Construction Consultants (PM) Pty Ltd

135 George Street, Parramatta

Traffic and Transport Assessment

Issue | 15 February 2017

Job number   240103

ARUP

Contents

Tables

Figures

| Issue | 15 February 2017 | Arup

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND
TRANSPORT REPORT 20170215_ISSUE.DOCX

Appendices

Appendix A
Traffic counts

Appendix B
SIDRA Outputs

| Issue | 15 February 2017 | Arup

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND
TRANSPORT REPORT 20170215_ISSUE.DOCX

1   Introduction

1.1   Background

Arup has been commissioned to undertake a transport assessment of the proposed rezoning at 135 George Street (and 118 Harris Street) Parramatta. The site is located on the corner of George Street and Harris Street within the Parramatta City Centre within the Parramatta Local Government Area (LGA). Reference is made to the relevant Parramatta City Council (PCC): Development Control Plan (DCP) and Local Environment Plans (LEP).

The site currently contains a two storey hotel building with an adjacent at-grade car park. The site has approved planning for development consisting of 291 apartment with 369 car parking spaces over 5 levels of basement as well as a restaurant and pub.

It is proposed to increase the density of the site which will result in an increased number of apartments (including the provision of aged living units), a restaurant, a pub and ground floor retail.

1.2   Scope

This traffic impact assessment supports the rezoning application for the Albion Hotel site and will outline the following:

- Existing transport conditions
- Forecast traffic generation
- Road network impacts
- Parking provisions
- Access arrangements
- Public transport availability

Section 4.2.3 describes the inclusion of the proposed 142 Macquarie Street development and the application of background traffic growth to reflect the high number of developments planned within Greater Parramatta. Section 4.2.4 describes the outcome of the traffic modelling.

2 Existing conditions

2.1 Site location

The site is located on the north-eastern corner of the Parramatta City Centre, on the corner of George Street and Harris Street. The site is made up of two lots, with addresses at 135 George Street and 118 Harris Street, Parramatta.
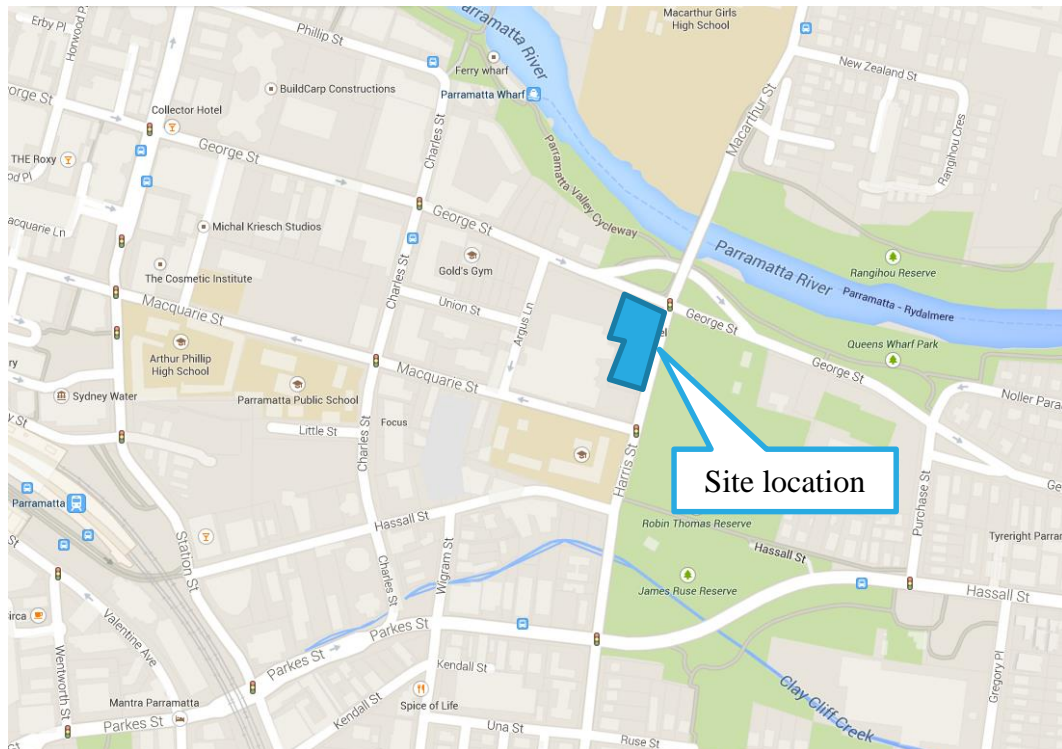
Figure 1: Site location

2.2 Road network and access

Harris Street / Macarthur Street is a regional road, connecting to Parkes Street south of the site and Victoria Road north of the site. Parkes Street is the main east-west regional road crossing the railway corridor, connecting Church Street / Great Western Highway with James Ruse Drive.

Macquarie Street and George Street are local east-west roads, operating as one way pairs into and out of the Parramatta CBD respectively. A George Street underpass is located under Macarthur Street (Gasworks Bridge) as a bypass of the traffic signals.

Access to the site is currently provided on Harris Street. Two driveways provide separate in and out access for the at-grade car park. The site currently generates 7 trips during the AM peak hour and 58 trips in the PM peak hour.

Traffic surveys were undertaken during a typical weekday in late 2014 for the intersections surrounding the site. Detailed traffic diagrams are provided in Appendix A.

2.3 Parking

2.3.1 On-street parking

On-street parking surrounding the site is meter restricted (8am-6pm Monday-Saturday) within the Parramatta City Centre. 10P commuter parking is provided in Harris Street and George Street (east of Harris Street). Short-stay 2P/4P meter parking is provided in Macquarie Street and George Street (west of Harris Street).

2P/4P (unmetered) resident permit parking is provided in streets surrounding the City Centre. These are located east of Robin Thomas Reserve and the Workers Club, north of Parramatta River and south of Parkes Street.

Parking is generally provided at $2.50 per hour for short-stay areas and $1.50 per hour for commuter parking areas, with rates up to $3.50 within the central CBD. Rates are capped at a maximum of $7.70 or $6.00 per day.

A part-time (10pm-6am) taxi rank operates on Harris Street in front of the site.

2.3.2 Off-street parking

The site has an existing at-grade car park located on the land addressed as 118 Harris Street. 37 car parking spaces are provided within the car park. A kerb side drop off is also provided along the building frontage to the car park.

Parramatta also has a number of paid public parking stations within walking distance of the site. The relevant sites near the site include:

- Macquarie Street PCC Car Park
- Leabeter Street level parking PCC Car Park
- Horwood Street PCC Car Park
- Horwood Place Secure Parking
- 80 George Street Wilson Car Park
- Valentine Avenue Secure Parking
- Wentworth Secure Parking

2.4 Public transport network

2.4.1 Parramatta interchange

Parramatta is highly accessible by public transport. The Parramatta Interchange is located to the west of the site within 10 minutes walking distance and includes train services on the T1 North Shore, Northern & Western Line, Blue Mountains Line and the T5 Cumberland Line as shown in Figure 2.

The interchange also provides connection to a wide range of bus services including Transitway services on Argyle Street. Bus services operate to key centres surrounding Parramatta including Epping, Bankstown, Liverpool and Rouse Hill.

The site is also located within walking distance of the Parramatta ferry wharf. The wharf provides regular ferry services along Parramatta River to Circular Quay.

| Issue | 15 February 2017 | Arup

Page 3

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TRANSPORT REPORT 20170215_ISSUE.DOCX

Figure 2: Sydney Trains map

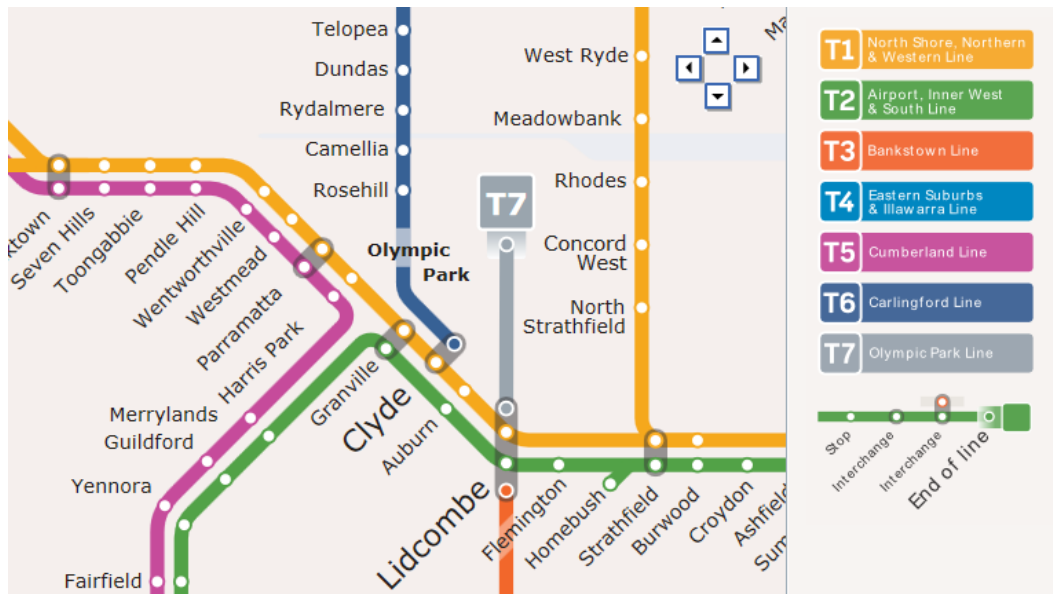### 2.4.2 Free shuttle bus

The Parramatta Shuttle Bus (formerly The Loop) is a free transport solution that connects tourists, residents and commuters to the commercial, retail and recreational landmarks of the city. A stop is located within five minutes walking distance west of the site. The free Parramatta Shuttle Bus runs every 10 minutes, seven days a week.

Figure 3: Parramatta Free Shuttle

2.4.3 Planned transport improvements

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

- **Western Sydney Light Rail Network** (PCC). This is a long term plan which identifies connections to Castle Hill, Macquarie Park, Rhodes and Bankstown. Connections to Castle Hill and Macquarie Park have been prioritised, which may have direct implications for the site.

- **Western Sydney Regional Ring Road** (PCC). This plan involves prioritised upgrades for key intersections on the roads surrounding greater Parramatta including Cumberland Highway, James Ruse Drive and M4 Motorway. It is understood that this will improve efficiency in the surrounding road network and take through traffic away from the centre.

- **Integrated Transport Plan for Parramatta City Centre** (PCC). This plan involves prioritising active and communal transport opportunities over commuter and private vehicle movements. The Strategy Plan covers key aspects of travel behaviours into the centre.

2.5 Walking and cycling network

The site is in an established urban area with a good network of footpaths on either side of the road. The site is within 10 minutes' walk to the City Centre and key transport nodes. Crossing facilities are provided at all signalised intersections on approach to the site.

A number of dedicated cycleways are located in close vicinity of the site, including the Parramatta Valley Cycleway, which is located north of the site. This 12km cycleway connects Putney to Elizabeth Street, Parramatta via the Parramatta River. Cycleways within Parramatta are presented in Figure 4.

| Issue | 15 February 2017 | Arup

Page 5

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND TRANSPORT REPORT 20170215_ISSUE.DOCX
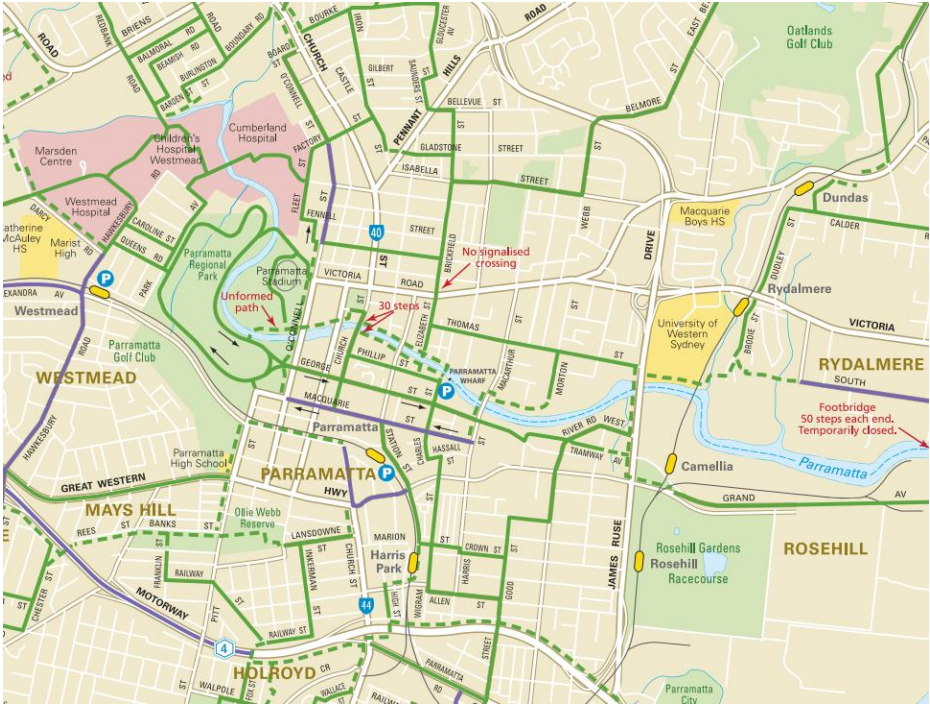
Figure 4: Cycleways in the vicinity of the site

| Issue | 15 February 2017 | Arup

Page 6

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TRANSPORT REPORT 20170215_ISSUE.DOCX

3 Proposed development

3.1 Description of proposed works

The planning proposal involves the rezoning of the site. It is proposed to demolish the existing building and car park, and provide two separate buildings, with a through site link in-between the buildings. The site is proposed to have common basement levels for car parking and loading spread under the two buildings. The total Gross Floor Area (GFA) of the design concept is approximately 41,194 square metres.
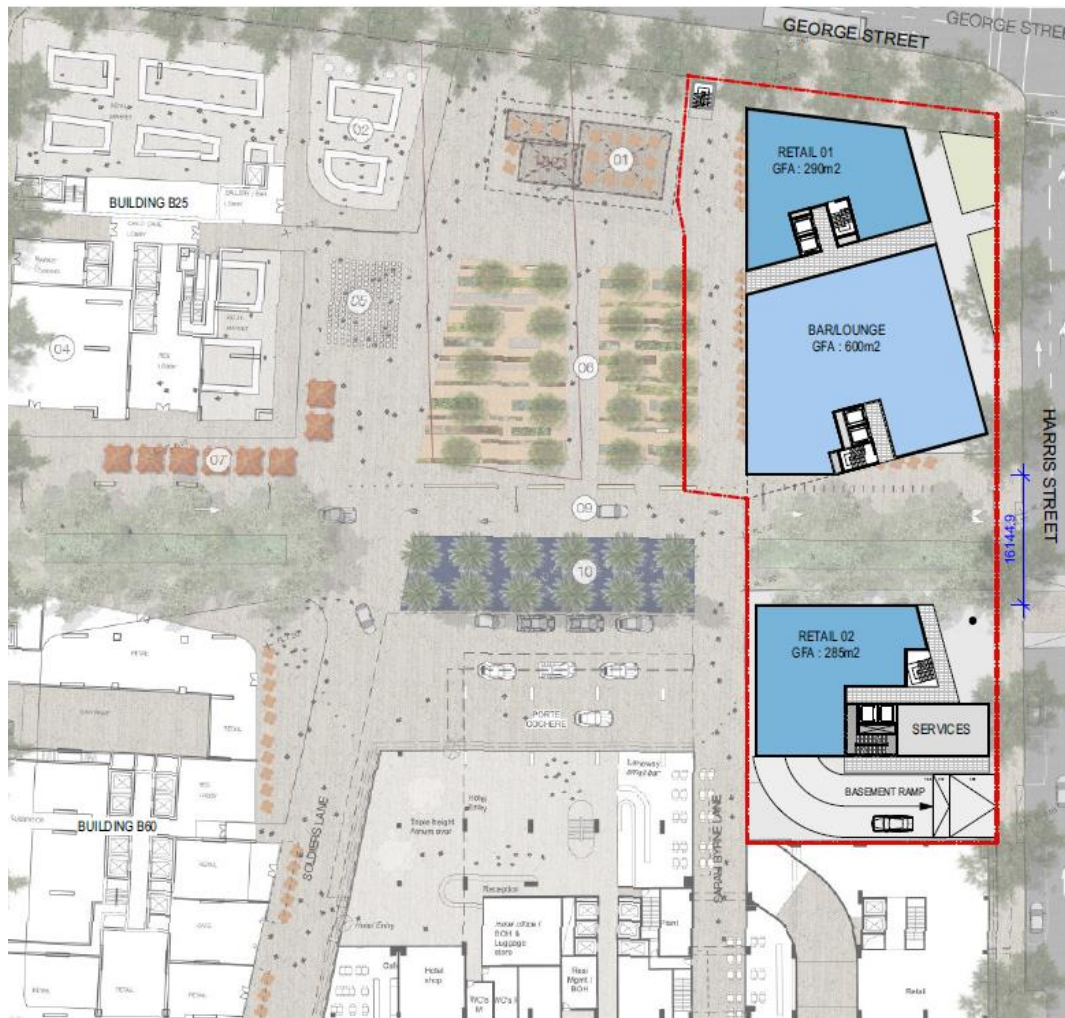
Figure 5: Proposed ground floor plan

Building A is proposed to contain a residential tower consisting of 47 storeys with 420 residential apartments. The Ground Floor will contain 600m^2 of bar/lounge and 290m^2 of retail, with Podium Level 1 having 660m^2 of restaurant GFA and Podium Level 2 having 250m2 of community GFA.

Building B is proposed to be a 10 storey building with 50 apartments, 36 of which will be aged living units. The Ground Floor will contain 285m^2 of retail, with Podium Level 1 and 2 each having 615m^2 of community GFA.

The development schedule is presented in Table 1.

| Issue | 15 February 2017 | Arup

Page 7

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Table 1: Development schedule

Unit Type	Building A	Building B	Total
1 bed apartment	126	7	133
2 bed apartment	294	41	335
3 bed apartment	0	2	2
Total Residential	**420 units**	**50 units**	**470 units**
Retail	290m²	285m²	**575m²**
Restaurant/Bar	1260m²	0	**1260m²**
Community	250m²	1230m²	**1480m²**

3.2   Proposed site access

The vehicular site access is proposed by a driveway within Building B which will provide car and light vehicle access via a ramp to the basement levels. The basement level car park extends to incorporate the footprint of the site as shown in Figure 6.

Pedestrian access to the residential tower is proposed via a lift lobby, accessed from Harris Street. A through site link to the adjacent proposed development at the News Corp site will provide active pedestrian street frontages within the current bounds of the site.

Figure 6: Basement vehicular access

| Issue | 15 February 2017 | Arup

Page 8

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND TRANSPORT REPORT 20170215_ISSUE.DOCX

4 Transport and parking assessment

4.1 Parking assessment

Part 4 of the PCC DCP 2011 was consulted for parking and service vehicle provisions as the site falls within the boundary of the Parramatta City Centre. Reference was also made to Clause 22C of the Parramatta City Centre LEP 2007 and Part 3 of the PCC DCP 2011 with reference to loading provisions.

4.1.1 Car parking

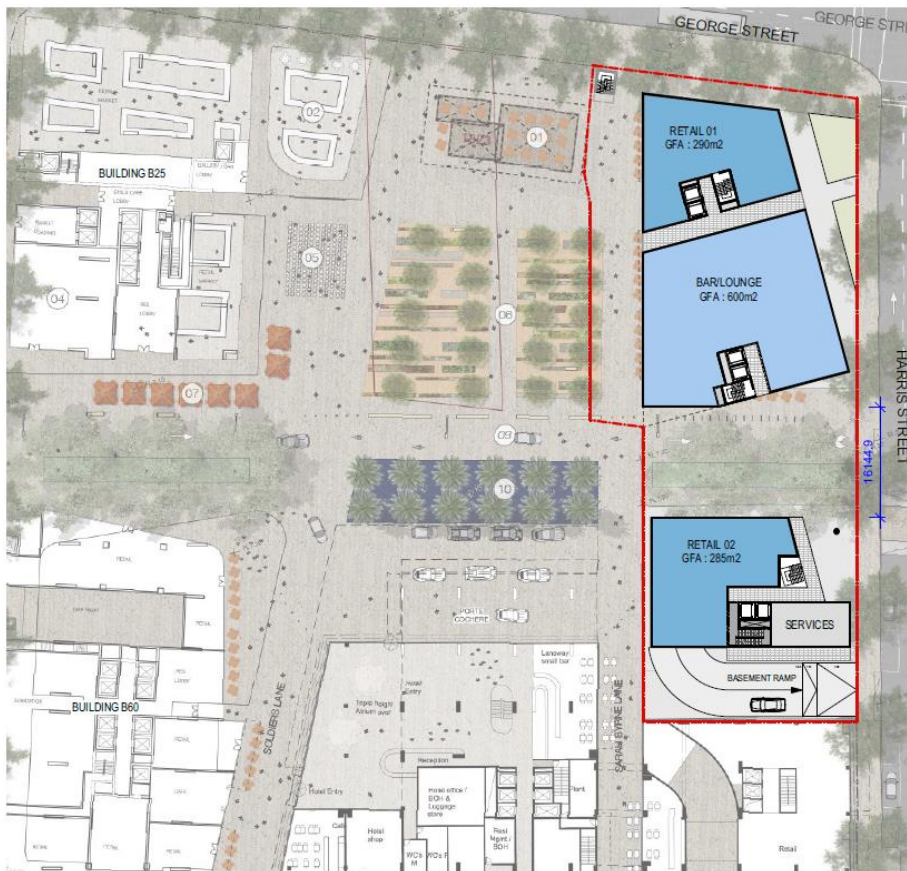PCC development plans indicate that the site has maximum parking rates. Therefore, parking was reduced to applicable rates for the development as provided in Table 2.

Table 2: Proposed parking provision

Proposed use of building	Number of units / GFA	Maximum number of parking spaces (LEP)	Proposed parking provided	Proposed parking
1 bedroom	133	1 per dwelling	0.4 per dwelling	54
2 bedroom	335		0.7 per dwelling	235
3 bedroom	2		2 per dwelling	4
Visitor	470	1 per 5 dwelling	0.14 per dwelling	66
Retail	2,055m^2	1 per 30m^2 GFA	1 per 30m^2 GFA	69
Restaurant/Pub	1,260m^2	1 per 10m^2 GFA or 1 for every 4 seats (whichever is the lesser)	1 per 16m^2 GFA	79
Total parking spaces provided				**507**

Car share parking is also required for developments containing more than 50 residential units and within 800m of a railway station. At least one space is to be provided within the development. This may be included as either visitor or residential parking, and be easily accessible within the building.

It is assumed that the food and beverage land use will be predominately used by 'walk-in' residents or residents already making a trip from the proposed development and surrounding sites. Given parking is constrained surrounding the site, it is not unreasonable to allow for sharing of visitor spaces with the food and beverage uses. This will encourage further use of active and public transport to access the site.

4.1.2 Service/loading provisions

There is no specific guidance on the service vehicle provisions within the Parramatta City Centre. Given that on-street loading will likely be prohibited, adequate provision for loading should be provided on-site. The retail rate from the DCP suggests one loading space per 400m2 GFA. This would allow for five loading/service bays. These may also be used for the residential component as well as waste removal. At least two bays designed for larger vehicles.

| Issue | 15 February 2017 | Arup

Page 9

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND
TRANSPORT REPORT 20170215_ISSUE.DOCX

4.1.3   Bicycle parking

Bicycle parking from the PCC development plans is to be provided at the following rates:

• 1 bicycle space per 2 dwellings

• 1 bicycle space per 200m^2 GFA

On this basis, up to 254 bicycle spaces will need to be provided for the development. Secure bicycle parking in the form of lockers would need to be provided, along with adequate end of trip facilities.

4.2   Road network impacts

4.2.1   Forecast traffic generation

Traffic generation rates were adopted from the RMS Technical Direction (TDT 2013/04a) re-released in August 2013 and the RTA Guide to Traffic Generating Developments, Version 2.2, October 2002 where applicable. The relevant rates for the concept development are shown below in Table 3.

Table 3: Peak hour traffic generation rates

Land use	Peak hour generation rate (RMS, 2013)	
High density residential (per apartment)	Weekday AM	0.19
	Weekday PM	0.15

1.   GLFA is assumed the same as the GFA

It should be noted that the existing site also generates traffic in the peak hours (see Section 2.2). This traffic is assumed to remain given that these uses will continue at this site. Therefore, the proposed concept development has been assessed with a conservative traffic generation, given the reduced parking provision. Trips for the proposed restaurant component have therefore been assumed as a proportional increase of the total rate for the existing pub.

Based on the indicative development schedule outlined in Section 3.1, a maximum development yield of approximately 470 units with 3,739m^2 pub/restaurant/retail and community uses are envisaged.

Table 4: Additional peak hour trips generated

Land use	AM peak hour trips	PM peak hour trips
Residential	89	71
Restaurant/Pub/ Retail /Community	0	70
Total trips	**89**	**141**

| Issue | 15 February 2017 | Arup

Page 10

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND
TRANSPORT REPORT 20170215_ISSUE.DOCX

4.2.2 Trip distribution

The distributed development traffic was based on the 2011 JTW data for travel zone 1054. During the AM peak, it is assumed that there will be 20% traffic into the development and 80% out of the development as the traffic will be residential only. During the PM peak, the food, beverage and retail has been assumed entering the development, and the residential component has been split to 20% of traffic out and 80% of traffic into the development. The current distribution applied across both peak hours is described below in Table 5.

Table 5: Peak distribution of trips

Zone	Origin/Destination	In	Out
1	Macarthur Street (N)	11%	11%
2	George Street (W)	9%	-
3	Macquarie Street (W)	-	9%
4	Parkes Street (W)	52%	45%
5	Harris Street (S)	5%	8%
6	Parkes Street (E)	23%	17%
7	George Street (E)	-	9%

The assumed distribution of trips to the local network reflects the observed journey to work patterns and the most likely routes which will be taken by future vehicular traffic travelling to and from the site.

4.2.3 Background traffic growth

The assumed 2020 background traffic includes the adjacent development proposal traffic at 142 Macquarie Street applied, as well as a 1.5% per annum growth rate consistent with the modelling performed for the nearby development (TTM, 2014). This is relatively conservative and reflects the high number of developments planned within Greater Parramatta.

4.2.4 Traffic modelling

The intersections have been assessed using RMS approved software SIDRA software. The existing intersection performance is assessed in this report in terms of the following three factors for each intersection.

- Degree of Saturation
- Average Delay (Seconds per vehicle)
- Level of Service

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LoS), is based on the average delay per vehicle. LoS ranges from A = very good to F = unsatisfactory (see Table 6).

| Issue | 15 February 2017 | Arup

Page 11

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND TRANSPORT REPORT 20170215_ISSUE.DOCX

Table 6: Level of service criteria for intersections

Level of Service	Average delay (seconds)	Description
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At Capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

Another common measure of intersection performance is the degree of saturation (DoS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DoS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection is 0.9.

The results of the surrounding intersections are summarised in Table 7. This includes three scenarios:

- Existing 2015 scenario to calibrate to existing traffic conditions,

- Background scenario as the 2020 Base case with traffic growth including the adjacent development at the 142 Macquarie Street site,

- Future scenario as the proposed full development with Background traffic within the existing traffic network.

Table 7: Existing Intersection layouts

Intersection	Scenario		LoS	Delay	DoS
George Street and Harris Street / Macarthur Street	AM Peak	2015 Existing	B	17	0.85
		2020 Base	C	37	0.98
		2020 Base+Development	C	40	0.99
	PM Peak	2015 Existing	B	25	0.70
		2020 Base	B	28	0.82
		2020 Base+Development	C	29	0.83
Macquarie Street and Harris Street	AM Peak	2015 Existing	A	9	0.70
		2020 Base	A	11	0.79
		2020 Base+Development	A	10	0.81
	PM Peak	2015 Existing	A	7	0.70
		2020 Base	A	7	0.73
		2020 Base+Development	A	8	0.82
Parkes Street and Harris Street	AM Peak	2015 Existing	E	57	0.92
		2020 Base	F	92	1.07
		2020 Base+Development	F	101	1.09
	PM Peak	2015 Existing	D	44	0.87
		2020 Base	D	55	1.00
		2020 Base+Development	E	70	1.05

4.2.5 Summary of impacts

The traffic modelling results indicate that the Parkes Street / Harris Street intersection is operating near practical capacity under the existing conditions in the AM and PM peak hour. However, the intersection operates within acceptable ranges of delay and LoS within an urban context for both peak hours. As a result of the additional Base case traffic, the intersection is operating over practical capacity, with increases in intersection delay and DoS. The development traffic slightly increases the delay and DoS further when compared to the base scenario.

The George Street / Harris Street intersection is operating under capacity in both the existing and future traffic conditions. The resulting additional traffic from the Base case brings the intersection near practical capacity in both peak hours with minimal change from the development. This concludes that the development traffic will have minimal impact on the intersection.

The Macquarie Street / Harris Street intersection is operating under capacity under both the existing and future traffic conditions. Therefore, the modelling concludes that the additional traffic generated by the site will have minimal impact on the operation of the surrounding intersections.

4.3 Walking and cycling access

There are changes proposed to the walking and cycling network interface to the site by way of a through site link to the adjacent development. The provision of walking/cycling facilities provided within the development will be integrated with the surrounding and well-connected network to contribute to active transport within the site. The current surrounding external network is deemed both adequate and appropriate for the proposed site development.

Secure bicycle parking will need to be provided as a component of the proposed development, with complementary end of trip facilities such as lockers and showers. Provision of these facilities will encourage active travel, such as cycling as a viable mode of transport to the site. This will further contribute to a reduced car mode share of trips.

| Issue | 15 February 2017 | Arup

Page 13

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND TRANSPORT REPORT 20170215_ISSUE.DOCX

5 Conclusions

This review has described the potential traffic and transport impacts of the proposed rezoning at Albion Hotel, Parramatta. Key findings of the review are as follows:

- The site is located within Parramatta City Centre with a constrained parking environment;

- The rezoned development would be responsible for a minor increase in peak hour traffic flows along surrounding key roads;

- Traffic modelling demonstrates that the adjacent intersections operate close to capacity in the 2020 'base' scenario. Delay and degree of saturation increases slightly in comparison to this scenario following completion of the development up to 2020 however this is considered acceptable within an urban context;

- Up to 507 off-street parking bays (with one car share space) are proposed for the concept development with rates in accordance with Parramatta City Council DCP and LEP;

- On-site loading and servicing is proposed for the concept development; and

- Secure bicycle parking is to be provided as a component of the proposed development

| Issue | 15 February 2017 | Arup

Page 14

\\GLOBAL.ARUP.COM\AUSTRALASIA\SYD\PROJECTS\240000\240103-00 ALBION HOTEL PARRAMATTA\WORK\INTERNAL\REPORT\ALBION HOTEL TRAFFIC AND
TRANSPORT REPORT 20170215_ISSUE.DOCX

Appendix A

Traffic counts

Arup

AM Peak

138	L				
36	T	0	832	260	
George 117	R	R	T	L	

L	T	R
0	584	17

Harris

2	L	2
1	R	R

L
2

0	L	218	772
Macquarie 0	R	R	T

L	T
411	631

Hassall

212	L			
501	T	334	308	54
Parkes 1	R	R	T	L

L	T	R	R	372
30	445	33	T	372
			L	34

Arup

PM Peak

Macarthur

George

	219	L			
	105	T	0	659	156
	206	R	R	T	L

L	T	R
0	668	31

Harris

	15	L	17
	6	R	R

L	T
20	

Macquarie

	0	L	192	791
	0	R	R	T

L	T
177	742

Hassall

Parkes

	279	L			
	433	T	296	364	74
	0	R	R	T	L

L	T	R	R	220
39	315	43	T	364
			L	32

Appendix B
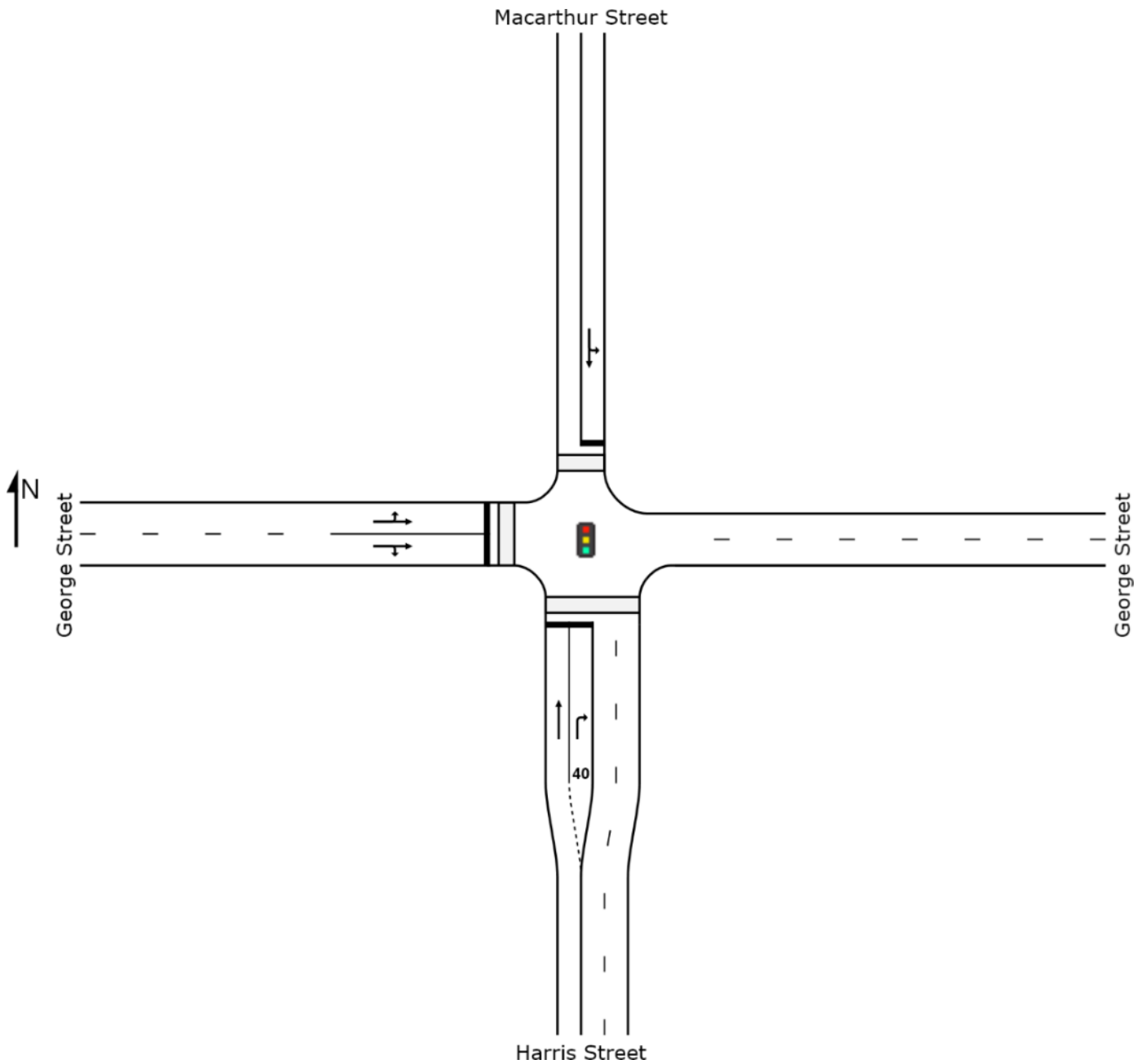
SIDRA Outputs

SITE LAYOUT

🚦 **Site: George Street / Harris Street Existing AM**

New Site
Signals - Actuated Isolated

Macarthur Street

N

George Street

George Street

40

Harris Street

MOVEMENT SUMMARY

🚦 Site: George Street / Harris Street Existing AM

New Site
Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
2	T1	615	1.0	0.504	6.9	LOS A	13.0	92.1	0.45	0.40	53.8
3	R2	18	0.0	0.162	39.9	LOS C	0.8	5.3	0.77	0.73	33.7
Approach		633	1.0	0.504	7.9	LOS A	13.0	92.1	0.46	0.41	52.9
North: Macarthur Street											
7	L2	274	1.5	0.851	18.5	LOS B	43.4	304.5	0.79	0.78	44.6
8	T1	876	0.1	0.851	12.9	LOS A	43.4	304.5	0.79	0.78	48.6
Approach		1149	0.4	0.851	14.2	LOS A	43.4	304.5	0.79	0.78	47.6
West: George Street											
10	L2	145	0.0	0.484	49.4	LOS D	7.6	53.2	0.93	0.79	31.0
11	T1	38	0.0	0.484	45.4	LOS D	7.6	53.2	0.93	0.79	29.8
12	R2	123	0.0	0.484	50.4	LOS D	7.0	48.8	0.93	0.78	30.6
Approach		306	0.0	0.484	49.3	LOS D	7.6	53.2	0.93	0.79	30.7
All Vehicles		2088	0.5	0.851	17.4	LOS B	43.4	304.5	0.71	0.67	45.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	38	44.0	LOS E	0.1	0.1	0.92	0.92
P3	North Full Crossing	7	39.4	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	65	6.2	LOS A	0.1	0.1	0.34	0.34
All Pedestrians		111	21.4	LOS C			0.57	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 **Site: George Street / Harris Street Existing PM**

New Site
Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
2	T1	703	0.9	0.649	13.5	LOS A	23.9	168.9	0.58	0.53	49.1
3	R2	33	0.0	0.189	37.7	LOS C	1.5	10.2	0.69	0.74	34.4
Approach		736	0.9	0.649	14.6	LOS B	23.9	168.9	0.59	0.54	48.2
North: Macarthur Street											
7	L2	164	2.6	0.695	21.3	LOS B	33.9	239.3	0.68	0.67	43.3
8	T1	694	0.8	0.695	15.7	LOS B	33.9	239.3	0.68	0.67	47.0
Approach		858	1.1	0.695	16.7	LOS B	33.9	239.3	0.68	0.67	46.3
West: George Street											
10	L2	231	1.8	0.594	52.4	LOS D	16.2	114.9	0.91	0.81	30.4
11	T1	111	0.0	0.594	48.5	LOS D	16.2	114.9	0.91	0.81	29.2
12	R2	217	1.5	0.594	53.9	LOS D	15.1	107.1	0.92	0.81	29.8
Approach		558	1.3	0.594	52.2	LOS D	16.2	114.9	0.91	0.81	29.9
All Vehicles		2152	1.1	0.695	25.2	LOS B	33.9	239.3	0.71	0.66	41.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	45	43.3	LOS E	0.1	0.1	0.82	0.82
P3	North Full Crossing	6	39.2	LOS D	0.0	0.0	0.78	0.78
P4	West Full Crossing	23	10.0	LOS B	0.0	0.0	0.39	0.39
All Pedestrians		75	32.6	LOS D			0.68	0.68

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: George Street / Harris Street Base AM

New Site
Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street										
2	T1	671	1.0	0.507	7.3	LOS A	14.9	105.0	0.47	0.42	53.6
3	R2	20	0.0	0.261	63.1	LOS E	1.1	7.5	0.97	0.70	27.8
Approach		691	1.0	0.507	8.9	LOS A	14.9	105.0	0.48	0.43	52.2
North: Macarthur Street										
7	L2	298	1.5	0.982	52.4	LOS D	94.0	660.3	1.00	1.15	31.5
8	T1	1029	0.1	0.982	46.8	LOS D	94.0	660.3	1.00	1.15	33.5
Approach		1327	0.4	0.982	48.0	LOS D	94.0	660.3	1.00	1.15	33.0
West: George Street										
10	L2	215	2.0	0.717	51.7	LOS D	11.6	82.8	0.97	0.82	30.4
11	T1	58	0.0	0.717	47.7	LOS D	11.6	82.8	0.98	0.82	29.3
12	R2	176	2.0	0.717	52.6	LOS D	10.7	76.1	0.98	0.82	30.1
Approach		448	1.7	0.717	51.6	LOS D	11.6	82.8	0.97	0.82	30.1
All Vehicles		2466	0.8	0.982	37.7	LOS C	94.0	660.3	0.85	0.89	36.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	38	44.0	LOS E	0.1	0.1	0.92	0.92
P3	North Full Crossing	7	39.4	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	65	6.2	LOS A	0.1	0.1	0.34	0.34
All Pedestrians		111	21.4	LOS C			0.57	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: George Street / Harris Street Base PM

New Site
Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street											
2	T1	766	0.8	0.722	14.3	LOS A	27.5	194.1	0.62	0.56	48.6
3	R2	36	0.0	0.317	51.5	LOS D	2.0	13.7	0.82	0.76	30.4
Approach		802	0.8	0.722	15.9	LOS B	27.5	194.1	0.63	0.57	47.3
North: Macarthur Street											
7	L2	179	2.4	0.817	23.9	LOS B	46.7	329.3	0.80	0.77	42.0
8	T1	831	0.6	0.817	18.4	LOS B	46.7	329.3	0.80	0.77	45.5
Approach		1009	0.9	0.817	19.4	LOS B	46.7	329.3	0.80	0.77	44.8
West: George Street											
10	L2	308	1.4	0.769	55.1	LOS D	22.2	156.8	0.97	0.85	29.7
11	T1	137	0.0	0.769	51.3	LOS D	22.2	156.8	0.97	0.85	28.5
12	R2	278	1.1	0.769	56.6	LOS E	20.7	145.9	0.97	0.85	29.1
Approach		723	1.0	0.769	55.0	LOS D	22.2	156.8	0.97	0.85	29.2
All Vehicles		2535	0.9	0.817	28.4	LOS B	46.7	329.3	0.79	0.73	39.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	45	43.3	LOS E	0.1	0.1	0.82	0.82
P3	North Full Crossing	6	39.2	LOS D	0.0	0.0	0.78	0.78
P4	West Full Crossing	23	10.0	LOS B	0.0	0.0	0.39	0.39
All Pedestrians		75	32.6	LOS D			0.68	0.68

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: George Street / Harris Street Future AM

New Site
Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
2	T1	678	1.0	0.510	7.3	LOS A	15.1	106.8	0.47	0.43	53.5
3	R2	26	0.0	0.350	65.1	LOS E	1.4	10.1	0.99	0.69	27.3
Approach		704	1.0	0.510	9.5	LOS A	15.1	106.8	0.49	0.44	51.7
North: Macarthur Street											
7	L2	298	1.5	0.989	56.7	LOS E	98.7	693.0	1.00	1.18	30.4
8	T1	1040	0.1	0.989	51.1	LOS D	98.7	693.0	1.00	1.18	32.2
Approach		1338	0.4	0.989	52.4	LOS D	98.7	693.0	1.00	1.18	31.8
West: George Street											
10	L2	215	2.0	0.718	51.7	LOS D	11.7	83.0	0.97	0.82	30.4
11	T1	58	0.0	0.718	47.7	LOS D	11.7	83.0	0.98	0.82	29.3
12	R2	177	2.0	0.718	52.6	LOS D	10.7	76.3	0.98	0.82	30.1
Approach		449	1.7	0.718	51.6	LOS D	11.7	83.0	0.98	0.82	30.1
All Vehicles		2492	0.8	0.989	40.1	LOS C	98.7	693.0	0.85	0.90	35.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	38	44.0	LOS E	0.1	0.1	0.92	0.92
P3	North Full Crossing	7	39.4	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	65	6.2	LOS A	0.1	0.1	0.34	0.34
All Pedestrians		111	21.4	LOS C			0.57	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: George Street / Harris Street Future PM

New Site
Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street											
2	T1	773	0.8	0.742	14.3	LOS A	27.9	196.8	0.62	0.57	48.5
3	R2	41	0.0	0.386	54.3	LOS D	2.3	16.4	0.85	0.77	29.7
Approach		814	0.8	0.742	16.4	LOS B	27.9	196.8	0.63	0.58	47.0
North: Macarthur Street											
7	L2	179	2.4	0.833	24.4	LOS B	48.7	343.5	0.82	0.78	41.8
8	T1	851	0.6	0.833	18.8	LOS B	48.7	343.5	0.82	0.78	45.3
Approach		1029	0.9	0.833	19.8	LOS B	48.7	343.5	0.82	0.78	44.6
West: George Street											
10	L2	308	1.4	0.777	55.3	LOS D	22.5	159.0	0.97	0.85	29.7
11	T1	137	0.0	0.777	51.4	LOS D	22.5	159.0	0.97	0.85	28.5
12	R2	285	1.1	0.777	56.7	LOS E	20.9	147.6	0.97	0.85	29.1
Approach		731	1.0	0.777	55.1	LOS D	22.5	159.0	0.97	0.85	29.2
All Vehicles		2574	0.9	0.833	28.7	LOS C	48.7	343.5	0.80	0.74	39.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	45	43.3	LOS E	0.1	0.1	0.82	0.82
P3	North Full Crossing	6	39.2	LOS D	0.0	0.0	0.78	0.78
P4	West Full Crossing	23	10.0	LOS B	0.0	0.0	0.39	0.39
All Pedestrians		75	32.6	LOS D			0.68	0.68

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Signals - Actuated Isolated

MOVEMENT SUMMARY

🚦 Site: Macquarie Street / Harris Street Existing AM

Signals - Actuated Isolated   Cycle Time = 39 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
1	L2	436	0.7	0.438	11.8	LOS A	5.1	36.2	0.63	0.76	46.0
2	T1	672	1.1	0.644	7.3	LOS A	9.3	65.6	0.74	0.66	53.5
Approach		1107	1.0	0.644	9.1	LOS A	9.3	65.6	0.70	0.70	50.3
North: Harris Street											
8	T1	822	1.2	0.695	7.6	LOS A	10.5	73.9	0.79	0.70	53.0
9	R2	229	0.0	0.695	12.4	LOS A	4.3	30.5	0.86	0.80	46.2
Approach		1052	0.9	0.695	8.6	LOS A	10.5	73.9	0.80	0.72	51.3
All Vehicles		2159	0.9	0.695	8.9	LOS A	10.5	73.9	0.75	0.71	50.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	39	14.0	LOS B	0.0	0.0	0.85	0.85
P4	West Full Crossing	85	6.8	LOS A	0.1	0.1	0.59	0.59
All Pedestrians		124	9.1	LOS A			0.67	0.67

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
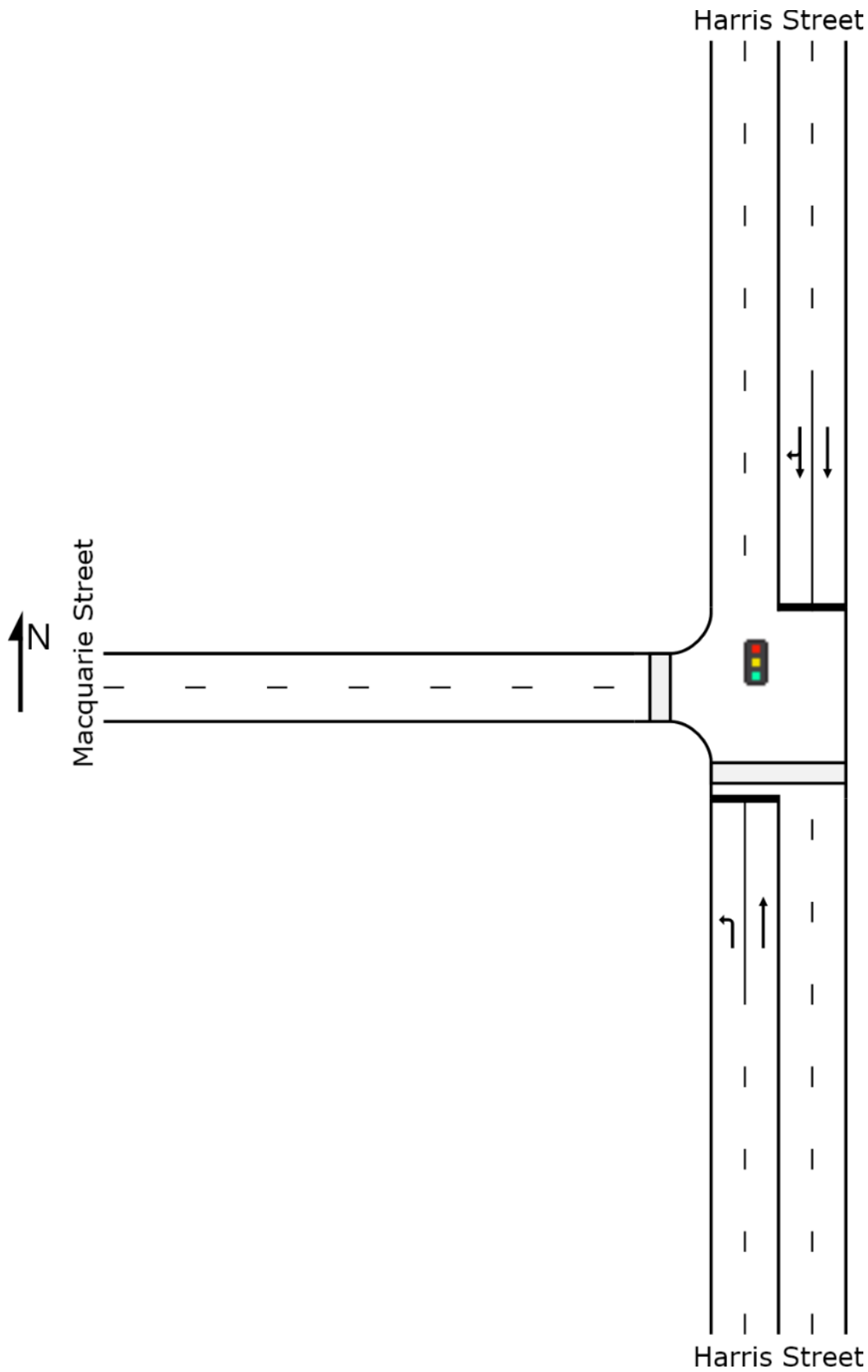Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Macquarie Street / Harris Street Existing PM

Signals - Actuated Isolated   Cycle Time = 47 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
1	L2	186	0.0	0.175	10.9	LOS A	2.0	14.3	0.49	0.70	46.6
2	T1	781	0.0	0.697	8.1	LOS A	12.9	90.6	0.75	0.68	52.9
Approach		967	0.0	0.697	8.6	LOS A	12.9	90.6	0.70	0.68	51.6
North: Harris Street											
8	T1	833	0.0	0.613	2.9	LOS A	7.2	50.5	0.48	0.44	56.9
9	R2	202	0.0	0.613	13.7	LOS A	4.8	33.7	0.83	0.79	45.4
Approach		1035	0.0	0.613	5.0	LOS A	7.2	50.5	0.55	0.50	54.2
All Vehicles		2002	0.0	0.697	6.8	LOS A	12.9	90.6	0.62	0.59	52.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	17.9	LOS B	0.0	0.0	0.87	0.87
P4	West Full Crossing	9	6.7	LOS A	0.0	0.0	0.53	0.53
All Pedestrians		23	13.3	LOS B			0.73	0.73

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Macquarie Street / Harris Street Base AM

Signals - Actuated Isolated   Cycle Time = 51 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
1	L2	576	0.5	0.529	12.7	LOS A	8.7	61.0	0.63	0.77	45.5
2	T1	732	1.0	0.642	7.9	LOS A	12.2	86.1	0.70	0.63	53.1
Approach		1307	0.8	0.642	10.0	LOS A	12.2	86.1	0.67	0.69	49.4
North: Harris Street											
8	T1	937	1.0	0.785	9.3	LOS A	17.3	121.9	0.82	0.75	51.8
9	R2	325	0.0	0.785	18.0	LOS B	7.7	53.9	0.98	0.92	42.7
Approach		1262	0.8	0.785	11.6	LOS A	17.3	121.9	0.86	0.79	49.1
All Vehicles		2569	0.8	0.785	10.8	LOS A	17.3	121.9	0.76	0.74	49.3

Movement Performance - Vehicles

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	39	19.9	LOS B	0.0	0.0	0.88	0.88
P4	West Full Crossing	85	6.7	LOS A	0.1	0.1	0.51	0.51
All Pedestrians		124	10.8	LOS B			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 **Site: Macquarie Street / Harris Street Base PM**

Signals - Actuated Isolated   Cycle Time = 47 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
1	L2	304	0.0	0.275	10.7	LOS A	3.4	23.9	0.50	0.71	46.6
2	T1	852	0.0	0.733	7.8	LOS A	14.3	99.8	0.76	0.69	53.2
Approach		1156	0.0	0.733	8.6	LOS A	14.3	99.8	0.69	0.70	51.3
North: Harris Street											
8	T1	948	0.0	0.614	2.4	LOS A	8.9	62.6	0.44	0.40	57.7
9	R2	295	0.0	0.614	14.5	LOS B	5.7	39.6	0.90	0.84	44.2
Approach		1243	0.0	0.614	5.2	LOS A	8.9	62.6	0.55	0.51	53.8
All Vehicles		2399	0.0	0.733	6.8	LOS A	14.3	99.8	0.62	0.60	52.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	17.9	LOS B	0.0	0.0	0.87	0.87
P4	West Full Crossing	9	6.1	LOS A	0.0	0.0	0.51	0.51
All Pedestrians		23	13.1	LOS B			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Macquarie Street / Harris Street Future AM

Signals - Actuated Isolated   Cycle Time = 47 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street											
1	L2	576	0.5	0.522	11.9	LOS A	7.9	55.4	0.62	0.77	46.0
2	T1	746	1.0	0.647	7.1	LOS A	11.4	80.7	0.69	0.62	53.7
Approach		1322	0.8	0.647	9.2	LOS A	11.4	80.7	0.66	0.69	50.0
North: Harris Street											
8	T1	978	1.0	0.809	8.6	LOS A	17.0	120.0	0.84	0.76	52.4
9	R2	332	0.0	0.809	16.7	LOS B	7.3	50.9	0.99	0.92	43.3
Approach		1309	0.7	0.809	10.7	LOS A	17.0	120.0	0.87	0.80	49.7
All Vehicles		2632	0.8	0.809	9.9	LOS A	17.0	120.0	0.77	0.74	49.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	39	17.9	LOS B	0.0	0.0	0.87	0.87
P4	West Full Crossing	85	6.1	LOS A	0.1	0.1	0.51	0.51
All Pedestrians		124	9.8	LOS A			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Macquarie Street / Harris Street Future PM

Signals - Actuated Isolated   Cycle Time = 47 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Harris Street										
1	L2	304	0.0	0.285	11.3	LOS A	3.6	25.2	0.53	0.72	46.3
2	T1	922	0.0	0.823	9.2	LOS A	17.4	121.8	0.86	0.78	52.1
Approach		1226	0.0	0.823	9.8	LOS A	17.4	121.8	0.78	0.76	50.5
North: Harris Street										
8	T1	981	0.0	0.628	2.5	LOS A	9.4	65.5	0.46	0.42	57.5
9	R2	300	0.0	0.628	16.9	LOS B	5.8	40.8	0.89	0.86	43.0
Approach		1281	0.0	0.628	5.9	LOS A	9.4	65.5	0.56	0.52	53.3
All Vehicles		2507	0.0	0.823	7.8	LOS A	17.4	121.8	0.67	0.64	51.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	17.9	LOS B	0.0	0.0	0.87	0.87
P4	West Full Crossing	9	6.7	LOS A	0.0	0.0	0.53	0.53
All Pedestrians		23	13.3	LOS B			0.73	0.73

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

🚦 Site: Harris Street / Parkes Street AM existing

Signals - Actuated Isolated

MOVEMENT SUMMARY

🚦 **Site: Harris Street / Parkes Street AM existing**

Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	32	3.3	0.753	61.5	LOS E	16.2	113.9	0.98	0.82	28.9
2	T1	468	0.2	0.753	56.9	LOS E	16.4	114.9	0.98	0.83	29.5
3	R2	35	0.0	0.753	61.5	LOS E	16.4	114.9	0.98	0.83	28.9
Approach		535	0.4	0.753	57.5	LOS E	16.4	114.9	0.98	0.83	29.5
East: Parkes Street (e)											
4	L2	36	0.0	0.487	32.4	LOS C	18.6	133.8	0.73	0.66	38.5
5	T1	392	3.8	0.487	26.8	LOS B	18.6	133.8	0.73	0.66	41.4
6	R2	392	0.3	0.909	67.5	LOS E	22.5	158.0	1.00	1.07	28.1
Approach		819	1.9	0.909	46.5	LOS D	22.5	158.0	0.86	0.86	33.7
North: Harris Street (n)											
7	L2	57	1.9	0.897	64.1	LOS E	24.1	169.2	1.00	0.90	29.7
8	T1	324	0.0	0.897	59.7	LOS E	24.1	169.2	1.00	0.90	28.7
9	R2	352	0.0	0.897	64.2	LOS E	23.3	162.8	1.00	0.88	28.8
Approach		733	0.1	0.897	62.2	LOS E	24.1	169.2	1.00	0.89	28.8
West: Parkes Street (w)											
10	L2	223	0.5	0.921	65.9	LOS E	24.5	174.0	1.00	0.91	28.9
11	T1	527	3.2	0.921	60.7	LOS E	25.2	181.6	1.00	0.92	29.8
Approach		751	2.4	0.921	62.3	LOS E	25.2	181.6	1.00	0.92	29.6
All Vehicles		2837	1.3	0.921	56.8	LOS E	25.2	181.6	0.95	0.88	30.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
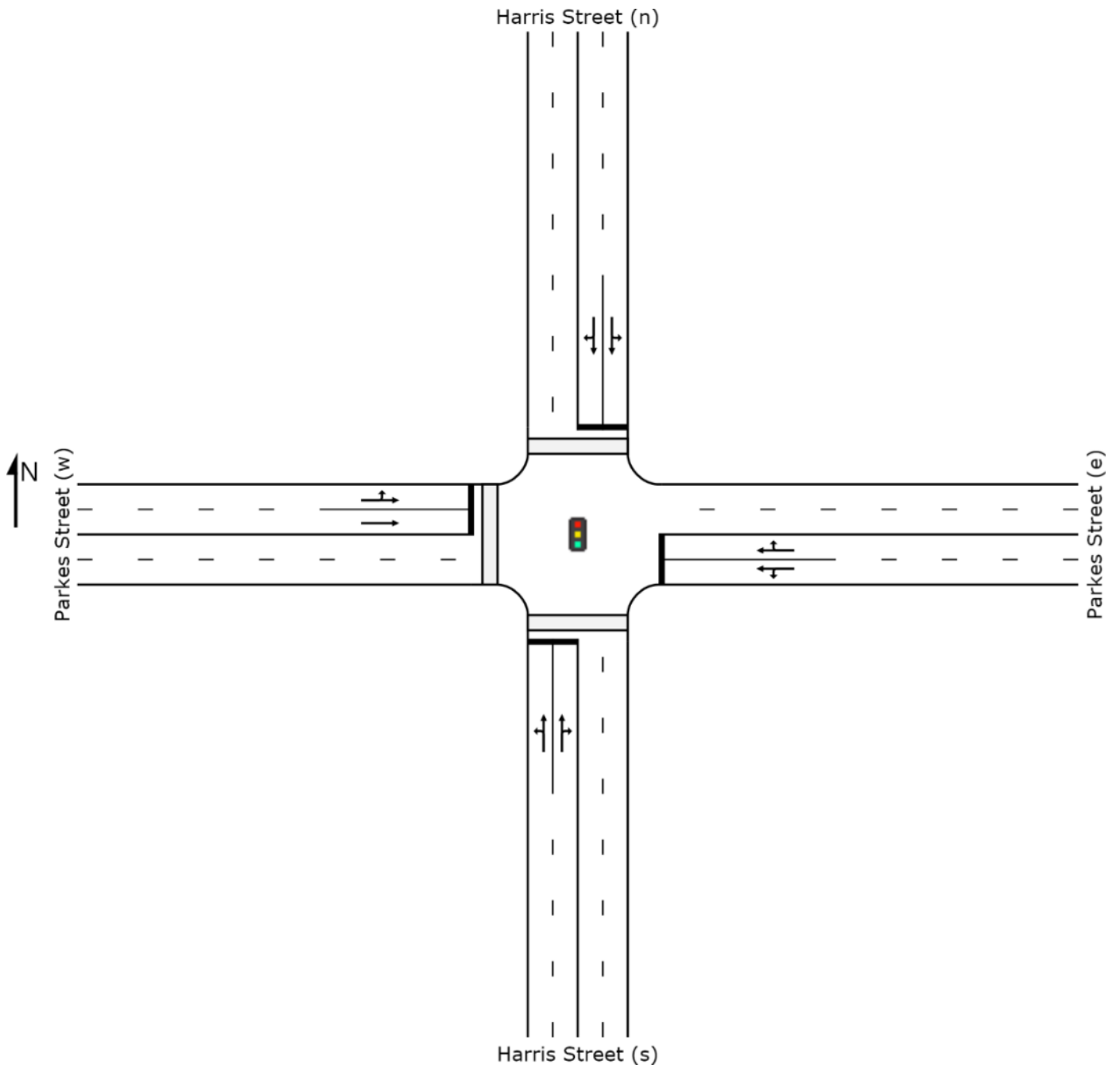
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	6	24.6	LOS C	0.0	0.0	0.62	0.62
P3	North Full Crossing	1	48.2	LOS E	0.0	0.0	0.86	0.86
P4	West Full Crossing	33	51.8	LOS E	0.1	0.1	0.89	0.89
All Pedestrians		40	47.4	LOS E			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 **Site: Harris Street / Parkes Street PM existing**

Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	41	0.0	0.634	50.9	LOS D	10.2	71.2	0.96	0.79	31.5
2	T1	332	0.0	0.634	46.3	LOS D	10.2	71.7	0.96	0.79	32.2
3	R2	45	0.0	0.634	50.9	LOS D	10.2	71.7	0.96	0.79	31.5
Approach		418	0.0	0.634	47.2	LOS D	10.2	71.7	0.96	0.79	32.1
East: Parkes Street (e)											
4	L2	34	0.0	0.508	30.6	LOS C	15.3	109.4	0.77	0.68	39.2
5	T1	373	2.8	0.508	25.1	LOS B	15.3	109.4	0.77	0.68	42.3
6	R2	232	0.0	0.706	53.0	LOS D	10.8	75.9	0.97	0.97	31.6
Approach		638	1.7	0.706	35.5	LOS C	15.3	109.4	0.84	0.79	37.5
North: Harris Street (n)											
7	L2	78	0.0	0.854	49.5	LOS D	19.7	137.8	1.00	0.87	33.7
8	T1	383	0.0	0.854	45.1	LOS D	19.7	137.8	1.00	0.87	32.3
9	R2	312	0.3	0.854	49.5	LOS D	19.1	134.0	1.00	0.87	32.8
Approach		773	0.1	0.854	47.3	LOS D	19.7	137.8	1.00	0.87	32.6
West: Parkes Street (w)											
10	L2	294	0.0	0.865	50.2	LOS D	18.6	130.6	0.99	0.87	32.7
11	T1	456	2.3	0.865	45.0	LOS D	19.3	137.8	1.00	0.87	34.3
Approach		749	1.4	0.865	47.0	LOS D	19.3	137.8	0.99	0.87	33.7
All Vehicles		2578	0.9	0.865	44.3	LOS D	19.7	137.8	0.95	0.84	33.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	17	24.0	LOS C	0.0	0.0	0.68	0.68
P3	North Full Crossing	11	39.5	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	26	44.9	LOS E	0.1	0.1	0.92	0.92
All Pedestrians		54	37.3	LOS D			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Harris Street / Parkes Street AM base

Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	35	3.0	0.887	63.7	LOS E	21.8	153.4	1.00	0.89	28.5
2	T1	612	0.2	0.887	59.1	LOS E	22.0	154.4	1.00	0.89	29.1
3	R2	38	0.0	0.887	63.6	LOS E	22.0	154.4	1.00	0.89	28.5
Approach		684	0.3	0.887	59.5	LOS E	22.0	154.4	1.00	0.89	29.0
East: Parkes Street (e)											
4	L2	39	0.0	0.539	33.9	LOS C	21.1	151.4	0.76	0.68	37.9
5	T1	426	3.5	0.539	28.3	LOS B	21.1	151.4	0.76	0.68	40.7
6	R2	426	0.2	0.988	86.3	LOS F	29.4	206.3	1.00	1.16	24.5
Approach		892	1.8	0.988	56.3	LOS D	29.4	206.3	0.87	0.91	30.9
North: Harris Street (n)											
7	L2	62	1.7	1.065	137.1	LOS F	42.5	297.9	1.00	1.31	18.7
8	T1	395	0.0	1.065	132.7	LOS F	42.5	297.9	1.00	1.30	18.2
9	R2	383	0.0	1.065	137.3	LOS F	41.0	287.0	1.00	1.14	18.3
Approach		840	0.1	1.065	135.1	LOS F	42.5	297.9	1.00	1.23	18.3
West: Parkes Street (w)											
10	L2	243	0.4	1.039	118.7	LOS F	37.0	262.0	1.00	1.15	20.4
11	T1	575	2.9	1.039	111.5	LOS F	37.7	270.8	1.00	1.20	21.1
Approach		818	2.2	1.039	113.6	LOS F	37.7	270.8	1.00	1.19	20.9
All Vehicles		3234	1.1	1.065	92.0	LOS F	42.5	297.9	0.97	1.06	23.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	6	25.2	LOS C	0.0	0.0	0.62	0.62
P3	North Full Crossing	1	49.1	LOS E	0.0	0.0	0.87	0.87
P4	West Full Crossing	33	50.1	LOS E	0.1	0.1	0.88	0.88
All Pedestrians		40	46.1	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Harris Street / Parkes Street PM base

Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	45	0.0	0.772	50.7	LOS D	14.1	98.5	0.98	0.83	31.6
2	T1	473	0.0	0.772	46.1	LOS D	14.1	99.0	0.98	0.83	32.3
3	R2	49	0.0	0.772	50.7	LOS D	14.1	99.0	0.98	0.83	31.6
Approach		567	0.0	0.772	46.9	LOS D	14.1	99.0	0.98	0.83	32.2
East: Parkes Street (e)											
4	L2	37	0.0	0.595	33.2	LOS C	18.3	130.6	0.82	0.73	38.2
5	T1	418	2.5	0.595	27.7	LOS B	18.3	130.6	0.82	0.73	41.0
6	R2	253	0.0	0.878	57.8	LOS E	12.3	85.9	1.00	1.00	30.4
Approach		707	1.5	0.878	38.7	LOS C	18.3	130.6	0.89	0.83	36.3
North: Harris Street (n)											
7	L2	85	0.0	1.000	76.7	LOS F	31.2	218.5	1.00	1.12	26.9
8	T1	481	0.0	1.000	72.3	LOS F	31.2	218.5	1.00	1.11	26.0
9	R2	340	0.3	1.000	76.9	LOS F	30.3	212.8	1.00	1.06	26.4
Approach		906	0.1	1.000	74.4	LOS F	31.2	218.5	1.00	1.09	26.2
West: Parkes Street (w)											
10	L2	320	0.0	0.942	57.0	LOS E	22.6	158.5	1.00	0.94	30.9
11	T1	497	2.1	0.942	51.8	LOS D	23.4	167.1	1.00	0.96	32.2
Approach		817	1.3	0.942	53.9	LOS D	23.4	167.1	1.00	0.95	31.7
All Vehicles		2998	0.7	1.000	55.2	LOS D	31.2	218.5	0.97	0.94	30.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	17	25.4	LOS C	0.0	0.0	0.70	0.70
P3	North Full Crossing	11	39.5	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	26	43.0	LOS E	0.1	0.1	0.91	0.91
All Pedestrians		54	36.8	LOS D			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Harris Street / Parkes Street AM future

Signals - Actuated Isolated   Cycle Time = 130 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	35	3.0	0.924	67.5	LOS E	22.8	160.5	1.00	0.93	27.6
2	T1	613	0.2	0.924	62.9	LOS E	23.1	161.6	1.00	0.93	28.2
3	R2	38	0.0	0.924	67.5	LOS E	23.1	161.6	1.00	0.93	27.7
Approach		685	0.3	0.924	63.4	LOS E	23.1	161.6	1.00	0.93	28.1
East: Parkes Street (e)											
4	L2	39	0.0	0.539	33.9	LOS C	21.1	151.4	0.76	0.68	37.9
5	T1	426	3.5	0.539	28.3	LOS B	21.1	151.4	0.76	0.68	40.7
6	R2	432	0.2	1.000	92.7	LOS F	31.2	218.6	1.00	1.18	23.5
Approach		897	1.8	1.000	59.5	LOS E	31.2	218.6	0.87	0.92	30.1
North: Harris Street (n)											
7	L2	71	1.5	1.088	155.3	LOS F	48.1	337.5	1.00	1.41	17.1
8	T1	400	0.0	1.088	150.9	LOS F	48.1	337.5	1.00	1.40	16.7
9	R2	418	0.0	1.088	155.5	LOS F	46.4	324.8	1.00	1.19	16.8
Approach		888	0.1	1.088	153.4	LOS F	48.1	337.5	1.00	1.30	16.8
West: Parkes Street (w)											
10	L2	252	0.4	1.050	127.1	LOS F	38.7	274.0	1.00	1.18	19.5
11	T1	575	2.9	1.050	119.9	LOS F	39.5	283.5	1.00	1.24	20.1
Approach		826	2.2	1.050	122.1	LOS F	39.5	283.5	1.00	1.22	19.9
All Vehicles		3297	1.1	1.088	101.3	LOS F	48.1	337.5	0.97	1.10	22.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	6	25.2	LOS C	0.0	0.0	0.62	0.62
P3	North Full Crossing	1	49.1	LOS E	0.0	0.0	0.87	0.87
P4	West Full Crossing	33	50.9	LOS E	0.1	0.1	0.89	0.89
All Pedestrians		40	46.8	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

🚦 Site: Harris Street / Parkes Street PM future

Signals - Actuated Isolated   Cycle Time = 105 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harris Street (s)											
1	L2	45	0.0	0.821	52.0	LOS D	14.4	101.0	0.99	0.84	31.3
2	T1	478	0.0	0.821	47.4	LOS D	14.5	101.5	0.99	0.84	31.9
3	R2	49	0.0	0.821	52.0	LOS D	14.5	101.5	0.99	0.84	31.2
Approach		573	0.0	0.821	48.2	LOS D	14.5	101.5	0.99	0.84	31.8
East: Parkes Street (e)											
4	L2	37	0.0	0.581	32.3	LOS C	18.0	128.4	0.81	0.72	38.5
5	T1	418	2.5	0.581	26.8	LOS B	18.0	128.4	0.81	0.72	41.5
6	R2	274	0.0	0.896	58.1	LOS E	13.3	93.2	1.00	1.02	30.3
Approach		728	1.4	0.896	38.9	LOS C	18.0	128.4	0.88	0.83	36.3
North: Harris Street (n)											
7	L2	95	0.0	1.046	108.1	LOS F	38.9	272.0	1.00	1.31	21.9
8	T1	485	0.0	1.046	103.8	LOS F	38.9	272.0	1.00	1.28	21.3
9	R2	367	0.3	1.046	108.3	LOS F	37.7	264.6	1.00	1.19	21.5
Approach		947	0.1	1.046	106.0	LOS F	38.9	272.0	1.00	1.25	21.4
West: Parkes Street (w)											
10	L2	366	0.0	0.997	74.6	LOS F	28.1	197.2	1.00	1.03	26.8
11	T1	497	2.1	0.997	69.5	LOS E	29.3	208.6	1.00	1.10	27.9
Approach		863	1.2	0.997	71.7	LOS F	29.3	208.6	1.00	1.07	27.4
All Vehicles		3112	0.7	1.046	70.1	LOS E	38.9	272.0	0.97	1.03	27.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	17	24.7	LOS C	0.0	0.0	0.69	0.69
P3	North Full Crossing	11	39.5	LOS D	0.0	0.0	0.87	0.87
P4	West Full Crossing	26	43.9	LOS E	0.1	0.1	0.92	0.92
All Pedestrians		54	37.0	LOS D			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.