



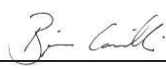
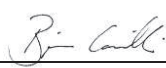
**Mixed Use Planning Proposal
142 Macquarie Street Parramatta
Traffic Engineering Review**



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September 14

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1. Introduction

1.1. Background

TTM Consulting has been engaged by Landmark East Pty Ltd to prepare a traffic engineering review investigating various yield and access arrangements for a mixed use planning proposal. It is anticipated that the review will be used to assess traffic generated by the preferred yield and accommodate access arrangements for a future Development Application.

1.2. Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Identification of likely traffic volumes from the:
 - Existing use;
 - Approved development yield (DA/140/2011);
 - future development;
- Identification of likely traffic distributions and impact of development on the public road network;
- Potential measures to mitigate any specific development impacts.

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- Parramatta City Council Planning Documents, specifically:
 - DCP Part 3 Development Principles (2011);
 - LEP Part 4 Principle Development standards and Related Provisions (2007)
- RTA (now RMS) Guide to Traffic Generating Developments

1.3. Site Location

The site is located at 142 Macquarie Street, at the eastern edge of the Parramatta CBD, as shown in Figure 1.1. The subject site incorporates the block bounded by George Street, Harris Street, Macquarie Street and Argus Lane except the existing Albion Hotel and associated at-grade car park.

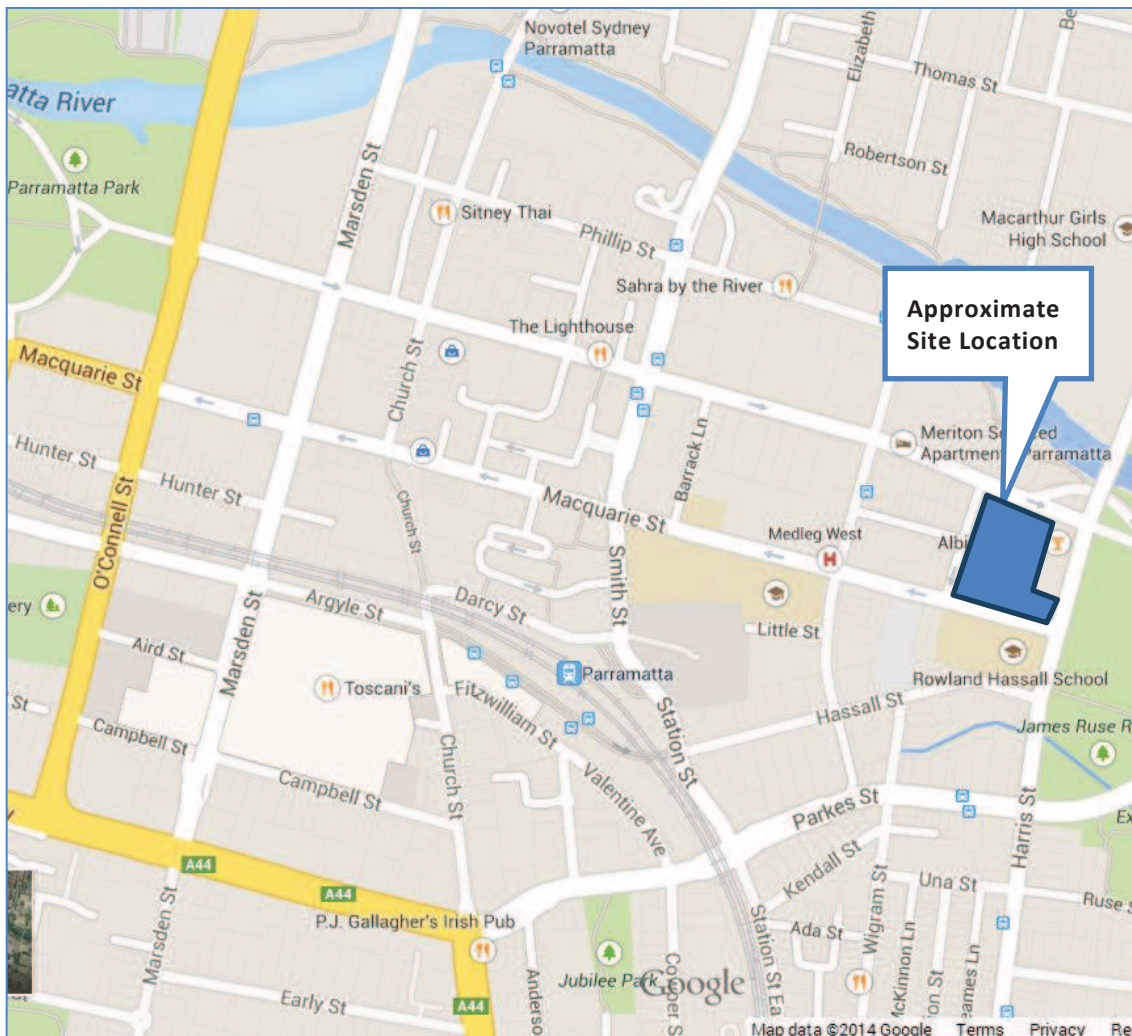


Figure 1.1: Site location

1.4. Current Site Use

The subject site has road frontages to George Street, Harris Street, Macquarie Street, Argus Lane and the termination of Union Street.

The subject site is currently occupied by a newspaper production centre with associated journalism and administration functions.

2. The Proposed Development

2.1. Development Profile

The proposed land uses for this development are summarised in Table 2.1.

Table 2.1: Proposed land uses

Use	Proposed Area/Quantity
Apartments:	
• 1 bedroom	182 units
• 2 bedroom	637 units
• 3 bedroom	91 units
Retail	5,000m ² GFA
Commercial	15,000m ² GFA

2.2. Parking Supply

The proposed land uses for this development are summarised in Table 2.12.

Table 2.2: Proposed land uses

Use	Proposed Area/Quantity	Proposed Parking Supply (spaces)
Apartments:		
• Resident	910 units	910
• Visitor	910 units	130
Retail	5,000m ² GFA	125
Commercial	15,000m ² GFA	75

It is noted that resident parking spaces may be allocated at different parking rates than one space per unit, depending on unit size. It is also noted that the residential visitor parking supply may decrease given the availability of nearby public and active transport facilities.

2.3. Access

The access strategy proposed to service the development is summarised as follows:

Widen Argus Lane (as per advice from Council) to facilitate two way traffic movements as part of the development proposal;

- Primary site access located on Argus Lane, south of Union Street, providing for movements in all directions;
- A right-in/right-out access located on Macquarie Street;
- An entry only access (left-in only) provided from the shared way accessed via Argus Lane located opposite Union Street.

A shared way (new lane) will be provided between Argus Street opposite Union Street to Macquarie Street. It is anticipated that this shared way will primarily allow service vehicles and pedestrians, however will also service a limited number of cars for drop off / pick up.

The access strategy is devised to maximise accessibility to and from the subject site. The access strategy is also designed to distribute traffic in an efficient manner with limited impacts on any intersection. Internal car parks will be interconnected to allow residents, staff and visitors the flexibility to use any access.

3. Existing Transport Infrastructure

3.1. The Road Network

All roads in the immediate vicinity of the site are administered by Parramatta City Council. The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Table 3.1.

Table 3.1: Local Road Hierarchy

Road	Speed Limit	Lanes	Classification	Road Authority
George Street	50kph	2 (eastbound only, plus parking)	Collector Road	PCC
Macquarie Street	50kph	2 (westbound only, plus parking)	Collector Road	PCC
Harris Street	50kph	3 (undivided)	Collector Road	PCC
Charles Street	50kph	2 (undivided, plus parking)	Collector Road	PCC
Union Street	50kph	2 (undivided)	Local Road	PCC
Argus Lane	50kph	1 (southbound only, plus parking)	Laneway	PCC

All roads in the vicinity of the subject site are local or collector roads with streetscapes, intersection controls and road use carefully controlled. Kerbside parking, where allowed, is carefully designed to maximise through traffic and on-street parking while having clear areas near accesses and intersections.

The intersections of George Street/Harris Street, George Street/Charles Street, Macquarie Street/Harris Street and Macquarie Street/Charles Street are signalised, with all other intersections near the subject site being priority controlled.

It is noted that Harris Street and Macarthur Street (north of George Street) forms a prominent approach to the eastern side of the CBD. This road link offers access to the CBD from key arterial roads: Victoria Road, James Ruse Drive and Parramatta Road. The importance of this road link should be reviewed when considering the future key connecting routes to the CBD.

3.2. Road Planning

There are several transport planning documents related to the Western Sydney or Parramatta City area. Key plans which are likely to result in either a reduction in vehicle trips, or a re-distribution of existing vehicle trips are as follows:

- Western Sydney Light Rail Network. This is a long term plan which would ideally lead to a reduction in vehicle movements in the CBD. This would also lead to a re-distribution in existing trips where park and ride opportunities occur;
- Western Sydney Regional Ring Road. This plan involves upgrading key intersections on the periphery of Parramatta CBD to redistribute traffic flows away from the CBD;

- Integrated Transport Plan for Parramatta City Centre. This plan involves prioritising active and communal transport opportunities over commuter and private vehicle movements. Providing the majority of or all aspects in this plan will lead to a reduction in vehicular movements in the Parramatta CBD;
- Badgerys Creek airport and associated transport infrastructure upgrades. The federal government is set to fund upgrades to ground transport in the Badgerys Creek area to improve connections to Greater Sydney. The provision of a second airport and related infrastructure improvements may result a re-distribution of traffic and/or a reduction in traffic in the local area.

3.3. Public and Active Transport

Council provides a free shuttle service which travels along Charles Street and Macquarie Street and travels in an anticlockwise loop around the periphery of the Parramatta CBD.

Over 50 local and regional bus services utilise the Parramatta interchange approximately 400m walk from the subject site. This interchange also provides access to the train network. Parramatta train station is located along the Western, Blue Mountains, Cumberland and Carlingford train lines.

This site is approximately 300m walk from the Parramatta ferry wharf with services running approximately hourly through the day.

Well established footpaths are located on both sides of all collector order roads in the local area. Argus Lane does not currently have footpaths and Union Street has them on the southern side only. There are pedestrian crossing facilities at all signalised intersections in the local area.

There appear to be minimum on-street cyclist facilities in the vicinity of the subject site. There are, however, several off-road shared paths close to local parks and along the Parramatta River.

4. Car Parking

4.1. RMS Parking Supply Rates

RMS parking supply rates identified in its *Guide to Traffic Generating Developments* for this type of development are identified in Table 4.1. It is noted that these are minimum or recommended parking rates for all uses.

Table 4.1: RMS Parking Supply Rates

Land Use	RMS Requirement	Proposed Area/Qty	Required number of car space
1 Bedroom unit			
– Resident	0.4 space/unit	182 units	73
– Visitor	1 space/7 units	182 units	26
2 Bedroom unit			
– Resident	0.7 space/unit	637 units	446
– Visitor	1 space/7 units	637 units	91
3 Bedroom unit			
– Resident	1.2 space/unit	91 units	110
– Visitor	1 space/7 units	91 units	13
Total Resident		910 units	629
Total Visitors		910 units	130
Retail	6.1 spaces/100m ²	5,000m ² GFA	305
Commercial	2.5 spaces/100m ²	15,000m ² GFA	375
Total Development site			1,439 spaces

4.2. Council Parking Supply Requirement

Council parking requirements for this type of development are identified in Table 4.2. It is noted that these are maximum parking rates in the Parramatta CBD area for all uses.

Table 4.2: Council Parking Supply Requirement

Land Use	Council Requirement	Extent	Requirement	Comparison to RMS
Residential unit				
– Resident	1 space/unit	910 Units	910	145%
– Visitor	1 space/5 units	910 Units	182	140%
Retail	1 spaces/30m ² (3.3 spaces/100m ²)	5,000m ² GFA	166.7	54.6%
Commercial	1 spaces/100m ²	15,000m ² GFA	150	40%
Total			1,409	

4.3. Proposed Parking Supply

Council's parking supply requirement is a maximum, and as such, the number of parking spaces provided can be lower than noted in Table 4.2. The proposed parking supply is provided in Table 4.3.

Table 4.3: Proposed Parking Supply

Land Use	Proposed Parking Rate	Extent	Proposed Provision	Comparison to RMS
Residential unit				
– Resident	1 space/unit	910 Units	910	145%
– Visitor	1 space/7 units	910 Units	130	100%
Retail	2.5 spaces/100m ²	5,000m ² GFA	125	41%
Commercial	1 space/200m ²	15,000m ² GFA	75	20%
Total			1,240	

4.4. Adequacy of Proposed Parking Supply

The resident parking supplies satisfies Council's maximum parking requirement and is therefore considered suitable. The proposed residential visitor parking supply of 130 spaces as noted in Table 3 also satisfies Council's parking requirements and is consistent with RMS recommendations on parking demands for this type of development. It is noted that this number of visitor spaces may ultimately be reduced, given nearby public and active transport facilities.

The parking supply for the retail and commercial components of the development is within Council's parking requirement. The parking rates adopted are intended to minimise traffic impacts and encourage alternative transport modes.

It is noted that there is a direct correlation between parking supply and traffic generation for retail and commercial uses. This is discussed in Section 7. TTM have been directed by Council to apply a traffic generation reduction based on the comparison between RMS and Council parking rates.

5. Existing Traffic Volumes

5.1. Peak Hour

TTM conducted intersection movement surveys at the following intersections between 7:00-9:30am and 4:00-6:00pm on Tuesday 20th May 2014:

- George Street/Charles Street;
- George Street/Harris Street;
- Macquarie Street/Charles Street; and
- Macquarie Street/Harris Street.

The peak hours were generally found to be 8:00 to 9:00am and 4:30 to 5:30pm. The results of the survey are shown below in Appendix A.

In addition to these traffic volumes TTM have obtained peak hour survey data from a previous report over the subject site (Cardno, 2010). The peak hour survey data relates to Argus Lane intersections with George Street, Union Street and Macquarie Street. These traffic volumes are also shown in Appendix A and have been increased by 1.5% p.a. to account for traffic growth in the 4 years since these surveys were undertaken.

6. Estimated Future Base Traffic Demands

6.1. Development Scenarios

For the purpose of assessing the future traffic demands TTM has adopted an annual growth rate of 1.5%. This is based on current growth rates in the local area and takes cognisance of Council's/RMS plans to improve road and public transport access to and in the vicinity of Parramatta which are anticipated to result in low traffic growth rates in the CBD area.

TTM has identified three assessment periods for the road network and the resulting anticipated current and future traffic volumes are provided in Appendix A.

6.1.1. Current Traffic Scenario

This scenario includes the 2014 traffic volumes modelled over the existing road network as well as the 2010 traffic volumes which have been increased by 1.5% over 4 years to account for growth from the survey to the current day. This analysis has been performed for both the AM and PM Peaks.

6.1.2. Opening Year (2020) Traffic Scenario

This analysis incorporates a 1.5% per annum increase in the background traffic volume for a period of 6 years from the most recent survey. For the base case scenario, the existing road network has been analysed.

6.1.3. 2030 Traffic Scenario

This analysis incorporates a 1.5% per annum increase in the background traffic volume for a period of 16 years (i.e. 10 years past opening year).

7. Estimated Site Traffic Movements

7.1. Development Traffic Generation

TTM have discussed potential development traffic generation with Council. Council recommended to use RMS traffic generation rates and to apply a reduction based on Council's maximum parking provision in the Parramatta CBD area. Following a review of RMS and Council parking rates with the proposed parking supply, it is clear that a reduced traffic generation rate for the retail and office uses are applicable.

Council parking rates for apartments are generally higher than RMS parking rates and as such a discounted traffic generation rate for residential uses is not applicable. This notwithstanding, RMS guidance indicates a specific traffic generation for apartment buildings in CBD areas which is lower than other residential traffic generation rates and takes cognisance of higher levels of public and active transport modes.

Table 7.1 identifies the determinants to provide the relevant traffic generation rates for the retail and commercial land uses.

Table 7.1: RTA Traffic Generation Rates

Land Use	Determinant	Parking Rates		Council parking rate as a %age of RMS rate	Traffic Generation Rate	
		Proposed	RMS		RMS	Applicable
Retail	Per 100m ²	2.5 spaces	6.1 spaces	41%	12.3vph*	5.1vph
Commercial	Per 100m ²	0.5 space	2.5 spaces	20%	2vph	0.4vph

* This traffic generation rate is applicable for the afternoon peak hour. A 50% discount is generally applied to determine traffic generation for retail uses in the morning peak and as such the RMS rate would be 6.2vph/100m² and the applicable rate would be 2.6vph/100m² in the AM peak.

Table 7.2 identifies the traffic generation relevant to the development proposal based on the applicable rate in Table 7.1 and RMS rates for apartment buildings in CBD areas.

Table 7.2: Traffic Generation of Current, Approved and Proposed Land Uses

Land Use	Determinant	Quantity/ Area	Generation Rate (vph/determinant)		Traffic Generation	
			AM	PM	AM	PM
Apartments	Unit	910	0.24	0.24	219vph	219vph
Retail	100m ²	5,000m ²	2.6	5.1	130vph	255vph
Commercial	100m ²	15,000m ²	0.4	0.4	60vph	60vph
Total					409vph	534vph

7.2. Estimated Development Traffic Distribution

The distribution of development generation traffic is based on the following:

- 40% of development traffic is inbound in the AM Peak, with the remaining 60% outbound
- 60% of development traffic is inbound in the PM Peak, with the remaining 40% outbound
- The remaining traffic movements are based on corresponding movements in the survey data.

The estimated distribution of development generated traffic in the morning and afternoon peak is shown in Figure 7.1 and Figure 7.2 (NB: Percentages shown are based on total incoming or total outgoing traffic, not total traffic generation).

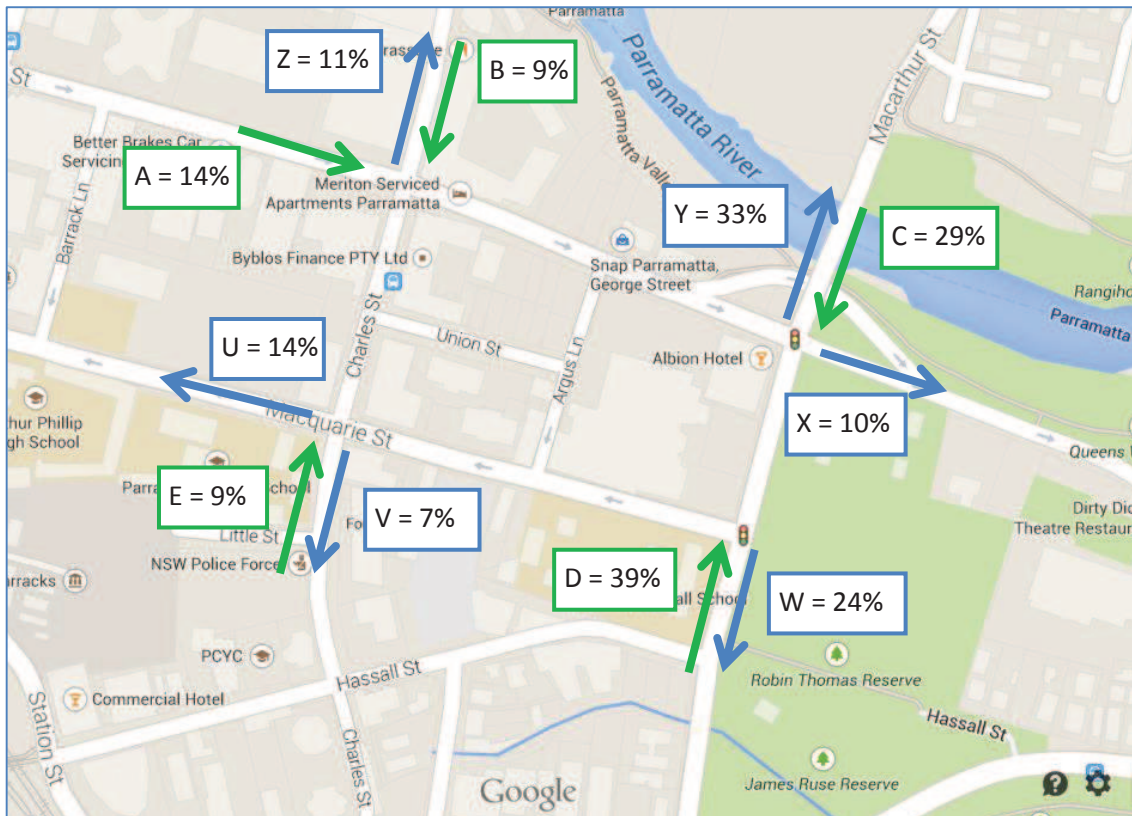


Figure 7.1: Estimated Distribution of Development Generated Traffic – Morning Peak

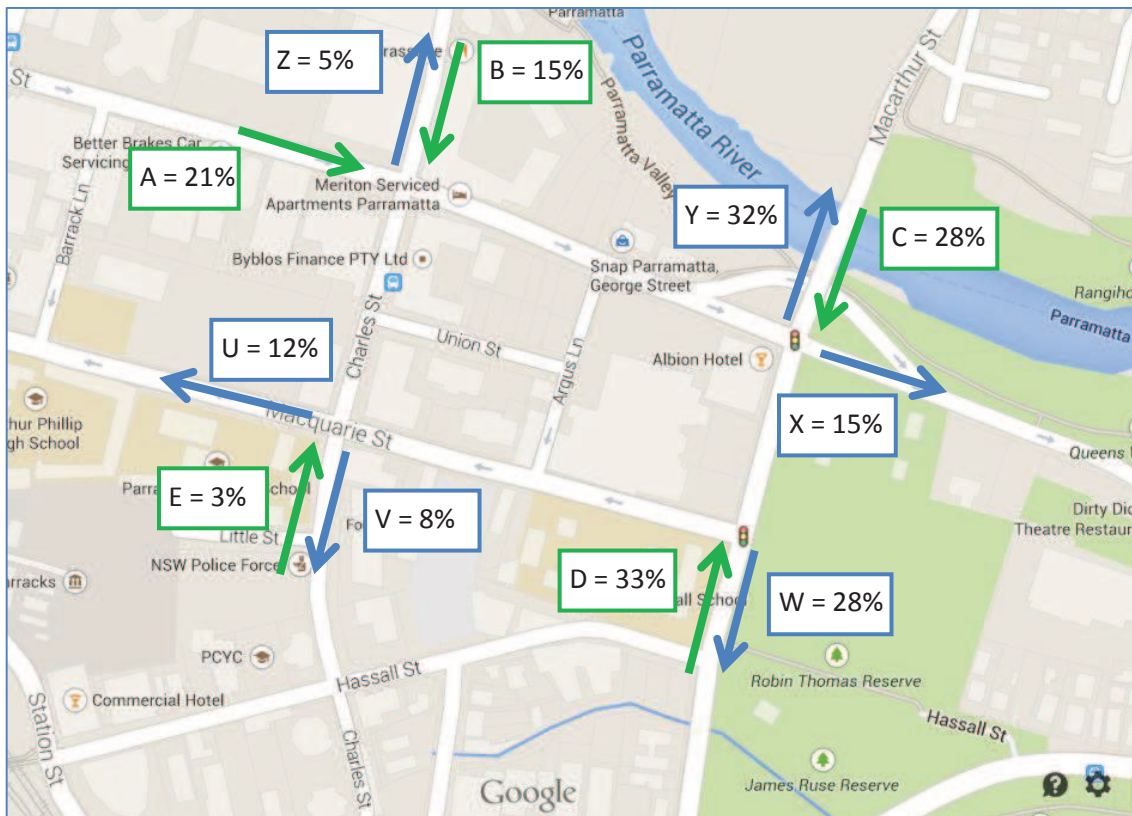


Figure 7.2: Estimated Distribution of Development Generated Traffic – Afternoon Peak

7.3. Access Arrangements

The access arrangements discussed in Section 2.3 will be assessed.

7.4. Future Project Traffic Demands

The future project traffic movements are based on the above traffic distribution and access arrangements and are provided in Appendix A. Future traffic scenarios both with and without development are also provided in Appendix A.

8. Road Network Performance

All intersections noted in Section 5 of this report have been assessed using Sidra analysis software (Version 6.0). For each intersection TTM has assessed all of the development scenarios up to 2030, both with and without development traffic. All analysis is based on existing intersection configurations except as noted below.

8.1. Analysis of George Street/Charles Street Intersection

The Sidra layout identified for this intersection is shown in Figure 8.1.

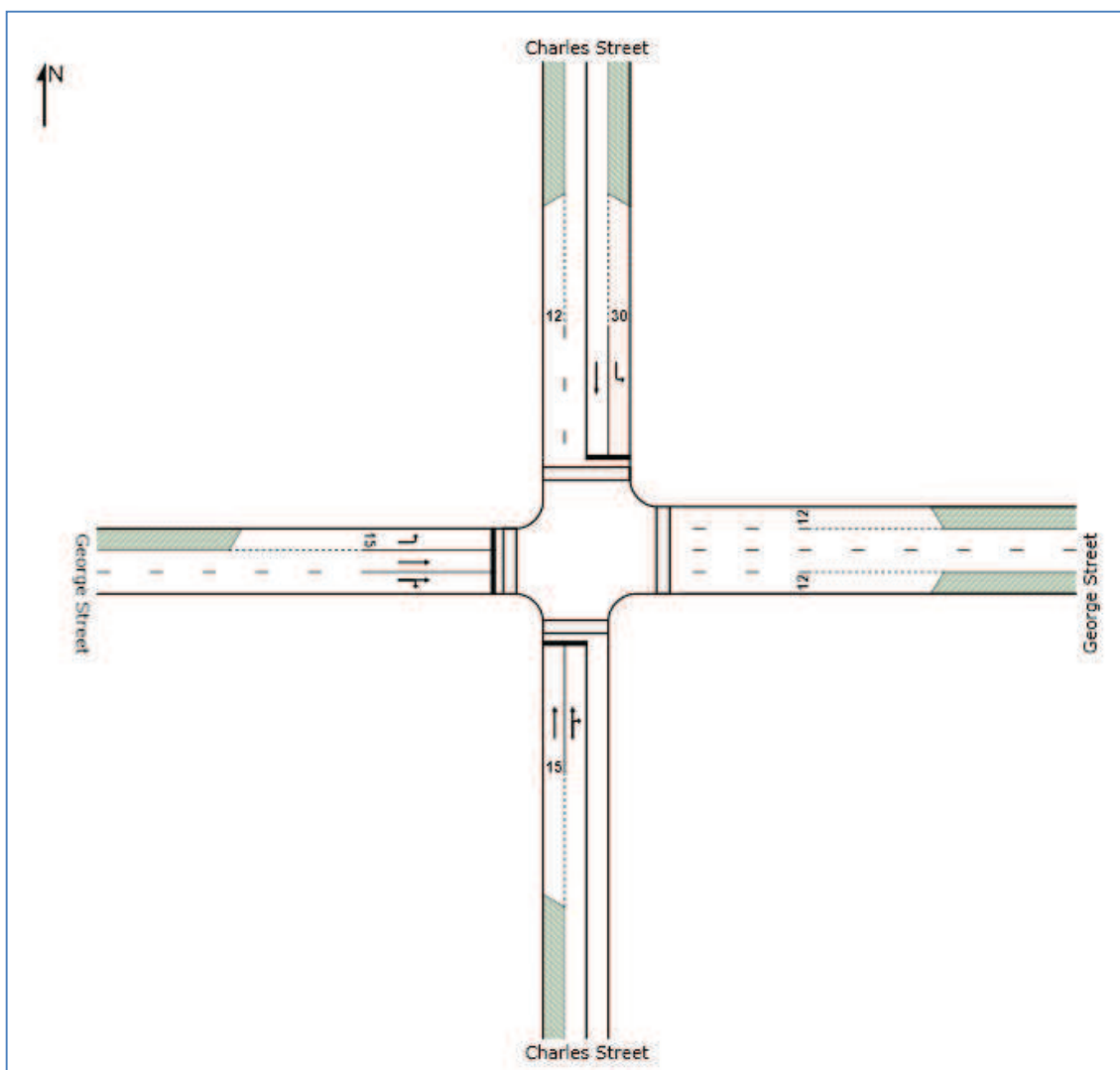


Figure 8.1: Existing George Street/Charles Street Intersection Layout

Table 8.1 gives a summary of the outputs for the various traffic cases applied to the intersection run as an individual site.

Table 8.1: Summary of Individual Sidra Outputs (George Street and Charles Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	69.3%	14.1	B	51.2	-	16.9	48.3
2020 AM Base Case	74.3%	14.8	C	59.6	-	18.5	56.2
2020 AM Project Case	78.3%	15.5	C	65.8	-	18.5	62.9
2030 AM Base Case	79.7%	17.5	C	76.3	-	21.6	89.8
2030 AM Project Case	84.7%	18.9	C	82.7	-	21.6	104.1
2014 PM Current Case	73.4%	15.6	C	30.4	-	33.2	78.7
2020 PM Base Case	80.2%	16.9	C	35.1	-	36.9	95.6
2020 PM Project Case	83.3%	19.1	C	42.1	-	49.0	121.2
2030 PM Base Case	88.7%	21.9	D	56.3	-	48.6	143.4
2030 PM Project Case	93.3%	28.9	E	77.1	-	69.1	217.1

8.2. Analysis of George Street/Argus Lane Intersection

The Sidra layout identified for this intersection in all base cases is shown in Figure 8.2.

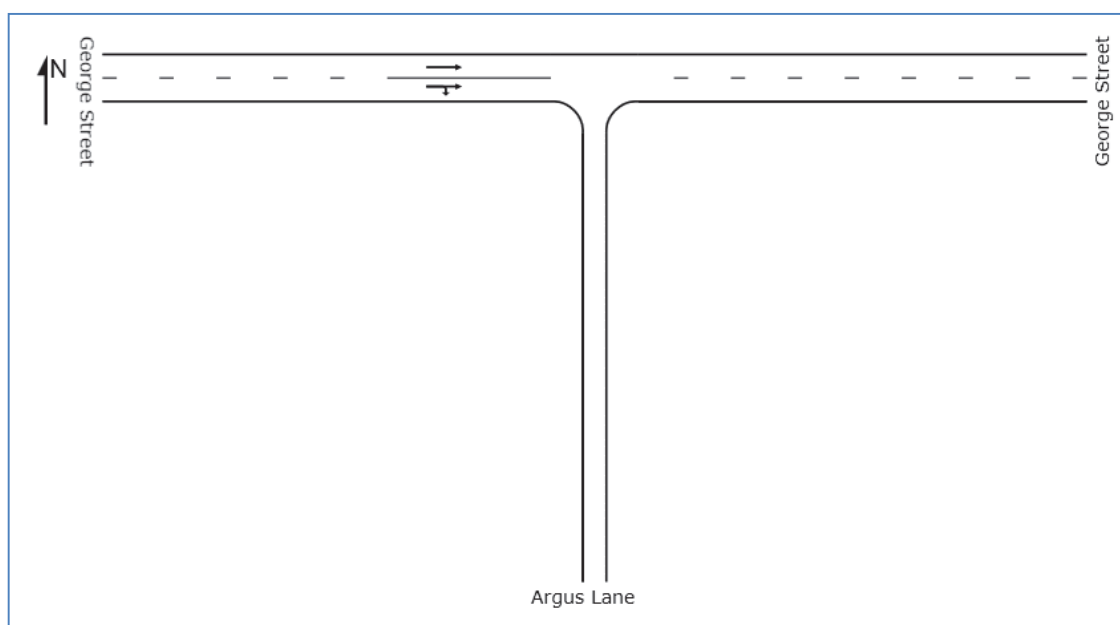


Figure 8.2: Existing George Street/Argus Lane Intersection Layout

The proposed Sidra intersection layout identified for all project cases is shown in Figure 8.3. The only change to the intersection layout is the two way configuration of Argus Lane.

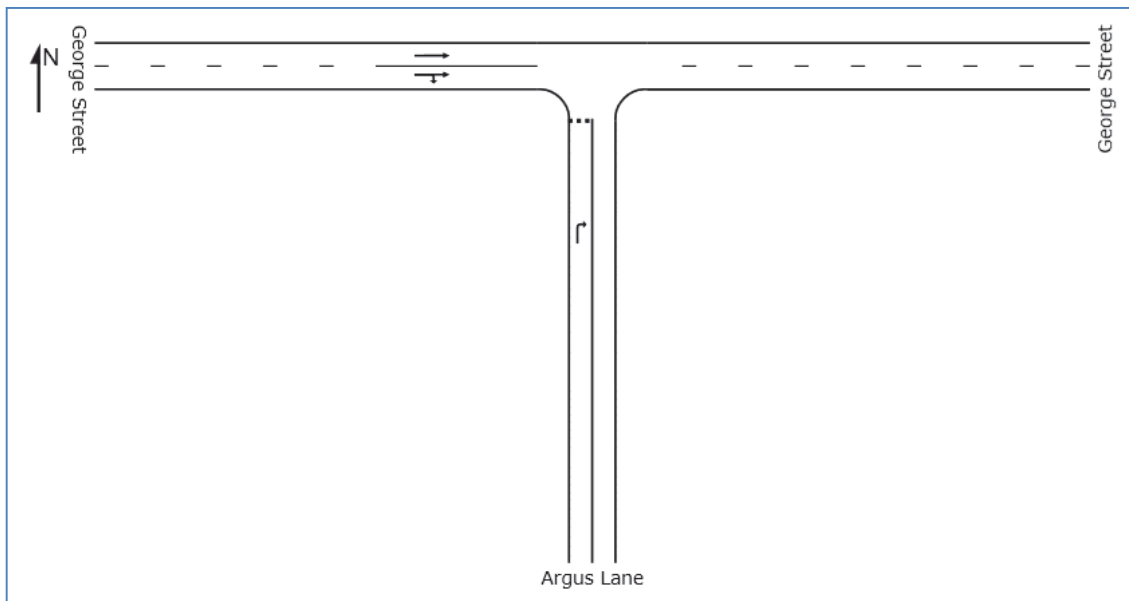


Figure 8.3: Proposed George Street/Argus Lane Intersection Layout

Table 8.2 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.2: Summary of Individual Sidra Outputs (George Street and Argus Lane Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	15.3%	0.4	A	-	-	-	0.0
2020 AM Base Case	16.7%	0.4	A	-	-	-	0.0
2020 AM Project Case	18.4%	0.8	A	0.6	-	-	0.0
2030 AM Base Case	19.4%	0.4	A	-	-	-	0.0
2030 AM Project Case	21.0%	1.6	A	1.9	-	-	0.0
2014 PM Current Case	28.6%	0.1	A	-	-	-	0.0
2020 PM Base Case	31.3%	0.1	A	-	-	-	0.0
2020 PM Project Case	39.0%	2.2	A	11.5	-	-	0.0
2030 PM Base Case	36.3%	0.1	A	-	-	-	0.0
2030 PM Project Case	50.0%	2.4	C	15.0	-	-	0.0

8.3. Analysis of George Street/Harris Street Intersection

The Sidra layout identified for this intersection is shown in Figure 8.4.

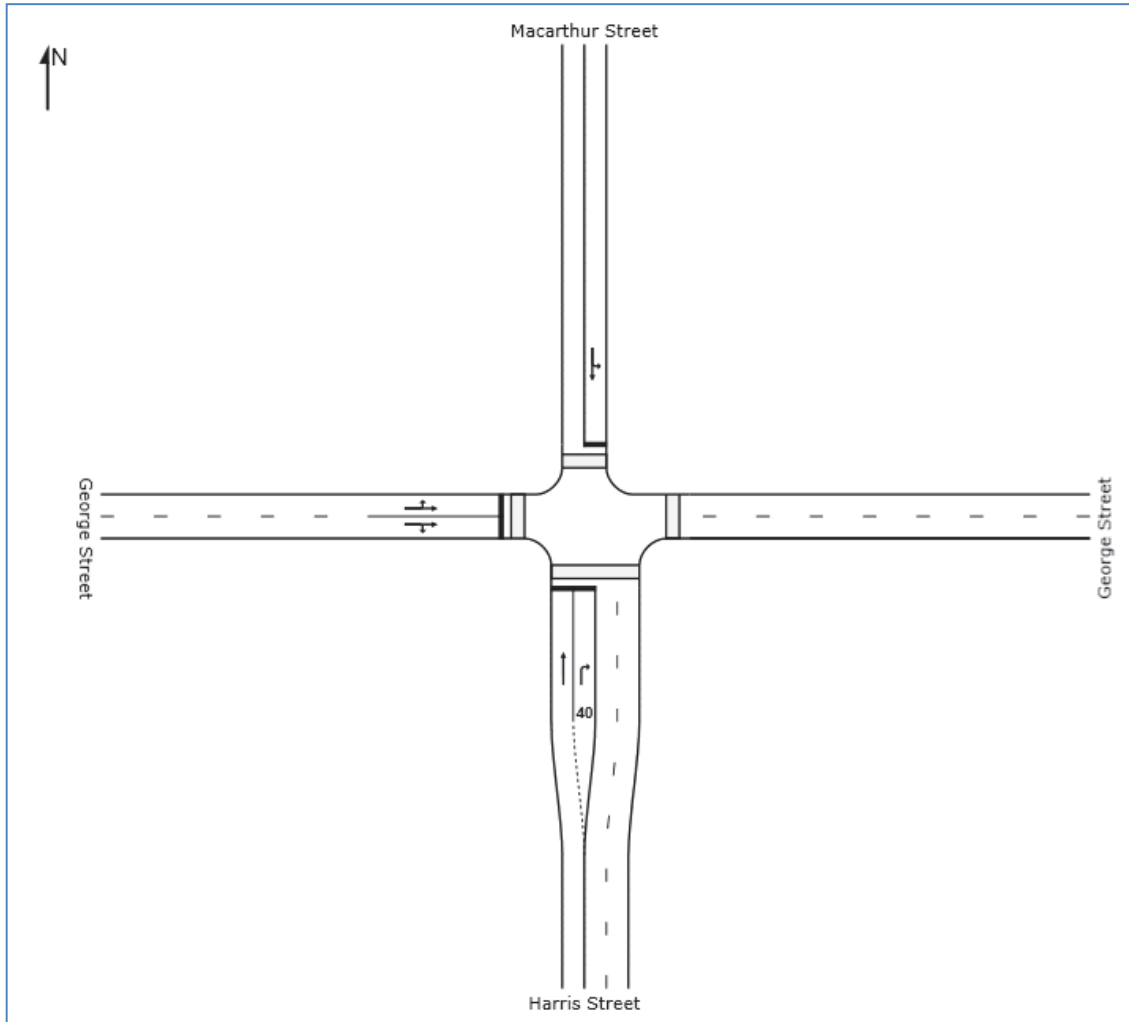


Figure 8.4: Existing George Street/Harris Street Intersection Layout

Table 8.3 gives a summary of the outputs for the various traffic cases applied to the intersection. “Project Case Modified” refers to further analysis that was undertaken to analyse the impact of improvements to this intersection, including an added short through lane and a left turn slip lane on the northern approach. An intersection layout including these modifications is shown in Figure 8.5.

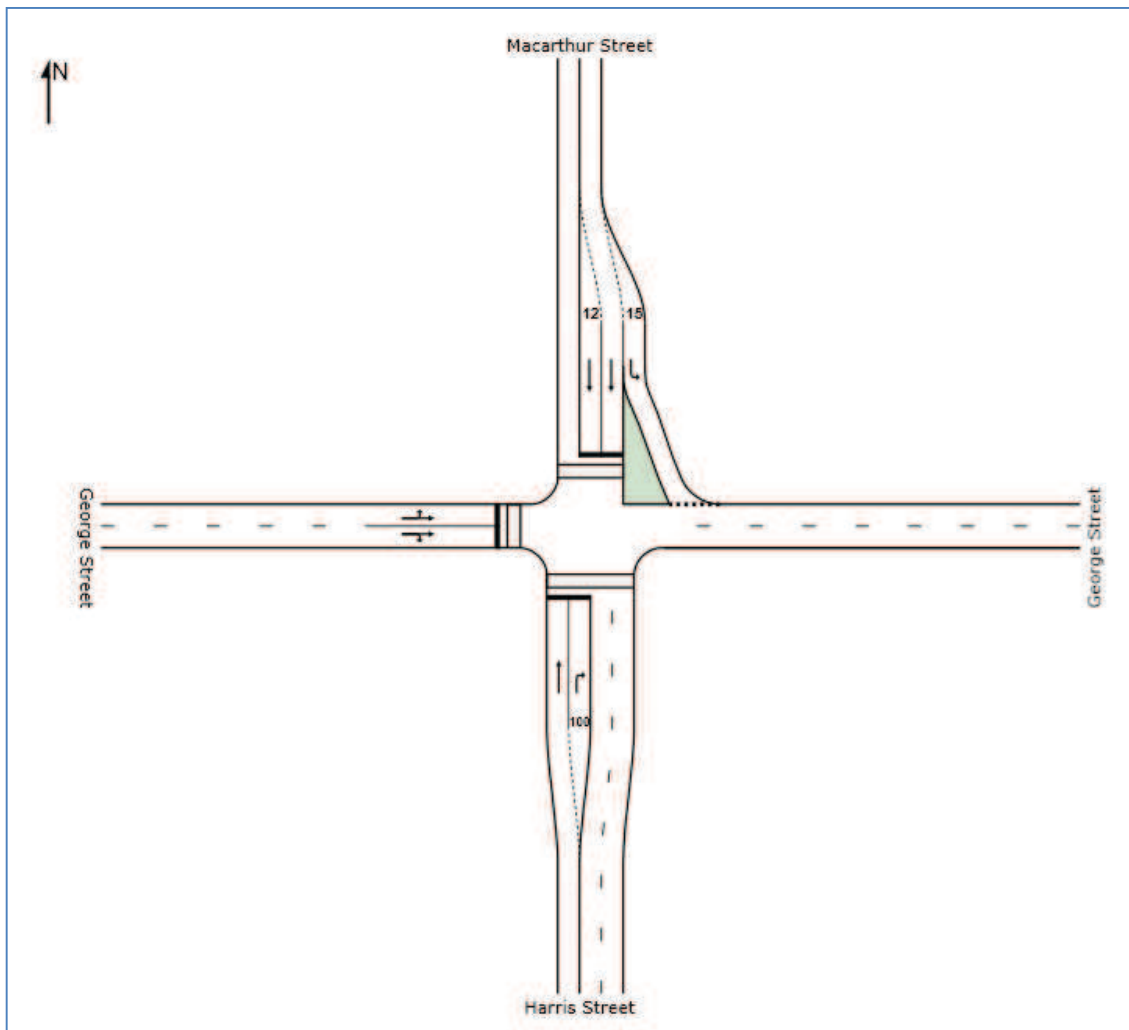


Figure 8.5: Modified George Street/Harris Street Intersection Layout

Table 8.3: Summary of Individual Sidra Outputs (George Street and Harris Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	80.3%	14.8	D	86.1	-	256.6	47.9
2020 AM Base Case	84.3%	15.8	D	97.8	-	317.0	59.6
2020 AM Project Case	87.3%	20.1	E	101.0	-	381.9	98.3
2020 AM Project Case Modified	68.9%	12.4	D	99.2	-	64.8	55.3
2030 AM Base Case	93.6%	25.5	E	122.9	-	594.7	86.4
2030 AM Project Case	99.2%	48.4	F	127.4	-	885.3	141.7
2030 AM Project Case Modified	76.7%	14.6	D	124.5	-	88.1	76.4
2014 PM Current Case	77.6%	17.5	D	119.4	-	188.4	78.2
2020 PM Base Case	83.4%	20.7	D	142.9	-	252.4	97.0
2020 PM Project Case	88.4%	31.3	E	204.5	-	422.4	186.9
2020 PM Project Case Modified	79.1%	18.2	C	158.3	-	74.1	87.5
2030 PM Base Case	91.4%	32.6	E	247.9	-	501.9	178.9
2030 PM Project Case	101.6%	65.1	F	267.2	-	866.8	272.9
2030 PM Project Case Modified	85.8%	26.8	C	271.3	-	127.5	157.1

8.4. Analysis of Charles Street/Union Street Intersection

The Sidra layout identified for this intersection is shown in Figure 8.6.

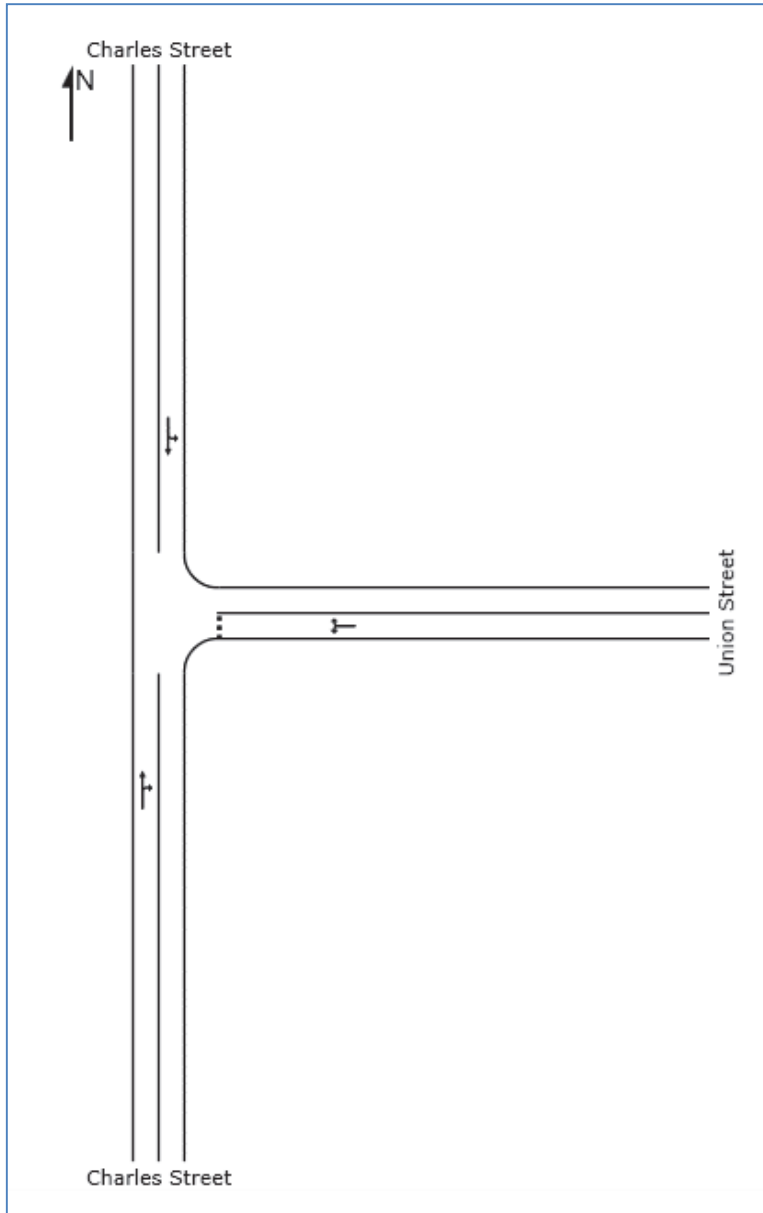


Figure 8.6: Existing Charles Street/Union Street Intersection Layout

Table 8.4 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.4: Summary of Individual Sidra Outputs (Charles Street and Union Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	32.3%	2.0	A	18.0	0.5	0.0	-
2020 AM Base Case	35.4%	2.2	A	21.0	0.6	0.0	-
2020 AM Project Case	37.1%	2.5	A	22.3	1.4	0.0	-
2030 AM Base Case	41.5%	2.7	A	29.9	0.7	0.0	-
2030 AM Project Case	43.3%	3.0	B	33.0	1.7	0.0	-
2014 PM Current Case	17.0%	2.3	A	5.1	5.2	0.0	-
2020 PM Base Case	19.2%	2.4	A	5.8	5.9	0.0	-
2020 PM Project Case	20.6%	2.5	A	6.1	6.3	0.0	-
2030 PM Base Case	23.9%	2.6	A	7.2	7.4	0.0	-
2030 PM Project Case	25.4%	2.7	A	7.5	7.9	0.0	-

8.5. Analysis of Argus Lane/Union Street Intersection

The Sidra layout identified for this intersection for all base cases is shown in Figure 8.7.

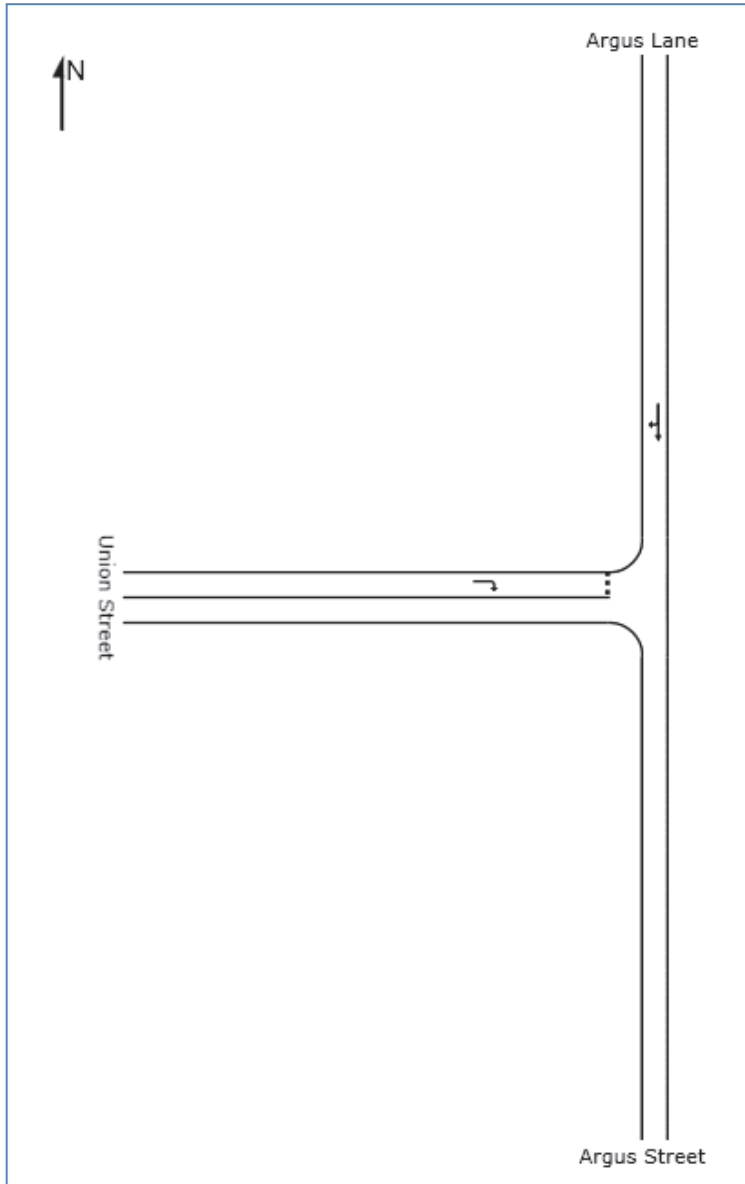


Figure 8.7: Existing Argus Lane/Union Street Intersection Layout

The proposed Sidra intersection layout identified for all project cases is shown in Figure 8.3. The intersection changes include the two way configuration of Argus Lane and the provision of a minor development access as the eastern arm of the intersection.

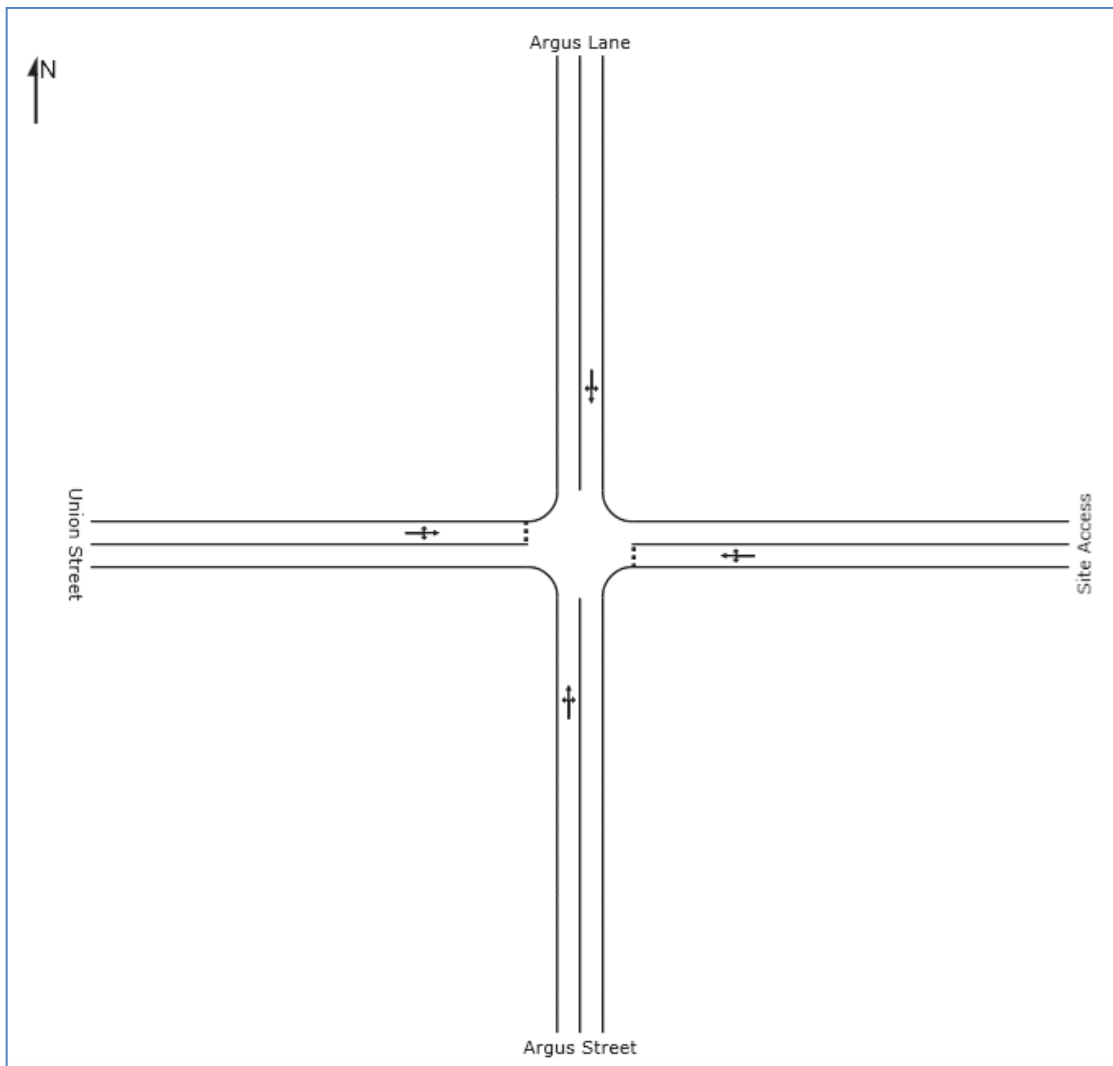


Figure 8.8: Proposed Argus Lane/Union Street/Site Access Intersection Layout

Table 8.5 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.5: Summary of Individual Sidra Outputs (Argus Lane and Union Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	1.9%	2.6	A	-	-	0.0	0.1
2020 AM Base Case	2.1%	2.6	A	-	-	0.0	0.1
2020 AM Project Case	7.3%	1.6	A	2.8	0.1	2.1	0.8
2030 AM Base Case	2.4%	2.6	A	-	-	0.0	0.1
2030 AM Project Case	7.3%	1.7	A	2.8	0.1	2.2	0.8
2014 PM Current Case	1.1%	2.0	A	-	-	0.0	0.1
2020 PM Base Case	1.2%	2.2	A	-	-	0.0	0.1
2020 PM Project Case	9.6%	1.1	A	4.0	0.1	3.3	0.5
2030 PM Base Case	1.4%	2.1	A	-	-	0.0	0.1
2030 PM Project Case	9.6%	1.2	A	4.0	0.1	3.4	0.6

8.6. Analysis of Macquarie Street/Charles Street Intersection

The Sidra layout identified for this intersection is shown in Figure 8.9.

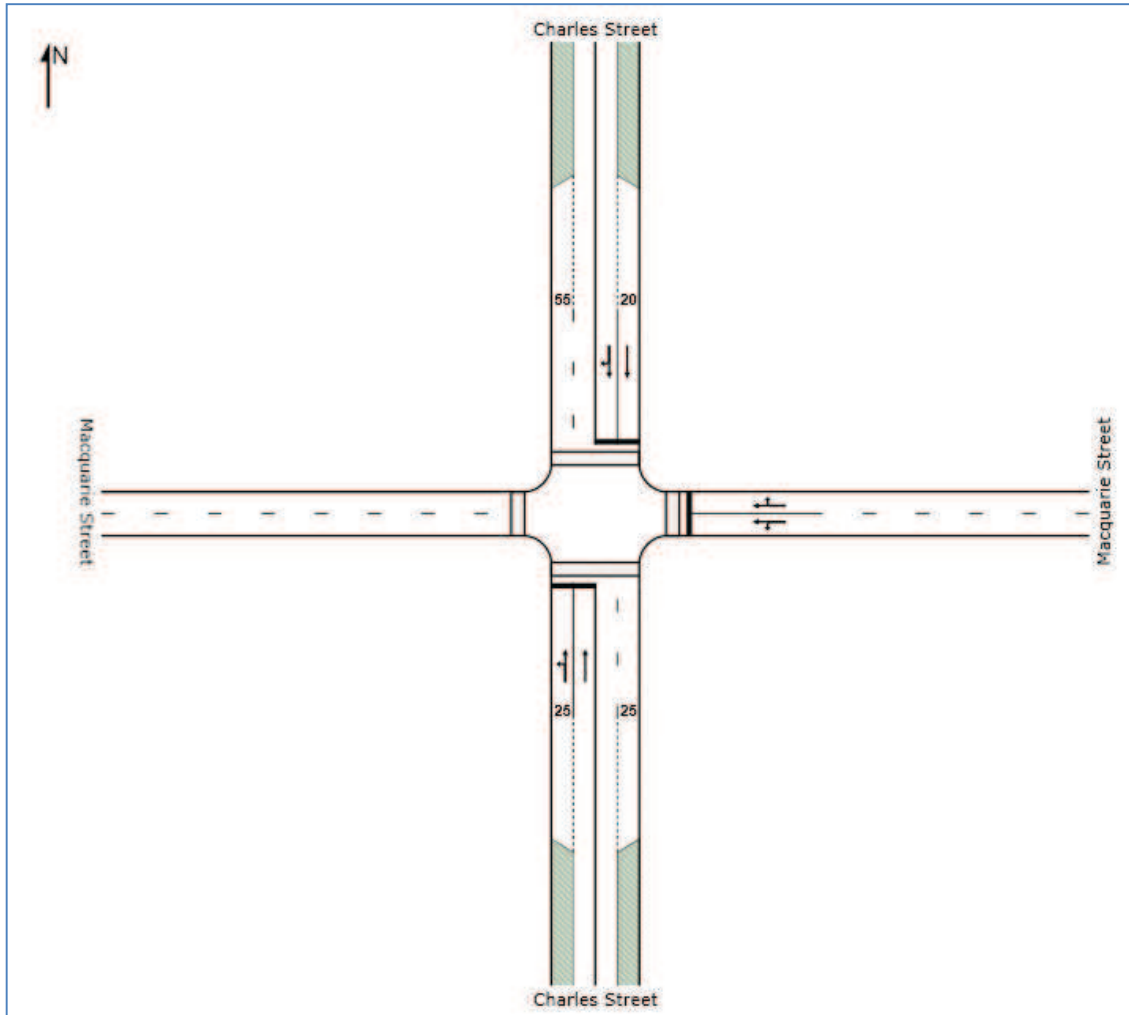


Figure 8.9: Existing Macquarie Street/Charles Street Intersection Layout

Table 8.6 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.6: Summary of individual Sidra Outputs (Macquarie Street and Charles Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	52.1%	13.5	B	33.9	39.9	20.3	-
2020 AM Base Case	56.8%	13.5	B	37.6	44.8	22.8	-
2020 AM Project Case	61.2%	14.0	C	41.7	47.3	22.8	-
2030 AM Base Case	67.6%	14.7	C	46.7	54.8	28.2	-
2030 AM Project Case	71.6%	15.1	C	52.0	58.4	28.3	-
2014 PM Current Case	62.8%	13.3	B	10.4	19.5	38.4	-
2020 PM Base Case	56.8%	13.5	B	11.3	26.1	40.7	-
2020 PM Project Case	57.2%	13.6	B	12.4	29.1	40.8	-
2030 PM Base Case	67.1%	14.1	B	13.2	31.0	51.2	-
2030 PM Project Case	69.3%	14.5	B	14.4	34.1	52.8	-

8.7. Analysis of Macquarie Street/Argus Lane Intersection

The Sidra layout identified for this intersection for all base cases is shown in Figure 8.10.

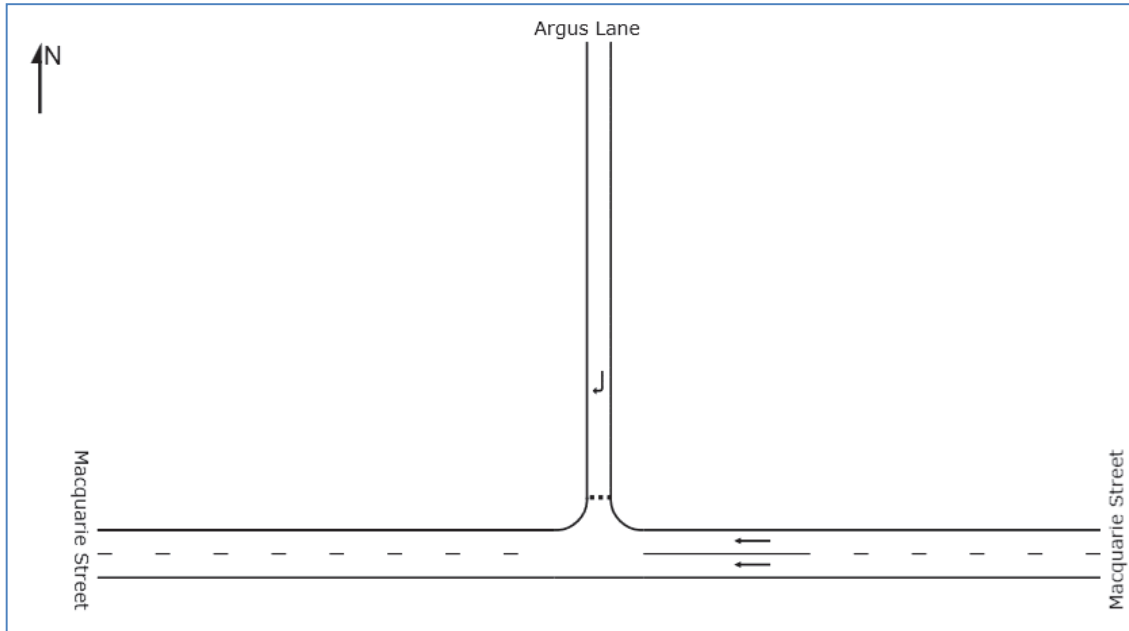


Figure 8.10: Existing Macquarie Street/Argus Lane Intersection Layout

The proposed Sidra intersection layout identified for all project cases is shown in Figure 8.11. The only change to the intersection layout is the two way configuration of Argus Lane.

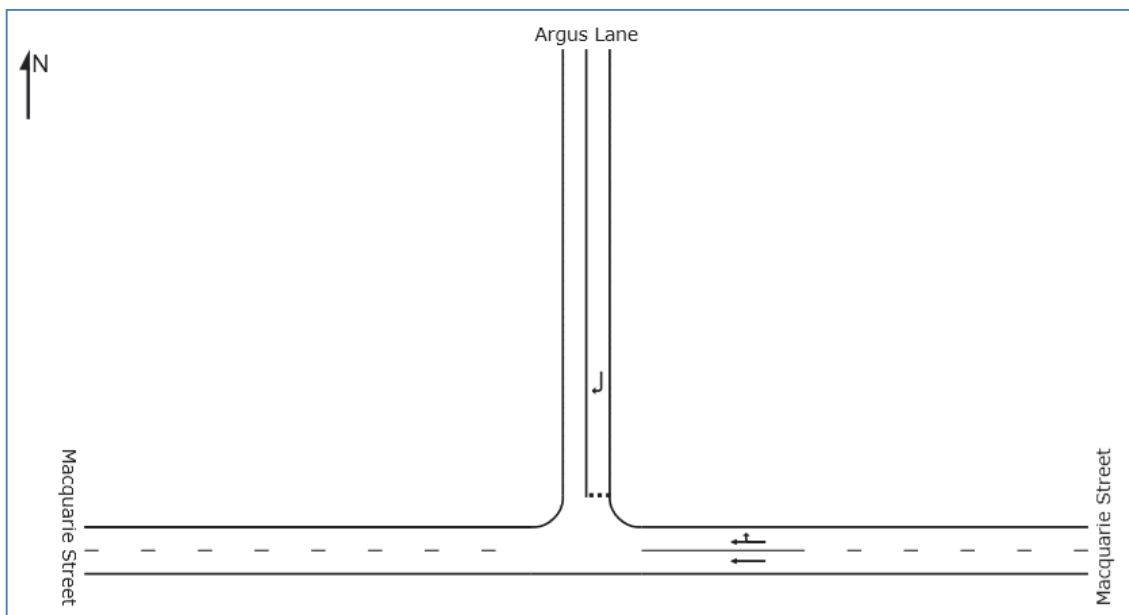


Figure 8.11: Proposed Macquarie Street/Argus Lane Intersection Layout

Table 8.7 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.7: Summary of individual Sidra Outputs (Macquarie Street and Argus Lane Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	23.2%	0.3	A	-	0.0	1.0	-
2020 AM Base Case	25.4%	0.3	A	-	0.0	1.1	-
2020 AM Project Case	25.4%	0.6	A	-	0.0	2.5	-
2030 AM Base Case	29.4%	0.3	A	-	0.0	1.6	-
2030 AM Project Case	29.5%	0.6	A	-	0.0	3.2	-
2014 PM Current Case	13.2%	0.3	A	-	0.0	0.7	-
2020 PM Base Case	14.4%	0.3	A	-	0.0	0.8	-
2020 PM Project Case	14.4%	0.8	A	-	0.0	2.0	-
2030 PM Base Case	16.7%	0.3	A	-	0.0	0.9	-
2030 PM Project Case	16.7%	0.8	A	-	0.0	2.3	-

8.8. Analysis of Macquarie Street/Harris Street Intersection

The Sidra layout identified for this intersection is shown in Figure 8.12.

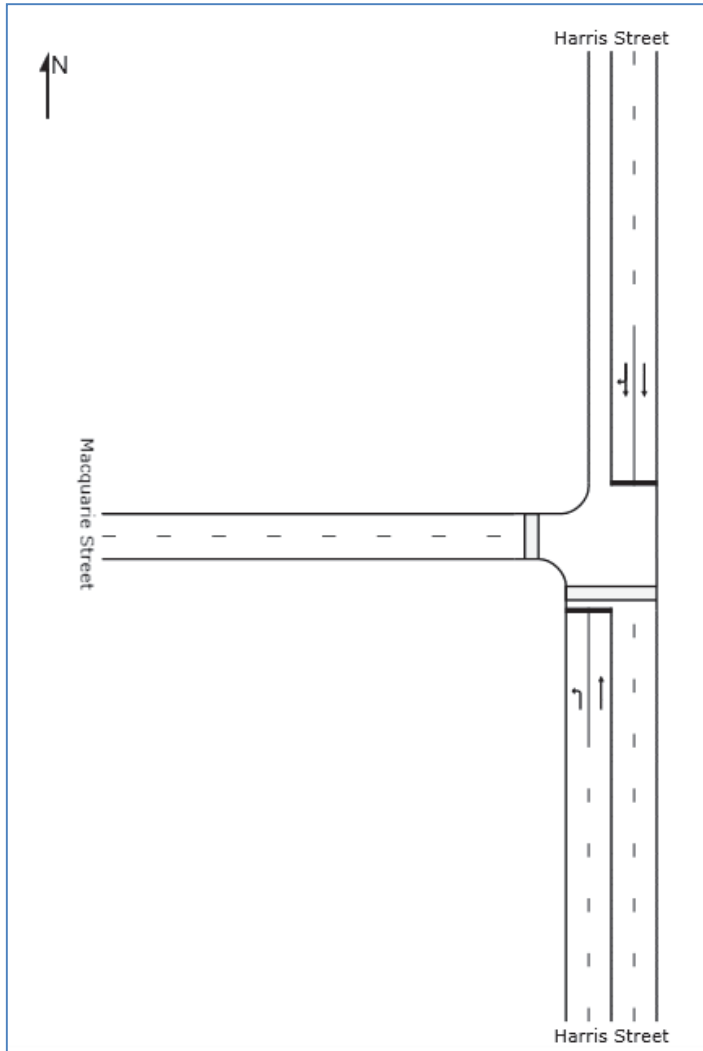


Figure 8.12: Existing Macquarie Street/Harris Street Intersection Layout

Table 8.8 gives a summary of the outputs for the various traffic cases applied to the intersection.

Table 8.8: Summary of Individual Sidra Outputs (Macquarie Street and Harris Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2014 AM Current Case	63.2%	11.3	B	102.9	-	107.7	-
2020 AM Base Case	70.2%	11.9	B	118.7	-	127.6	-
2020 AM Project Case	87.5%	17.1	D	118.3	-	168.0	-
2030 AM Base Case	90.0%	15.8	B	153.4	-	218.6	-
2030 AM Project Case	88.6%	18.9	D	157.2	-	243.8	-
2014 PM Current Case	65.7%	9.9	B	137.2	-	117.5	-
2020 PM Base Case	71.8%	10.5	B	160.6	-	144.6	-
2020 PM Project Case	77.4%	11.5	C	153.4	-	227.6	-
2030 PM Base Case	83.4%	12.5	B	215.9	-	215.1	-
2030 PM Project Case	84.8%	20.5	D	258.3	-	304.2	-

For the 2030 project cases, it is noted that Sidra reallocates green time between the phases, which is the reason the Degree of Saturation does not increase in line with expected. The key differences between the base and project cases in 2030 are in the average delay, level of service and queuing outputs.

8.9. Analysis Conclusions

A summary of conclusions based on this analysis is provided in Table 8.9.

Table 8.9: Summary of Intersection Operations

Intersection	Overview
George Street/Charles Street	Operates suitably in the base cases. Operates suitably in 2030 AM and nears capacity in 2030 PM with development traffic.
George Street/Argus Lane	Operates suitably in all cases.
George Street/Harris Street	Currently constrained by two lane bridge on northern approach. Operates suitably in the base cases. Breaches capacity in 2030 with development traffic. Operates suitably in 2030 with development traffic and modified layout.
Charles Street/Union Street	Operates suitably in all cases.
Argus Lane/Union Street	Operates suitably in all cases.
Macquarie Street/Charles Street	Operates suitably in all cases.
Macquarie Street/Argus Lane	Operates suitably in all cases.
Macquarie Street/Harris Street	Operates suitably in all cases.

9. Summary and Conclusions

9.1. Car Parking Arrangements

The proposal includes overall resident parking rates consistent with Council's maximum requirement for high density residential use in this location. Residential visitor parking is provided in accordance with the recommend RMS rate however this may be further revised in the future. Commercial and retail parking is provided at rates lower than Council's maximum parking requirement. The rates proposed are considered suitable considering the availability of nearby public and active transport facilities.

9.2. Development Access

Argus Lane will be reconfigured for two way traffic as part of the proposal. This will result in less circuitous routes to a from the subject site and will go some way to minimising traffic pressures at nearby signalised intersections. This scenario may result in a small number of vehicles re-routing from existing trips in the network; however, it is not expected that a significant volume of traffic would be attracted to Argus Lane if it were to be converted to two-way flow.

A land dedication would be required along the Argus Lane site frontage to achieve the required lane design for two-way traffic. The carriageway is currently approximately 5.5m wide between kerbs. A 6.5m wide carriageway would be sufficient to convert Argus Lane to two-way; hence a 1.0m road dedication would be required.

The main development access is from Argus Lane south of Union Street. Further minor development accesses are provided from Macquarie Street (right-in/right-out) and via a proposed shared lane connecting Union Street with Macquarie Street.

9.3. Operation of Surrounding Road Network

All intersections have been assessed for a long term - 2030 - design horizon. With the exception of George Street/Harris Street, all intersections are predicted to operate suitably up to this design year with background traffic growth and development traffic. With the exception of this one intersection there are no significant operational issues beyond what would be expected in a CBD traffic environment.

TTM have investigated potential modifications to the George Street/Harris Street intersection to mitigate the impact of development traffic. The Sidra analysis identifies that a short left slip lane and short stand up lane added on the northern Harris Street approach would improve intersection operations; however, the primary constraint with this intersection is the two lane bridge. Given this bridge is a critical link to the CBD, which is undergoing significant growth / redevelopment, the upgrade of this intersection is considered a broader issue that should be addressed by Council, and not be linked to any specific development.

Appendix A Surveyed and Future Traffic Volumes

Site: 142 Macquarie Street, Mixed Use Planning Proposal
Reference: 14SYT0028

2020 Estimated AM Base Volumes											
George Street/Charles Street 8:00-9:00				George Street/Argus Lane 8:00-9:00				George Street/Harris Street 8:00-9:00			
H%	4.8%	114		H%				H%			
T	335			T				T			
L	134			L				L			
R				R				R			
H%	5.6%	156	126	H%				H%	1.9%	945	304
T				T				T			
L				L				L			
R				R				R			
H%	6.1%			H%	5.0%	562	36	H%	6.1%	144	
T				T				T			
L				L				L			
R				R				R			
H%	0.3%	374	112	H%				H%	1.9%	58	
T				T				T			
L				L				L			
R				R				R			
H%	0.0%			H%	5.0%			H%	2.9%	114	
T				T				T			
L				L				L			
R				R				R			
H%	5.0%	197	87	H%				H%	1.4%	690	19
T				T				T			
L				L				L			
R				R				R			
H%	0.3%	514	98	H%				H%	0.0%		
T				T				T			
L				L				L			
R				R				R			
H%	12.8%	85	129	H%	5.0%			H%	0.4%	269	807
T				T				T			
L				L				L			
R				R				R			
H%	0.3%	110	297	H%				H%	0.6%	541	711
T				T				T			
L				L				L			
R				R				R			
H%	1.7%			H%	5.0%			H%	2.3%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			
R				R				R			
H%	0.3%			H%	5.0%			H%	0.4%		
T				T				T			
L				L				L			

2030 Estimated AM Base Volumes									
George Street/Charles Street					George Street/Argus Lane				
8:00-9:00					8:00-9:00				
H%		5.6%	6.1%		H%				
T		181	146		T				
L					L				
T					T				
R					R				
H%		4.8%	132		H%				
T		3.6%	388		T				
R		4.9%	156		R				
L					L				
T					T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		228	102		T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		596	114		T				
R		0.3%	0.3%		R				
L					L				
H%		12.8%	1.7%		H%				
T		99	150		T				
R					R				
L					L				
H%		364	0.3%		H%				
T		449	1.1%		T				
R		110	0.0%		R				
L					L				
H%		128	345		H%				
T		3.0%	0.0%		T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		19	23		T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		10	0.3%		T				
R		8	5.0%		R				
L					L				
H%		5.0%	5.0%		H%				
T		596	114		T				
R		0.3%	0.3%		R				
L					L				
H%		12.8%	1.7%		H%				
T		99	150		T				
R					R				
L					L				
H%		364	0.3%		H%				
T		449	1.1%		T				
R		110	0.0%		R				
L					L				
H%		128	345		H%				
T		3.0%	0.0%		T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		19	23		T				
R					R				
L					L				
H%		5.0%	5.0%		H%				
T		10	0.3%		T				
R		8	5.0%		R				
L					L				
H%		5.0%	5.0%		H%				
T		596	114		T				
R		0.3%	0.3%		R				
L					L				
H%		12.8%	1.7%		H%				
T		99	150		T				
R					R				

Estimated AM Development Volumes

George Street/Charles Street
8:00-9:00

H%			0	22
T			0	22

H%			0	22
T			0	22

George Street/Argus Lane

H%				
T				

H%				
T				

George Street/Harris Street
8:00-9:00

H%			71	0
T			71	0

H%				
T				

Charles Street/Union Street (2014)

H%			18	0
T			18	0

H%			18	0
T			18	0

Argus Lane/Union Street

H%			0	56	0
T			0	56	0

H%				
T				

Macquarie Street/Charles Street
7:45-8:45

H%			0	0
T			0	0

H%				
T				

Macquarie Street/Argus Lane

H%			34	
T			34	

H%				
T				

Macquarie Street/Harris Street
8:00-9:00

H%			71	39
T			71	39

H%				
T				

2020 Estimated PM Base Volumes											
George Street/Charles Street 16:30-17:30				George Street/Argus Lane				George Street/Harris Street 16:45-17:45			
H%				H%				H%			
T				T				T			
H%	0.0%	141		H%				H%	0.0%	237	
L				L				L			
T				T				T			
R				R				R			
H%	0.4%	539		H%	5.0%	1101		H%	0.9%	128	
L				L				L			
H%	0.0%	127		H%	5.0%	20		H%	0.9%	255	
L				L				L			
T				T				T			
H%				H%				H%			
L				L				L			
T				T				T			
R				R				R			
H%	0.7%	0.8%		H%				H%	1.0%	0.0%	
L				L				L			
T				T				T			
R				R				R			
H%	0.5%	0.5%		H%	5.0%	5.0%		H%	853	16	
L				L				L			
T				T				T			
R				R				R			
H%	0.5%	295	9	H%	5.0%	5.0%		H%	1.0%	0.0%	
L				L				L			
T				T				T			
R				R				R			
H%	0.5%	219	7	H%				H%			
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	0.0%		H%	5.0%			H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	152	231	H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.5%	1.3%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%			
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	0.0%		H%	5.0%			H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	126	0.0%	H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	247	0.9%	H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	50	0.0%	H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	5.0%	103		H%				H%	0.6%	0.8%	
L				L				L			
T				T				T			
R				R				R			
H%	2.0%	1.1%		H%				H%	0.6%	0.8%	
L											

Site: 142 Macquarie Street, Mixed Use Planning Proposal
Reference: 14SYT0028

Estimated PM Development Volumes

George Street/Charles Street

16:30-17:30

H%	T	L	R	T	L	H%	T	L	R	T	L
	0	67	0				11	0			

George Street/Argus Lane

H%	T	L	R	T	L	H%	T	L	R	T	L
		0	115								

George Street/Harris Street

16:45-17:45

H%	T	L	R	T	L	H%	T	L	R	T	L
		68	32	60			0	0			

Charles Street/Union Street (2014)

H%	T	L	R	T	L	H%	T	L	R	T	L
		0	0				0	0			

Argus Lane/Union Street

H%	T	L	R	T	L	H%	T	L	R	T	L
		0	115	0			0	0	0		

Macquarie Street/Charles Street

16:30-17:30

H%	T	L	R	T	L	H%	T	L	R	T	L
	0	0					0	10			

Macquarie Street/Argus Lane

H%	T	L	R	T	L	H%	T	L	R	T	L
	43										

Macquarie Street/Harris Street

16:30-17:30

H%	T	L	R	T	L	H%	T	L	R	T	L
	90	60					106	0			