PROPOSED RESIDENTIAL DEVELOPMENT

103-105 O'Riordan Street in Mascot

Traffic and Parking Impact Report

Prepared for: Glupane Glupi Pty Ltd

A1112705N (Version 1b)

March 2012

Suite 195, 79-83 Longueville Road, Lane Cove NSW 2066

Telephone: 02 8004 2434 ***Facsimile: 1300 739 523***
sydney@mltraffic.com.au *www.mltraffic.com.au*

ABN 69 981 485 197

1. INTRODUCTION

ML Traffic Engineers was commissioned by Glupane Glupi Pty Ltd to undertake a traffic and parking impact assessment of a proposed residential development at 103-105 O'Riordan Street in Mascot. The site is located on the south western corner of O'Riordan Street with Gardeners Road.

Currently the site is undeveloped land on the northern side and an unoccupied building to the south of the site.

It can be demonstrated that the traffic impacts of the proposed residential development has acceptable impacts on the external road and intersection network.

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

2. BACKGROUND AND EXISTING CONDITIONS

2.1 Location and Land Use

The subject site is located on the south western corner of the signalised intersection of O'Riordan Street with Gardeners Road. Currently the site is occupied by a two storey brick warehouse building with metal roof The property is triangular in shape with a storm water channel forming the western boundary of the property. The site is located within a short walk to Mascot train station.

The nearby landuses are retail, commercial office light industry and residential. The area has a mix of landuse types and is far more disperse than many areas in Sydney.

Figure 1 present an aerial photograph of the site, and the property shape and the surrounding areas. Figure 1 shows the roof tops of the many nearby commercial/light industrial landuses. There are also sport fields nearby as well.

Figure 2 shows the site from the local road network.

Figure 3 shows a photograph of the site looking to the site from the north east of the signalised intersection of O'Riordan Street with Gardeners Road. The greenery is the foreground of the subject site with the two storey warehouse

building to the south. Figure 4 shows the northern end of the site which is unoccupied by buildings.

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

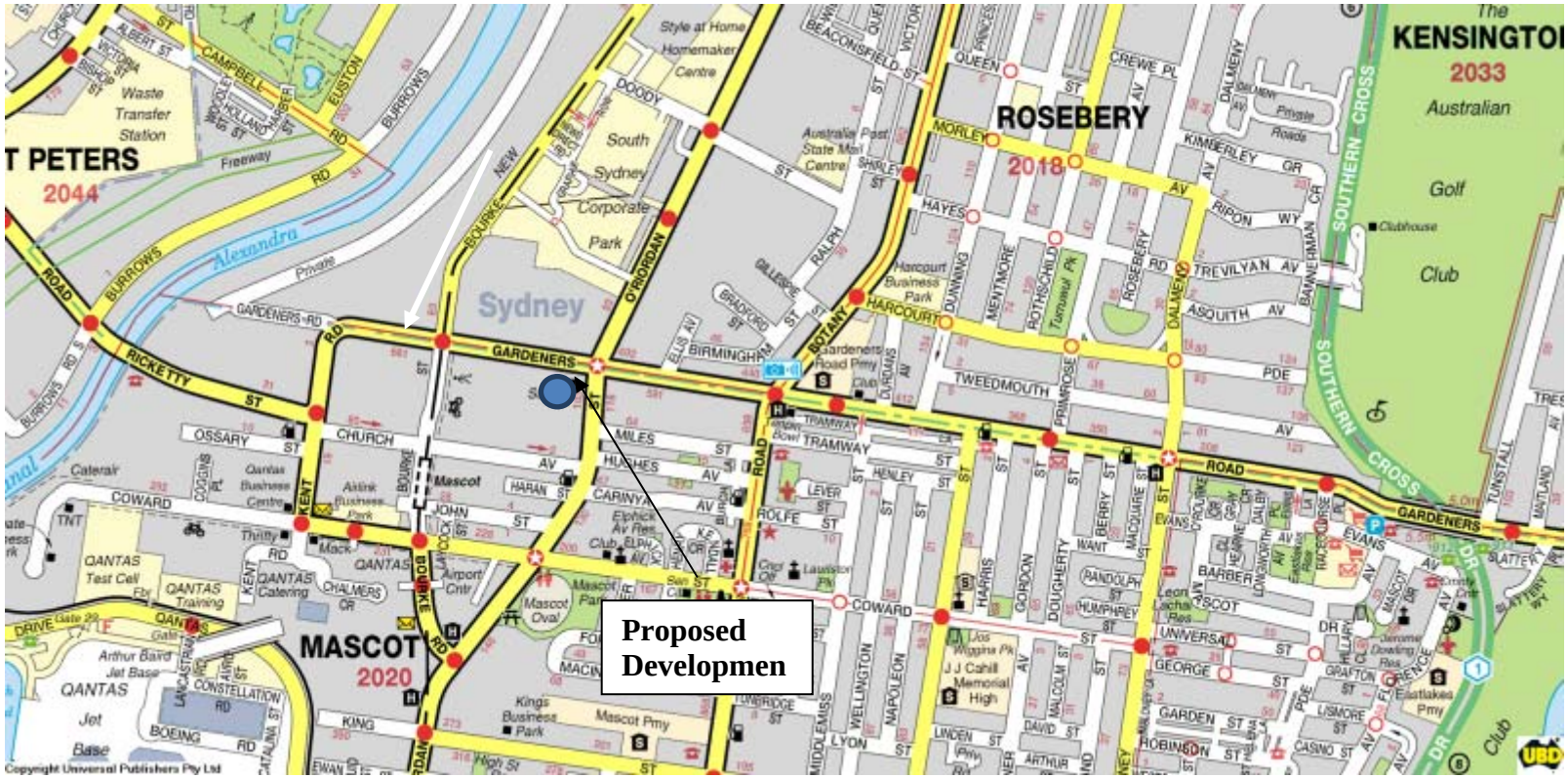

Figure 2: Location of the Subject Site on a Street Map View

Suite 195, 79-83 Longueville Road, Lane Cove NSW 2066

Telephone: 02 8004 2434 ***Facsimile: 1300 739 523***
sydney@mltraffic.com.au *www.mltraffic.com.au*

ABN 69 981 485 197

Figure 3: Location of the Subject Site from the north east of the Adjacent Signalised Intersection

Suite 195, 79-83 Longueville Road, Lane Cove NSW 2066

Telephone: 02 8004 2434 ***Facsimile: 1300 739 523***
sydney@mltraffic.com.au *www.mltraffic.com.au*

ABN 69 981 485 197

Figure 4: Northern end of the subject site

2.2 Road Network

This section describes the roads adjacent to the proposed development. The proposed development is located on the south western corner of the intersection of O'Riordan Street with Gardeners Road. Both roads are considered sub-arterial roads.

O'Riordan Street is two lanes each way at the midblock near the proposed development. The speed limit is 60 km/hr. Figure 5 shows a photograph of O'Riordan Street adjacent to the proposed development.

Gardeners Road is two lanes each way at the midblock near the proposed development. The speed limit is 60 km/hr. Figure 5 shows a photograph of Gardeners Road near the signalised intersection of O'Riordan Street with Gardeners Road.

Figure 5: O'Riordan Street adjacent to the Development Site (on the Left)

Figure 6: Gardeners Street looking towards O'Riordan Street

2.3 Intersection Descriptions

As part of this traffic impact assessment, the immediate signalised intersection of O'Riordan with Gardeners Road has been considered.

Traffic as a result of the development will most likely travel through this intersection for either the inbound or outbound movement. Traffic could also head south along O'Riordan, however the O'Riordan and Gardeners Road intersection is considered to be the most likely frequented due to its proximity to the site.

As traffic disperses, the affect upon the respective intersections and road midblock lessens.

The signalised intersection of O'Riordan with Gardeners Road is a four leg intersection There are short length turning bays at the intersection as follows:

- South arm of O'Riordan St turning right into Gardeners Rd
- East arm of Gardeners Rd turning right into O'Riordan St
- North arm of O'Riordan St turning right into Gardeners Rd

Figure 7 shows the layout of the intersection using SIDRA – an industry standard intersection assessment. The numbers on the lanes represent short lane in metres.

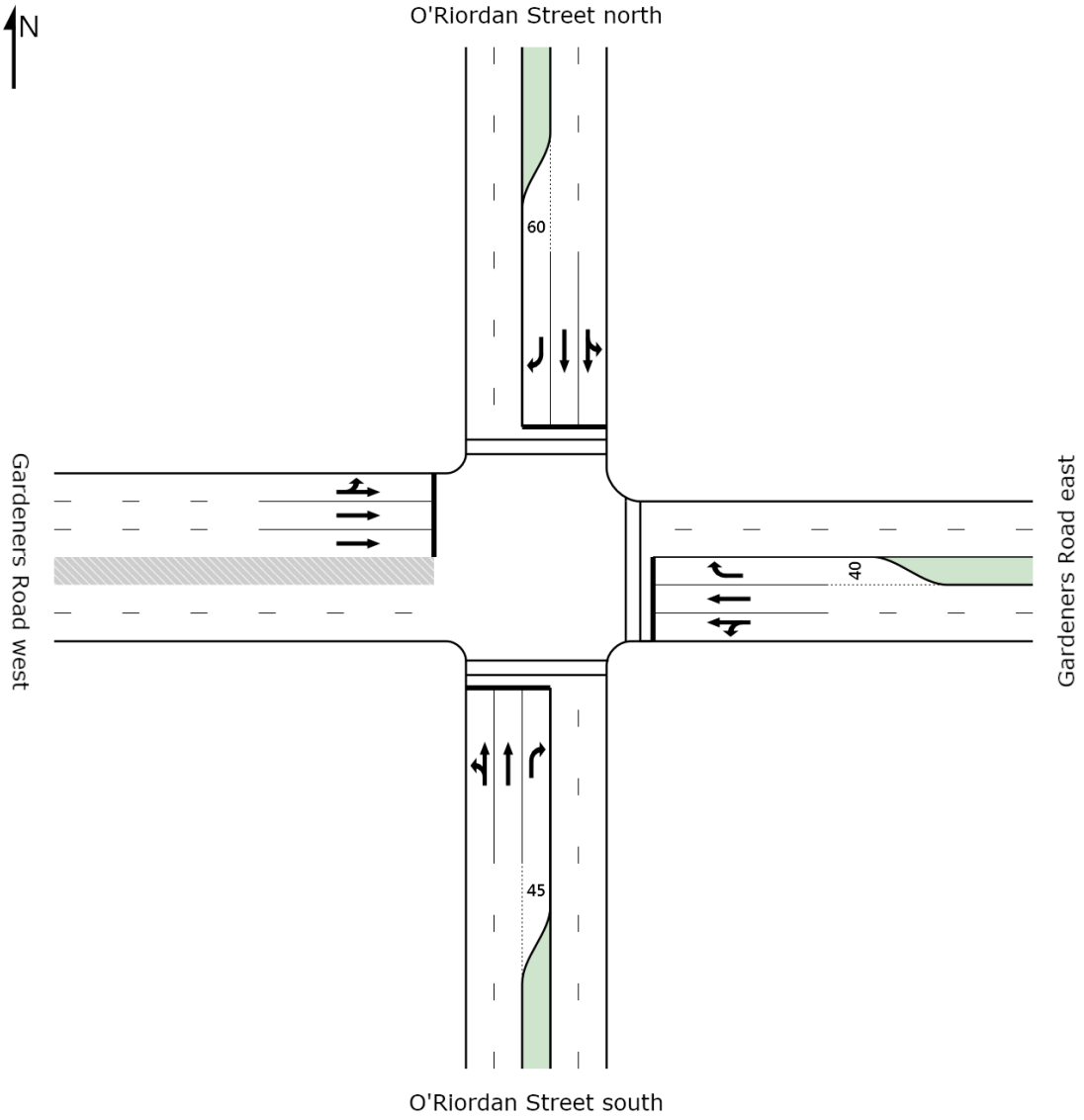

Figure 7: Intersection Layout of O'Riordan Street with Gardeners Road (SIDRA)

2.4 Public Parking Opportunities

There is limited public parking near the proposed development site. On street parking is not permitted on O'Riordan Street or Gardeners Road within a reasonable distance of the proposed development. The nearest on street parking is on Church Avenue –which is approximately 200 metres away to the nearest car space.

Other on street parking areas are on the branch roads running off O'Riordan Street (such as Miles Street) but they are not convenient to walk to (needing to cross a busy road).

The parking demand of the proposed development will need to be contained on site.

2.5 Traffic Volumes

Traffic volumes were collected as part of this project for the weekday AM (7am to 9am) and PM commuter period (5pm to 7pm).

The peak hours were 7:45am-8:45am, and 5:00pm to 6pm for the weekday AM and PM peak hour respectively. Figures 8 and 9 present the weekday AM and PM peak hour traffic volumes respectively.

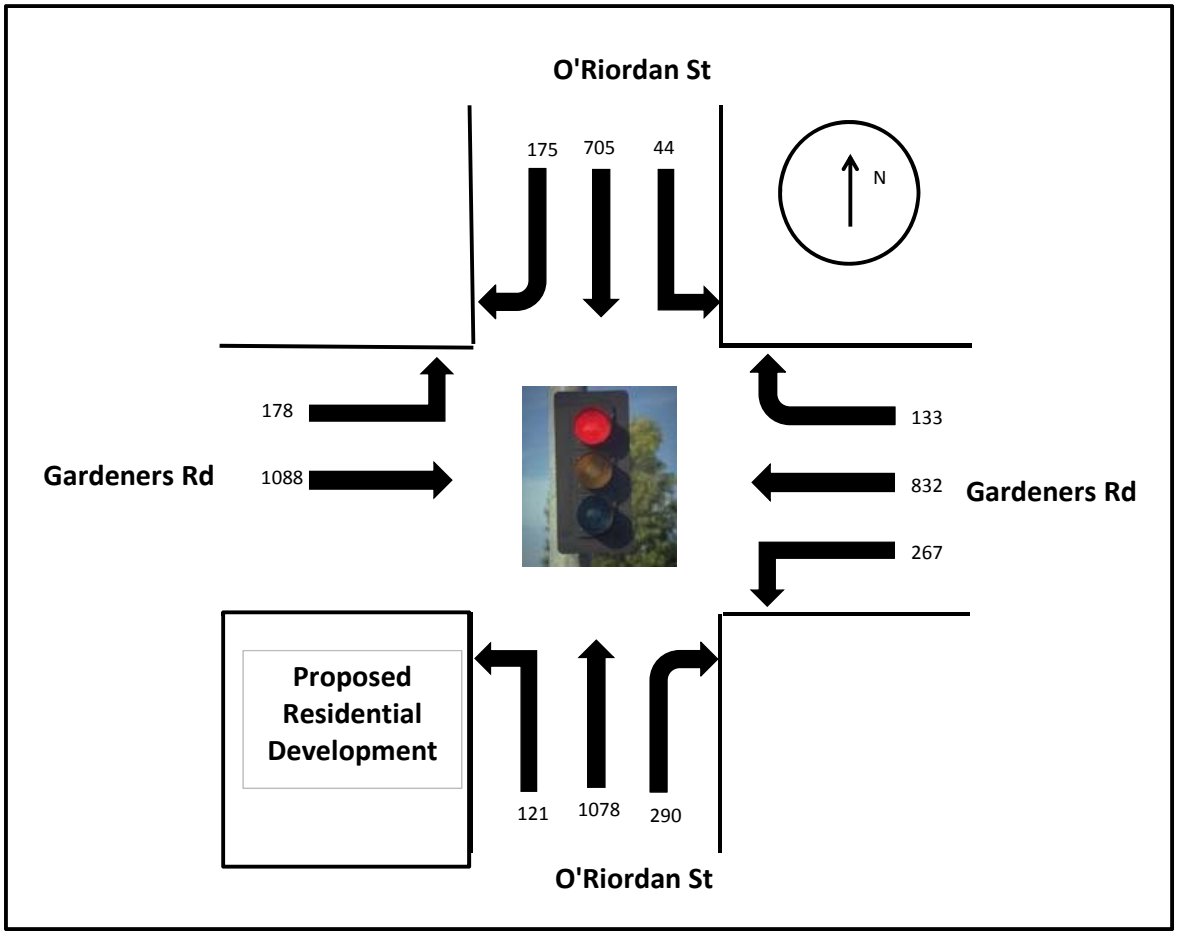

Figure 8: Weekday AM Peak Hour Traffic Volumes

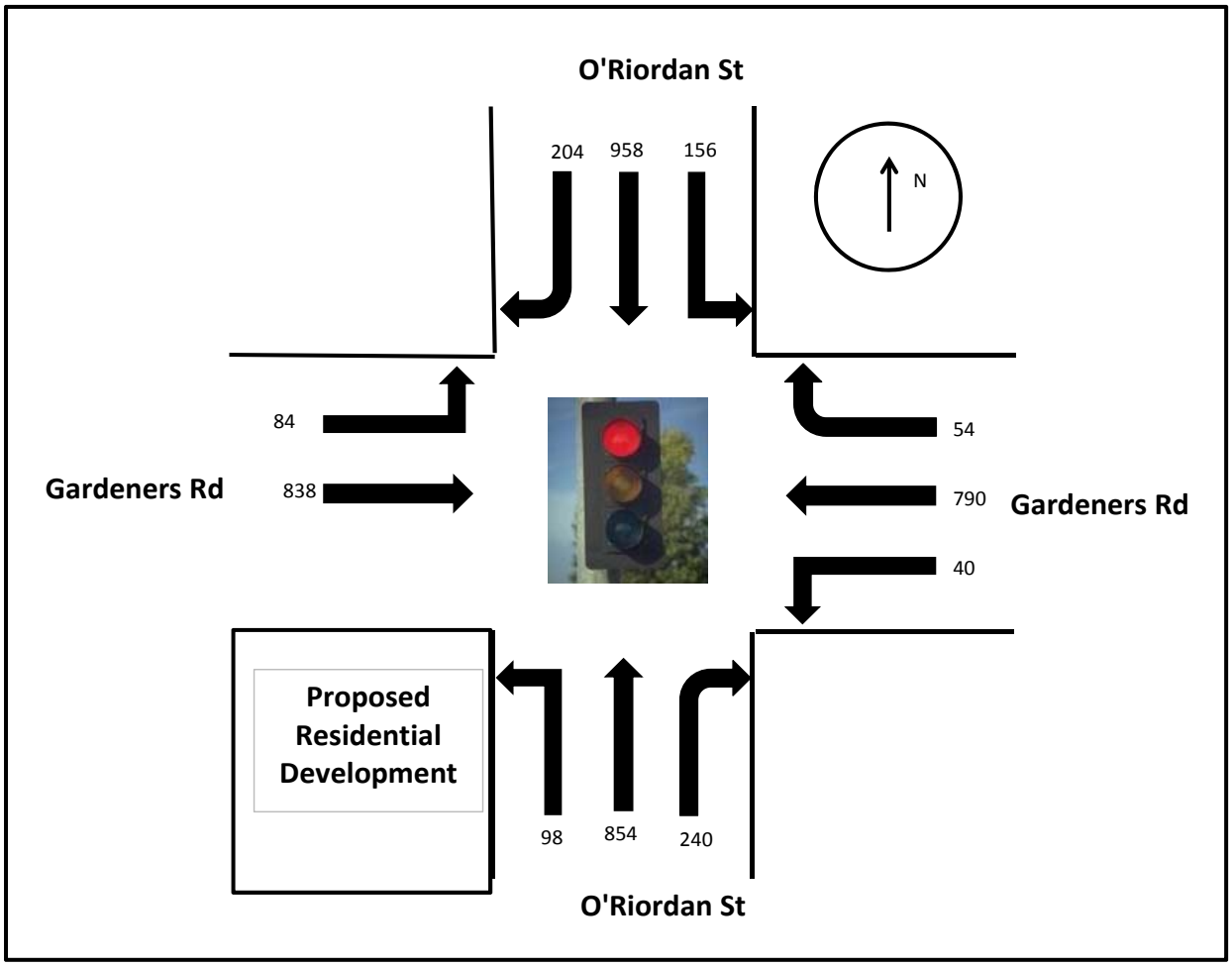

Figure 9: Weekday PM Peak Hour Traffic Volumes

2.6 Intersection Assessment

As part of this traffic impact assessment, the signalised intersection of Gardeners Road with O'Riordan Street was assessed.

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

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

Table 1: Intersection Level of Service

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

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

Table 2: Intersection Average Delay (AVD)

The degree of saturation (DS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt

to keep DS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9 queues can be anticipated.

The results of the intersection assessment based on the current traffic conditions are as follows:

Weekday AM Peak Hour

- The intersection has a LoS F for the PM peak hour.
- There is spare but limited capacity at this intersection to accommodate additional vehicle traffic

Weekday PM Peak Hour

- The intersection has a LoS C for the PM peak hour.
- There is spare capacity at this intersection to accommodate additional vehicle traffic

The full details of SIDRA results are presented in Appendix A.

An assessment of the post development including the approved development at 12-14 Church Avenue and 619-629 Gardeners Road is contained in Section 5 of this report.

2.7 Public Transport

The proposed development is within an approximate six minutes walking distance of Mascot train station. Bus route 357 runs on Gardeners Road and O'Riordan Street. Bus route 357 travels from Sydenham Station to Bondi Junction interchange via Eastlakes, Kingsford and Randwick Junction.

The site has excellent access to public transport.

2.8 Conclusions

An assessment of the existing conditions showed the following:

- There is spare but limited capacity for additional trips at the adjacent intersection of O'Riordan Street with Gardeners Road.
- There is no convenient public on street car spaces nearby.
- The proposed development has excellent access to public transport.

3. PROPOSED RESIDENTIAL DEVELOPMENT

The proposed development is a residential development with the following details:

Apartments

- Eighteen studio apartments
- Seven 1 bedroom apartments
- Twenty five 2 bedroom apartments
- A total of 50 apartments

Carpark

- A three level basement carpark accessed via O'Riordan Street
- 86 residential car spaces of which three are disabled car spaces
- 8 visitor car spaces of which one is disabled
- 2 wash bays which can also be used as visitor car spaces

Service Vehicle

- A service vehicle parking area will be provided on site near the ramp area and the main pedestrian entrance from O'Riordan Street
- The driver of the service vehicle will turn left in to the site and leave the site in a forward motion
- The service vehicle has been designed for a medium rigid truck

Full scale drawings of the proposed development are provided as part of the Development Application package and hence reference should be made to these drawings.

3.1 Vehicle Access and Egress to the Carpark

The vehicle entrance to the carpark should be located furthest away from the intersection of O'Riordan Street with Gardeners Road. This will reduce potential impacts of queuing on O'Riordan Street on drivers entering or leaving the carpark.

4. PARKING ASSESSMENT

4.1 Car Parking Considerations using Botany Bay Council's Development Control Plan Rates

The car parking requirements for the residential development as set out in Botany Bay Council's Mascot Station Precinct Development Control Plan on Off Street Parking is as follows:

- One car space per one bedroom or studio apartment
- Two car spaces per large apartments
- Visitor parking a one car space per seven dwellings
- Minimum of two car wash bays

The parking requirements are set out in Table 3. The total car parking requirement is for 94 car spaces of which 86 car spaces are residential. The visitor parking is 8 car spaces rounded upwards.

The proposed development proposes 96 car spaces (including four disabled parking spaces) of which two car wash bays are also visitor car spaces.

The proposed development complies with Council's parking requirements.

Apartments	Number	Car parking requirement per unit	Car spaces
Studio	18	1	18
One Bedroom	7	1	7
Two bedroom	25	2	50
Visitor		0.14	7
Car wash bay		2	2
Total	50		84

Table 3: Car parking Requirements as set by Botany Bay Council

4.2 Adequacy of the Car Parking Provision

The proposed development complies with Council's parking requirements for the residential tenants and residential visitors. Ninety four car spaces have been provided within the basement carpark and is in excess of Council's parking requirements.

The proposed development provides for ten bicycle storage spaces.

In addition the proposed development is located within a six minute walk of Mascot train station and there are bus services on O'Riordan Street and Gardeners Road.

4.3 Disabled Car Parking

The parking requirements for persons with disabilities is set out in Building Code of Australia which recommends one percent of the parking supply should be allocated to disabled parking. Four disabled parking spaces are provided and hence the disabled parking provision is acceptable.

4.4 Service Vehicles

A service vehicle bay is provided on site near the ramp area and is designed for a medium rigid truck (8.8 metres long as set out in AS2890.2.). This service bay will be available for residents, couriers and other purposes.

5. VEHICLE TRAFFIC IMPACT CONSIDERATIONS

5.1 Background Traffic Growth

Council has approved a mixed use development (retail and residential apartments) at 12-14 Church Avenue and 619-629 Gardeners Road. The details of Gardeners Road/Church Avenue Development are as follows

- 297 residential units
- 1,618m^2 in local showroom floorspace
- Vehicle access is from Gardeners Road via a left-in-left out arrangement
- The estimated generated trips are 167 vehicles in the AM peak hour with 127 outbound and 40 inbound
- The estimated generated trips are 167 vehicles in the PM peak hour with 40 outbound and 127 inbound

The traffic from the Gardeners Road development will be included in the traffic assessment to determine the cumulative impact of the proposed development.

5.2 Traffic Generation of the Proposed Development

The RTA Guide to Trip Generating Developments publishes peak hour trip rates for the proposed development for residential apartments for high density for residential apartments in a metropolitan sub regional centre (with good public transport access):

- 0.29 trips per peak hour

Table 4 presents the estimated *development* trips. It is estimated that the proposed development will generate 15 vehicle trips in the weekday commuter peak hour. The proposed development is a modest trip generator.

Apartments	Number	Trip rates per unit	Trips
Studio	18	0.29	5
One Bedroom	7		2
Two bedroom	25		7
		Total	14

Table 4: Estimated Weekday Peak Hour Trips Generated by Proposed Development

Table 5 presents the inbound and outbound trips to be distributed to the external road network (with rounding to 15 trips in the peak hour).

Weekday	Origin	Destination	Total
AM Peak Hour	13	2	15
PM peak Hour	2	13	15

Table 6: Estimated Additional Inbound and Outbound Trips

5.3 Traffic Volumes

Figures 10 and 11 present the existing and the development traffic volumes for the weekday AM and PM peak hours. The additional development traffic is in red and bold. The trips from Gardeners Road development (retail and residential apartments) at 12-14 Church Avenue and 619-629 Gardeners Road are in blue. The traffic distribution from 12-14 Church Avenue and 619-629 Gardeners Road is the same distribution used in the submitted Traffic Impact Assessment.

The additional development traffic (subject to this report) is very low compared to the existing traffic volumes.

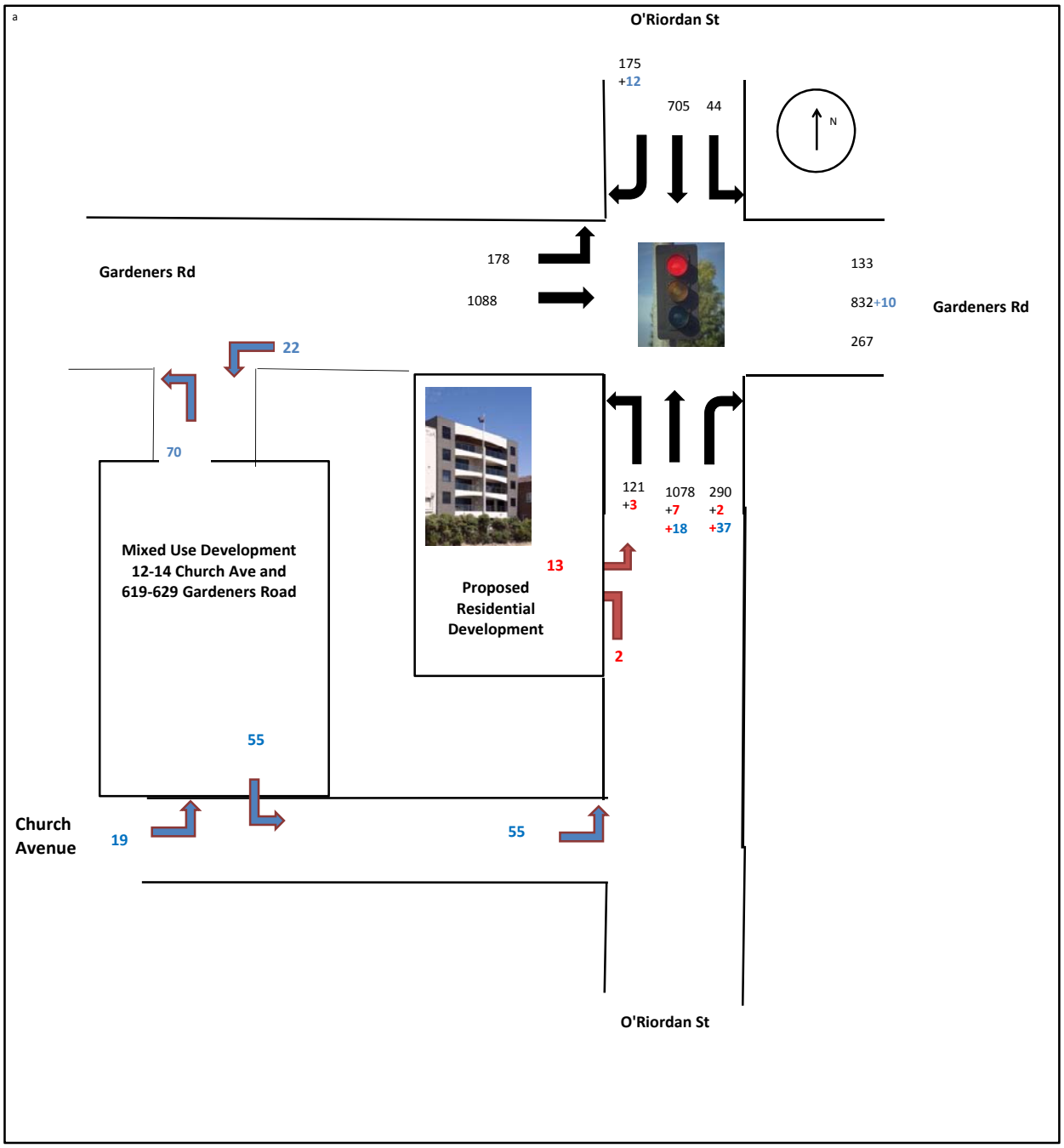

Figure 10: Weekday AM Peak Hour with additional Development Traffic in Bold and Red and Background Traffic in Blue

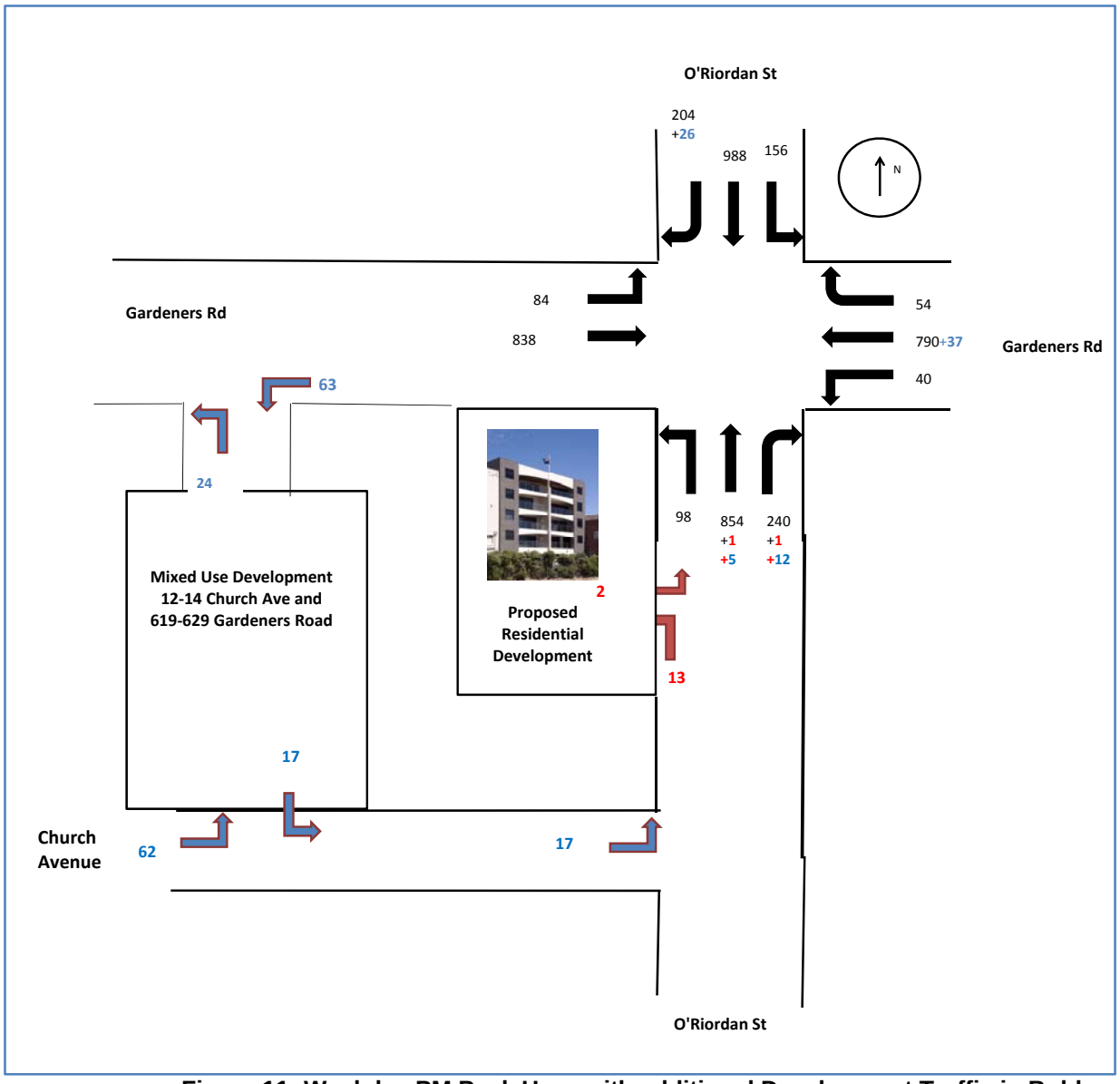

Figure 11: Weekday PM Peak Hour with additional Development Traffic in Bold and Background Traffic in Blue

5.4 Intersection Assessment

As part of this traffic impact assessment the nearby intersection of O'Riordan Street with Gardeners Street has been assessed with the existing and development traffic for the following forecast scenarios:

- Existing conditions with the Gardeners Road and Church Avenue Development (background traffic growth)

- Existing conditions with the Gardeners Road and Church Avenue Development (background traffic growth) with the proposed development

Existing conditions with the Gardeners Road and Church Avenue Development

The results of the intersection assessment are as follows:

- The intersection has the same Level of Service with the Gardeners Road and Church Avenue development traffic as per the existing condition for both peak hours.

The full details of SIDRA results are presented in Appendix B.

Existing conditions with Development and Gardeners Road Development Traffic

The results of the intersection assessment are as follows:

- The additional development trips has a marginal effect on the intersection performance as a consequence that the additional trips are low when compared to the scenario of the existing conditions with the Gardeners Road and Church Avenue development

The full details of SIDRA results are presented in Appendix C.

Table 7 summarises the intersection performance of Gardeners Road with O'Riordan Street for all scenarios as discussed above. The following comments are made with respect to the AM peak hour:

- In the weekday AM peak hour this intersection is at or near saturation for certain turn movements. The traffic conditions are unsettled because there are significant delays for certain turn movements and not all of the existing traffic is able to travel through the peak hour assess (the queuing extending beyond the peak hour)
- In the two non-existing scenarios (existing with Gardeners Road and Church Avenue, and existing with Gardeners Road and Church Avenue and development traffic) there is increased traffic added to the intersection.
    - The Gardeners Road/Church adds 77 trips in the AM peak hour
    - The proposed development adds a further 13 trips in the AM peak hour

- The intersection software (SIDRA) redistributes the phase time out of a fixed cycle time (in this case 150 seconds) as shown in Table 8 for the two non-existing scenarios.
- As a consequence the overall LoS for the two non-existing scenarios slightly improves and hence has 'improved" LoS despite the fact that the intersection is saturated (with very little spare capacity).
- The Sidra program is trying to optimise the number of vehicles able to travel through the intersection. Existing turn movements with a poor Los. The additional trips are added with the SIDRA program able to process the trips on turn movements which are able to travel through the intersection in the assessed hour. Existing turn movements, such as the right turn from O'Riordan Street south, cannot process additional trips within the hour being assessed. Hence the Sidra re-allocates the phase time (seen in Table 8)and leads to change in Level of Service without addressing that some turn movements are not able to handle the traffic making this movement.
- The intersection assessment for the weekday AM peak hour using SIDRA of the sensitivity of the model in traffic conditions at close or at saturation.

	Existing	Existing with Gardeners Road & Church Avenue Development	Existing with Gardeners Road & Church Avenue Development and Proposed Development
Overall LoS			
AM Peak Hour	F	E	E
PM Peak Hour	C	C	C
Degree of Saturation			
AM Peak Hour	1.205	1.205	1.205
PM Peak Hour	0.85	0.86	0.86
Average Delay			
AM Peak Hour	73.9	67.9	68.8
PM Peak Hour	38.5	39.5	39.5

Table 7: Summary of the Intersection Assessment of Gardeners Road with O'Riordan Street

Weekday AM	A	B	C	D	Total
Existing	44	38	47	21	150
Existing with Gardeners Rd & Church Ave Development	44	40	48	18	150
Existing with Gardeners Rd & Church Ave Development and Proposed Development	43	39	48	20	150

Table 8: Summary of the Phase Cycle Times for the Intersection Assessment of Gardeners Road with O'Riordan Street in the Weekday AM peak Hour

6. CONCLUSIONS

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

- The proposed development complies with Councils parking requirements for resident parking and visitors
- The proposed development will generate additional but moderate level of trips in the weekday AM and PM peak hour.
- The additional development trips will be accommodated at the nearby intersections without significantly affecting intersection performance or increasing delays and queues.
- The proposed development has excellent access to public transport

- On this basis of this assessment, there are no traffic engineering reasons which would affect the issue of a development consent for the proposed residential use development at 103-105 O'Riordan Street in Mascot.

APPENDIX A

SIDRA Intersection Results for Existing Traffic Conditions

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	121	0.0	0.676	37.5	LOS C	35.7	249.6	0.81	0.92	30.7
2	T	1202	0.0	0.676	29.3	LOS C	35.7	249.6	0.81	0.74	31.5
3	R	166	0.0	1.000 [3]	67.1	LOS E	10.5	73.4	0.98	0.81	21.1
Approach		1489	0.0	1.000	34.2	LOS C	35.7	249.6	0.83	0.76	29.8
East: Gardeners Road east											
4	L	267	0.0	0.683	40.1	LOS C	28.1	196.7	0.76	0.88	29.1
5	T	836	0.0	0.683	33.0	LOS C	28.6	199.9	0.77	0.69	30.0
6	R	129	0.0	1.000 [3]	80.6	LOS F	9.3	65.3	1.00	0.79	18.7
Approach		1232	0.0	1.000	39.5	LOS C	28.6	199.9	0.79	0.74	28.0
North: O'Riordan Street north											
7	L	44	0.0	0.876	98.6	LOS F	37.6	263.0	1.00	1.05	16.6
8	T	816	0.0	0.876	78.5	LOS F	37.6	263.0	1.00	1.02	18.3
9	R	64	0.0	1.205	464.9	LOS F	14.0	97.9	1.00	1.53	4.4
Approach		924	0.0	1.205	106.0	LOS F	37.6	263.0	1.00	1.05	14.9
West: Gardeners Road west											
10	L	178	0.0	0.351	55.0	LOS D	9.4	66.0	0.77	0.79	23.8
11	T	1088	0.0	1.021	142.8	LOS F	64.0	447.7	1.00	1.44	11.9
Approach		1266	0.0	1.021	130.4	LOS F	64.0	447.7	0.97	1.35	12.8
All Vehicles		4911	0.0	1.205	73.9	LOS F	64.0	447.7	0.89	0.96	19.3

Table A1: Intersection Performance of O'Riordan Street with Gardeners Road for the AM Peak Hour Existing Conditions

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	98	0.0	0.722	39.6	LOS C	20.4	142.6	0.94	0.89	30.0
2	T	854	0.0	0.722	31.3	LOS C	20.6	143.9	0.94	0.82	30.5
3	R	240	0.0	0.851	54.1	LOS D	11.0	77.3	1.00	0.98	24.1
Approach		1192	0.0	0.851	36.6	LOS C	20.6	143.9	0.95	0.86	28.9
East: Gardeners Road east											
4	L	40	0.0	0.560	33.8	LOS C	15.8	110.6	0.83	0.90	32.6
5	T	790	0.0	0.560	25.9	LOS B	15.9	111.5	0.84	0.73	33.3
6	R	54	0.0	0.485	60.8	LOS E	2.7	19.2	1.00	0.74	22.4
Approach		884	0.0	0.560	28.4	LOS B	15.9	111.5	0.85	0.74	32.3
North: O'Riordan Street north											
7	L	156	0.0	0.837	53.6	LOS D	27.2	190.2	0.99	1.05	25.0
8	T	958	0.0	0.837	41.4	LOS C	27.7	193.6	0.99	1.00	26.7
9	R	204	0.0	0.660	48.3	LOS D	9.3	65.3	0.99	0.93	25.8
Approach		1318	0.0	0.837	43.9	LOS D	27.7	193.6	0.99	0.99	26.3
West: Gardeners Road west											
10	L	84	0.0	0.174	39.2	LOS C	3.2	22.3	0.81	0.76	28.8
11	T	838	0.0	0.826	43.2	LOS D	21.3	148.9	1.00	0.97	26.3
Approach		922	0.0	0.826	42.8	LOS D	21.3	148.9	0.98	0.95	26.5
All Vehicles		4316	0.0	0.851	38.5	LOS C	27.7	193.6	0.95	0.90	28.1

Table A2: Intersection Performance of O'Riordan Street with Gardeners Road for the PM Peak Hour Existing Conditions

APPENDIX B

SIDRA Intersection Results for Existing Conditions with Background Traffic Growth (Gardeners Road and Church Avenue Development)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	121	0.0	0.685	36.5	LOS C	36.9	258.0	0.81	0.92	31.1
2	T	1254	0.0	0.685	28.3	LOS B	36.9	258.0	0.81	0.74	31.9
3	R	169	0.0	1.000 [3]	66.1	LOS E	10.5	73.4	0.98	0.81	21.3
Approach		1544	0.0	1.000	33.1	LOS C	36.9	258.0	0.83	0.76	30.2
East: Gardeners Road east											
4	L	267	0.0	0.715	42.4	LOS C	30.0	209.8	0.80	0.88	28.3
5	T	850	0.0	0.715	35.3	LOS C	30.4	212.5	0.81	0.72	29.0
6	R	125	0.0	1.000 [3]	84.5	LOS F	9.3	65.3	1.00	0.79	18.1
Approach		1242	0.0	1.000	41.8	LOS C	30.4	212.5	0.82	0.76	27.2
North: O'Riordan Street north											
7	L	44	0.0	0.889	102.5	LOS F	39.9	279.2	1.00	1.07	16.1
8	T	828	0.0	0.889	81.6	LOS F	39.9	279.2	1.00	1.04	17.8
9	R	64	0.0	1.205	464.9	LOS F	14.0	97.9	1.00	1.53	4.4
Approach		936	0.0	1.205	108.6	LOS F	39.9	279.2	1.00	1.07	14.7
West: Gardeners Road west											
10	L	178	0.0	0.342	54.1	LOS D	9.3	65.0	0.76	0.79	24.1
11	T	1088	0.0	0.996	114.2	LOS F	57.5	402.2	1.00	1.31	14.2
Approach		1266	0.0	0.996	105.8	LOS F	57.5	402.2	0.97	1.23	15.0
All Vehicles		4988	0.0	1.205	67.9	LOS E	57.5	402.2	0.89	0.94	20.4

Table B1: Intersection Performance of O'Riordan Street with Gardeners Road for the AM Peak Hour Existing Conditions with Background Traffic Growth

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	98	0.0	0.725	39.7	LOS C	20.6	143.9	0.94	0.89	29.9
2	T	859	0.0	0.725	31.5	LOS C	20.7	145.2	0.94	0.83	30.5
3	R	252	0.0	0.838	53.4	LOS D	11.5	80.3	1.00	0.99	24.3
Approach		1209	0.0	0.838	36.7	LOS C	20.7	145.2	0.95	0.87	28.9
East: Gardeners Road east											
4	L	40	0.0	0.601	35.0	LOS C	17.0	119.1	0.86	0.90	32.1
5	T	827	0.0	0.601	27.2	LOS B	17.1	120.0	0.86	0.75	32.7
6	R	54	0.0	0.485	60.8	LOS E	2.7	19.2	1.00	0.74	22.4
Approach		921	0.0	0.601	29.5	LOS C	17.1	120.0	0.87	0.76	31.8
North: O'Riordan Street north											
7	L	156	0.0	0.837	53.6	LOS D	27.2	190.2	0.99	1.05	25.0
8	T	958	0.0	0.837	41.4	LOS C	27.7	193.6	0.99	1.00	26.7
9	R	230	0.0	0.704	49.6	LOS D	10.6	74.1	0.99	0.98	25.4
Approach		1344	0.0	0.837	44.2	LOS D	27.7	193.6	0.99	1.00	26.2
West: Gardeners Road west											
10	L	84	0.0	0.181	40.0	LOS C	3.2	22.6	0.82	0.77	28.5
11	T	838	0.0	0.859	47.1	LOS D	22.4	156.7	1.00	1.02	25.1
Approach		922	0.0	0.859	46.4	LOS D	22.4	156.7	0.98	0.99	25.4
All Vehicles		4396	0.0	0.859	39.5	LOS C	27.7	193.6	0.95	0.91	27.8

Table B2: Intersection Performance of O'Riordan Street with Gardeners Road for the PM Peak Hour Existing Conditions with Background Traffic Growth

APPENDIX C

SIDRA Intersection Results for Existing Conditions with Development Traffic and Gardeners Road/Church Avenue Development Traffic

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	124	0.0	0.710	38.3	LOS C	38.5	269.4	0.83	0.92	30.4
2	T	1265	0.0	0.710	30.1	LOS C	38.5	269.4	0.83	0.76	31.1
3	R	167	0.0	1.000 [3]	66.6	LOS E	10.5	73.4	0.98	0.81	21.2
Approach		1556	0.0	1.000	34.7	LOS C	38.5	269.4	0.85	0.78	29.5
East: Gardeners Road east											
4	L	267	0.0	0.690	40.3	LOS C	28.6	200.2	0.77	0.88	29.1
5	T	847	0.0	0.690	33.2	LOS C	29.1	203.4	0.78	0.69	29.9
6	R	128	0.0	1.000 [3]	81.8	LOS F	9.3	65.3	1.00	0.79	18.5
Approach		1242	0.0	1.000	39.7	LOS C	29.1	203.4	0.80	0.74	28.0
North: O'Riordan Street north											
7	L	44	0.0	0.913	108.3	LOS F	41.0	287.3	1.00	1.12	15.5
8	T	828	0.0	0.913	87.6	LOS F	41.0	287.3	1.00	1.08	17.0
9	R	64	0.0	1.205	464.9	LOS F	14.0	97.9	1.00	1.53	4.4
Approach		936	0.0	1.205	114.3	LOS F	41.0	287.3	1.00	1.12	14.1
West: Gardeners Road west											
10	L	178	0.0	0.342	54.1	LOS D	9.3	65.0	0.76	0.79	24.1
11	T	1088	0.0	0.996	114.2	LOS F	57.5	402.2	1.00	1.31	14.2
Approach		1266	0.0	0.996	105.8	LOS F	57.5	402.2	0.97	1.23	15.0
All Vehicles		5000	0.0	1.205	68.8	LOS E	57.5	402.2	0.89	0.95	20.2

Table C1: Intersection Performance of O'Riordan Street with Gardeners Road for the AM Peak Hour Existing Conditions with Development and Gardeners Road Development Traffic

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: O'Riordan Street south											
1	L	98	0.0	0.726	39.7	LOS C	20.6	144.2	0.94	0.89	29.9
2	T	860	0.0	0.726	31.5	LOS C	20.8	145.5	0.94	0.83	30.5
3	R	253	0.0	0.842	53.5	LOS D	11.5	80.6	1.00	0.99	24.3
Approach		1211	0.0	0.842	36.8	LOS C	20.8	145.5	0.95	0.87	28.9
East: Gardeners Road east											
4	L	40	0.0	0.601	35.0	LOS C	17.0	119.1	0.86	0.90	32.1
5	T	827	0.0	0.601	27.2	LOS B	17.1	120.0	0.86	0.75	32.7
6	R	54	0.0	0.485	60.8	LOS E	2.7	19.2	1.00	0.74	22.4
Approach		921	0.0	0.601	29.5	LOS C	17.1	120.0	0.87	0.76	31.8
North: O'Riordan Street north											
7	L	156	0.0	0.837	53.6	LOS D	27.2	190.2	0.99	1.05	25.0
8	T	958	0.0	0.837	41.4	LOS C	27.7	193.6	0.99	1.00	26.7
9	R	230	0.0	0.704	49.7	LOS D	10.6	74.2	0.99	0.98	25.4
Approach		1344	0.0	0.837	44.2	LOS D	27.7	193.6	0.99	1.00	26.2
West: Gardeners Road west											
10	L	84	0.0	0.181	40.0	LOS C	3.2	22.6	0.82	0.77	28.5
11	T	838	0.0	0.859	47.1	LOS D	22.4	156.7	1.00	1.02	25.1
Approach		922	0.0	0.859	46.4	LOS D	22.4	156.7	0.98	0.99	25.4
All Vehicles		4398	0.0	0.859	39.5	LOS C	27.7	193.6	0.95	0.91	27.8

Table C2: Intersection Performance of O'Riordan Street with Gardeners Road for the PM Peak Hour Existing Conditions with Development and Gardeners Road Development Traffic