TRAFFIC AND PARKING IMPACT ASSESSMENT OF A PROPOSED RESIDENTIAL DEVELOPMENT

29-31 Castlereagh Street in Penrith

Traffic and Parking Impact Assessment Report

Prepared for: BB & B Penrith Pty Ltd

N1715731A (Version 1a)

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1. INTRODUCTION

Motion Traffic Engineers was commissioned by BB & B Penrith Pty Ltd to prepare a traffic and parking impact assessment of the proposed residential development located at 29-31 Castlereagh Street in Penrith. Currently the site is a vacant block of land.

This traffic report focuses on the proposed development and changes in car usage and car park utilisation and additional trips from the proposed development.

In the course of preparing this assessment, the subject 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

2.1 Location and Land Use

The development is located south of Penrith Town Centre and Penrith Train Station. The train station and town centre are within the walking distance from the development site. The adjacent land uses are primarily residential dwellings.

Penrith Westfield is north west of the development site and Penrith High School and Nepean Hospital are located North East of the development site.

Figure 1 shows an aerial view of the development site.

Figure 2 shows the location of the development using street directory.

Figure 3 shows a photograph of the development site.

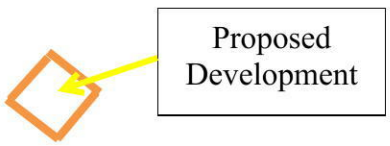
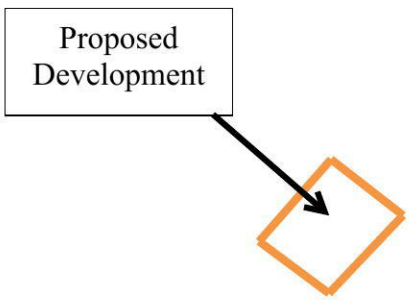


Figure 1: Location of the development site from an aerial view



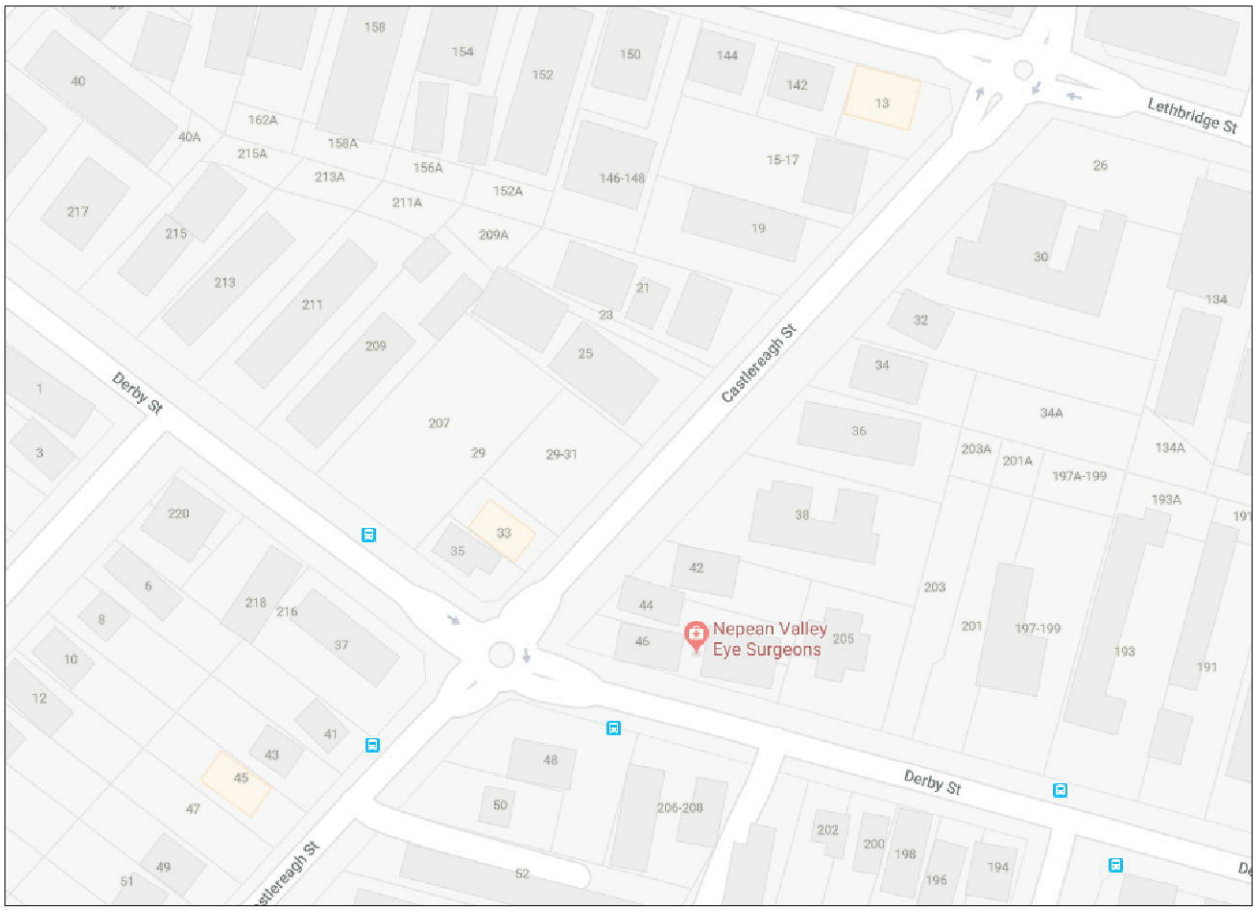


Figure 2: Location of the development using street directory

Figure 3: Photograph of 29-31 Castlereagh Street in Penrith

2.2 Road Network

The development is located on and has frontage to Castlereagh Street.

Castlereagh Street is a local road with one lane each way with a default posted speed limit of 50km/hr. Unrestricted on-street parking is permitted on the both sides of Castlereagh Street. Figure 4 shows a photograph of Castlereagh Street.

Lethbridge Street is a local road with one lane each way with time-restricted parking is available on both sides of the street. The sign posted speed limit is 50km/hr. Unrestricted on-street parking is permitted on the both sides of Lethbridge Street. Figure 5 shows a photograph of Lethbridge Street.

Derby Street is a local road with one lane each way with street parking on both sides of the road. The default speed limit is 50km/hr. Unrestricted on-street parking is permitted on the both sides of Derby Street. Figure 6 shows a photograph of Derby Street.

Figure 4: Castlereagh Street facing North East

Figure 5: Lethbridge Street facing East

Figure 6: Derby Street facing East

2.3 Public Car Parking Opportunities

The development site is located south of Penrith Town Centre. There is unrestricted on-street parking on both sides of Castlereagh Street and street parking lines on both sides of Derby Street. Site visits show that there are there are ample vacant car spaces on these roads.

2.4 Intersection Description

As part of the traffic impact assessment, the performance of two nearby intersections were surveyed and assessed:

- Roundabout intersection of Castlereagh Street with Derby Street.
- Roundabout intersection of Castlereagh Street with Lethbridge Street.

External traffic travelling to and from the development will have to travel through one of the above intersections.

The roundabout intersection of Castlereagh Street with Derby Street is a four-leg intersection with one circulating lane. All turn movements are permitted. The numbers on the roundabout island represent the diameter of the island in metres in the relevant direction. Figure 7 shows the layout of the intersection using SIDRA – an industry standard intersection software.

The roundabout intersection of Castlereagh Street with Lethbridge Street four-leg intersection with one circulating lane. All turn movements are permitted. The numbers on the roundabout island represent the diameter of the island in metres in the relevant direction. Figure 8 shows the layout of the intersection using SIDRA.

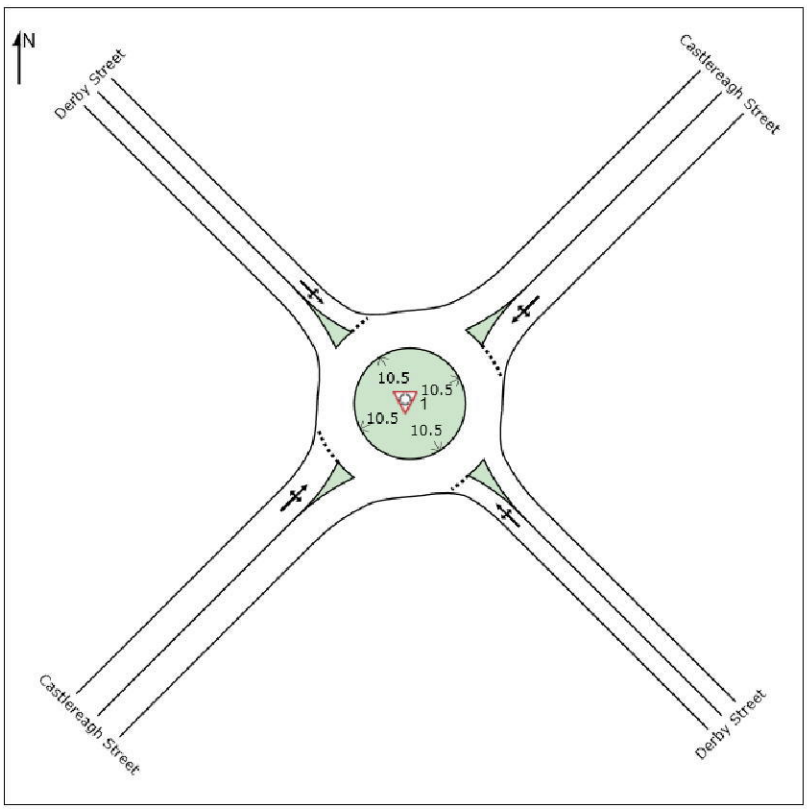


Figure 7: Roundabout intersection of Castlereagh Street with Derby Street (SIDRA)

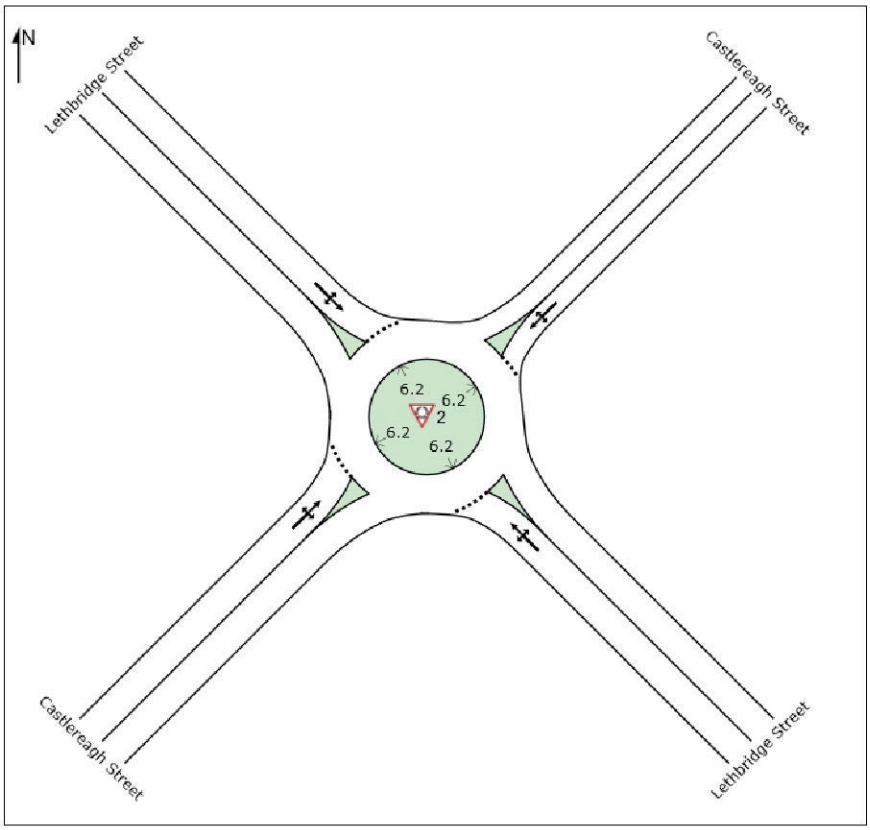


Figure 8: Roundabout intersection of Castlereagh Street with Lethbridge Street (SIDRA)

2.5 Existing Traffic Volumes

Traffic volumes were collected as part of this project for the weekday AM and PM peak hour period in December 2017 for the two surveyed intersections presented. The peak hour is from 8am to 9am and 5pm to 6pm.

Figure 9 and 10 presents the existing weekday AM and PM peak hour traffic volumes respectively in vehicle numbers.

Figure 9: Weekday Existing AM Peak Hour Traffic Volumes

Figure 10: Weekday Existing PM Peak Hour Traffic Volumes

2.6 Intersection Assessment

An intersection assessment and survey has been undertaken for the weekday AM and PM peak hours for both intersections.

The existing intersection operating performance was assessed using the SIDRA 7.0 software package 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 assessment are as follows:

Roundabout intersection of Castlereagh Street with Derby Street

- The intersection has a LoS A for the AM and PM peak hour for all turn movements
- There is spare capacity at this intersection

Roundabout intersection of Castlereagh Street with Lethbridge Street

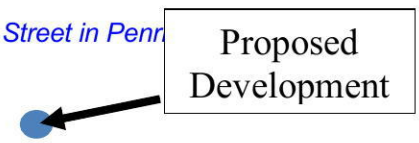
- The intersection has a LoS A for the AM and PM peak hour for all turn movements
- There is spare capacity at this intersection

The full SIDRA results are presented in Appendix A for the existing conditions.

2.7 Public Transport

The nearest bus stop to the development site is 100 metres away on Stafford Street. This stop is serviced by the 770, 774, 775, 776, 789, 791 and 794 bus routes. These provide transport to a range of suburbs including Mount Druitt, Jamison town and Glenmore Park. The nearest train station is Penrith Railway Station, which is 1200 metres to the development. This station is serviced by the BMT, TI, T5, Western NSW and Blue Mountains Line railway routes. These provide transport to a range of suburbs including Central, Hornsby, North Sydney, Emu Plans and Mount Victoria. Figure 11 shows the proximity of the site to public transport services.

The site has excellent access to public transport with the proximity to Penrith Train Station.



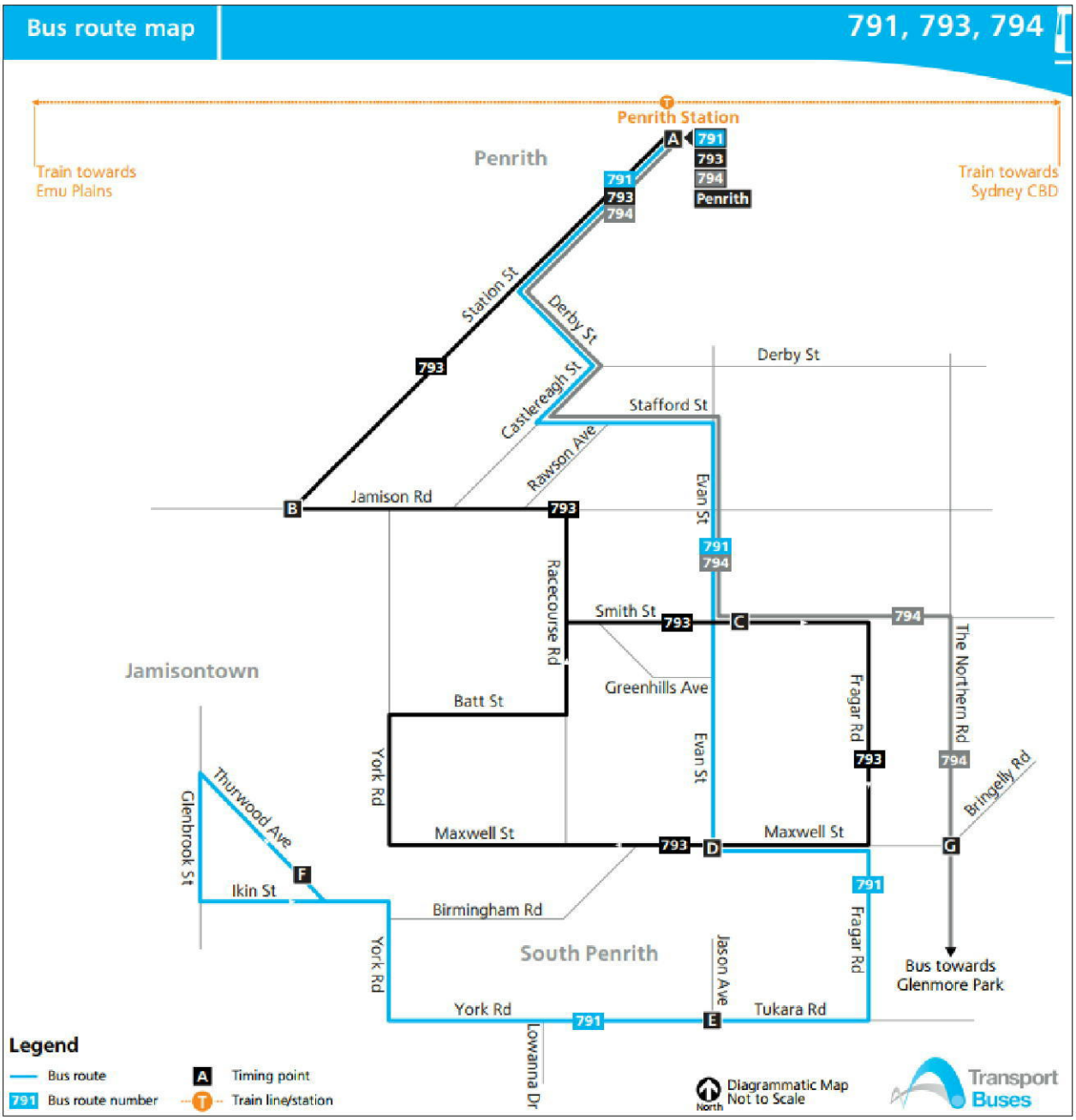


Figure 11: Public Transport Services near the site

2.8 Conclusions on the Existing Conditions

The two intersections assessed performed adequately in the AM and PM peak hours with capacity to accommodate additional development traffic.

The location of the development has access to public transport.

There is satisfactory on-street parking available surrounding the development.

3. PROPOSED RESIDENTIAL DEVELOPMENT

The land uses for the proposed development are as follows:

Residential

- 4 x one-bedroom apartments
- 14 x two-bedroom apartments
- 2 x three-bedroom apartments

Parking

- 28 car spaces including 4 visitor's car spaces and 2 accessible car spaces
- 8 bicycle parking spaces

Car spaces are provided on two basement levels.

Vehicle access and egress is via Castlereagh Street.

A full scaled plan of the proposed development is provided as part of the Development Application. Scaled measurements should use these plans.

4. CAR PARKING CONSIDERATIONS

4.1 Penrith City Council's Development Control Plan

The car parking requirements for residential multi storey apartment developments are presented in *Penrith City Council's Development Control Plan 2014* with the car parking rates as follows:

Residential Flat Buildings

- 1 car space per one or two bedrooms
- 2 car spaces per three or more bedrooms
- 1 visitor car space per 5 apartments

Table 3 summarises the car parking requirements of the proposed development.

The proposed development complies in relation to council's car parking requirements

Table 3: Car Parking Requirements

Use	Number of Rooms	Parking Rate	Parking Spaces Required	Parking Spaces Provided
1 bedroom	4	1	4	28
2 bedroom	14	1	14	
3 bedroom	2	2	4	
Total	20	0.2	4	
TOTAL			**26**	**28**

The bicycle parking spaces requirements for residential developments are presented in Planning Guidelines for Walking and Cycling (NSW Government 2004) with the bicycle parking rates as follows:

2- or more bedroom units/flats

- 20–30% of number of units

Table 4 summarises the bicycle parking requirements of the proposed development.

The proposed development complies in relation to council's bicycle parking requirements

Number of Units	Parking Rate	Parking Spaces Required	Parking Spaces Provided
20	0.2-0.3	Maximun 6	8

4.2 Adequacy of Car Parking Provision

The proposed development complies with Penrith City Council's residential car and bicycle parking requirements, meeting the 26 car spaces that are required with 28 spaces provided and 6 bicycle spaces that are required with 8 spaces provided respectively.

5. VEHICLE TRAFFIC IMPACT CONSIDERATIONS

5.1 Traffic Generation

The RTA Guide to Traffic Generating Developments publishes car trip rates as follows for the weekday peak hour:

- 0.5 trips per small unit (up to two bedrooms) for the AM and PM peak hour
- 0.65 trips per large unit (three or more bedrooms) apartment for the AM and PM peak hour

Table 5 summarises the proposed trip generation for the proposed development.

Table 6 summarises the trip distribution of the generated trips. The proposed development is a low trip generator.

Proposed			
Landuse	**Number of Rooms**	**Trip Rate Per Room**	**Trips**
1 bedroom	4	0.5	2
2 bedroom	14	0.5	7
3 bedroom	2	0.65	1.3
		Total Trips	**11**

Table 5: Trips Generated by the Residential Development Weekday AM and PM Peak Hour

Existing			
Landuse	**Number**	**Trip Rate Per Dwelling**	**Trips**
	0	0	0
		Net Trips	11
Net Trips			
Weekday Rates	**Origin**	**Destination**	**Total**
AM Peak Hour	9	2	11
PM Peak Hour	2	9	11

Table 6: Trips Generated by the Residential Development in the Weekday AM and PM Peak Hour

5.2 Forecast Traffic Volumes

The following presents the existing and with development traffic volumes for the AM and PM Peak Hour distributed onto the two intersections with the development traffic. The additional traffic is in red for origin trips and blue for destination trips.

Figure 11: Weekday AM Peak Hour with additional development Traffic in Red for Origin Trips and Blue for Destination Trips

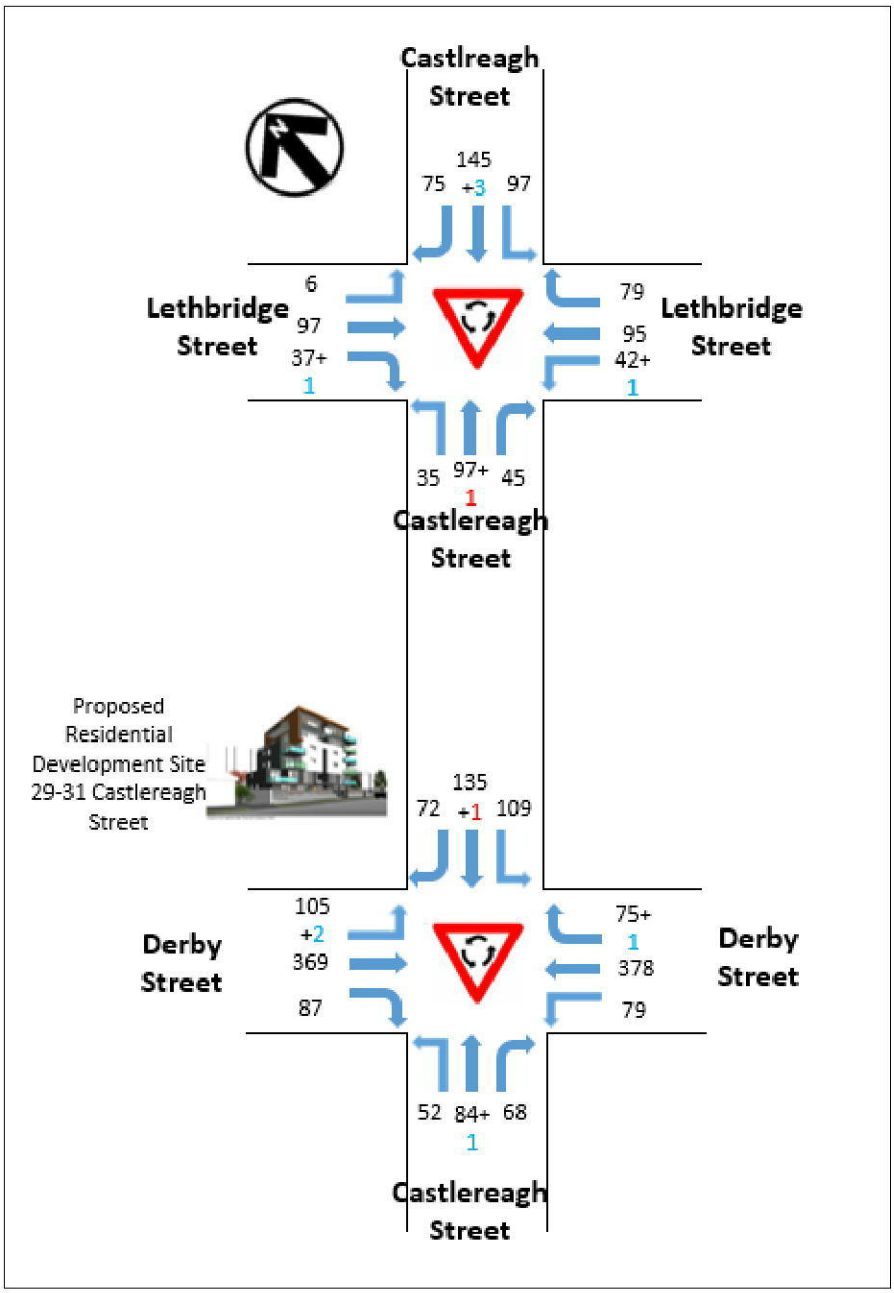


Figure 12: Weekday PM Peak Hour with additional development Traffic in Red for Origin Trips and Blue for Destination Trips

5.3 Intersection Assessment

This section assesses the following intersections for the existing traffic with the development traffic. The intersection results are as follows:

Roundabout intersection of Castlereagh Street with Derby Street

- The intersection has a LoS A for the AM and PM peak hour for all turn movements
- The additional trips do not change the LoS for the turn movements or the overall LoS for the intersection during the AM and PM peak hours.

Roundabout intersection of Castlereagh Street with Lethbridge Street

- The intersection has a LoS A for the AM and PM peak hour for all turn movements
- The additional trips do not change the LoS for the turn movements or the overall LoS for the intersection during the AM and PM peak hours.

The two intersections performances will not change with the additional trips generated.

The full SIDRA results are presented in Appendix B for the existing conditions with the development traffic. The full SIDRA results are presented in Appendix A for the existing conditions.

6.

CONCLUSIONS

Based on the considerations presented in this report, it is considered that:

Parking

- The proposed development does comply with council's parking requirements with the required car spaces and bicycle spaces provided.

Traffic

- The development is a low trip generator in the AM and PM peak hour
- The additional development trips can be accommodated in the nearby intersection without significantly affecting the performance or creating any noticeable delays or queues
- There are no traffic engineering reasons why a planning permit for the development at 29-31 Castlereagh Street in Penrith should be refused

APPENDIX A – SIDRA INTERSECTION EXISTING TRAFFIC CONDITIONS

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Derby Street											
21	L2	63	0.0	0.548	6.1	LOS A	4.7	32.7	0.68	0.66	40.4
22	T1	422	0.0	0.548	6.0	LOS A	4.7	32.7	0.68	0.66	37.4
23	R2	75	0.0	0.548	9.2	LOS A	4.7	32.7	0.68	0.66	39.8
Approach		560	0.0	0.548	6.4	LOS A	4.7	32.7	0.68	0.66	38.2
NorthEast: Castlereagh Street											
24	L2	109	0.0	0.328	6.5	LOS A	1.7	11.9	0.53	0.70	42.4
25	T1	135	0.0	0.328	6.3	LOS A	1.7	11.9	0.53	0.70	47.3
26	R2	72	0.0	0.328	9.6	LOS A	1.7	11.9	0.53	0.70	35.6
Approach		316	0.0	0.328	7.1	LOS A	1.7	11.9	0.53	0.70	43.2
NorthWest: Derby Street											
27	L2	105	0.0	0.489	6.6	LOS A	3.8	26.7	0.70	0.70	37.6
28	T1	309	0.0	0.489	6.4	LOS A	3.8	26.7	0.70	0.70	37.3
29	R2	40	0.0	0.489	9.7	LOS A	3.8	26.7	0.70	0.70	40.4
Approach		454	0.0	0.489	6.7	LOS A	3.8	26.7	0.70	0.70	37.7
SouthWest: Castlereagh Street											
30	L2	90	0.0	0.381	6.6	LOS A	2.2	15.1	0.65	0.77	39.2
31	T1	175	0.0	0.381	6.2	LOS A	2.2	15.1	0.65	0.77	42.1
32	R2	59	0.0	0.381	9.5	LOS A	2.2	15.1	0.65	0.77	41.1
Approach		324	0.0	0.381	6.9	LOS A	2.2	15.1	0.65	0.77	41.2
All Vehicles		1654	0.0	0.548	6.7	LOS A	4.7	32.7	0.65	0.70	39.9

Table A1: Existing Roundabout Intersection Performance of Castlereagh Street with Derby Street for the Weekday AM Peak Hour

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Lethbridge Street											
21	L2	55	0.0	0.232	5.8	LOS A	1.0	7.1	0.39	0.64	41.4
22	T1	95	0.0	0.232	5.0	LOS A	1.0	7.1	0.39	0.64	42.8
23	R2	90	0.0	0.232	7.6	LOS A	1.0	7.1	0.39	0.64	40.6
Approach		240	0.0	0.232	6.2	LOS A	1.0	7.1	0.39	0.64	41.8
NorthEast: Castlereagh Street											
24	L2	78	0.0	0.320	6.1	LOS A	2.0	14.3	0.51	0.60	40.2
25	T1	218	0.0	0.320	5.6	LOS A	2.0	14.3	0.51	0.60	39.2
26	R2	27	0.0	0.320	8.2	LOS A	2.0	14.3	0.51	0.60	39.5
Approach		323	0.0	0.320	5.9	LOS A	2.0	14.3	0.51	0.60	39.5
NorthWest: Lethbridge Street											
27	L2	15	0.0	0.158	6.0	LOS A	0.6	4.5	0.40	0.63	38.7
28	T1	97	0.0	0.158	5.2	LOS A	0.6	4.5	0.40	0.63	43.0
29	R2	46	0.0	0.158	7.8	LOS A	0.6	4.5	0.40	0.63	41.3
Approach		158	0.0	0.158	6.1	LOS A	0.6	4.5	0.40	0.63	42.2
SouthWest: Castlereagh Street											
30	L2	64	0.0	0.307	5.6	LOS A	1.4	9.8	0.35	0.59	40.9
31	T1	199	0.0	0.307	4.7	LOS A	1.4	9.8	0.35	0.59	40.2
32	R2	80	0.0	0.307	7.3	LOS A	1.4	9.8	0.35	0.59	45.1
Approach		343	0.0	0.307	5.5	LOS A	1.4	9.8	0.35	0.59	41.7
All Vehicles		1064	0.0	0.320	5.9	LOS A	2.0	14.3	0.42	0.61	41.2

Table A2: Existing Roundabout Intersection Performance of Castlereagh Street with Lethbridge Street for the Weekday AM Peak Hour

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Derby Street											
21	L2	79	0.0	0.553	6.8	LOS A	4.7	33.2	0.73	0.71	40.0
22	T1	378	0.0	0.553	6.7	LOS A	4.7	33.2	0.73	0.71	36.9
23	R2	75	0.0	0.553	9.9	LOS A	4.7	33.2	0.73	0.71	39.4
Approach		532	0.0	0.553	7.1	LOS A	4.7	33.2	0.73	0.71	37.9
NorthEast: Castlereagh Street											
24	L2	109	0.0	0.356	6.3	LOS A	1.9	13.6	0.61	0.74	38.7
25	T1	135	0.0	0.356	5.9	LOS A	1.9	13.6	0.61	0.74	42.3
26	R2	72	0.0	0.356	9.2	LOS A	1.9	13.6	0.61	0.74	38.7
Approach		316	0.0	0.356	6.8	LOS A	1.9	13.6	0.61	0.74	40.4
NorthWest: Derby Street											
27	L2	105	0.0	0.534	5.9	LOS A	4.5	31.5	0.65	0.64	37.8
28	T1	369	0.0	0.534	5.7	LOS A	4.5	31.5	0.65	0.64	37.6
29	R2	87	0.0	0.534	9.0	LOS A	4.5	31.5	0.65	0.64	40.6
Approach		561	0.0	0.534	6.3	LOS A	4.5	31.5	0.65	0.64	38.2
SouthWest: Castlereagh Street											
30	L2	52	0.0	0.233	6.0	LOS A	1.2	8.3	0.57	0.71	39.3
31	T1	85	0.0	0.233	5.6	LOS A	1.2	8.3	0.57	0.71	42.2
32	R2	68	0.0	0.233	8.9	LOS A	1.2	8.3	0.57	0.71	41.2
Approach		205	0.0	0.233	6.8	LOS A	1.2	8.3	0.57	0.71	41.2
All Vehicles		1614	0.0	0.553	6.7	LOS A	4.7	33.2	0.66	0.69	39.1

Table A3: Existing Roundabout Intersection Performance of Castlereagh Street with Derby Street for the Weekday PM Peak Hour

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Lethbridge Street											
21	L2	42	0.0	0.204	5.6	LOS A	0.9	6.0	0.36	0.62	41.5
22	T1	95	0.0	0.204	4.8	LOS A	0.9	6.0	0.36	0.62	43.0
23	R2	79	0.0	0.204	7.4	LOS A	0.9	6.0	0.36	0.62	40.8
Approach		216	0.0	0.204	5.9	LOS A	0.9	6.0	0.36	0.62	42.0
NorthEast: Castlereagh Street											
24	L2	97	0.0	0.306	5.9	LOS A	1.9	13.6	0.48	0.61	40.0
25	T1	145	0.0	0.306	5.4	LOS A	1.9	13.6	0.48	0.61	39.0
26	R2	75	0.0	0.306	8.1	LOS A	1.9	13.6	0.48	0.61	39.3
Approach		317	0.0	0.306	6.2	LOS A	1.9	13.6	0.48	0.61	39.4
NorthWest: Lethbridge Street											
27	L2	6	0.0	0.133	5.7	LOS A	0.5	3.6	0.34	0.59	39.1
28	T1	97	0.0	0.133	4.9	LOS A	0.5	3.6	0.34	0.59	43.3
29	R2	37	0.0	0.133	7.5	LOS A	0.5	3.6	0.34	0.59	41.6
Approach		140	0.0	0.133	5.6	LOS A	0.5	3.6	0.34	0.59	42.8
SouthWest: Castlereagh Street											
30	L2	55	0.0	0.245	5.7	LOS A	1.0	7.2	0.35	0.61	40.8
31	T1	137	0.0	0.245	4.8	LOS A	1.0	7.2	0.35	0.61	39.6
32	R2	71	0.0	0.245	7.5	LOS A	1.0	7.2	0.35	0.61	42.4
Approach		263	0.0	0.245	5.7	LOS A	1.0	7.2	0.35	0.61	40.8
All Vehicles		936	0.0	0.306	5.9	LOS A	1.9	13.6	0.40	0.61	41.0

Table A4: Existing Roundabout Intersection Performance of Castlereagh Street with Lethbridge Street for the Weekday PM Peak Hour

APPENDIX B – SIDRA INTERSECTION EXISTING WITH ADDITIONAL RESIDENTIAL TRAFFIC

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Derby Street											
21	L2	63	0.0	0.550	6.1	LOS A	4.7	32.9	0.69	0.66	40.3
22	T1	422	0.0	0.550	6.0	LOS A	4.7	32.9	0.69	0.66	37.3
23	R2	75	0.0	0.550	9.3	LOS A	4.7	32.9	0.69	0.66	39.7
Approach		560	0.0	0.550	6.5	LOS A	4.7	32.9	0.69	0.66	38.2
NorthEast: Castlereagh Street											
24	L2	111	0.0	0.333	6.5	LOS A	1.7	12.1	0.53	0.71	42.4
25	T1	137	0.0	0.333	6.3	LOS A	1.7	12.1	0.53	0.71	47.3
26	R2	73	0.0	0.333	9.6	LOS A	1.7	12.1	0.53	0.71	35.6
Approach		321	0.0	0.333	7.1	LOS A	1.7	12.1	0.53	0.71	43.2
NorthWest: Derby Street											
27	L2	105	0.0	0.489	6.6	LOS A	3.8	26.7	0.70	0.70	37.6
28	T1	309	0.0	0.489	6.4	LOS A	3.8	26.7	0.70	0.70	37.3
29	R2	40	0.0	0.489	9.7	LOS A	3.8	26.7	0.70	0.70	40.4
Approach		454	0.0	0.489	6.7	LOS A	3.8	26.7	0.70	0.70	37.7
SouthWest: Castlereagh Street											
30	L2	90	0.0	0.383	6.6	LOS A	2.2	15.2	0.66	0.77	39.2
31	T1	176	0.0	0.383	6.2	LOS A	2.2	15.2	0.66	0.77	42.1
32	R2	59	0.0	0.383	9.5	LOS A	2.2	15.2	0.66	0.77	41.1
Approach		325	0.0	0.383	6.9	LOS A	2.2	15.2	0.66	0.77	41.2
All Vehicles		1660	0.0	0.550	6.8	LOS A	4.7	32.9	0.66	0.70	39.9

Table B1: Existing Roundabout Intersection Performance Castlereagh Street with Derby Street for the Weekday AM Peak Hour with Apartment Traffic

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Lethbridge Street											
21	L2	55	0.0	0.232	5.8	LOS A	1.0	7.1	0.40	0.64	41.4
22	T1	95	0.0	0.232	5.0	LOS A	1.0	7.1	0.40	0.64	42.8
23	R2	90	0.0	0.232	7.6	LOS A	1.0	7.1	0.40	0.64	40.6
Approach		240	0.0	0.232	6.2	LOS A	1.0	7.1	0.40	0.64	41.7
NorthEast: Castlereagh Street											
24	L2	78	0.0	0.321	6.1	LOS A	2.1	14.4	0.51	0.60	40.2
25	T1	219	0.0	0.321	5.6	LOS A	2.1	14.4	0.51	0.60	39.2
26	R2	27	0.0	0.321	8.2	LOS A	2.1	14.4	0.51	0.60	39.5
Approach		324	0.0	0.321	6.0	LOS A	2.1	14.4	0.51	0.60	39.5
NorthWest: Lethbridge Street											
27	L2	15	0.0	0.158	6.1	LOS A	0.6	4.5	0.41	0.63	38.7
28	T1	97	0.0	0.158	5.2	LOS A	0.6	4.5	0.41	0.63	43.0
29	R2	46	0.0	0.158	7.8	LOS A	0.6	4.5	0.41	0.63	41.2
Approach		158	0.0	0.158	6.1	LOS A	0.6	4.5	0.41	0.63	42.2
SouthWest: Castlereagh Street											
30	L2	65	0.0	0.310	5.6	LOS A	1.4	9.9	0.35	0.59	40.9
31	T1	200	0.0	0.310	4.7	LOS A	1.4	9.9	0.35	0.59	40.2
32	R2	81	0.0	0.310	7.3	LOS A	1.4	9.9	0.35	0.59	45.1
Approach		346	0.0	0.310	5.5	LOS A	1.4	9.9	0.35	0.59	41.7
All Vehicles		1068	0.0	0.321	5.9	LOS A	2.1	14.4	0.42	0.61	41.2

Table B2: Existing Roundabout Intersection Performance Castlereagh Street with Lethbridge Street for the Weekday AM Peak Hour with Apartment Traffic

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Derby Street											
21	L2	79	0.0	0.555	6.8	LOS A	4.8	33.5	0.73	0.71	40.0
22	T1	378	0.0	0.555	6.7	LOS A	4.8	33.5	0.73	0.71	36.9
23	R2	76	0.0	0.555	10.0	LOS A	4.8	33.5	0.73	0.71	39.4
Approach		533	0.0	0.555	7.2	LOS A	4.8	33.5	0.73	0.71	37.9
NorthEast: Castlereagh Street											
24	L2	109	0.0	0.357	6.3	LOS A	2.0	13.7	0.61	0.74	38.7
25	T1	136	0.0	0.357	5.9	LOS A	2.0	13.7	0.61	0.74	42.3
26	R2	72	0.0	0.357	9.2	LOS A	2.0	13.7	0.61	0.74	38.7
Approach		317	0.0	0.357	6.8	LOS A	2.0	13.7	0.61	0.74	40.5
NorthWest: Derby Street											
27	L2	107	0.0	0.537	5.9	LOS A	4.5	31.8	0.65	0.64	37.8
28	T1	369	0.0	0.537	5.8	LOS A	4.5	31.8	0.65	0.64	37.6
29	R2	87	0.0	0.537	9.1	LOS A	4.5	31.8	0.65	0.64	40.6
Approach		563	0.0	0.537	6.3	LOS A	4.5	31.8	0.65	0.64	38.2
SouthWest: Castlereagh Street											
30	L2	52	0.0	0.235	6.0	LOS A	1.2	8.4	0.57	0.72	39.3
31	T1	86	0.0	0.235	5.6	LOS A	1.2	8.4	0.57	0.72	42.2
32	R2	68	0.0	0.235	8.9	LOS A	1.2	8.4	0.57	0.72	41.2
Approach		206	0.0	0.235	6.8	LOS A	1.2	8.4	0.57	0.72	41.2
All Vehicles		1619	0.0	0.555	6.8	LOS A	4.8	33.5	0.66	0.69	39.1

Table B3: Existing Roundabout Intersection Performance of Castlereagh Street with Derby Street for the Weekday PM Peak Hour with Apartment Traffic

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Lethbridge Street											
21	L2	43	0.0	0.218	6.0	LOS A	1.0	6.8	0.43	0.65	41.3
22	T1	95	0.0	0.218	5.2	LOS A	1.0	6.8	0.43	0.65	42.7
23	R2	79	0.0	0.218	7.8	LOS A	1.0	6.8	0.43	0.65	40.5
Approach		217	0.0	0.218	6.3	LOS A	1.0	6.8	0.43	0.65	41.7
NorthEast: Castlereagh Street											
24	L2	97	0.0	0.383	6.0	LOS A	2.6	18.3	0.51	0.61	40.0
25	T1	231	0.0	0.383	5.6	LOS A	2.6	18.3	0.51	0.61	38.9
26	R2	75	0.0	0.383	8.2	LOS A	2.6	18.3	0.51	0.61	39.2
Approach		403	0.0	0.383	6.2	LOS A	2.6	18.3	0.51	0.61	39.3
NorthWest: Lethbridge Street											
27	L2	6	0.0	0.134	5.7	LOS A	0.5	3.6	0.35	0.59	39.1
28	T1	97	0.0	0.134	4.9	LOS A	0.5	3.6	0.35	0.59	43.3
29	R2	38	0.0	0.134	7.5	LOS A	0.5	3.6	0.35	0.59	41.6
Approach		141	0.0	0.134	5.6	LOS A	0.5	3.6	0.35	0.59	42.7
SouthWest: Castlereagh Street											
30	L2	55	0.0	0.246	5.7	LOS A	1.0	7.3	0.36	0.61	40.8
31	T1	138	0.0	0.246	4.8	LOS A	1.0	7.3	0.36	0.61	39.5
32	R2	71	0.0	0.246	7.5	LOS A	1.0	7.3	0.36	0.61	42.4
Approach		264	0.0	0.246	5.7	LOS A	1.0	7.3	0.36	0.61	40.8
All Vehicles		1025	0.0	0.383	6.0	LOS A	2.6	18.3	0.43	0.62	40.8

Table B4: Existing Roundabout Intersection Performance Castlereagh Street with Lethbridge Street for the Weekday PM Peak Hour with Apartment Traffic