TRAFFIC AND PARKING IMPACT ASSESSMENT OF A PROPOSED RESIDENTIAL DEVELOPMENT

9-11 Sydney Street in St Marys

Traffic and Parking Impact Assessment Report

Prepared for: gm architects

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1. INTRODUCTION

Motion Traffic Engineers was commissioned by GM architects to prepare a traffic and parking impact assessment of the proposed residential development located at 9-11 Sydney Street in St Marys. Currently the site has two residential buildings.

The entrance and exit to the site is via Sydney Street.

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 Whalan Reserve and east of St Marys Train station. The adjacent land uses are predominantly residential areas. All traffic that enters and exits the proposed development site will pass through Sydney Street.

Figure 1 presents an aerial view of the development site.

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

Figure 3a and 3b present photographs of the development site.

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

Figure 2: Street Map of the Location of the Development Site

Figure 3a: Photograph of 9 Sydney Street from Sydney Street

Figure 3b: Photograph of 11 Sydney Street from Sydney Street

2.2 Road Network

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

Sydney Street is a local road with one lane each way with a default speed limit of 50km/hr. On-street parking is permitted on the both sides of Sydney Street from Hobart Street to Brisbane Street without restriction. Figure 4 presents a photograph of Sydney Street.

Hobart Street is a local road with one lane each way with a default speed limit of 50km/hr. On-street parking is permitted on the both sides of Hobart Street without restriction. Figure 5 presents a photograph of Hobart Street.

Brisbane Street is a local road with one lane each way with a sign posted speed limit of 50km/hr. On-street parking is permitted on the both sides of Brisbane Street without restriction. Figure 6 presents roundabout intersection of Sydney Street with Brisbane Street.

Figure 4: Sydney Street Facing South

Figure 5: Hobart Street Facing East

Figure 6: Roundabout Intersection of Sydney Street with Brisbane Street

2.3 Intersection Description

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

- Priority-controlled intersection of Hobart Street with Sydney Street
- Roundabout intersection of Brisbane Street with Sydney Street

External traffic travelling to and from the development will majorly travel through the above intersection.

The priority-controlled intersection of Hobart Street with Sydney Street is a three-leg intersection. Drivers on Sydney Street need to give way to traffic on Hobart Street. All turn movements are permitted on this intersection. Figure 7 shows the layout of the intersection using SIDRA 7 – an industry standard intersection software.

The roundabout intersection of Brisbane Street with Sydney Street is a four-leg intersection with one circulating lane. All turn movements are permitted on this intersection. Figure 8 shows the layout of the intersection using SIDRA 7. The numbers on the island represent the dimater in metres.

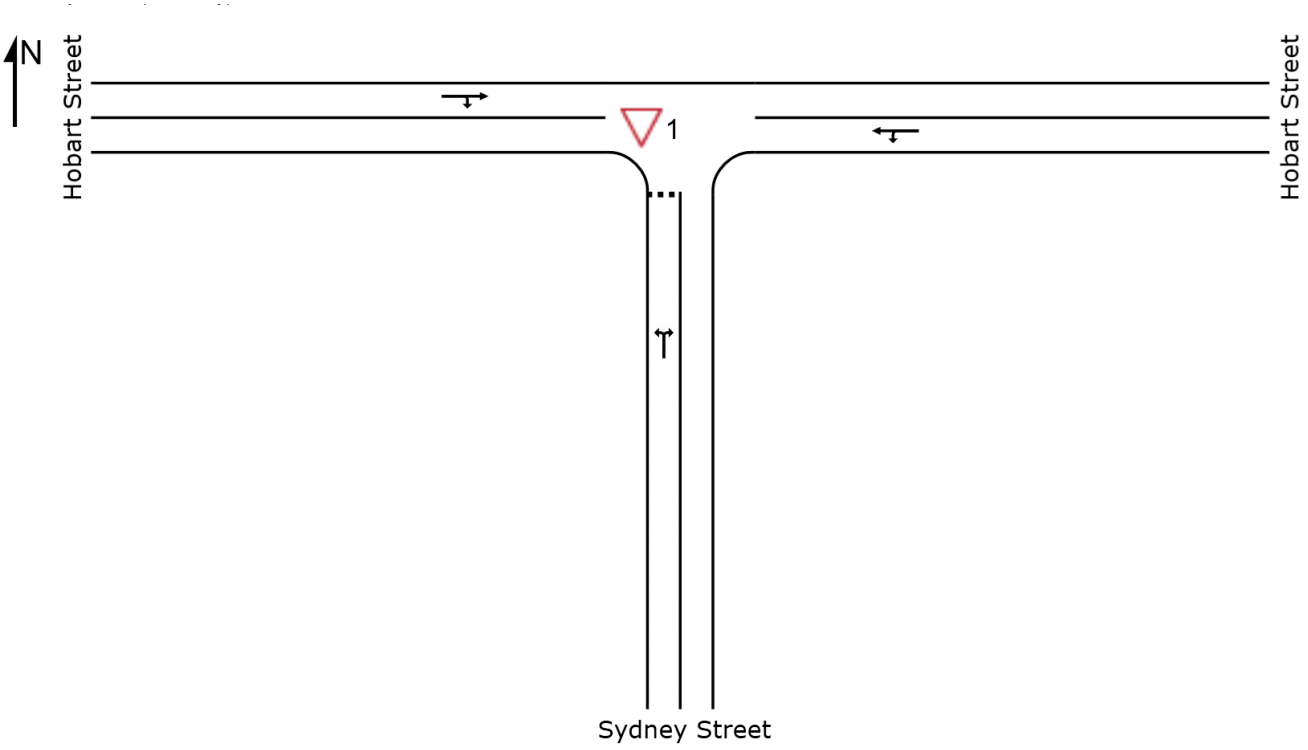

Figure 7: Priority-controlled Intersection of Hobart Street with Sydney Street

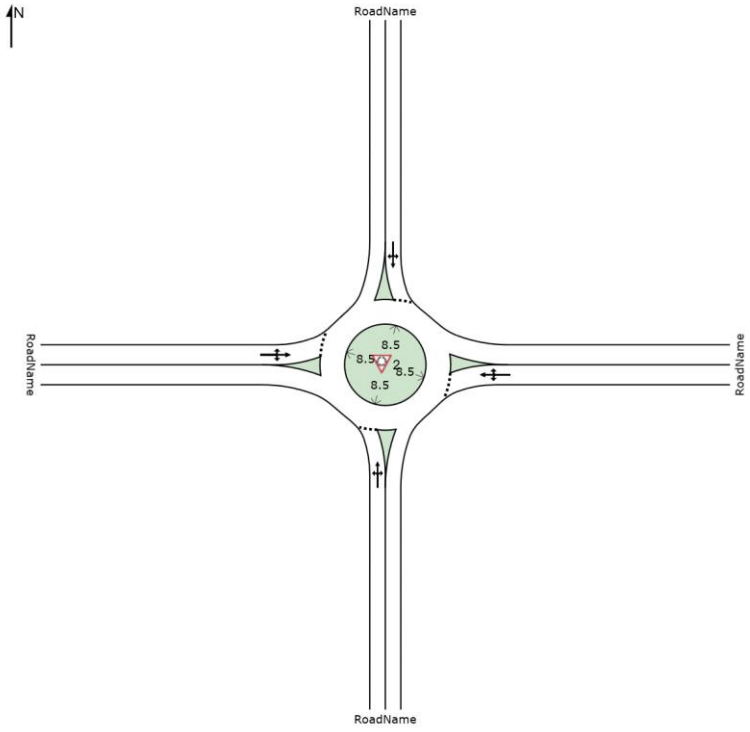

Figure 8: Roundabout Intersection of Brisbane Street with Sydney Street

2.4 Existing Traffic Volumes

Traffic volumes were collected as part of this project for the weekday AM and PM peak hours for the two surveyed intersections presented. The peak hours are from 8am to 9am and 5pm to 6pm respectively.

Figures 9 presents the existing weekday AM peak hour traffic volumes in vehicle numbers.

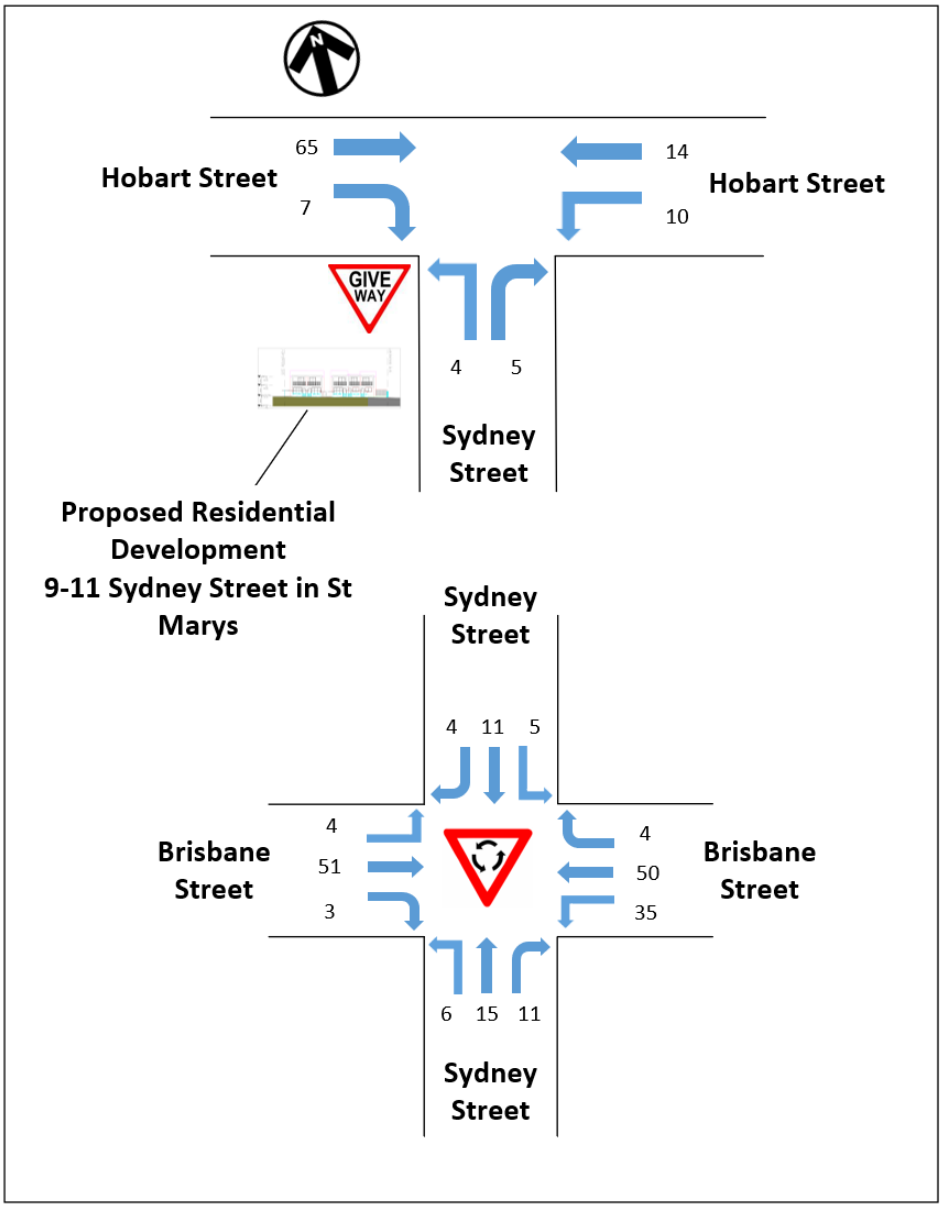

Figure 9: Weekday Existing AM Peak Hour Traffic Volumes

Figures 10 presents the existing weekday PM peak hour traffic volumes in vehicle numbers.

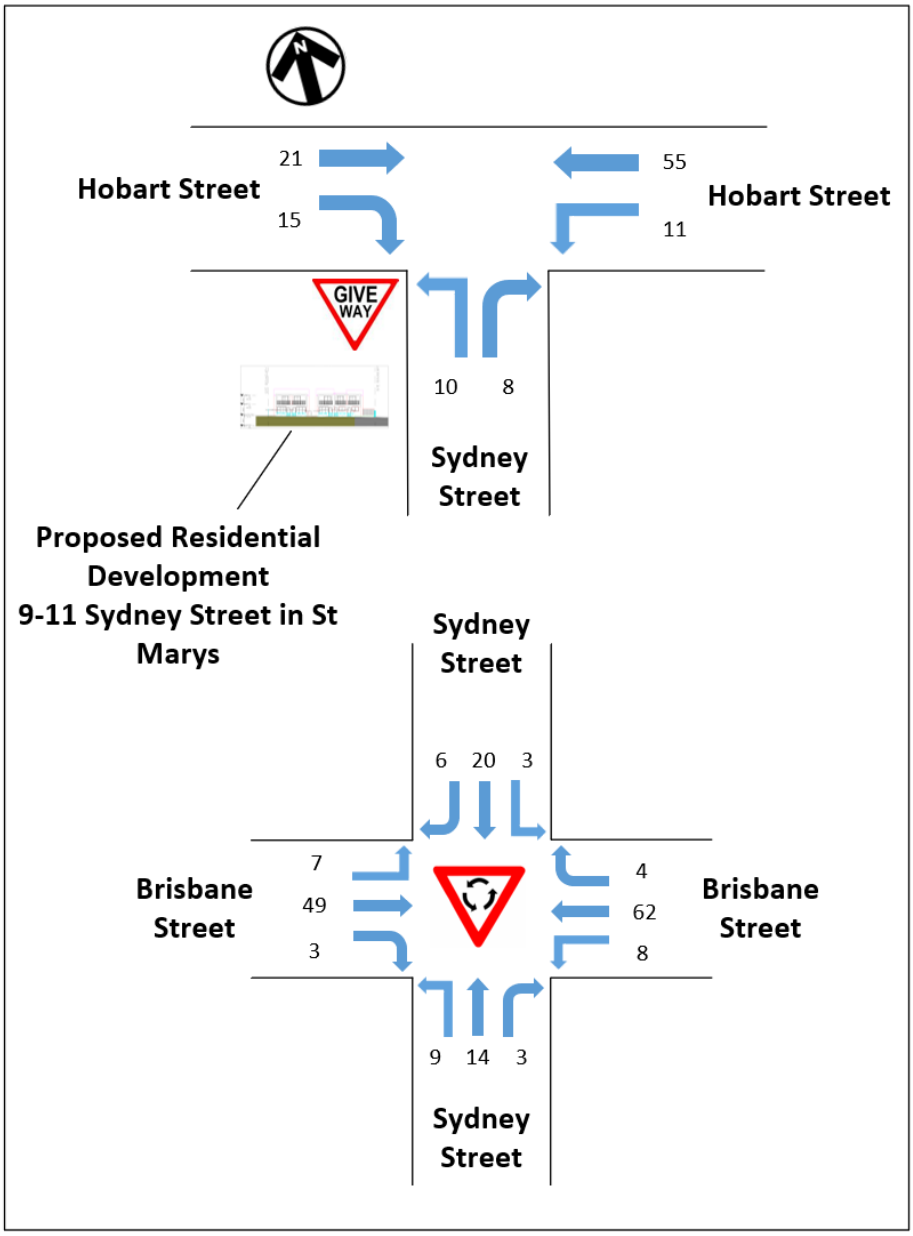

Figure 10: Weekday Existing PM Peak Hour Traffic Volumes

2.5 Public Parking Opportunities

The site is located in a residential area where there is low on street parking demand. Many of the residences have on site parking. Site observations show that there are a large number of vacant car spaces (See Figure 4).

2.6 Intersection Assessment

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

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:

Priority-controlled Intersection of Hobart Street with Sydney Street

- The intersection has a LoS A or for all tern movements for the weekday AM and PM peak hours.
- There is spare capacity at this intersection.

Roundabout Intersection of Brisbane Street with Sydney Street

- The overall intersection has a LoS A for the weekday AM and PM peak hours.
- 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 is approximately 250m from the proposed development site. The bus stop is being serviced by 774 and S11 routes. These routes provide transport mainly to the local suburbs such as St Clair, Colyton Oxley Park, St Marys, Kingswood and Penrith. The site is also not far away from St Marys Train station (around 1.4 km).

The development has average connections to public transport. Figure 11&12 show bus routes of 774 and S11 respectively.

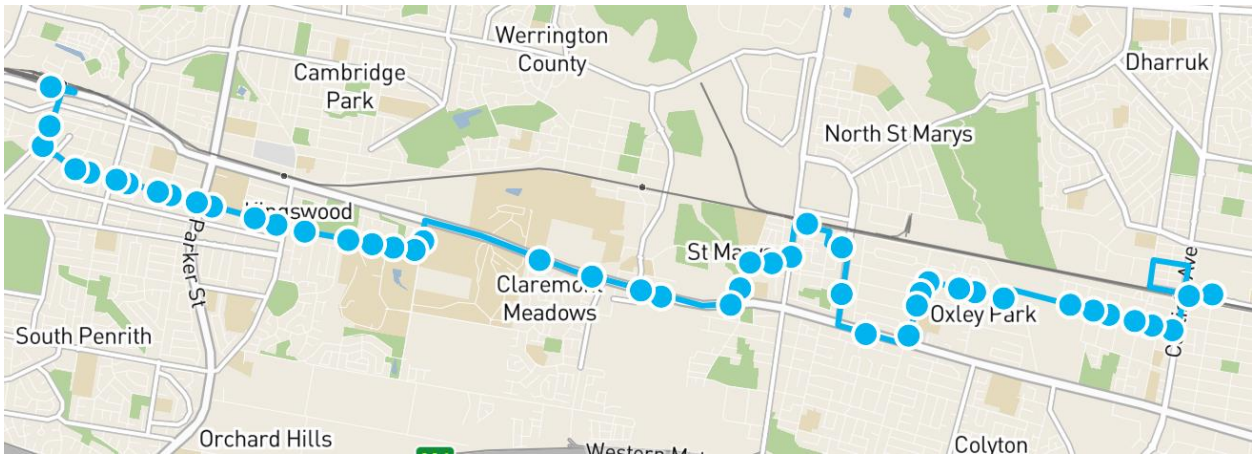

Figure 12: Route Map of Bus 774

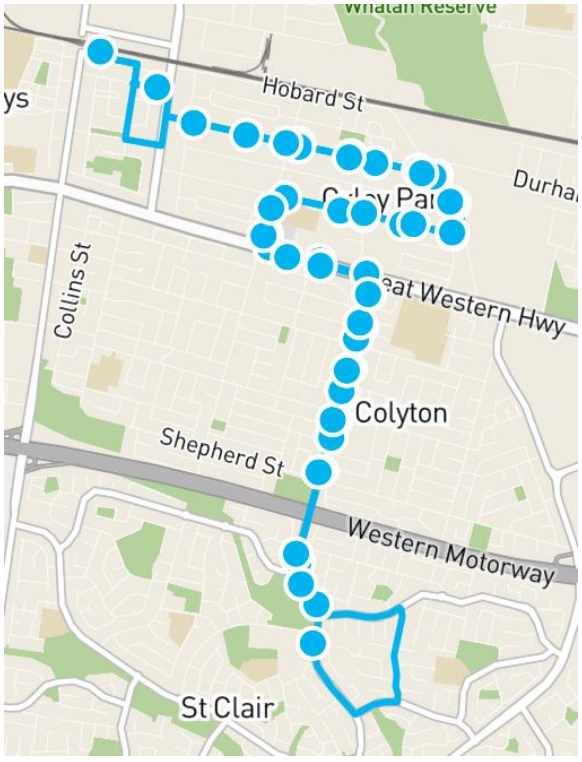

Figure 12: Route Map of Bus S11

2.8 Conclusions on the Existing Conditions

The local area is serviced by several bus routes and has average connections to public transport.

The nearby intersections perform well.

There are vacant car spaces on Sydney Street.

3. PROPOSED RESIDENTIAL SITE

The details of the proposed residential development are as follows:

- Thirteen apartments are provided of which seven are two-bedroom apartments and the remainder three-bedroom apartments
- 26 on site car spaces
    - 3 visitor car spaces are provided (one is a disabled car space)
    - 23 tenant car spaces are provided (one is a disabled car space)
- Car parking is provided on the basement level.
- Vehicle access and egress is via Sydney 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 Development Control Plan 2014

The car parking requirements for residential development is presented in the Penrith Development Control Plan 2014 with the car parking rates as follows as it applies to this development:

Residential:

- 2-bedroom unit: 1.5 spaces per unit
- 3-bedroom unit: 2 spaces per unit

Plus:

- 1 space per 5 units for visitors

Table 3 summarises the car parking requirements of the proposed development

Number of Units	Number of Bedrooms	Parking Rates	Car Spaces Required	Car Spaces Provided
7	2	1.5	10.5	23
6	3	2	12	
Car Spaces for Visitors		0.2	2.6	3
Total			25.1	26

Table 3: Summarises of Car Parking Requirements

4.2 Adequacy of Car Parking Provision

The proposed development provides sufficient tenant car spaces and three visitor car spaces are provided. Additional visitor parking demand can be met in the vacant car spaces on Sydney street.

5. VEHICLE TRAFFIC IMPACT CONSIDERATIONS

5.1 Traffic Generation

The NSW RTA Guide to Traffic Generating Development document publishes trip generation rates as follows:

Medium density residential flat building:

- 0.65 per dwelling during AM and PM peak hour

Table 4 presents the estimated total peak period trips generated by the proposed residential flat building during the AM and PM peak period.

Table 5 presents the net trips generated by the proposed residential flat building during the AM and PM peak period.

Proposed			
Landuse	**Number of Units**	**Trip Rate Per Unit**	**Trips**
Residential Flat Building	13	0.65	9

Table 4: Trips Generated by the proposed residential development in the Weekday AM and PM Peak hour

Existing			
Landuse	**Number**	**Trip Rate Per Dwelling**	**Trips**
House	2	0.85	2
		Net Trips	7
Net Trips			
Weekday Rates	**Origion**	**Destination**	**Total**
AM Peak Hour	5	2	7
PM Peak Hour	2	5	7

Table 5: Net Trips Generated by the proposed residential development in the Weekday AM and PM Peak hour

5.2 Forecast Traffic Volumes

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

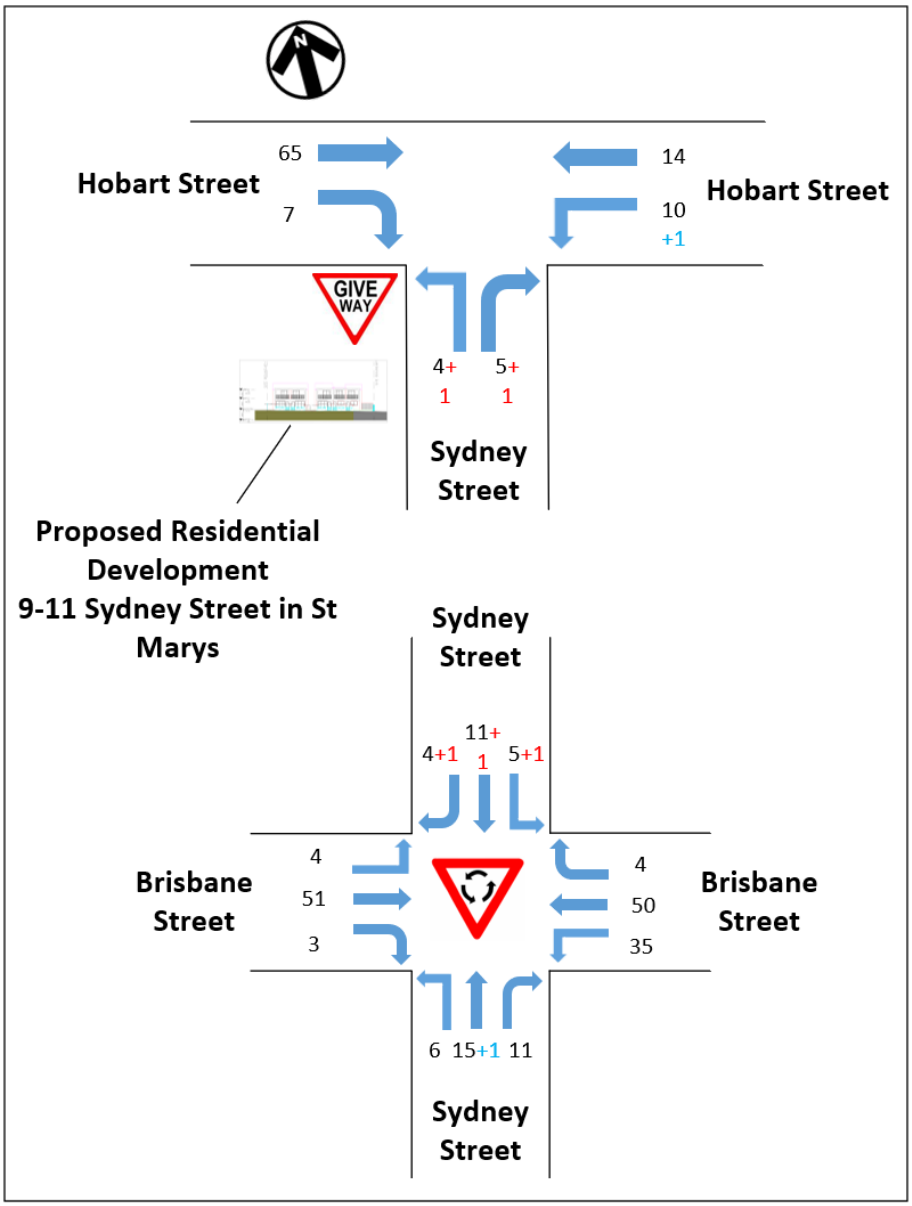

Figure 13: Weekday AM Peak Hour with additional development Traffic in Red for Origin Trips and Blue for Destination Trips

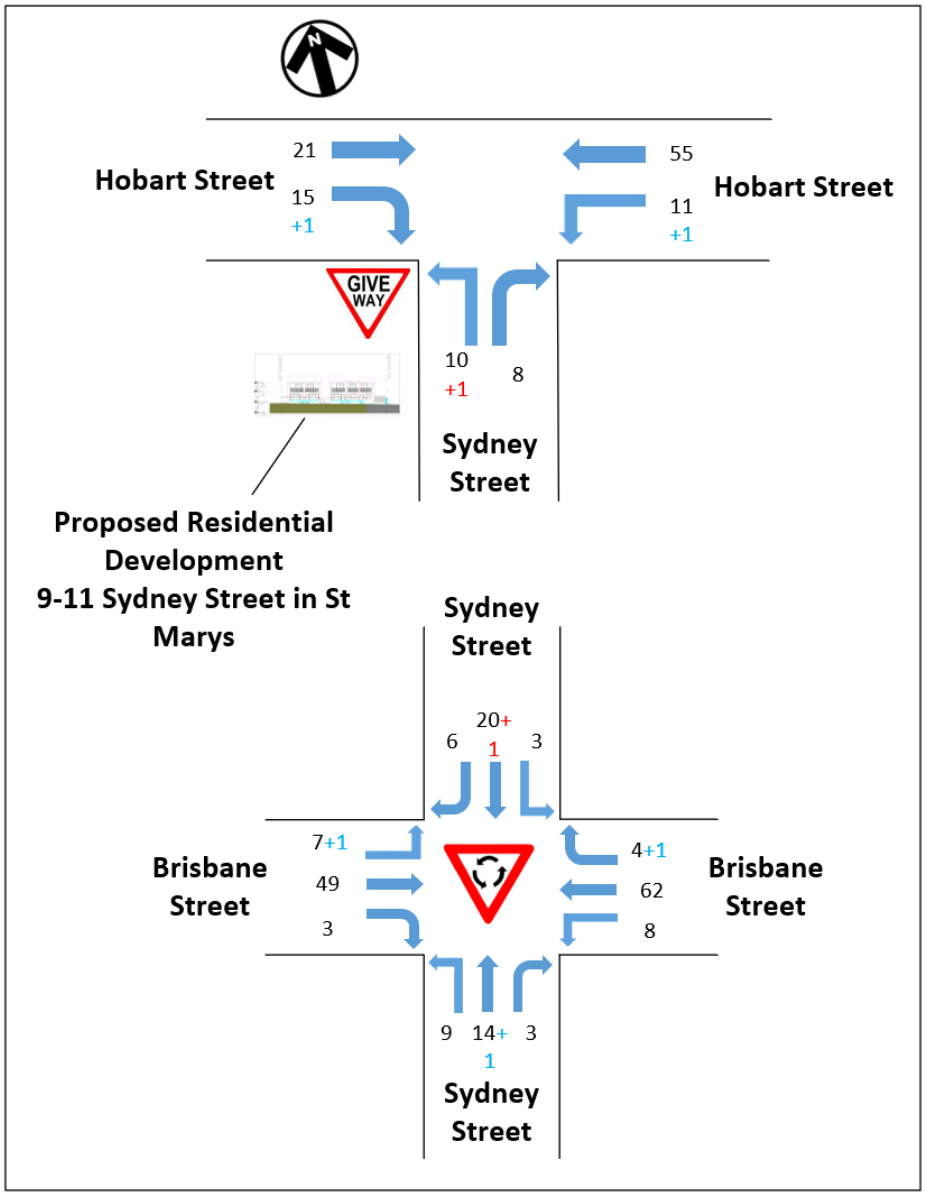

Figure 14: Weekday PM Peak Hour with additional development Traffic in Red for Origin Trips and Blue for Destination Trips

5.3 Intersection Assessment Using Existing Intersection Layout

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

Priority-controlled Intersection of Hobart Street with Sydney Street

- The intersection has a LoS A for the weekday AM and PM peak hours.
- There is spare capacity at this intersection.
- 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 Brisbane Street with Sydney Street

- The intersection has a LoS A for the weekday AM and PM peak hours.
- There is spare capacity at this intersection.
- 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 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 residential development complies with council's parking requirements.

Traffic

- The development is a low trip generator in the AM and PM peak hours.
- The additional development trips can be accommodated in the nearby intersection without significantly affecting the performance or creating any additional delays or queues.
- There are no traffic engineering reasons why a construction permit for the development at 9-11 Sydney Street in St Marys 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
South: Sydney Street											
1	L2	4	0.0	0.007	4.6	LOS A	0.0	0.2	0.06	0.52	46.5
3	R2	5	0.0	0.007	4.9	LOS A	0.0	0.2	0.06	0.52	44.5
Approach		9	0.0	0.007	4.7	LOS A	0.0	0.2	0.06	0.52	45.5
East: Hobart Street											
4	L2	11	0.0	0.013	4.6	LOS A	0.0	0.0	0.00	0.23	47.5
5	T1	15	0.0	0.013	0.0	LOS A	0.0	0.0	0.00	0.23	48.8
Approach		25	0.0	0.013	1.9	NA	0.0	0.0	0.00	0.23	48.3
West: Hobart Street											
11	T1	68	0.0	0.039	0.0	LOS A	0.0	0.3	0.02	0.05	49.6
12	R2	7	0.0	0.039	4.6	LOS A	0.0	0.3	0.02	0.05	48.8
Approach		76	0.0	0.039	0.5	NA	0.0	0.3	0.02	0.05	49.6
All Vehicles		111	0.0	0.039	1.2	NA	0.0	0.3	0.02	0.13	49.0

Table A1: Priority-controlled Intersection Performance of Hobart Street with Sydney 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
South: Sydney Street											
1	L2	11	0.0	0.014	4.7	LOS A	0.0	0.3	0.14	0.51	46.3
3	R2	8	0.0	0.014	4.9	LOS A	0.0	0.3	0.14	0.51	44.2
Approach		19	0.0	0.014	4.8	LOS A	0.0	0.3	0.14	0.51	45.5
East: Hobart Street											
4	L2	11	0.0	0.035	4.6	LOS A	0.0	0.0	0.00	0.08	48.6
5	T1	58	0.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.08	49.5
Approach		68	0.0	0.035	0.7	NA	0.0	0.0	0.00	0.08	49.4
West: Hobart Street											
11	T1	22	0.0	0.021	0.1	LOS A	0.1	0.5	0.12	0.22	48.4
12	R2	16	0.0	0.021	4.7	LOS A	0.1	0.5	0.12	0.22	47.6
Approach		38	0.0	0.021	2.0	NA	0.1	0.5	0.12	0.22	48.1
All Vehicles		125	0.0	0.035	1.7	NA	0.1	0.5	0.06	0.19	48.4

Table A2: Priority-controlled Intersection Performance of Hobart Street with Sydney 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
South: Sydney Street											
1	L2	6	0.0	0.028	4.2	LOS A	0.1	1.0	0.21	0.50	44.9
2	T1	16	0.0	0.028	4.1	LOS A	0.1	1.0	0.21	0.50	43.3
3	R2	12	0.0	0.028	7.0	LOS A	0.1	1.0	0.21	0.50	44.4
Approach		34	0.0	0.028	5.1	LOS A	0.1	1.0	0.21	0.50	44.1
East: Brisbane Street											
4	L2	37	0.0	0.068	4.1	LOS A	0.3	2.1	0.09	0.46	44.7
5	T1	53	0.0	0.068	3.8	LOS A	0.3	2.1	0.09	0.46	47.5
6	R2	4	0.0	0.068	6.8	LOS A	0.3	2.1	0.09	0.46	46.3
Approach		94	0.0	0.068	4.0	LOS A	0.3	2.1	0.09	0.46	46.6
North: Sydney Street											
7	L2	5	0.0	0.018	4.3	LOS A	0.1	0.6	0.22	0.47	45.1
8	T1	12	0.0	0.018	4.1	LOS A	0.1	0.6	0.22	0.47	43.7
9	R2	4	0.0	0.018	7.1	LOS A	0.1	0.6	0.22	0.47	46.3
Approach		21	0.0	0.018	4.7	LOS A	0.1	0.6	0.22	0.47	44.8
West: Brisbane Street											
10	L2	4	0.0	0.048	4.1	LOS A	0.2	1.4	0.12	0.44	46.3
11	T1	54	0.0	0.048	3.8	LOS A	0.2	1.4	0.12	0.44	47.4
12	R2	3	0.0	0.048	6.8	LOS A	0.2	1.4	0.12	0.44	46.2
Approach		61	0.0	0.048	4.0	LOS A	0.2	1.4	0.12	0.44	47.3
All Vehicles		209	0.0	0.068	4.3	LOS A	0.3	2.1	0.13	0.46	46.4

Table A3: Roundabout Intersection Performance of Brisbane Street with Sydney 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
South: Sydney Street											
1	L2	9	0.0	0.023	4.3	LOS A	0.1	0.8	0.23	0.46	45.2
2	T1	15	0.0	0.023	4.1	LOS A	0.1	0.8	0.23	0.46	43.8
3	R2	3	0.0	0.023	7.1	LOS A	0.1	0.8	0.23	0.46	44.8
Approach		27	0.0	0.023	4.5	LOS A	0.1	0.8	0.23	0.46	44.6
East: Brisbane Street											
4	L2	8	0.0	0.060	4.1	LOS A	0.3	1.8	0.11	0.44	44.7
5	T1	65	0.0	0.060	3.8	LOS A	0.3	1.8	0.11	0.44	47.4
6	R2	4	0.0	0.060	6.8	LOS A	0.3	1.8	0.11	0.44	46.2
Approach		78	0.0	0.060	4.0	LOS A	0.3	1.8	0.11	0.44	47.2
North: Sydney Street											
7	L2	3	0.0	0.025	4.2	LOS A	0.1	0.9	0.20	0.47	45.2
8	T1	21	0.0	0.025	4.0	LOS A	0.1	0.9	0.20	0.47	43.7
9	R2	6	0.0	0.025	7.0	LOS A	0.1	0.9	0.20	0.47	46.3
Approach		31	0.0	0.025	4.7	LOS A	0.1	0.9	0.20	0.47	44.7
West: Brisbane Street											
10	L2	7	0.0	0.047	4.1	LOS A	0.2	1.4	0.09	0.44	46.4
11	T1	52	0.0	0.047	3.8	LOS A	0.2	1.4	0.09	0.44	47.5
12	R2	3	0.0	0.047	6.8	LOS A	0.2	1.4	0.09	0.44	46.3
Approach		62	0.0	0.047	4.0	LOS A	0.2	1.4	0.09	0.44	47.3
All Vehicles		198	0.0	0.060	4.2	LOS A	0.3	1.8	0.14	0.45	46.7

Table A4: Roundabout Intersection Performance of Brisbane Street with Sydney Street for the Weekday PM Peak Hour

APPENDIX B – SIDRA INTERSECTION EXISTING TRAFFIC C 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
South: Sydney Street											
1	L2	5	0.0	0.009	4.6	LOS A	0.0	0.2	0.06	0.52	46.5
3	R2	6	0.0	0.009	4.9	LOS A	0.0	0.2	0.06	0.52	44.5
Approach		12	0.0	0.009	4.7	LOS A	0.0	0.2	0.06	0.52	45.5
East: Hobart Street											
4	L2	12	0.0	0.014	4.6	LOS A	0.0	0.0	0.00	0.24	47.4
5	T1	15	0.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.24	48.7
Approach		26	0.0	0.014	2.0	NA	0.0	0.0	0.00	0.24	48.2
West: Hobart Street											
11	T1	68	0.0	0.039	0.0	LOS A	0.0	0.3	0.02	0.05	49.6
12	R2	7	0.0	0.039	4.6	LOS A	0.0	0.3	0.02	0.05	48.8
Approach		76	0.0	0.039	0.5	NA	0.0	0.3	0.02	0.05	49.6
All Vehicles		114	0.0	0.039	1.3	NA	0.0	0.3	0.02	0.14	48.9

Table B1: Priority-controlled Intersection Performance of Hobart Street with Sydney Street for the Weekday AM Peak Hour with Development 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
South: Sydney Street											
1	L2	12	0.0	0.015	4.7	LOS A	0.1	0.4	0.14	0.51	46.3
3	R2	8	0.0	0.015	4.9	LOS A	0.1	0.4	0.14	0.51	44.2
Approach		20	0.0	0.015	4.8	LOS A	0.1	0.4	0.14	0.51	45.6
East: Hobart Street											
4	L2	13	0.0	0.036	4.6	LOS A	0.0	0.0	0.00	0.10	48.5
5	T1	58	0.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.10	49.5
Approach		71	0.0	0.036	0.8	NA	0.0	0.0	0.00	0.10	49.3
West: Hobart Street											
11	T1	22	0.0	0.021	0.1	LOS A	0.1	0.6	0.13	0.23	48.4
12	R2	17	0.0	0.021	4.8	LOS A	0.1	0.6	0.13	0.23	47.5
Approach		39	0.0	0.021	2.1	NA	0.1	0.6	0.13	0.23	48.0
All Vehicles		129	0.0	0.036	1.8	NA	0.1	0.6	0.06	0.20	48.4

Table B2: Priority-controlled Intersection Performance of Hobart Street with Sydney Street for the Weekday PM Peak Hour with Development 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
South: Sydney Street											
1	L2	6	0.0	0.029	4.2	LOS A	0.1	1.0	0.21	0.50	44.9
2	T1	17	0.0	0.029	4.1	LOS A	0.1	1.0	0.21	0.50	43.3
3	R2	12	0.0	0.029	7.1	LOS A	0.1	1.0	0.21	0.50	44.4
Approach		35	0.0	0.029	5.1	LOS A	0.1	1.0	0.21	0.50	44.1
East: Brisbane Street											
4	L2	37	0.0	0.069	4.1	LOS A	0.3	2.1	0.09	0.46	44.7
5	T1	53	0.0	0.069	3.8	LOS A	0.3	2.1	0.09	0.46	47.4
6	R2	4	0.0	0.069	6.8	LOS A	0.3	2.1	0.09	0.46	46.3
Approach		94	0.0	0.069	4.0	LOS A	0.3	2.1	0.09	0.46	46.6
North: Sydney Street											
7	L2	6	0.0	0.020	4.3	LOS A	0.1	0.7	0.22	0.48	45.1
8	T1	13	0.0	0.020	4.1	LOS A	0.1	0.7	0.22	0.48	43.6
9	R2	5	0.0	0.020	7.1	LOS A	0.1	0.7	0.22	0.48	46.3
Approach		24	0.0	0.020	4.8	LOS A	0.1	0.7	0.22	0.48	44.9
West: Brisbane Street											
10	L2	4	0.0	0.048	4.1	LOS A	0.2	1.4	0.12	0.44	46.3
11	T1	54	0.0	0.048	3.8	LOS A	0.2	1.4	0.12	0.44	47.4
12	R2	3	0.0	0.048	6.8	LOS A	0.2	1.4	0.12	0.44	46.2
Approach		61	0.0	0.048	4.0	LOS A	0.2	1.4	0.12	0.44	47.3
All Vehicles		214	0.0	0.069	4.3	LOS A	0.3	2.1	0.13	0.46	46.4

Table B3: Roundabout Intersection Performance of Brisbane Street with Sydney Street for the Weekday AM Peak Hour with Development 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
South: Sydney Street											
1	L2	9	0.0	0.024	4.3	LOS A	0.1	0.9	0.23	0.46	45.2
2	T1	16	0.0	0.024	4.1	LOS A	0.1	0.9	0.23	0.46	43.8
3	R2	3	0.0	0.024	7.1	LOS A	0.1	0.9	0.23	0.46	44.8
Approach		28	0.0	0.024	4.5	LOS A	0.1	0.9	0.23	0.46	44.5
East: Brisbane Street											
4	L2	8	0.0	0.060	4.1	LOS A	0.3	1.8	0.12	0.44	44.6
5	T1	65	0.0	0.060	3.8	LOS A	0.3	1.8	0.12	0.44	47.4
6	R2	5	0.0	0.060	6.8	LOS A	0.3	1.8	0.12	0.44	46.2
Approach		79	0.0	0.060	4.1	LOS A	0.3	1.8	0.12	0.44	47.1
North: Sydney Street											
7	L2	3	0.0	0.026	4.2	LOS A	0.1	0.9	0.20	0.47	45.2
8	T1	22	0.0	0.026	4.0	LOS A	0.1	0.9	0.20	0.47	43.7
9	R2	6	0.0	0.026	7.0	LOS A	0.1	0.9	0.20	0.47	46.3
Approach		32	0.0	0.026	4.7	LOS A	0.1	0.9	0.20	0.47	44.7
West: Brisbane Street											
10	L2	8	0.0	0.048	4.1	LOS A	0.2	1.4	0.10	0.44	46.3
11	T1	52	0.0	0.048	3.8	LOS A	0.2	1.4	0.10	0.44	47.5
12	R2	3	0.0	0.048	6.8	LOS A	0.2	1.4	0.10	0.44	46.3
Approach		63	0.0	0.048	4.0	LOS A	0.2	1.4	0.10	0.44	47.3
All Vehicles		202	0.0	0.060	4.2	LOS A	0.3	1.8	0.14	0.45	46.7

Table B4: Roundabout Intersection Performance of Brisbane Street with Sydney Street for the Weekday PM Peak Hour with Development Traffic