2	15.9	0.71	1.07	45.2
Approach		260	2.7	0.157	6.5	LOS C	2.2	15.9	0.71	0.07	48.0
East: Dalley Road East											
4	L	33	6.1	0.125	13.7	LOS B	0.3	1.9	0.55	0.83	43.8
6	R	130	1.5	0.667	41.6	LOS E	4.3	30.6	0.92	1.17	27.9
Approach		163	2.4	0.668	35.9	LOS E	4.3	30.6	0.84	1.10	30.1
North West: Wyrallah Road NW											
7	L	252	2.8	0.382	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	467	3.0	0.382	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		719	2.9	0.383	2.8	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1142	2.8	0.668	8.4	NA	4.3	30.6	0.28	0.37	48.2

Table 16: SIDRA Output – Wyrallah Road / Dalley Street – 2015 AM (Base)

MOVEMENT SUMMARY

Site: AM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	517	5.9	0.353	6.1	LOS A	6.0	43.9	0.80	0.00	46.9
3	R	55	2.0	0.353	15.4	LOS C	6.0	43.9	0.80	1.12	45.3
Approach		572	5.5	0.353	7.0	LOS C	6.0	43.9	0.80	0.11	46.8
East: Dalley Road East											
4	L	17	0.0	0.052	11.8	LOS B	0.1	0.7	0.47	0.72	45.4
6	R	140	4.8	1.085	267.2	LOS F	24.1	175.5	1.00	2.63	7.1
Approach		157	4.3	1.082	239.6	LOS F	24.1	175.5	0.94	2.42	7.9
North West: Wyrallah Road NW											
7	L	311	5.8	0.326	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	283	6.8	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		594	6.3	0.326	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1323	5.7	1.082	33.3	NA	24.1	175.5	0.46	0.52	30.7

Table 17: SIDRA Output – Wyrallah Road / Dalley Street – 2015 AM (Development)

MOVEMENT SUMMARY

Site: Development AM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	517	5.9	0.373	7.3	LOS A	6.8	49.8	0.88	0.00	45.9
3	R	64	2.0	0.374	16.6	LOS C	6.8	49.8	0.88	1.12	44.4
Approach		581	5.5	0.373	8.3	LOS C	6.8	49.8	0.88	0.12	45.7
East: Dalley Road East											
4	L	30	0.0	0.093	12.1	LOS B	0.2	1.3	0.46	0.76	45.2
6	R	248	4.8	2.084	2018.4	LOS F	169.1	1232.6	1.00	7.65	1.1
Approach		278	4.3	2.088	1801.9	LOS F	169.1	1232.6	0.94	6.90	1.2
North West: Wyrallah Road NW											
7	L	361	5.8	0.354	8.0	LOS A	0.0	0.0	0.00	0.79	49.3
8	T	283	6.8	0.354	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		644	6.2	0.354	4.5	LOS A	0.0	0.0	0.00	0.44	53.5
All Vehicles		1503	5.6	2.088	338.4	NA	169.1	1232.6	0.51	1.51	5.8

Table 18: SIDRA Output – Wyrallah Road / Dalley Street – 2015 PM (Base)

MOVEMENT SUMMARY

Site: PM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	272	2.5	0.183	7.6	LOS A	3.0	21.1	0.61	0.00	46.1
3	R	20	5.6	0.183	17.2	LOS C	3.0	21.1	0.81	1.05	43.9
Approach		292	2.7	0.183	8.4	LOS C	3.0	21.1	0.81	0.07	45.9
East: Dalley Road East											
4	L	37	6.1	0.153	14.9	LOS B	0.3	2.4	0.62	0.86	42.8
6	R	146	1.5	0.967	125.8	LOS F	12.4	87.9	0.99	1.86	13.4
Approach		183	2.4	0.964	103.3	LOS F	12.4	87.9	0.92	1.66	15.6
North West: Wyrallah Road NW											
7	L	284	2.8	0.431	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	526	3.0	0.431	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		810	2.9	0.431	2.6	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1285	2.6	0.964	18.4	NA	12.4	87.9	0.31	0.45	39.4

Table 19: SIDRA Output – Wyrallah Road / Dalley Street – 2015 PM (Development)

MOVEMENT SUMMARY

Site: Development PM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	272	2.5	0.218	11.5	LOS B	4.1	29.5	0.94	0.00	42.2
3	R	29	5.6	0.218	20.9	LOS C	4.1	29.5	0.94	1.04	41.1
Approach		301	2.8	0.218	12.4	LOS C	4.1	29.5	0.94	0.10	42.1
East: Dalley Road East											
4	L	55	6.1	0.247	16.6	LOS C	0.6	4.1	0.67	0.91	41.4
6	R	215	1.5	1.680	1281.5	LOS F	115.6	819.6	1.00	6.49	1.6
Approach		270	2.4	1.678	1023.8	LOS F	115.6	819.6	0.93	5.36	2.0
North West: Wyrallah Road NW											
7	L	402	2.8	0.496	7.9	LOS A	0.0	0.0	0.00	0.84	49.3
8	T	526	3.0	0.496	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		928	2.9	0.496	3.4	LOS A	0.0	0.0	0.00	0.36	54.9
All Vehicles		1499	2.8	1.678	189.0	NA	115.6	819.6	0.36	1.21	9.6

Table 20: SIDRA Output – Wyrallah Road / Dalley Street – 2025 AM (Base)

MOVEMENT SUMMARY

Site: AM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.519	14.9	LOS B	11.7	85.5	1.00	0.00	39.4
3	R	74	2.0	0.517	24.2	LOS C	11.7	85.5	1.00	1.21	38.8
Approach		768	5.5	0.519	15.6	LOS C	11.7	85.5	1.00	0.12	39.4
East: Dalley Road East											
4	L	23	0.0	0.082	13.4	LOS B	0.2	1.2	0.55	0.81	43.9
6	R	188	4.8	3.133	3953.8	LOS F	169.0	1231.5	1.00	5.84	0.5
Approach		211	4.3	3.133	3524.2	LOS F	169.0	1231.5	0.95	5.29	0.6
North West: Wyrallah Road NW											
7	L	417	5.8	0.437	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	380	6.8	0.437	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		797	6.3	0.437	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1776	5.7	3.133	427.4	NA	169.0	1231.5	0.55	0.87	4.7

Table 21: SIDRA Output – Wyrallah Road / Dalley Street – 2025 AM (Development)

MOVEMENT SUMMARY

Site: Development AM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.555	18.4	LOS C	12.5	91.3	1.00	0.00	37.1
3	R	83	2.0	0.557	27.7	LOS D	12.5	91.3	1.00	1.23	36.5
Approach		777	5.5	0.555	19.4	LOS D	12.5	91.3	1.00	0.13	37.0
East: Dalley Road East											
4	L	36	0.0	0.132	13.9	LOS B	0.3	2.0	0.57	0.85	43.6
6	R	296	4.8	4.933	7196.6	LOS F	308.2	2246.4	1.00	6.70	0.3
Approach		332	4.3	4.933	6417.8	LOS F	308.2	2246.4	0.95	6.06	0.3
North West: Wyrallah Road NW											
7	L	468	5.8	0.466	8.0	LOS A	0.0	0.0	0.00	0.79	49.3
8	T	380	6.8	0.466	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		848	6.2	0.466	4.4	LOS A	0.0	0.0	0.00	0.44	53.6
All Vehicles		1957	5.6	4.933	1098.4	NA	308.2	2246.4	0.56	1.27	1.9

Table 22: SIDRA Output – Wyrallah Road / Dalley Street – 2025 PM (Base)

MOVEMENT SUMMARY

Site: PM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.298	21.1	LOS C	7.5	53.8	1.00	0.00	35.6
3	R	27	5.6	0.297	30.5	LOS D	7.5	53.8	1.00	1.08	35.1
Approach		393	2.7	0.298	21.7	LOS D	7.5	53.8	1.00	0.07	35.5
East: Dalley Road East											
4	L	50	6.1	0.296	21.9	LOS C	0.7	5.3	0.79	0.96	37.7
6	R	197	1.5	3.127	3921.5	LOS F	176.7	1253.1	1.00	5.89	0.5
Approach		247	2.4	3.128	3132.1	LOS F	176.7	1253.1	0.96	4.89	0.7
North West: Wyrallah Road NW											
7	L	381	2.8	0.578	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	706	3.0	0.578	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1087	2.9	0.578	2.6	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1727	2.8	3.128	454.7	NA	176.7	1253.1	0.36	0.91	4.4

Table 23: SIDRA Output – Wyrallah Road / Dalley Street – 2025 PM (Development)

MOVEMENT SUMMARY

Site: Development PM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.396	36.2	LOS E	9.9	71.2	1.00	0.00	28.5
3	R	36	5.6	0.396	45.5	LOS E	9.9	71.2	1.00	1.11	28.2
Approach		402	2.8	0.396	37.0	LOS E	9.9	71.2	1.00	0.10	28.5
East: Dalley Road East											
4	L	67	6.1	0.447	27.1	LOS D	1.2	8.8	0.84	1.01	34.6
6	R	265	1.5	4.417	6253.2	LOS F	268.4	1903.2	1.00	6.39	0.3
Approach		332	2.4	4.417	4996.7	LOS F	268.4	1903.2	0.97	5.30	0.4
North West: Wyrallah Road NW											
7	L	500	2.8	0.644	7.9	LOS A	0.0	0.0	0.00	0.84	49.3
8	T	706	3.0	0.644	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1206	2.9	0.644	3.3	LOS A	0.0	0.0	0.00	0.35	55.1
All Vehicles		1940	2.8	4.417	864.8	NA	268.4	1903.2	0.37	1.15	2.4

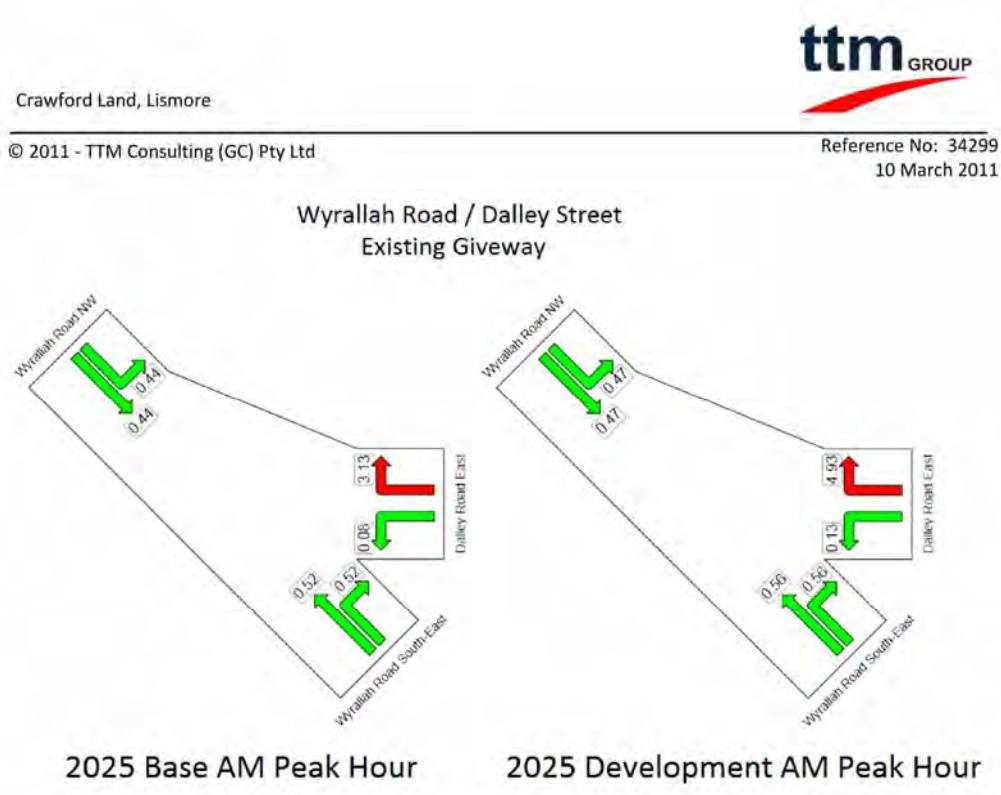


Figure 17: SIDRA Output – Wyrallah Road / Dalley Street – 2025 AM (DoS)

Analysis of the cases reveals that for the right turn movement out of Dalley Street for the 2015 development cases, the capacity is exceeded, with the Degree of Saturation (DoS) surpassing 1.0. The DoS reaching this level means that ameliorate works would be required in order to increase the performance of the intersection. 2025 cases however show that the right turn movement quickly becomes over capacitated, regardless of the development.

Using the 3.0% p.a. growth rate, the right turn movement on the base intersection case reaches capacity by 2015.

Council already has plans to upgrade the intersection to a roundabout, and it is likely the works will be performed in the near future. In order to properly assess the 2025 cases, the cases have been reassessed with the proposed new intersection layout as shown in Figure 18.

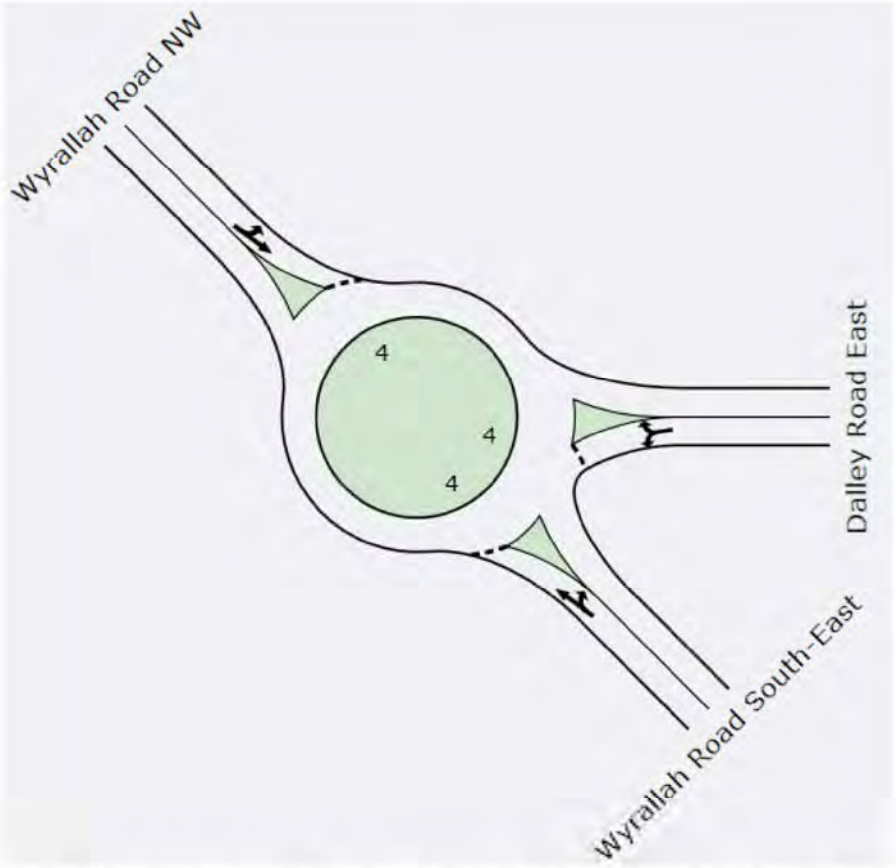


Figure 18: SIDRA Representation of Planned Upgrade to Wyrallah Road / Dalley Street Intersection

Table 24: SIDRA Output – Wyrallah Road / Dalley Street Roundabout – 2025 AM (Base)

MOVEMENT SUMMARY

Site: Roundabout AM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.724	11.4	LOS B	11.2	82.1	0.63	0.71	45.7
3	R	74	2.0	0.725	14.9	LOS B	11.2	82.1	0.63	0.75	43.3
Approach		768	5.5	0.724	11.8	LOS B	11.2	82.1	0.63	0.72	45.4
East: Dalley Road East											
4	L	23	0.0	0.261	12.2	LOS B	2.1	15.2	0.66	0.78	44.8
6	R	188	4.8	0.263	13.4	LOS B	2.1	15.2	0.66	0.79	44.0
Approach		211	4.3	0.263	13.3	LOS B	2.1	15.2	0.66	0.79	44.1
North West: Wyrallah Road NW											
7	L	417	5.8	0.592	8.0	LOS A	8.3	61.5	0.48	0.54	47.7
8	T	380	6.8	0.592	8.3	LOS A	8.3	61.5	0.48	0.55	47.7
Approach		797	6.3	0.592	8.1	LOS A	8.3	61.5	0.48	0.54	47.7
All Vehicles		1776	5.7	0.724	10.3	LOS B	11.2	82.1	0.65	0.65	46.2

Table 25: SIDRA Output – Wyrallah Road / Dalley Street Roundabout – 2025 AM (Development)

MOVEMENT SUMMARY

Site: Roundabout Development AM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.839	18.5	LOS B	18.7	137.4	1.00	1.02	39.7
3	R	83	2.0	0.838	22.8	LOS C	18.7	137.4	1.00	1.02	37.9
Approach		777	5.5	0.839	19.0	LOS C	18.7	137.4	1.00	1.02	39.5
East: Dalley Road East											
4	L	36	0.0	0.409	11.9	LOS B	3.7	26.6	0.73	0.80	45.0
6	R	296	4.8	0.411	13.6	LOS B	3.7	26.6	0.73	0.81	43.7
Approach		332	4.3	0.410	13.6	LOS B	3.7	26.6	0.73	0.81	43.8
North West: Wyrallah Road NW											
7	L	468	5.8	0.660	8.3	LOS A	10.4	77.0	0.59	0.54	47.2
8	T	380	6.8	0.660	8.3	LOS A	10.4	77.0	0.59	0.55	47.2
Approach		848	6.2	0.660	8.3	LOS A	10.4	77.0	0.59	0.54	47.2
All Vehicles		1957	5.6	0.839	13.4	LOS B	18.7	137.4	0.78	0.78	43.3

Table 26: SIDRA Output – Wyrallah Road / Dalley Street Roundabout – 2025 PM (Base)

MOVEMENT SUMMARY

Site: Roundabout PM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.394	9.6	LOS A	3.9	27.6	0.59	0.66	46.8
3	R	27	5.6	0.391	13.3	LOS B	3.9	27.6	0.59	0.76	44.6
Approach		393	2.7	0.394	9.8	LOS B	3.9	27.6	0.59	0.67	46.7
East: Dalley Road East											
4	L	50	6.1	0.424	17.3	LOS B	3.8	27.0	0.86	0.97	40.7
6	R	197	1.5	0.424	18.1	LOS B	3.8	27.0	0.86	0.97	40.1
Approach		247	2.4	0.424	17.9	LOS B	3.8	27.0	0.86	0.97	40.2
North West: Wyrallah Road NW											
7	L	381	2.8	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
8	T	706	3.0	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
Approach		1087	2.9	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
All Vehicles		1727	2.8	0.719	9.9	LOS A	13.5	96.7	0.48	0.63	46.4

Table 27: SIDRA Output – Wyrallah Road / Dalley Street Roundabout – 2025 PM (Development)

MOVEMENT SUMMARY

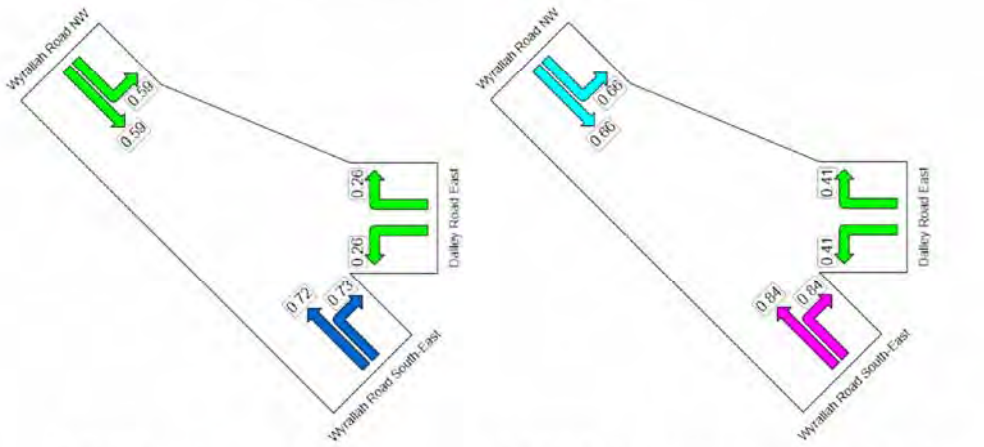
Site: Roundabout Development PM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.449	10.4	LOS B	4.5	32.0	0.70	0.72	46.4
3	R	36	5.6	0.450	14.1	LOS B	4.5	32.0	0.70	0.80	44.0
Approach		402	2.8	0.449	10.7	LOS B	4.5	32.0	0.70	0.73	46.1
East: Dalley Road East											
4	L	67	6.1	0.598	21.7	LOS C	7.0	49.9	0.95	1.10	37.6
6	R	265	1.5	0.601	22.5	LOS C	7.0	49.9	0.95	1.10	37.1
Approach		332	2.4	0.600	22.3	LOS C	7.0	49.9	0.95	1.10	37.2
North West: Wyrallah Road NW											
7	L	500	2.8	0.816	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
8	T	706	3.0	0.815	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
Approach		1206	2.9	0.815	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
All Vehicles		1940	2.8	0.815	11.3	LOS B	20.5	147.0	0.66	0.64	44.8

Wyrallah Road / Dalley Street
Proposed Roundabout Upgrade



2025 Base AM Peak Hour 2025 Development AM Peak Hour

Figure 19: SIDRA Output – Wyrallah Road / Dalley Street Roundabout – 2025 AM (DoS)

The upgrade of Wyrallah Road / Dalley Street to a roundabout solves previous issues regarding the right turn from Dalley Street in 2025 with and without the development. The Degree of Saturation (DoS) remains acceptable in AM and PM peaks, with the development resulting in a minor performance impact. The lowest Level of Service at the intersection continues to be Level C with or without development. The roundabout has sufficient capacity and hence further ameliorative works would not be required for the intersection.

The roundabout upgrade to the intersection is already planned by Council, and as the development does not cause the necessity for the roundabout, TTM Group believes that the costs of the works should be solely borne by the Council.

3. Summary and Recommendation

The Traffic Generated by the residential portion of the development has a minor impact on the Invercauld Road / Cynthia Wilson Drive and Military Road / Dalley Street intersections, but the performance on these intersections remains acceptable. The practical absorption capacity of right turn movement, calculated from Austroads' forumula, is vastly greater than the expected right turn movements. No ameliorative works would be required of these two intersections within the 10 year design horizon.

The Dalley Street right turn movement on the existing Wyrallah Road / Dalley Street intersection has its capacity exceeded by 2015, regardless of the site being developed. Council has existing plans for the intersection to be upgraded to a roundabout. The proposed roundabout upgrade has sufficient capacity to service the traffic generated by the development site during the 10 year design horizon, and hence no further ameliorative works would be required. TTM Group believes that the cost of the roundabout upgrade should be entirely borne by the Council due to the existing issue of capacity in the intersection. The timing of the upgrade is currently uncertain, but it is likely that the upgrades will be performed well before any development on the site opens.

Appendix A

TABULAR TRAFFIC SURVEY DATA

TTM Data

TTM Reference: 34541
Location: Military Rd/ Dalley St
Suburb: Lismore
Date: PM Wednesday 9.2.11 & AM Thursday 10.2.11
Survey Duration: 0700-0900 & 1600-1800 AM Peak: 0800-0900
Weather: Fine PM Peak: 1630-1730
Notes:

Time	Northern Approach: Military Road									Southern Approach: Military Road									Western Approach: Dalley Street								
15 min	Straight			Right			U-turns	TOTAL	Peds	Left			Straight			U-turns	TOTAL	Peds	Left			Right			U-turns	TOTAL	Peds
time start	Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total			
7:00	9	0	**9**	27	3	**30**	**0**	**39**	0	5	0	**5**	5	0	**5**	**0**	**10**	0	20	1	**21**	2	0	**2**	**0**	**23**	1
7:15	6	0	**6**	31	6	**37**	**0**	**43**	0	5	0	**5**	4	0	**4**	**0**	**9**	0	26	1	**27**	4	0	**4**	**0**	**31**	3
7:30	5	0	**5**	46	2	**48**	**0**	**53**	0	5	0	**5**	4	0	**4**	**0**	**9**	0	43	1	**44**	1	0	**1**	**0**	**45**	5
7:45	5	0	**5**	49	7	**56**	**0**	**61**	0	4	0	**4**	6	0	**6**	**0**	**10**	0	45	2	**47**	3	0	**3**	**0**	**50**	0
8:00	15	1	**16**	81	3	**84**	**0**	**100**	0	7	0	**7**	7	0	**7**	**0**	**14**	0	46	1	**47**	2	0	**2**	**0**	**49**	1
8:15	7	2	**9**	82	2	**84**	**0**	**93**	0	11	0	**11**	8	0	**8**	**0**	**19**	0	73	2	**75**	5	3	**8**	**0**	**83**	2
8:30	20	1	**21**	107	1	**108**	**0**	**129**	0	9	0	**9**	13	0	**13**	**0**	**22**	0	97	1	**98**	4	7	**11**	**0**	**109**	9
8:45	32	2	**34**	100	1	**101**	**0**	**135**	0	5	0	**5**	13	0	**13**	**0**	**18**	0	96	4	**100**	3	8	**11**	**0**	**111**	6
TOTAL	**99**	**6**	**105**	**523**	**25**	**548**	**0**	**653**	**0**	**51**	**0**	**51**	**60**	**0**	**60**	**0**	**111**	**0**	**446**	**13**	**459**	**24**	**18**	**42**	**0**	**501**	**27**
AM Peak	74	6	80	370	7	377	0	457	0	32	0	32	41	0	41	0	73	0	312	8	320	14	18	32	0	352	18
16:00	11	0	**11**	65	0	**65**	**0**	**76**	0	10	0	**10**	9	1	**10**	**0**	**20**	0	62	0	**62**	6	0	**6**	**0**	**68**	0
16:15	10	0	**10**	64	1	**65**	**0**	**75**	0	11	0	**11**	5	0	**5**	**0**	**16**	0	62	3	**65**	3	0	**3**	**0**	**68**	0
16:30	9	0	**9**	64	2	**66**	**0**	**75**	0	3	0	**3**	2	0	**2**	**0**	**5**	1	79	4	**83**	8	0	**8**	**0**	**91**	2
16:45	7	0	**7**	75	3	**78**	**0**	**85**	0	7	0	**7**	5	0	**5**	**0**	**12**	0	61	0	**61**	6	0	**6**	**0**	**67**	1
17:00	9	1	**10**	107	0	**107**	**0**	**117**	0	3	0	**3**	8	1	**9**	**0**	**12**	0	84	2	**86**	5	0	**5**	**0**	**91**	0
17:15	15	0	**15**	98	1	**99**	**0**	**114**	0	4	0	**4**	2	0	**2**	**0**	**6**	0	100	1	**101**	7	0	**7**	**0**	**108**	0
17:30	6	0	**6**	68	0	**68**	**0**	**74**	0	2	0	**2**	8	0	**8**	**0**	**10**	0	68	1	**69**	10	0	**10**	**0**	**79**	1
17:45	9	0	**9**	50	0	**50**	**0**	**59**	0	4	0	**4**	2	1	**3**	**0**	**7**	0	34	2	**36**	6	0	**6**	**0**	**42**	1
TOTAL	**76**	**1**	**77**	**591**	**7**	**598**	**0**	**675**	**0**	**44**	**0**	**44**	**41**	**3**	**44**	**0**	**88**	**1**	**550**	**13**	**563**	**51**	**0**	**51**	**0**	**614**	**5**
PM Peak	40	1	41	344	6	350	0	391	0	17	0	17	17	1	18	0	35	1	324	7	331	26	0	26	0	357	3

TTM Data

TTM Reference: 33842
Location: Invercauld Rd / Cynthia Willson Dr
Suburb: Lismore
Date: 9.2.2010
Survey Duration: 0700-0900 & 1600-1800 AM Peak: 0800-0900
Weather: AM: Showers PM: Fine PM Peak: 1700-1800
Notes: Traffic approaching from the South are required to "GIVE WAY"

Time	Northern Approach: Invercauld Rd									Southern Approach: Invercauld Rd									Western Approach: Cynthia Willson Dr								
15 min	Straight			Right			U-turns	TOTAL	Peds	Left			Straight			U-turns	TOTAL	Peds	Left			Right			U-turns	TOTAL	Peds
time start	Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total			
7:00	3	0	3	16	0	16	0	19	0	4	0	4	6	0	6	0	10	0	11	0	11	1	0	1	0	12	5
7:15	4	0	4	31	1	32	0	36	0	10	0	10	11	0	11	0	21	0	5	2	7	1	0	1	0	8	0
7:30	5	0	5	43	1	44	0	49	0	6	0	6	3	0	3	0	9	0	16	2	18	1	0	1	0	19	0
7:45	5	0	5	73	0	73	0	78	1	10	0	10	13	0	13	0	23	0	24	1	25	1	0	1	0	26	4
8:00	5	1	6	46	1	47	0	53	0	1	0	1	19	1	20	0	21	0	21	0	21	0	0	0	0	21	1
8:15	3	1	4	60	1	61	0	65	0	8	1	9	20	1	21	0	30	0	30	0	30	1	0	1	0	31	0
8:30	5	0	5	84	0	84	0	89	0	7	0	7	10	1	11	0	18	0	24	0	24	6	0	6	0	30	0
8:45	4	0	4	87	1	88	0	92	0	6	1	7	21	0	21	0	28	0	35	1	36	3	0	3	0	39	0
TOTAL	**34**	**2**	**36**	**440**	**5**	**445**	**0**	**481**	**1**	**52**	**2**	**54**	**103**	**3**	**106**	**0**	**160**	**0**	**166**	**6**	**172**	**14**	**0**	**14**	**0**	**186**	**10**
AM Peak	17	2	19	277	3	280	0	299	0	22	2	24	70	3	73	0	97	0	110	1	111	10	0	10	0	121	1
16:00	14	1	15	34	1	35	0	50	0	2	1	3	10	0	10	0	13	0	37	1	38	4	0	4	0	42	1
16:15	15	0	15	32	5	37	0	52	0	2	0	2	11	0	11	0	13	0	49	0	49	6	0	6	0	55	1
16:30	15	0	15	34	2	36	0	51	0	2	0	2	12	0	12	0	14	0	38	0	38	2	0	2	0	40	0
16:45	20	1	21	19	1	20	0	41	1	2	0	2	8	0	8	0	10	1	39	1	40	3	0	3	0	43	1
17:00	19	1	20	46	0	46	0	66	0	5	0	5	21	0	21	0	26	0	53	0	53	8	0	8	0	61	0
17:15	22	0	22	43	2	45	0	67	0	4	0	4	4	0	4	0	8	0	45	0	45	6	0	6	0	51	0
17:30	9	0	9	30	0	30	0	39	0	3	0	3	10	0	10	0	13	1	39	0	39	5	0	5	0	44	1
17:45	18	0	18	39	1	40	0	58	1	6	0	6	13	1	14	0	20	1	36	1	37	4	0	4	0	41	4
TOTAL	**132**	**3**	**135**	**277**	**12**	**289**	**0**	**424**	**2**	**26**	**1**	**27**	**89**	**1**	**90**	**0**	**117**	**3**	**336**	**3**	**339**	**38**	**0**	**38**	**0**	**377**	**8**
PM Peak	68	1	69	158	3	161	0	230	1	18	0	18	48	1	49	0	67	2	173	1	174	23	0	23	0	197	5

TTM Data

TTM Reference: 34541
Location: Wyrallah Rd/ Dalley St
Suburb: Lismore
Date: PM Wednesday 9.2.11 & AM Thursday 10.2.11
Survey Duration: 0700-0900 & 1600-1800 AM Peak: 0800-0900
Weather: Fine PM Peak: 1630-1730
Notes:

Time	Northern Approach: Wyrallah Road									Southern Approach Wyrallah Road									Eastern Approach: Dalley Street								
15 min	Left			Straight			U-turns	TOTAL	Peds	Straight			Right			U-turns	TOTAL	Peds	Left			Right			U-turns	TOTAL	Peds
time start	Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total				Light	Heavy	Total	Light	Heavy	Total			
7:00	13	0	13	23	3	26	0	39	0	47	8	55	6	0	6	0	61	0	3	0	3	17	4	21	0	24	5
7:15	24	2	26	36	5	41	0	67	1	46	10	56	3	0	3	0	59	0	1	0	1	25	2	27	0	28	4
7:30	30	0	30	26	9	35	0	65	0	68	2	70	3	0	3	0	73	0	3	0	3	22	3	25	0	28	3
7:45	41	2	43	40	1	41	0	84	0	82	5	87	4	0	4	0	91	0	3	0	3	22	0	22	0	25	2
8:00	47	3	50	45	6	51	0	101	0	101	4	105	12	0	12	0	117	0	4	0	4	29	2	31	0	35	7
8:15	62	3	65	51	1	52	0	117	0	101	5	106	8	1	9	0	115	0	5	0	5	29	2	31	0	36	6
8:30	76	3	79	68	7	75	0	154	0	97	4	101	14	0	14	0	115	0	2	0	2	32	1	33	0	35	2
8:45	75	7	82	70	3	73	0	155	0	133	14	147	14	0	14	0	161	0	4	0	4	28	1	29	0	33	3
TOTAL	**370**	**20**	**390**	**359**	**35**	**394**	**0**	**784**	**1**	**675**	**52**	**727**	**64**	**1**	**65**	**0**	**792**	**0**	**25**	**0**	**25**	**204**	**15**	**219**	**0**	**244**	**32**
AM Peak	260	16	276	234	17	251	0	527	0	432	27	459	48	1	49	0	508	0	15	0	15	118	6	124	0	139	18
16:00	56	0	56	95	5	100	0	156	0	89	5	94	2	0	2	0	96	0	10	0	10	13	0	13	0	23	0
16:15	51	1	52	94	1	95	0	147	0	65	3	68	8	0	8	0	76	0	13	0	13	30	0	30	0	43	0
16:30	64	3	67	109	4	113	0	180	0	69	0	69	5	0	5	0	74	0	9	0	9	26	1	27	0	36	0
16:45	61	1	62	108	4	112	0	174	0	60	5	65	3	0	3	0	68	0	9	2	11	36	1	37	0	48	0
17:00	72	3	75	110	2	112	0	187	0	55	0	55	5	1	6	0	61	1	7	0	7	38	0	38	0	45	3
17:15	48	0	48	126	4	130	0	178	0	52	1	53	4	0	4	0	57	0	6	0	6	28	0	28	0	34	9
17:30	65	1	66	100	1	101	0	167	0	66	1	67	7	0	7	0	74	0	5	0	5	34	0	34	0	39	1
17:45	41	0	41	96	0	96	0	137	0	57	1	58	7	0	7	0	65	0	6	0	6	23	0	23	0	29	2
TOTAL	**458**	**9**	**467**	**838**	**21**	**859**	**0**	**1326**	**0**	**513**	**16**	**529**	**41**	**1**	**42**	**0**	**571**	**1**	**65**	**2**	**67**	**228**	**2**	**230**	**0**	**297**	**15**
PM Peak	245	7	252	453	14	467	0	719	0	236	6	242	17	1	18	0	260	1	31	2	33	128	2	130	0	163	12

Appendix B

SIDRA MOVEMENT SUMMARY TABLES

MOVEMENT SUMMARY

Site: 2011 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	32	0.0	0.070	8.6	LOS A	0.2	1.2	0.43	0.67	41.5
2	T	41	0.0	0.070	8.9	LOS A	0.3	2.4	0.52	0.67	41.2
Approach		73	0.0	0.070	8.7	LOS A	0.3	2.4	0.48	0.67	41.3
North: Military Road North											
8	T	80	7.5	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	377	1.9	0.243	6.8	LOS A	0.0	0.0	0.00	0.70	43.0
Approach		457	2.9	0.243	5.6	LOS A	0.0	0.0	0.00	0.57	44.0
West: Dalley Street West											
10	L	320	2.5	0.195	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	32	56.3	0.195	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		352	7.4	0.195	6.6	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		882	4.4	0.243	6.3	NA	0.3	2.4	0.04	0.60	43.5

MOVEMENT SUMMARY

Site: 2015 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	36	0.0	0.081	9.0	LOS A	0.2	1.5	0.46	0.70	41.1
2	T	46	0.0	0.086	9.6	LOS A	0.4	2.9	0.55	0.71	40.5
Approach		82	0.0	0.085	9.3	LOS A	0.4	2.9	0.51	0.71	40.8
North: Military Road North											
8	T	90	7.5	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	424	1.9	0.273	6.8	LOS A	0.0	0.0	0.00	0.70	43.0
Approach		514	2.9	0.273	5.6	LOS A	0.0	0.0	0.00	0.57	44.0
West: Dalley Street West											
10	L	360	2.5	0.219	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	36	56.3	0.220	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		396	7.4	0.219	6.6	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		992	4.4	0.273	6.3	NA	0.4	2.9	0.04	0.60	43.5

MOVEMENT SUMMARY

Site: Development 2015 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	158	0.0	0.355	10.0	LOS A	1.2	8.3	0.51	0.81	40.3
2	T	127	0.0	0.262	12.7	LOS B	1.6	11.1	0.65	0.86	38.2
Approach		285	0.0	0.355	11.2	LOS B	1.6	11.1	0.57	0.83	39.4
North: Military Road North											
8	T	130	7.5	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	424	1.9	0.294	6.8	LOS A	0.0	0.0	0.00	0.71	43.0
Approach		554	3.2	0.294	5.2	LOS A	0.0	0.0	0.00	0.55	44.4
West: Dalley Street West											
10	L	360	2.5	0.262	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	95	56.3	0.262	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		455	13.7	0.262	6.8	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1294	6.2	0.355	7.1	NA	1.6	11.1	0.13	0.63	42.8

MOVEMENT SUMMARY

Site: 2025 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	48	0.0	0.124	10.5	LOS B	0.4	2.5	0.54	0.80	39.9
2	T	62	0.0	0.154	12.7	LOS B	0.7	5.1	0.65	0.83	38.2
Approach		110	0.0	0.154	11.8	LOS B	0.7	5.1	0.60	0.81	38.9
North: Military Road North											
8	T	121	7.5	0.367	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	570	1.9	0.367	6.8	LOS A	0.0	0.0	0.00	0.70	43.0
Approach		691	2.9	0.367	5.6	LOS A	0.0	0.0	0.00	0.57	44.0
West: Dalley Street West											
10	L	484	2.5	0.294	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	48	56.3	0.294	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		532	7.4	0.294	6.6	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1333	4.4	0.367	6.5	NA	0.7	5.1	0.05	0.61	43.3

MOVEMENT SUMMARY

Site: Development 2025 AM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	170	0.0	0.436	12.6	LOS B	1.7	11.9	0.60	0.92	38.3
2	T	143	0.0	0.437	19.5	LOS C	2.7	18.6	0.79	1.01	34.0
Approach		313	0.0	0.437	15.8	LOS C	2.7	18.6	0.69	0.96	36.2
North: Military Road North											
8	T	161	7.5	0.388	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	570	1.9	0.388	6.8	LOS A	0.0	0.0	0.00	0.71	43.0
Approach		731	3.1	0.388	5.3	LOS A	0.0	0.0	0.00	0.55	44.3
West: Dalley Street West											
10	L	484	2.5	0.338	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	107	56.3	0.338	7.8	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		591	12.2	0.337	6.7	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1635	5.8	0.437	7.8	NA	2.7	18.6	0.13	0.65	42.2

T

MOVEMENT SUMMARY

Site: 2025 PM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	26	0.0	0.065	9.9	LOS A	0.2	1.2	0.51	0.74	40.3
2	T	27	5.9	0.068	12.5	LOS B	0.3	2.3	0.62	0.79	38.5
Approach		53	3.0	0.068	11.2	LOS B	0.3	2.3	0.57	0.77	39.4
North: Military Road North											
8	T	62	2.5	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	529	1.7	0.313	6.8	LOS A	0.0	0.0	0.00	0.68	43.0
Approach		591	1.8	0.313	6.1	LOS A	0.0	0.0	0.00	0.61	43.6
West: Dalley Street West											
10	L	501	2.1	0.287	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	39	0.0	0.287	6.6	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		540	1.9	0.287	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
All Vehicles		1184	1.9	0.313	6.5	NA	0.3	2.3	0.03	0.62	43.3

MOVEMENT SUMMARY

Site: Development 2025 PM Peak

Military Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Military Road South											
1	L	112	0.0	0.277	10.7	LOS B	0.9	6.1	0.55	0.84	39.8
2	T	85	5.9	0.289	18.7	LOS C	1.5	10.8	0.78	0.94	34.5
Approach		197	2.5	0.289	14.2	LOS C	1.5	10.8	0.65	0.88	37.3
North: Military Road North											
8	T	147	2.5	0.356	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R	529	1.7	0.356	6.8	LOS A	0.0	0.0	0.00	0.71	43.0
Approach		676	1.9	0.356	5.3	LOS A	0.0	0.0	0.00	0.55	44.3
West: Dalley Street West											
10	L	501	2.1	0.354	6.5	LOS A	0.0	0.0	0.00	0.61	43.3
12	R	166	0.0	0.354	6.6	LOS A	0.0	0.0	0.00	0.64	43.2
Approach		667	1.6	0.354	6.5	LOS A	0.0	0.0	0.00	0.62	43.3
All Vehicles		1540	1.8	0.356	7.0	NA	1.5	10.8	0.08	0.62	42.8

MOVEMENT SUMMARY

Site: AM Peak 2010

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	24	8.3	0.080	9.1	LOS A	0.4	3.0	0.25	0.70	48.0
2	T	73	4.1	0.080	7.7	LOS A	0.4	3.0	0.25	0.55	49.0
Approach		97	5.1	0.080	8.1	LOS A	0.4	3.0	0.25	0.59	48.7
North: Invercauld Road North											
8	T	19	10.5	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	280	1.1	0.158	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		299	1.7	0.158	7.9	LOS A	0.0	0.0	0.00	0.67	49.2
West: Cynthia Willson Drvie West											
10	L	111	0.9	0.064	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	10	0.0	0.064	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		121	0.8	0.064	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		517	2.1	0.158	8.0	NA	0.4	3.0	0.05	0.66	49.0

MOVEMENT SUMMARY

Site: AM Peak 2015

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	28	8.3	0.096	9.3	LOS A	0.5	3.6	0.27	0.71	48.0
2	T	85	4.1	0.096	7.9	LOS A	0.5	3.6	0.27	0.56	48.8
Approach		113	5.1	0.096	8.2	LOS A	0.5	3.6	0.27	0.60	48.6
North: Invercauld Road North											
8	T	22	10.5	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	325	1.1	0.184	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		347	1.7	0.184	7.9	LOS A	0.0	0.0	0.00	0.67	49.2
West: Cynthia Willson Drvie West											
10	L	129	0.9	0.074	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	12	0.0	0.075	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		141	0.8	0.074	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		601	2.1	0.184	8.1	NA	0.5	3.6	0.05	0.66	49.0

MOVEMENT SUMMARY

Site: Development AM Peak 2015

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	31	8.3	0.107	9.6	LOS A	0.5	3.9	0.35	0.73	47.7
2	T	85	4.1	0.106	8.2	LOS A	0.5	3.9	0.35	0.60	48.4
Approach		116	5.2	0.106	8.6	LOS A	0.5	3.9	0.35	0.63	48.2
North: Invercauld Road North											
8	T	22	10.5	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	361	1.1	0.203	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		383	1.6	0.203	8.0	LOS A	0.0	0.0	0.00	0.68	49.1
West: Cynthia Willson Drvie West											
10	L	203	0.9	0.117	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	18	0.0	0.117	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		221	0.8	0.117	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		720	2.0	0.203	8.2	NA	0.5	3.9	0.06	0.67	48.9

MOVEMENT SUMMARY

Site: AM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Invercauld Road South											
1	L	37	8.3	0.139	9.7	LOS A	0.7	5.2	0.33	0.76	47.7
2	T	114	4.1	0.139	8.3	LOS A	0.7	5.2	0.33	0.59	48.5
Approach		151	5.1	0.139	8.6	LOS A	0.7	5.2	0.33	0.63	48.3
North: Invercauld Road North											
8	T	30	10.5	0.246	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	436	1.1	0.247	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		466	1.7	0.247	7.9	LOS A	0.0	0.0	0.00	0.67	49.2
West: Cynthia Willson Drvie West											
10	L	173	0.9	0.100	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	16	0.0	0.100	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		189	0.8	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		806	2.1	0.247	8.1	NA	0.7	5.2	0.06	0.66	49.0

MOVEMENT SUMMARY

Site: Development AM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Invercauld Road South											
1	L	41	8.3	0.155	10.1	LOS B	0.8	5.8	0.41	0.78	47.4
2	T	114	4.1	0.154	8.7	LOS A	0.8	5.8	0.41	0.63	48.1
Approach		155	5.2	0.155	9.1	LOS B	0.8	5.8	0.41	0.67	47.9
North: Invercauld Road North											
8	T	30	10.5	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	473	1.1	0.266	8.5	LOS A	0.0	0.0	0.00	0.72	48.6
Approach		503	1.7	0.266	8.0	LOS A	0.0	0.0	0.00	0.66	49.2
West: Cynthia Willson Drvie West											
10	L	247	0.9	0.142	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	22	0.0	0.142	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		269	0.8	0.142	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		927	2.0	0.266	8.2	NA	0.8	5.8	0.07	0.67	48.9

MOVEMENT SUMMARY

Site: PM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	28	0.0	0.097	9.5	LOS A	0.5	3.4	0.38	0.69	47.5
2	T	76	2.0	0.097	8.3	LOS A	0.5	3.4	0.38	0.63	48.2
Approach		104	1.5	0.097	8.6	LOS A	0.5	3.4	0.38	0.64	48.0
North: Invercauld Road North											
8	T	107	1.4	0.187	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	251	1.9	0.188	8.5	LOS A	0.0	0.0	0.00	0.80	48.6
Approach		358	1.8	0.188	6.0	LOS A	0.0	0.0	0.00	0.56	51.6
West: Cynthia Willson Drvie West											
10	L	271	0.6	0.162	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	36	0.0	0.161	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		307	0.5	0.162	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		769	1.2	0.188	7.2	NA	0.5	3.4	0.05	0.61	50.0

MOVEMENT SUMMARY

Site: Development PM Peak 2025

Invercauld Cynthia Willson
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Invercauld Road South											
1	L	37	0.0	0.113	9.9	LOS A	0.6	4.0	0.43	0.72	47.4
2	T	76	2.0	0.113	8.7	LOS A	0.6	4.0	0.43	0.66	47.9
Approach		113	1.3	0.114	9.1	LOS A	0.6	4.0	0.43	0.68	47.7
North: Invercauld Road North											
8	T	107	1.4	0.228	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	327	1.9	0.228	8.5	LOS A	0.0	0.0	0.00	0.76	48.6
Approach		434	1.8	0.228	6.4	LOS A	0.0	0.0	0.00	0.59	51.0
West: Cynthia Willson Drvie West											
10	L	322	0.6	0.192	8.2	LOS A	0.0	0.0	0.00	0.66	49.0
12	R	43	0.0	0.192	8.4	LOS A	0.0	0.0	0.00	0.73	48.6
Approach		365	0.5	0.192	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
All Vehicles		912	1.2	0.228	7.5	NA	0.6	4.0	0.05	0.63	49.7

MOVEMENT SUMMARY

Site: AM PEAK 2011

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	459	5.9	0.307	4.5	LOS A	4.3	31.5	0.72	0.00	48.0
3	R	49	2.0	0.306	13.6	LOS B	4.3	31.5	0.72	1.09	46.5
Approach		508	5.5	0.307	5.4	LOS B	4.3	31.5	0.72	0.11	47.9
East: Dalley Road East											
4	L	15	0.0	0.044	11.3	LOS B	0.1	0.6	0.44	0.70	45.9
6	R	124	4.8	0.725	50.7	LOS F	4.8	35.0	0.94	1.22	25.0
Approach		139	4.3	0.725	46.5	LOS F	4.8	35.0	0.88	1.17	26.3
North West: Wyrallah Road NW											
7	L	275	5.8	0.289	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	251	6.8	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		526	6.3	0.289	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1173	5.7	0.725	9.7	NA	4.8	35.0	0.42	0.37	45.7

MOVEMENT SUMMARY

Site: AM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	517	5.9	0.353	6.1	LOS A	6.0	43.9	0.80	0.00	46.9
3	R	55	2.0	0.353	15.4	LOS C	6.0	43.9	0.80	1.12	45.3
Approach		572	5.5	0.353	7.0	LOS C	6.0	43.9	0.80	0.11	46.8
East: Dalley Road East											
4	L	17	0.0	0.052	11.6	LOS B	0.1	0.7	0.47	0.72	45.4
6	R	140	4.8	1.085	267.2	LOS F	24.1	175.5	1.00	2.63	7.1
Approach		157	4.3	1.082	239.6	LOS F	24.1	175.5	0.94	2.42	7.9
North West: Wyrallah Road NW											
7	L	311	5.8	0.326	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	283	6.8	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		594	6.3	0.326	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1323	5.7	1.082	33.3	NA	24.1	175.5	0.46	0.52	30.7

MOVEMENT SUMMARY

Site: Development AM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	517	5.9	0.373	7.3	LOS A	6.8	49.8	0.88	0.00	45.9
3	R	64	2.0	0.374	16.6	LOS C	6.8	49.8	0.88	1.12	44.4
Approach		581	5.5	0.373	8.3	LOS C	6.8	49.8	0.88	0.12	45.7
East: Dalley Road East											
4	L	30	0.0	0.093	12.1	LOS B	0.2	1.3	0.48	0.76	45.2
6	R	248	4.8	2.084	2018.4	LOS F	169.1	1232.6	1.00	7.65	1.1
Approach		278	4.3	2.088	1801.9	LOS F	169.1	1232.6	0.94	6.90	1.2
North West: Wyrallah Road NW											
7	L	361	5.8	0.354	8.0	LOS A	0.0	0.0	0.00	0.79	49.3
8	T	283	6.8	0.354	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		644	6.2	0.354	4.5	LOS A	0.0	0.0	0.00	0.44	53.5
All Vehicles		1503	5.6	2.088	338.4	NA	169.1	1232.6	0.51	1.51	5.8

MOVEMENT SUMMARY

Site: AM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.519	14.9	LOS B	11.7	85.5	1.00	0.00	39.4
3	R	74	2.0	0.517	24.2	LOS C	11.7	85.5	1.00	1.21	38.8
Approach		768	5.5	0.519	15.8	LOS C	11.7	85.5	1.00	0.12	39.4
East: Dalley Road East											
4	L	23	0.0	0.082	13.4	LOS B	0.2	1.2	0.55	0.81	43.9
6	R	188	4.8	3.133	3953.8	LOS F	169.0	1231.5	1.00	5.84	0.5
Approach		211	4.3	3.133	3524.2	LOS F	169.0	1231.5	0.95	5.29	0.6
North West: Wyrallah Road NW											
7	L	417	5.8	0.437	8.0	LOS A	0.0	0.0	0.00	0.80	49.3
8	T	380	6.8	0.437	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		797	6.3	0.437	4.2	LOS A	0.0	0.0	0.00	0.42	53.9
All Vehicles		1776	5.7	3.133	427.4	NA	169.0	1231.5	0.55	0.87	4.7

MOVEMENT SUMMARY

Site: Development AM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.555	18.4	LOS C	12.5	91.3	1.00	0.00	37.1
3	R	83	2.0	0.557	27.7	LOS D	12.5	91.3	1.00	1.23	36.5
Approach		777	5.5	0.555	19.4	LOS D	12.5	91.3	1.00	0.13	37.0
East: Dalley Road East											
4	L	36	0.0	0.132	13.9	LOS B	0.3	2.0	0.57	0.85	43.6
6	R	296	4.8	4.933	7196.6	LOS F	308.2	2246.4	1.00	6.70	0.3
Approach		332	4.3	4.933	6417.8	LOS F	308.2	2246.4	0.95	6.06	0.3
North West: Wyrallah Road NW											
7	L	468	5.8	0.466	8.0	LOS A	0.0	0.0	0.00	0.79	49.3
8	T	380	6.8	0.466	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		848	6.2	0.466	4.4	LOS A	0.0	0.0	0.00	0.44	53.6
All Vehicles		1957	5.6	4.933	1098.4	NA	308.2	2246.4	0.56	1.27	1.9

MOVEMENT SUMMARY

Site: PM PEAK 2011

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	242	2.5	0.157	5.9	LOS A	2.2	15.9	0.71	0.00	48.2
3	R	18	5.6	0.158	15.2	LOS C	2.2	15.9	0.71	1.07	45.2
Approach		260	2.7	0.157	6.5	LOS C	2.2	15.9	0.71	0.07	48.0
East: Dalley Road East											
4	L	33	6.1	0.125	13.7	LOS B	0.3	1.9	0.55	0.83	43.8
6	R	130	1.5	0.667	41.6	LOS E	4.3	30.6	0.92	1.17	27.9
Approach		163	2.4	0.668	35.9	LOS E	4.3	30.6	0.84	1.10	30.1
North West: Wyrallah Road NW											
7	L	252	2.8	0.382	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	467	3.0	0.382	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		719	2.9	0.383	2.8	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1142	2.8	0.668	8.4	NA	4.3	30.6	0.28	0.37	48.2

MOVEMENT SUMMARY

Site: PM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	272	2.5	0.183	7.8	LOS A	3.0	21.1	0.81	0.00	46.1
3	R	20	5.6	0.183	17.2	LOS C	3.0	21.1	0.81	1.05	43.9
Approach		292	2.7	0.183	8.4	LOS C	3.0	21.1	0.81	0.07	45.9
East: Dalley Road East											
4	L	37	6.1	0.153	14.9	LOS B	0.3	2.4	0.62	0.88	42.8
6	R	146	1.5	0.967	125.8	LOS F	12.4	87.9	0.99	1.86	13.4
Approach		183	2.4	0.964	103.3	LOS F	12.4	87.9	0.92	1.66	15.6
North West: Wyrallah Road NW											
7	L	284	2.8	0.431	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	526	3.0	0.431	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		810	2.9	0.431	2.8	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1285	2.8	0.964	18.4	NA	12.4	87.9	0.31	0.45	39.4

MOVEMENT SUMMARY

Site: Development PM PEAK 2015

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	272	2.5	0.218	11.5	LOS B	4.1	29.5	0.94	0.00	42.2
3	R	29	5.6	0.218	20.9	LOS C	4.1	29.5	0.94	1.04	41.1
Approach		301	2.8	0.218	12.4	LOS C	4.1	29.5	0.94	0.10	42.1
East: Dalley Road East											
4	L	55	6.1	0.247	16.6	LOS C	0.6	4.1	0.67	0.91	41.4
6	R	215	1.5	1.680	1281.5	LOS F	115.6	819.6	1.00	6.49	1.6
Approach		270	2.4	1.678	1023.8	LOS F	115.6	819.6	0.93	5.36	2.0
North West: Wyrallah Road NW											
7	L	402	2.8	0.496	7.9	LOS A	0.0	0.0	0.00	0.84	49.3
8	T	526	3.0	0.496	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		928	2.9	0.496	3.4	LOS A	0.0	0.0	0.00	0.36	54.9
All Vehicles		1499	2.8	1.678	189.0	NA	115.6	819.6	0.36	1.21	9.6

MOVEMENT SUMMARY

Site: PM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.298	21.1	LOS C	7.5	53.8	1.00	0.00	35.6
3	R	27	5.6	0.297	30.5	LOS D	7.5	53.8	1.00	1.06	35.1
Approach		393	2.7	0.298	21.7	LOS D	7.5	53.8	1.00	0.07	35.5
East: Dalley Road East											
4	L	50	6.1	0.296	21.9	LOS C	0.7	5.3	0.79	0.96	37.7
6	R	197	1.5	3.127	3921.5	LOS F	176.7	1253.1	1.00	5.89	0.5
Approach		247	2.4	3.128	3132.1	LOS F	176.7	1253.1	0.96	4.89	0.7
North West: Wyrallah Road NW											
7	L	381	2.8	0.578	7.9	LOS A	0.0	0.0	0.00	0.87	49.3
8	T	706	3.0	0.578	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1087	2.9	0.578	2.8	LOS A	0.0	0.0	0.00	0.31	55.8
All Vehicles		1727	2.8	3.128	454.7	NA	176.7	1253.1	0.36	0.91	4.4

MOVEMENT SUMMARY

Site: Development PM PEAK 2025

Wyrallah Dalley
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.396	36.2	LOS E	9.9	71.2	1.00	0.00	28.5
3	R	36	5.6	0.396	45.5	LOS E	9.9	71.2	1.00	1.11	28.2
Approach		402	2.8	0.396	37.0	LOS E	9.9	71.2	1.00	0.10	28.5
East: Dalley Road East											
4	L	67	6.1	0.447	27.1	LOS D	1.2	8.8	0.84	1.01	34.6
6	R	265	1.5	4.417	6253.2	LOS F	268.4	1903.2	1.00	6.39	0.3
Approach		332	2.4	4.417	4996.7	LOS F	268.4	1903.2	0.97	5.30	0.4
North West: Wyrallah Road NW											
7	L	500	2.8	0.644	7.9	LOS A	0.0	0.0	0.00	0.84	49.3
8	T	706	3.0	0.644	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1206	2.9	0.644	3.3	LOS A	0.0	0.0	0.00	0.35	55.1
All Vehicles		1940	2.8	4.417	864.8	NA	268.4	1903.2	0.37	1.15	2.4

MOVEMENT SUMMARY

Site: Roundabout AM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.724	11.4	LOS B	11.2	82.1	0.63	0.71	45.7
3	R	74	2.0	0.725	14.9	LOS B	11.2	82.1	0.63	0.75	43.3
Approach		768	5.5	0.724	11.8	LOS B	11.2	82.1	0.63	0.72	45.4
East: Dalley Road East											
4	L	23	0.0	0.261	12.2	LOS B	2.1	15.2	0.66	0.78	44.8
6	R	188	4.8	0.263	13.4	LOS B	2.1	15.2	0.66	0.79	44.0
Approach		211	4.3	0.263	13.3	LOS B	2.1	15.2	0.66	0.79	44.1
North West: Wyrallah Road NW											
7	L	417	5.8	0.592	8.0	LOS A	8.3	61.5	0.48	0.54	47.7
8	T	380	6.8	0.592	8.3	LOS A	8.3	61.5	0.48	0.55	47.7
Approach		797	6.3	0.592	8.1	LOS A	8.3	61.5	0.48	0.54	47.7
All Vehicles		1776	5.7	0.724	10.3	LOS B	11.2	82.1	0.65	0.65	46.2

MOVEMENT SUMMARY

Site: Roundabout Development AM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	694	5.9	0.839	18.5	LOS B	16.7	137.4	1.00	1.02	39.7
3	R	83	2.0	0.838	22.8	LOS C	16.7	137.4	1.00	1.02	37.9
Approach		777	5.5	0.839	19.0	LOS C	16.7	137.4	1.00	1.02	39.5
East: Dalley Road East											
4	L	36	0.0	0.409	11.9	LOS B	3.7	26.6	0.73	0.80	45.0
6	R	296	4.8	0.411	13.8	LOS B	3.7	26.6	0.73	0.81	43.7
Approach		332	4.3	0.410	13.6	LOS B	3.7	26.6	0.73	0.81	43.8
North West: Wyrallah Road NW											
7	L	468	5.8	0.660	8.3	LOS A	10.4	77.0	0.59	0.54	47.2
8	T	380	6.8	0.660	8.3	LOS A	10.4	77.0	0.59	0.55	47.2
Approach		848	6.2	0.660	8.3	LOS A	10.4	77.0	0.59	0.54	47.2
All Vehicles		1957	5.6	0.839	13.4	LOS B	16.7	137.4	0.78	0.78	43.3

MOVEMENT SUMMARY

Site: Roundabout PM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.394	9.6	LOS A	3.9	27.6	0.59	0.66	46.8
3	R	27	5.6	0.391	13.3	LOS B	3.9	27.6	0.59	0.76	44.6
Approach		393	2.7	0.394	9.8	LOS B	3.9	27.6	0.59	0.67	46.7
East: Dalley Road East											
4	L	50	6.1	0.424	17.3	LOS B	3.8	27.0	0.86	0.97	40.7
6	R	197	1.5	0.424	18.1	LOS B	3.8	27.0	0.86	0.97	40.1
Approach		247	2.4	0.424	17.9	LOS B	3.8	27.0	0.86	0.97	40.2
North West: Wyrallah Road NW											
7	L	381	2.8	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
8	T	706	3.0	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
Approach		1087	2.9	0.719	8.1	LOS A	13.5	96.7	0.35	0.53	47.9
All Vehicles		1727	2.8	0.719	9.9	LOS A	13.5	96.7	0.48	0.63	46.4

MOVEMENT SUMMARY

Site: Roundabout Devel-opment PM PEAK 2025

Wyrallah Dalley
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Wyrallah Road South-East											
2	T	366	2.5	0.449	10.4	LOS B	4.5	32.0	0.70	0.72	46.4
3	R	36	5.6	0.450	14.1	LOS B	4.5	32.0	0.70	0.80	44.0
Approach		402	2.8	0.449	10.7	LOS B	4.5	32.0	0.70	0.73	46.1
East: Dalley Road East											
4	L	67	6.1	0.598	21.7	LOS C	7.0	49.9	0.95	1.10	37.6
6	R	265	1.5	0.601	22.5	LOS C	7.0	49.9	0.95	1.10	37.1
Approach		332	2.4	0.600	22.3	LOS C	7.0	49.9	0.95	1.10	37.2
North West: Wyrallah Road NW											
7	L	500	2.8	0.816	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
8	T	706	3.0	0.815	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
Approach		1206	2.9	0.815	8.5	LOS A	20.5	147.0	0.56	0.49	47.0
All Vehicles		1940	2.8	0.815	11.3	LOS B	20.5	147.0	0.66	0.64	44.8