

TRAFFIC AND PARKING IMPACT ASSESSMENT

Proposed Residential Rezoning

4273 Goulburn Road, Crookwell NSW

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1. Introduction

Motion Traffic Engineers was commissioned by Client to undertake a traffic and parking impact assessment of proposed residential rezoning at 4273 Goulburn Road, Crookwell.

Application is now being sought for a proposed residential rezoning. The site is currently farmland.

This traffic report presents an assessment of the anticipated transport implications of the proposed residential rezoning, with the following considerations:

- ➡ Background and existing traffic and parking conditions of the proposed residential rezoning site
- ➡ Assessment of the public transport network within the vicinity of the site
- ➡ Adequacy of car and parking provision
- ➡ The projected traffic generation residential rezoning
- ➡ The transport impact of the residential rezoning on the surrounding road network

In the course of preparing this assessment, the proposed site and its environs have been inspected, plans of the development examined, and all relevant traffic and parking data collected and analysed.

2. Background and Existing Conditions of the Proposed Residential Rezoning

2.1. Location and Land Use

The proposed residential rezoning site is located at 4273 Goulburn Road, Crookwell. Currently is farmland.

This site is located within a Primary Production, RU1 zone, South-East of Crookwell Town Centre. The immediate surrounding area of the proposed site are rural landscapes, residential and commercial development is located north west of the site within Crookwell Town Centre.

Figures 1 and 2 shows the location of the residential rezoning site from the aerial and street map perspective respectively. Figure 2 also shows the location of the surveyed intersection in relation to the site.

Figure 3 shows a photograph of the site taken at Goulburn Road.

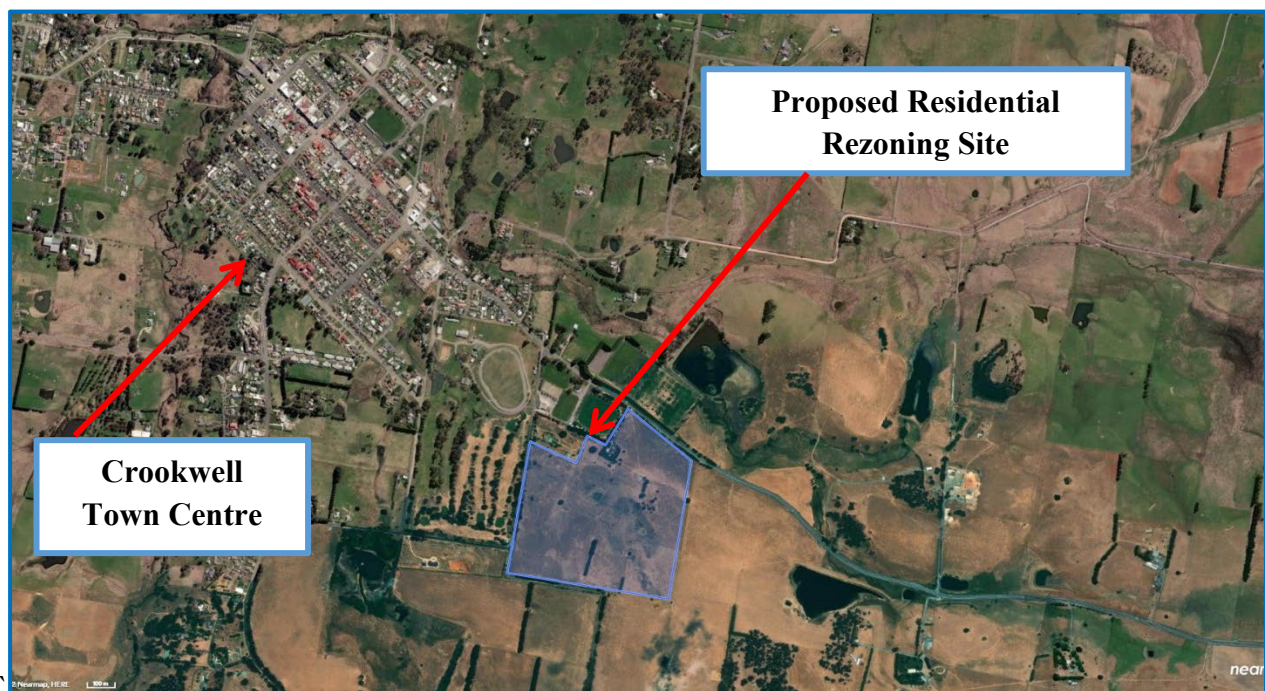


Figure 1: Location of the Subject Site on Aerial View Perspective

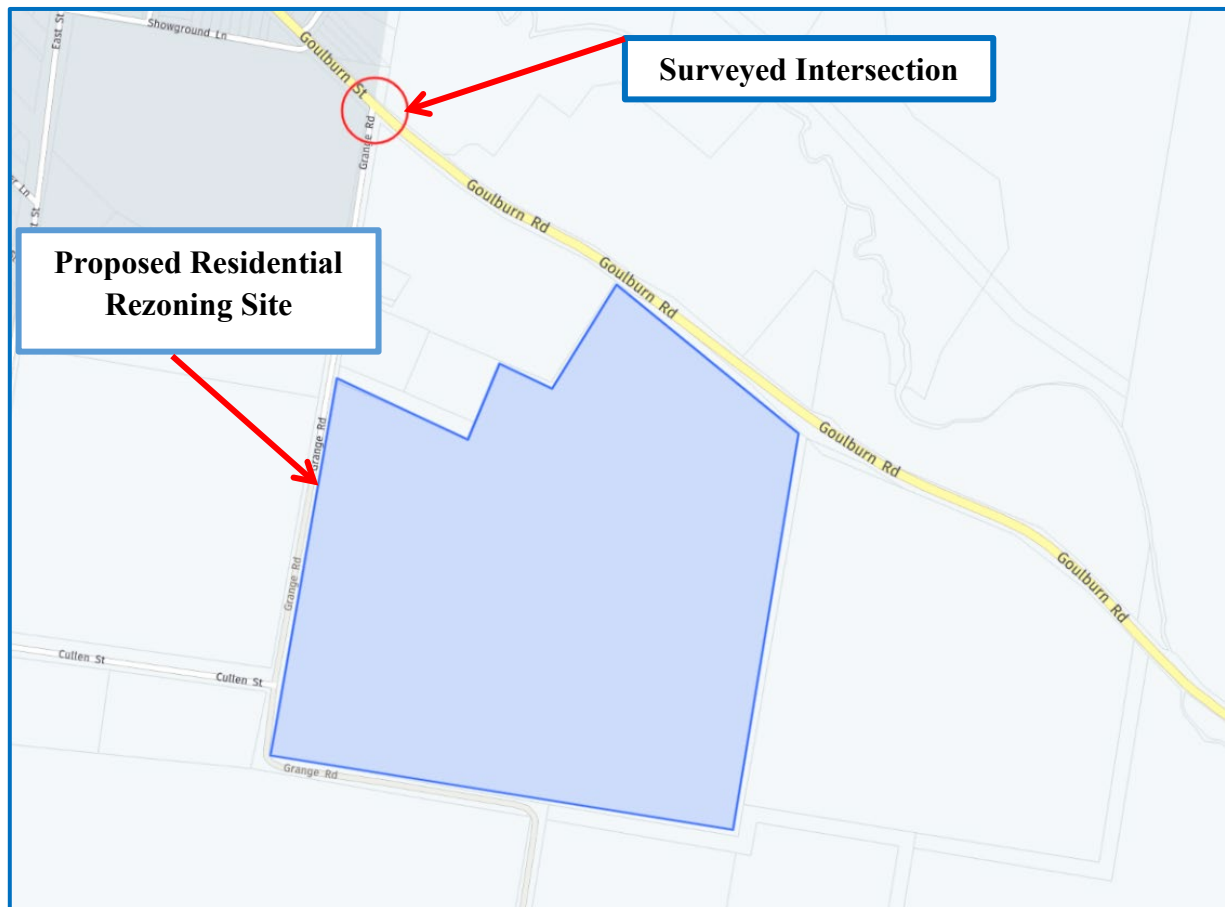


Figure 2: Location of the Site on Street Map in Relation to Surveyed Intersections



Figure 3: Photograph of Proposed residential rezoning Site from Goulburn Road

2.2. Road Network

Goulburn Road is a collector road within Crookwell Town Centre. Goulburn Road has one lane of traffic each at the midblock. Sections of Goulburn Road near the residential rezoning site have a road shoulder for emergency parking such as a car breakdown. The sign posted speed limit is 50km/hr. Figure 4a and 4b show photographs of Goulburn Road.

Grange Road is a residential road with one lane of traffic. The default speed limit is 50km/hr. Figure 4c shows a photograph of Grange Road.



**Figure 4a: Goulburn Road looking east
from the site**



**Figure 4b: Goulburn Road looking west
from the site**



**Figure 4c: Grange Road looking north
from the site**

2.3. Public Parking

On street parking is not permitted on Grange Road or Goulburn Road,

2.4. Intersection Description

As part of the traffic impact assessment, the performance of the nearby intersection was surveyed and assessed:

- ➡ The priority intersection of Goulburn Road with Grange Road

External traffic to and from the proposed residential rezoning is likely to travel through at least one of the above intersections. Drivers on Grange Road need to give way to traffic on Goulburn Road.

The priority intersection of Goulburn Road with Grange Road is a three-leg intersection, with all turn movements permitted. Drivers on Grange Road need to give way to Goulburn Road traffic

Figure 6a and 6b present photographs of the intersection on Aerial and the layout of this intersection using SIDRA (9), respectively. SIDRA is an industry standard intersection software.

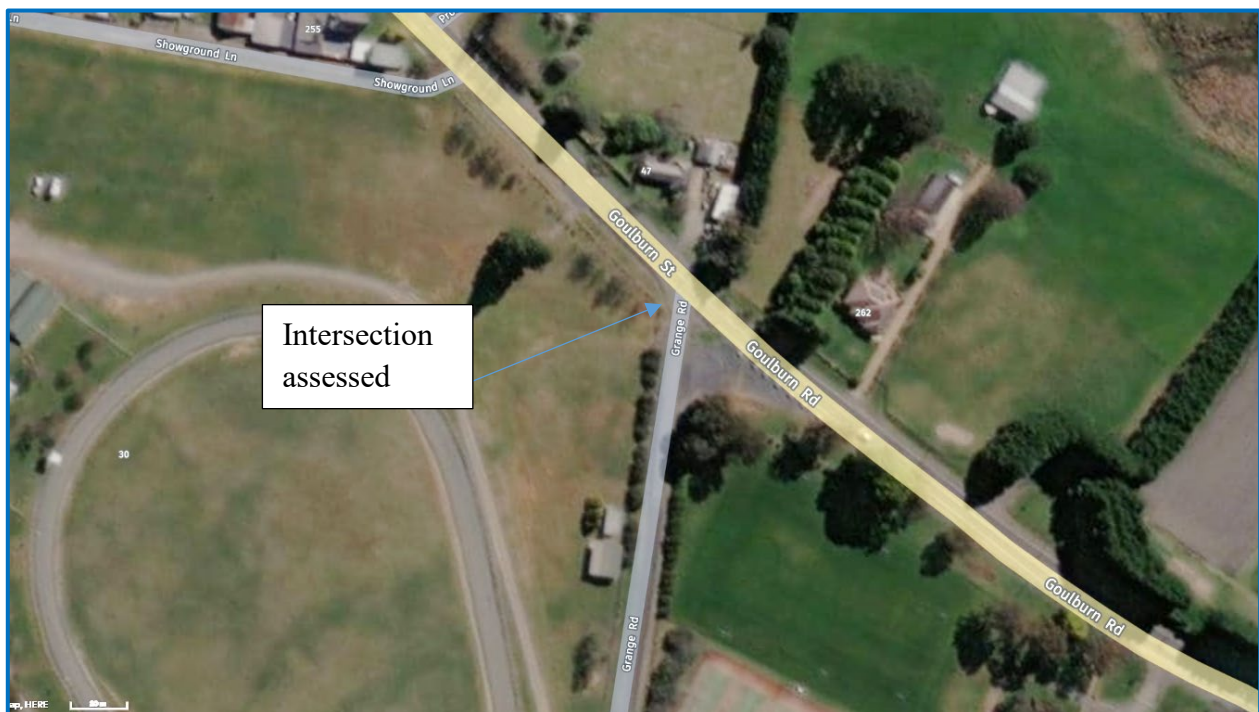


Figure 6a: The priority intersection of Goulburn Road with Grange Road

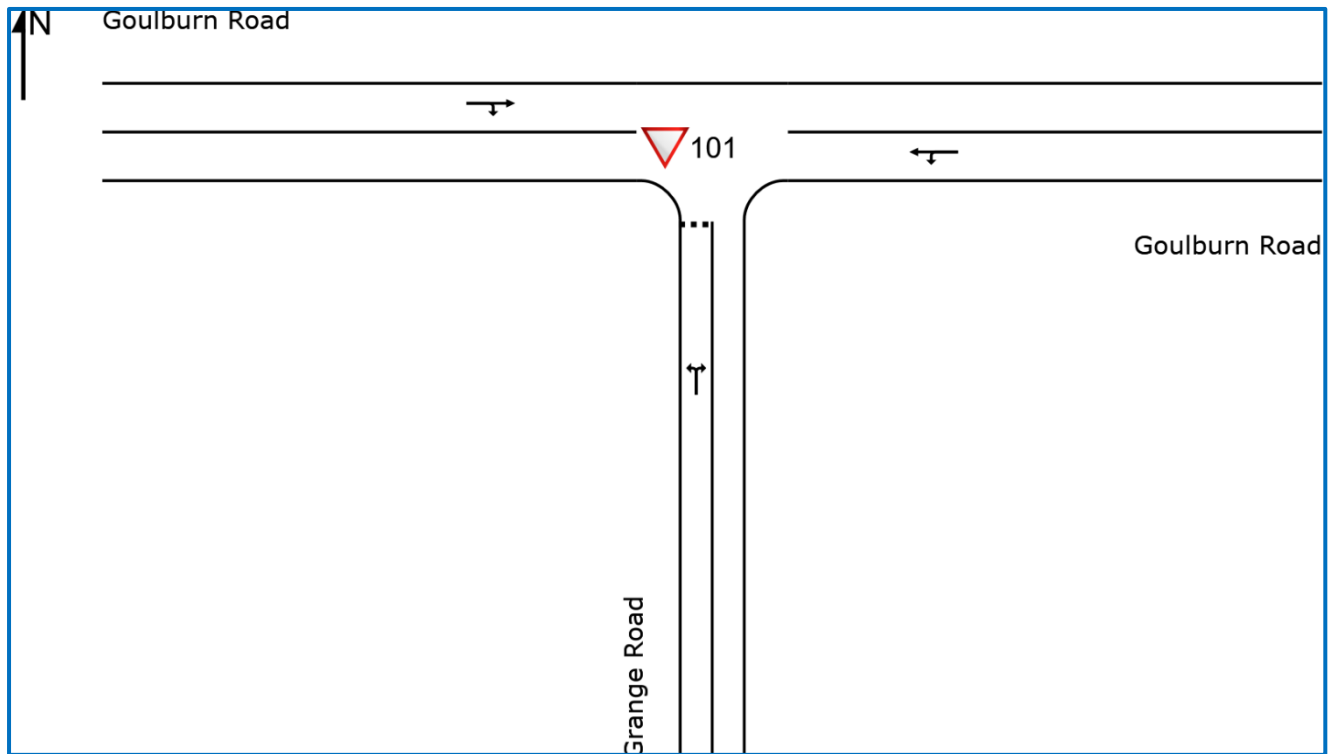


Figure 6b: The priority intersection of Goulburn Road with Grange Road (SIDRA)

2.5. Existing Traffic Volumes

As part of the traffic assessment, traffic counts have been undertaken at the above-mentioned intersections and the AM and PM peak hours are identified accordingly. The AM peak hour is 7:45am to 8:45am and the PM peak hour is 4:30pm to 5:30pm.

The following Figures present the traffic volumes in vehicles for the weekday peak hours. The bracketed numbers are trucks, and un-bracketed are cars

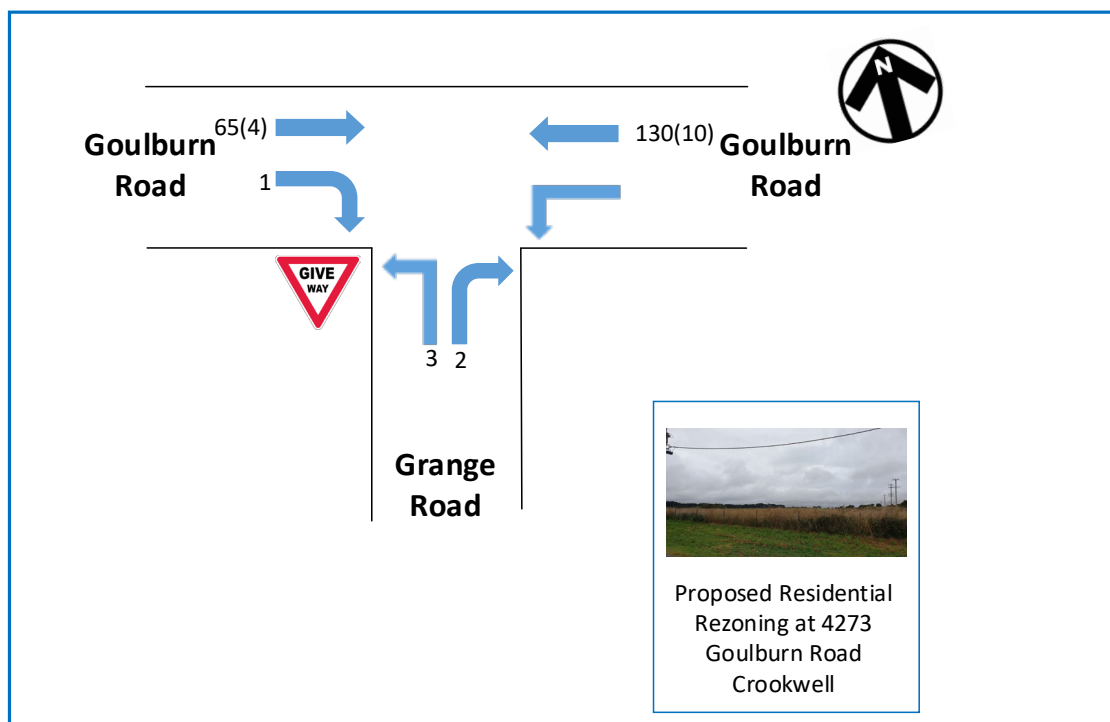


Figure 7a: Existing Weekday Traffic Volumes AM Peak Hour

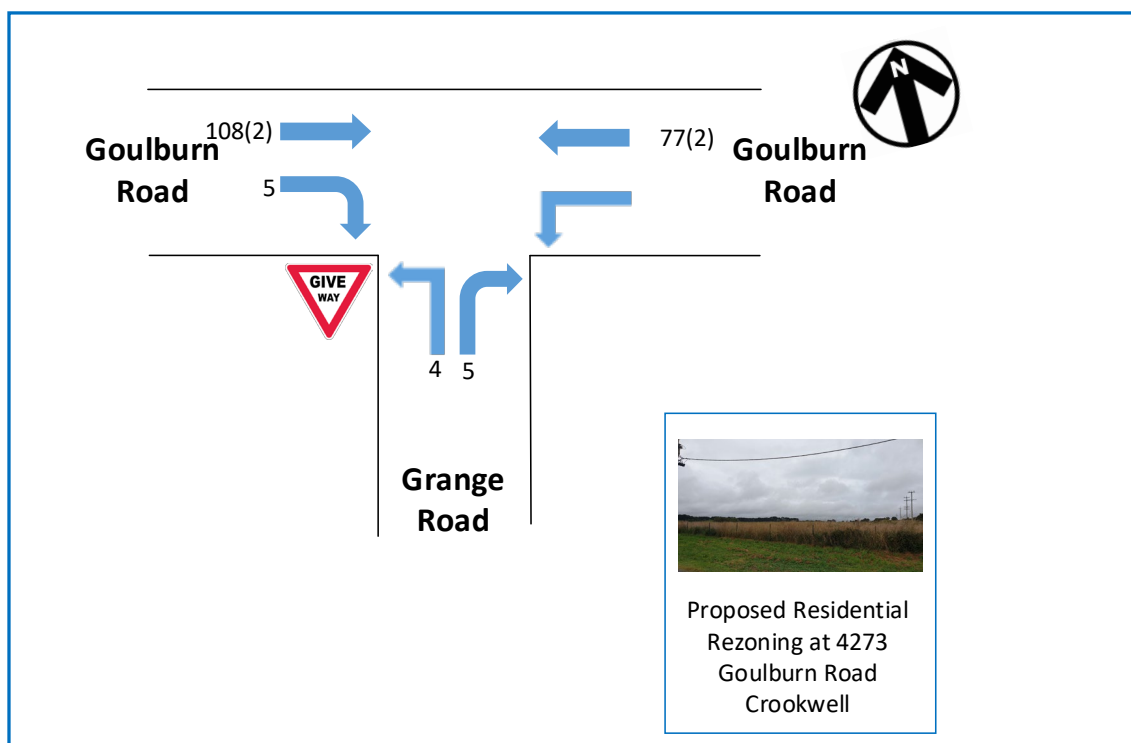


Figure 8b: Existing Weekday Traffic Volumes PM Peak Hour

2.6. Intersection Assessment with Existing Traffic

An intersection assessment has been undertaken for:

- ➡ The priority intersection of Goulburn Road with Grange Road

The existing intersection operating performance was assessed using the SIDRA software package (version 9) to determine the Degree of Saturation (DS), Average Delay (AVD in seconds) and Level of Service (LoS) at each intersection. The SIDRA program provides Level of Service Criteria Tables for various intersection types. The key indicator of intersection performance is Level of Service, where results are placed on a continuum from 'A' to 'F', as shown in Table 1.

LoS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction control
A	Good operation	Good operation
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but accident study required
D	Operating near capacity	Near capacity & accident study required
E	At capacity, at signals incidents will cause excessive delays.	At capacity, requires other control mode
F	Unsatisfactory and requires additional capacity, Roundabouts require other control mode	At capacity, requires other control mode

Table 1: Intersection Level of Service

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection as indicated below, which relates AVD to LOS. The AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e., inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for level of service assessment should be that movement with the highest average delay.

LoS	Average Delay per Vehicles (seconds/vehicle)
A	Less than 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	>70

Table 2: Intersection Average Delay (AVD)

The degree of saturation (DS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt to keep DS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9 queues can be anticipated.

The results of the intersection analysis are as follows

Intersection/ Performance criteria	AM Peak Hour Existing	PM Peak Hour Existing
Goulburn Road/Grange Road		
<i>LoS</i>	N/A(Worst A)	N/A(Worst A)
<i>AVD(s)</i>	0.2	0.4
<i>DS</i>	0.073	0.058

Table 3: Existing intersection performances

All intersections are operating at excellent level of services with the current traffic volume. There are spare capacities at these intersections to accommodate additional traffic volume. The full intersection results are presented in Appendix A.

2.7. Conclusions on the Existing Conditions

The proposed residential rezoning is located in an area where there are no vacant on-street car spaces available.

The nearby intersection overall performs well with sufficient spare capacity to accommodate additional traffic.

3. Proposed Residential Rezoning

A description of the Proposed residential rezoning are as follows:

- ➔ Proposed rezoning with the potential for 171 lots ranging from 800m² to 5850m².
- ➔ There are two proposed roads that will run off Grange Road
- ➔ The internal roads will incorporate a 15 m road reserve width, 7m bitumen sealed carriageway, kerbing and footpath in accordance with councils Development Control Plan 2010
- ➔ The road width and geometry will accommodate Council's waste truck
- ➔ Vehicle and pedestrian sight distance at the intersections will comply with Council and Austroads requirements

A full scaled plan of the proposed residential rezoning will be provided as part of the Development Application.

4. Parking Requirements

Future of the residential lots will need to comply with the car parking requirements of Upper Lachlan Shire Council as follows:

- ➡ One car space per dwelling

There are no additional parking requirements for a residential lot. The internal road layout will be able to accommodate visitor parking.

5. Traffic Generation and Impact

5.1. Traffic Generation

The *NSW RTA Guide to Traffic Generating Developments* provides trip rates for residential rezoning as follows for the weekday peak hours

- ➡ 0.85 car trips per residential lot

Overall, the residential rezoning is a high trip generator.

Application of the above-mentioned rates to the proposed residential development results the peak hour trip generation presented in Table 5a below:

Landuse	Number of lots	Trip Generation Rate	Trips Generated
Residential	171	0.85	145

Table 5a: Trip generation by the proposed residential rezoning

5.2. Trip Distribution

The predicted trips are distributed to the road network assuming 80 percent outbound trips 20 percent inbound trips for the AM peak hour and 20 percent outbound trips 80 percent inbound trips for the PM peak hour, which results the following:

- ➡ AM peak hour: 116 origin trips and 29 destination trips
- ➡ PM peak hour: 29 origin trips and 116 destination trips

5.3. Existing with Residential Rezoning Traffic

The additional development trips are assigned onto the local traffic network. The following figures present the future traffic volume with the development trips (in red for origin trips and blue for destination trips) for the weekday AM and PM peak hours.

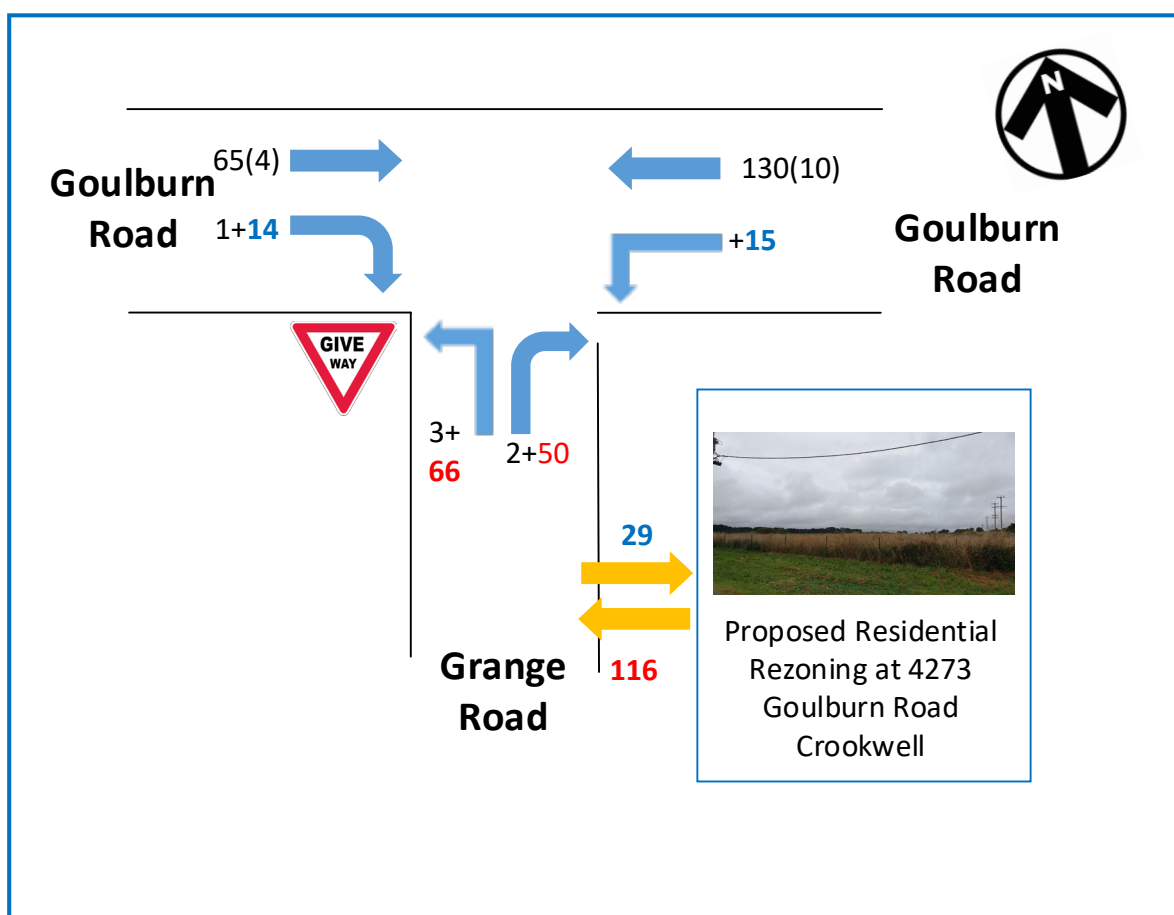


Figure 10a: Existing Weekday Traffic Volumes with Proposed residential rezoning Traffic AM Peak Hour

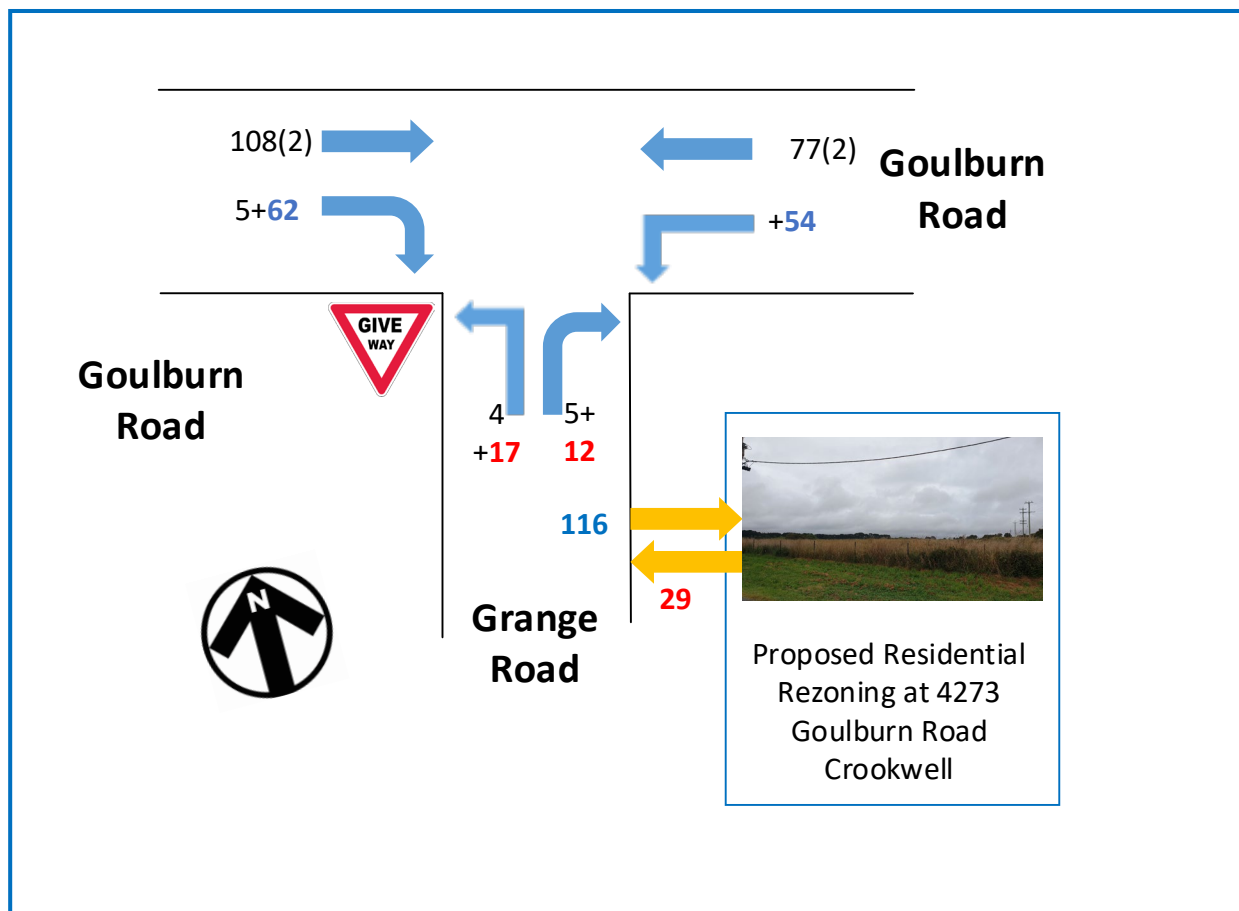


Figure 10b: Existing Weekday Traffic Volumes with Proposed residential rezoning Traffic PM Peak Hour

5.4. Traffic Impact

This section assesses the following intersections for the existing traffic with the Proposed residential rezoning Traffic. The results of the intersection assessment are as follows:

Intersection/ Performance criteria	Performance with Existing Traffic		Projected Performance with Existing and Proposed Apartment Traffic	
	AM Peak Hour Existing	PM Peak Hour Existing	AM Peak Hour Projected	PM Peak Hour Projected
Goulburn Road /Grange Road				
LoS	N/A(Worst A)	N/A(Worst A)	N/A(Worst A)	N/A(Worst A)
AVD(s)	0.2	0.4	2.2	2.4
DS	0.073	0.058	0.104	0.101

Table 6: Projected Intersection Performance with Proposed residential rezoning Traffic

As presented in Table 6 above, the additional trips generated by the proposed residential rezoning have minimum impact on the intersection performances in both AM and PM peak hours. The LoS, AVD and DS of each intersection are not significantly affected by the addition of proposed residential rezoning traffic. The traffic impact of the Proposed residential rezoning is therefore considered acceptable.

The full SIDRA results are presented in Appendix B for the future conditions with the Proposed residential rezoning traffic.

6. Conclusions

This traffic impact assessment reports relates to a Proposed residential rezoning at 4273 Goulburn Road in Crookwell. Based on the analysis and discussions presented in this report, the following conclusions are made:

- ➔ The residential rezoning site is located in a Primary Production, RUI zone
- ➔ The nearby intersection currently operates at good levels of service
- ➔ Each of the residential lots will be subject to council approval for minimum car park requirement
- ➔ The proposed residential rezoning is expected to generate a high number of additional trips in both AM and PM peak hours
- ➔ According to the Intersection Assessment, the additional trips can be accommodated in the nearby intersections without significantly affecting the performance of any turn movement, approach arm or the overall intersection

There are no general traffic engineering reasons why a development consent for the Proposed residential rezoning at 4273 Goulburn Road in Crookwell should not be granted.

APPENDIX A

INTERSECTION ASSESSMENT FOR EXISTING TRAFFIC

Vehicle Movement Performance														
Mov ID	Turn	INPUT [Total veh/h]	VOLUMES HV] veh/h	DEMAND [Total veh/h]	FLows HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Grange Road														
1	L2	3	0	3	0.0	0.004	5.0	LOS A	0.0	0.1	0.24	0.50	0.24	46.1
3	R2	2	0	2	0.0	0.004	5.3	LOS A	0.0	0.1	0.24	0.50	0.24	45.9
Approach		5	0	5	0.0	0.004	5.1	LOS A	0.0	0.1	0.24	0.50	0.24	46.0
East: Goulburn Road														
4	L2	1	0	1	0.0	0.073	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	49.5
5	T1	140	10	147	7.1	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		141	10	148	7.1	0.073	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Goulburn Road														
11	T1	69	4	73	5.8	0.036	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.9
12	R2	1	0	1	0.0	0.036	5.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.2
Approach		70	4	74	5.7	0.036	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.9
All Vehicles		216	14	227	6.5	0.073	0.2	NA	0.0	0.1	0.01	0.02	0.01	49.8

Table A1: The priority intersection of Goulburn Road with Grange Road for the AM Peak Hour

Vehicle Movement Performance														
Mov ID	Turn	INPUT [Total veh/h]	VOLUMES HV] veh/h	DEMAND [Total veh/h]	FLows HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Grange Road														
1	L2	4	0	4	0.0	0.008	4.8	LOS A	0.0	0.2	0.19	0.51	0.19	46.2
3	R2	5	0	5	0.0	0.008	5.2	LOS A	0.0	0.2	0.19	0.51	0.19	46.0
Approach		9	0	9	0.0	0.008	5.0	LOS A	0.0	0.2	0.19	0.51	0.19	46.1
East: Goulburn Road														
4	L2	1	0	1	0.0	0.040	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.5
5	T1	79	2	83	2.5	0.040	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach		80	2	84	2.5	0.040	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
West: Goulburn Road														
11	T1	110	2	116	1.8	0.058	0.0	LOS A	0.0	0.2	0.02	0.02	0.02	49.8
12	R2	5	0	5	0.0	0.058	4.8	LOS A	0.0	0.2	0.02	0.02	0.02	49.1
Approach		115	2	121	1.7	0.058	0.2	NA	0.0	0.2	0.02	0.02	0.02	49.8
All Vehicles		204	4	215	2.0	0.058	0.4	NA	0.0	0.2	0.02	0.04	0.02	49.7

Table A2: The priority intersection of Goulburn Road with Grange Road for the PM Peak Hour

APPENDIX B

INTERSECTION ASSESSMENT FOR FUTURE CONDITION WITH RESIDENTIAL REZONING TRAFFIC

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.]	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		veh	m				km/h
South: Grange Road														
1	L2	69	0	73	0.0	0.104	5.0	LOS A	0.4	2.7	0.27	0.55	0.27	46.0
3	R2	52	0	55	0.0	0.104	5.5	LOS A	0.4	2.7	0.27	0.55	0.27	45.8
Approach		121	0	127	0.0	0.104	5.3	LOS A	0.4	2.7	0.27	0.55	0.27	45.9
East: Goulburn Road														
4	L2	15	0	16	0.0	0.080	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	49.2
5	T1	140	10	147	7.1	0.080	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	49.7
Approach		155	10	163	6.5	0.080	0.5	NA	0.0	0.0	0.00	0.05	0.00	49.6
West: Goulburn Road														
11	T1	69	4	73	5.8	0.046	0.1	LOS A	0.1	0.8	0.11	0.10	0.11	49.1
12	R2	15	0	16	0.0	0.046	5.1	LOS A	0.1	0.8	0.11	0.10	0.11	48.4
Approach		84	4	88	4.8	0.046	1.0	NA	0.1	0.8	0.11	0.10	0.11	49.0
All Vehicles		360	14	379	3.9	0.104	2.2	NA	0.4	2.7	0.12	0.23	0.12	48.2

Table B1: The priority intersection of Goulburn Road with Grange Road for the AM Peak Hour with residential rezoning traffic

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.]	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		veh	m				km/h
South: Grange Road														
1	L2	21	0	22	0.0	0.033	4.8	LOS A	0.1	0.8	0.18	0.52	0.18	46.2
3	R2	17	0	18	0.0	0.033	5.7	LOS A	0.1	0.8	0.18	0.52	0.18	46.0
Approach		38	0	40	0.0	0.033	5.2	LOS A	0.1	0.8	0.18	0.52	0.18	46.1
East: Goulburn Road														
4	L2	59	0	62	0.0	0.071	4.6	LOS A	0.0	0.0	0.00	0.23	0.00	48.2
5	T1	79	2	83	2.5	0.071	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	48.7
Approach		138	2	145	1.4	0.071	2.0	NA	0.0	0.0	0.00	0.23	0.00	48.5
West: Goulburn Road														
11	T1	110	2	116	1.8	0.101	0.3	LOS A	0.4	2.9	0.20	0.20	0.20	48.3
12	R2	67	0	71	0.0	0.101	5.0	LOS A	0.4	2.9	0.20	0.20	0.20	47.7
Approach		177	2	186	1.1	0.101	2.1	NA	0.4	2.9	0.20	0.20	0.20	48.1
All Vehicles		353	4	372	1.1	0.101	2.4	NA	0.4	2.9	0.12	0.25	0.12	48.0

Table B2: The priority intersection of Goulburn Road with Grange Road for the PM Peak Hour with residential rezoning traffic