Delbest Pty Ltd

"Life City Wollongong"

Traffic and Transport Assessment

February 2013

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1. Introduction

1.1 Overview

This report has been prepared by GHD Pty Ltd (GHD) on behalf of Delbest Pty Ltd to accompany a Part 3A concept application for the development of the Hi Tech Holistic Cancer and Medical Facility "Life City Wollongong".

Life City Wollongong (Life City) is to be situated on Nolan Street, Berkeley, NSW. As shown below in Figure 1.

Planning for future development is guided by a number of policy documents, of which include:

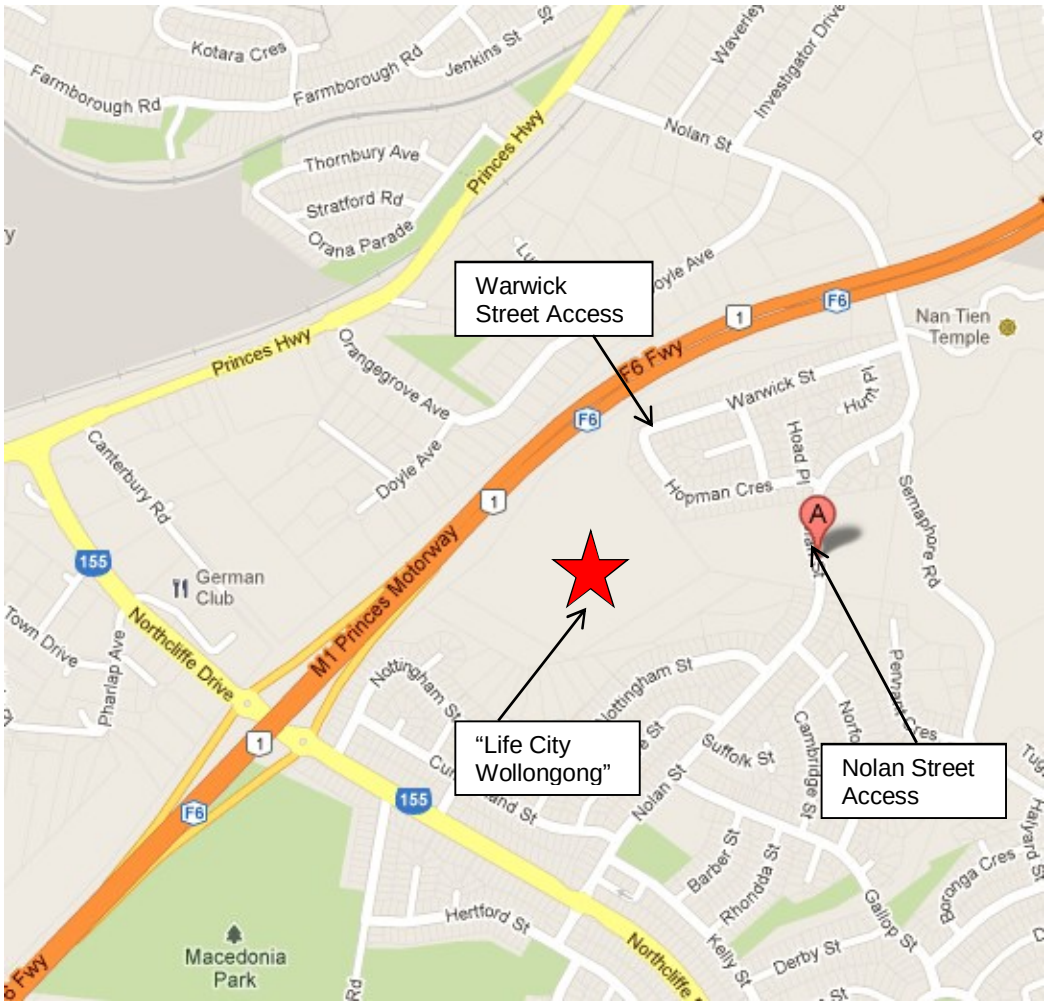
- The *Metropolitan Plan – Connecting the City for Cities;*
- NSW State Plan;
- NSW Planning Guidelines for Walking and Cycling;
- Integrated Land Use and Transport Policy;
- NSW Bike Plan; and
- RMS *Guide to Traffic Generating Developments, 2002 ("The Guide")*

This Traffic Impact Assessment has been prepared taking into consideration the policy documents where applicable.

The report discusses the following:

- Existing Conditions – a review of existing road features, adjacent developments, traffic volumes, pedestrian facilities, sight distances and crash data;
- Proposed Development– a review of additional traffic generated from the proposed facility, proposed access/egress arrangements and parking facilities; and
- Development Impact– assessment of sightline distances and the performance of the existing intersections (queues, delays, level of service, safety).

Figure 1 – Site Location



Source: Google Maps, 2012

1.2 Study Scope

This report has been prepared by GHD for TCG Planning and Delbest Pty Ltd and may only be used and relied on by TCG Planning and Delbest Pty Ltd for the purpose agreed as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than TCG Planning and Delbest Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in Section 1.3 of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by TCG Planning and others who provided information to GHD (including Government authorities)], which GHD has not

independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.3 Assumptions

This report has been based on the following assumptions:

- Data collection has been limited to traffic volumes surveys at key intersections; trip generation surveys of similar developments have not been undertaken.
- Some of the land uses are not addressed in the RMS Guide, for these, the traffic generation and assumptions used are those provided in the Traffic Impact Assessment undertaken by Bruce Conneeley of Traffic Impact Service Pty Ltd for the Preliminary Environmental Assessment.
- Traffic growth assumptions have been provided by Wollongong City Council in the form of model outputs from the Wollongong Shoalhaven (WOLSH) Strategic Traffic Model.
- Staging and Configurations of each stage are based on those provided in the Traffic Impact Assessment undertaken by Bruce Conneeley of Traffic Impact Service Pty Ltd for the Preliminary Environmental Assessment and the plans provided by Boss Design dated September 2012, received by GHD on 7 November 2012.

2. Existing Conditions

This section outlines the existing conditions around the Life City site including traffic conditions on Nolan Street, Warwick Street, Northcliffe Drive and the Princes Highway. This includes the profile of the development, the existing transport and accessibility conditions and the existing road network performance.

2.1 Existing Road Network Characteristics

The classification of roads on the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry. The Roads and Maritime Services (RMS) have developed a set of road hierarchy classifications detailed in Table 1 indicating typical nominal volumes expressed in terms of average annual daily traffic (AADT) serviced by various classes of roads.

Table 1 Functional Classification of Roads

Type of Road	Traffic Volume (vpd*)	Peak Hour Volume (vph**)
Arterial Road	>20,000	>2,000
Sub-Arterial Road	10,000 – 20,000	1,000 – 2,000
Collector Road	2,000 – 10,000	200 – 1,000
Local Road	<2,000	0 – 200

Note: * vpd – vehicles per day

** vph – vehicles per hour

2.1.1 Nolan Street

Nolan Street performs the function of a collector road in Berkeley and has the following key features:

- The posted speed limit is 50 km/h, there is a 40 km/h school zone located on the southern end of Nolan Street; and
- The carriageway is sealed, with one lane marked in each direction.

Photo 1 - Nolan Street north of Warwick Street.

2.1.2 Warwick Street

Warwick Street performs the function of a local road in Berkeley and has the following key features:

- The posted speed limit is 50 km/h; and
- The carriageway is sealed approximately 10 metres wide with no road marking.

Photo 2 - Warwick Street looking west with the proposed development to be accessed at the western end of Warwick Street.

2.1.3 Northcliffe Drive

Northcliffe Drive performs the function of a sub-arterial road in Berkeley and has the following key features:

- The posted speed limit is 70 km/h; and

- The carriageway is sealed, median divided with two lanes in each direction.

Photo 3 - Northcliffe Drive looking east to the east of the Southern Freeway south bound on and off ramps.

2.1.4 Princes Highway

Princes Highway performs the function of a sub-arterial road in Berkeley and has the following key features:

- The posted speed limit is 70 km/h in the vicinity of Nolan Street; and
- The carriageway is sealed, with two marked lanes in each direction.

Photo 4 - The Princes Highway looking south to the south of Nolan Street

2.2 Existing Traffic Volumes

This section provides an understanding of current traffic volumes.

2.2.1 Existing Daily and Peak Hour Traffic

Intersection turning movement surveys were undertaken during the peak AM and PM at the following intersections on Tuesday the 9th October 2012 between 7–9 am and 4–6 pm:

- Warwick Street / Nolan Street (stop sign);
- Nolan Street / Northcliffe Drive (roundabout);
- Northcliffe Drive / Southern Freeway, Southbound on and off ramps (roundabout);
- Northcliffe Drive / Southern Freeway, Northbound on and off ramps (roundabout);
- Northcliffe Drive / Princes Highway (signalised); and
- Nolan Street / Princess Highway (signalised).

A copy of the traffic count data is provided in the Appendix A.

Maximum peak hour and estimated daily traffic volumes are summarised in Table 2 Existing Traffic Volumes – October 2012.

Table 2 Existing Traffic Volumes – October 2012

Location	AM Peak Hour (vph)	PM Peak Hour (vph)	Daily* (vpd)
Nolan Street	456	484	4,840
Warwick Street	54	65	650
Northcliffe Drive	1283	1518	15,180
Princes Highway	1248	1140	12,480

Note: *daily traffic volumes have been estimates based on the assumption that the peak hour traffic flow is approximately 10% of the daily traffic volume.

Based on the existing traffic volumes shown in Table 2 these roads all are within the expected functional classification as outlined in Table 1.

2.2.2 Heavy and Light Vehicle Ratio

From the traffic volume surveys undertaken in September 2012 the heavy vehicle percentage is shown in Table 3 Heavy Vehicles – October 2012.

Table 3 Heavy Vehicles – October 2012

Location	Vehicles per hour (vph)	HCV* (vph)	HCV* %
Nolan Street	484	25	5.2%
Warwick Street	65	0	0%
Northcliffe Drive	1518	38	2.5%
Princes Highway	1248	77	6.2%

Note: * HCV – heavy commercial vehicles

2.3 Existing Intersection Performance

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. SIDRA intersection modelling software was used to assess the proposed peak hour operating

performance of intersections on the surrounding road network. The criteria for evaluating the operational performance of intersections is provided by the RMS *Guide to Traffic Generating Developments* and reproduced in Table 4. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. Level of Service), which is applied to each band of average vehicle delay.

Table 4 Performance Criteria at Intersections

Level of Service	Average Delay Per Vehicle (secs/vehicle)	Traffic Signals, Roundabout	Give-Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and other accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity and requires other control mode
F	Greater than 70	Roundabouts require other control mode	

Notes:

a) The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.
b) The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.
c) The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.

Existing traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area.

Table 5 Intersection Performance AM and PM Peak Hour –Traffic Conditions 2012 (without development)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Northcliffe Dr	13	A	0.20	13	A	0.24
Nolan St/Warwick St	14	A	0.07	14	A	0.05
Nolan St/Princes Hwy	18	B	0.67	18	B	0.6
Northcliffe Dr/Southern Fwy Southbound on/off ramps	16	B	0.25	15	B	0.29
Northcliffe Dr/Southern Fwy Northbound on/off ramps	15	B	0.15	15	B	0.12
Princes Hwy/Northcliffe Drive	22	B	0.71	19	B	0.78

Table 5 indicates that the existing intersections surrounding Life City currently operate satisfactorily in both the AM and PM peaks in 2012. Detailed performance of these intersections is in Appendix B.

2.4 Crash Statistics

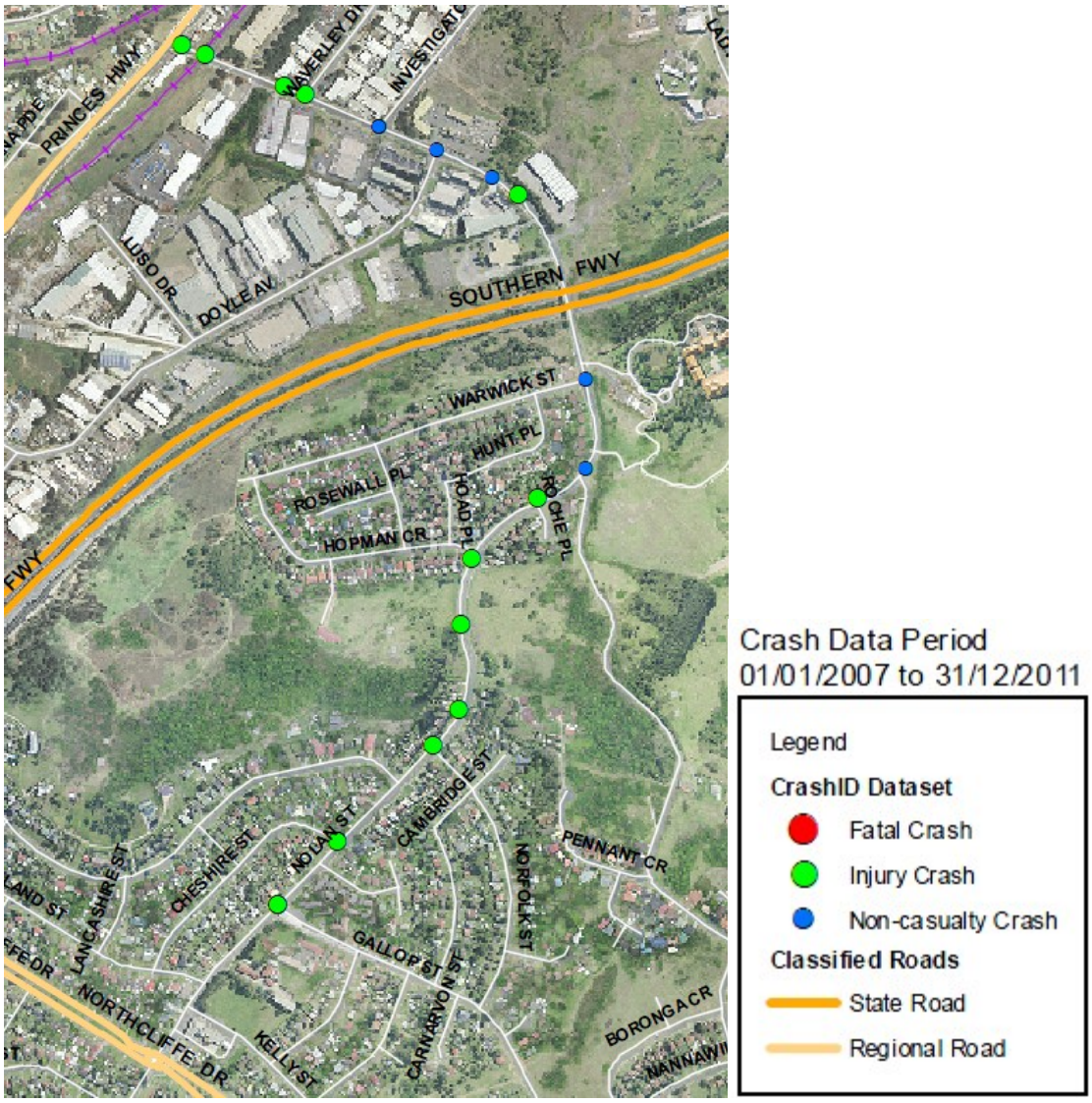
The Roads and Maritime Services (RMS) Crash Analysis Department supplied GHD with crash statistics for a five-year period from 2007 to 2011 for the length of Nolan Street covering the proposed access location to the development, and are summarised below:

In total, 22 crashes occurred over this 5 year period. Of these recorded crashes:

- 13 crashes resulted in injury;
- 16 of these crashes occurred in dry/daylight conditions;
- 16 were multi vehicle crashes;
- 14 crashes occurred at an intersection; and
- Speed was a contributing factor in 5 of the crashes.

Figure 2 shows the location of the crashes on Nolan Street. These crashes were spread along the route and not concentrated in one particular area. The crash statistics along Nolan Street do not indicate any pattern of crashes that would signify a specific safety issue along the route. Detailed crash reports are in Appendix D.

Figure 2 – Nolan Street Crash Map



2.5 Pedestrian and Bicycle Environment

Nolan Street has a pedestrian footpath approximately 1.5 m wide on both sides of the road between Northcliffe Drive and pedestrian crossing to the school. The footpath then continues on the eastern side only from the school to Hopman Crescent, where it changes to the western side to the Princes Highway.

There are no on or off road bicycle facilities along Nolan Street.

2.6 Public Transport

The Warrawong to Wollongong Bus Route 34 travels via Nolan Street. Figure 3 shows the route for this service and Table 6 shows the bus stop locations along Nolan Street.

Figure 3 – Bus Network Map

Source: http://www.premierillawarra.com.au/networkmap.html

Table 6 Bus Stop Locations on Nolan Street (including Warwick St Loop)

Northbound (Along Nolan Street)	Southbound (Along Nolan Street)
Between Northcliffe to Cumberland Street	Near Investigator Drive
Between Cumberland Street to Gallop Street	On Warwick Street near Hunt Place
Nottingham Street to Norfolk Street	On Hopman Cres – near Newcombe Street
On Hopman Cres – near Warwick Street	Between Gallop Street and Suffolk Street
On Warwick St – near Newcombe Street	Between Kelly Street and Gallop Street
On Warwick between Hunt and Newcombe St	
Warwick Street to Nolan Bridge	
Near Investigator Drive	
Near the Rail Crossing	

Route 34 from Warrawong to Wollongong travels through Nolan Street every 20 – 30 mins from 6 am to 8:30 pm Monday to Friday. Services also operate on weekends and public holidays.

As the bus route 34 from Warrawong to Wollongong already travels through Nolan Street, there could be an opportunity extend the bus route to include a loop through the Life City Development to encourage public transport usage to the site.

3. Proposed Life City Development Impact

This section outlines the proposed development on the Life City development and summarises the traffic impact analysis of the development as well as any additional works that may be required to accommodate additional traffic generated by the development.

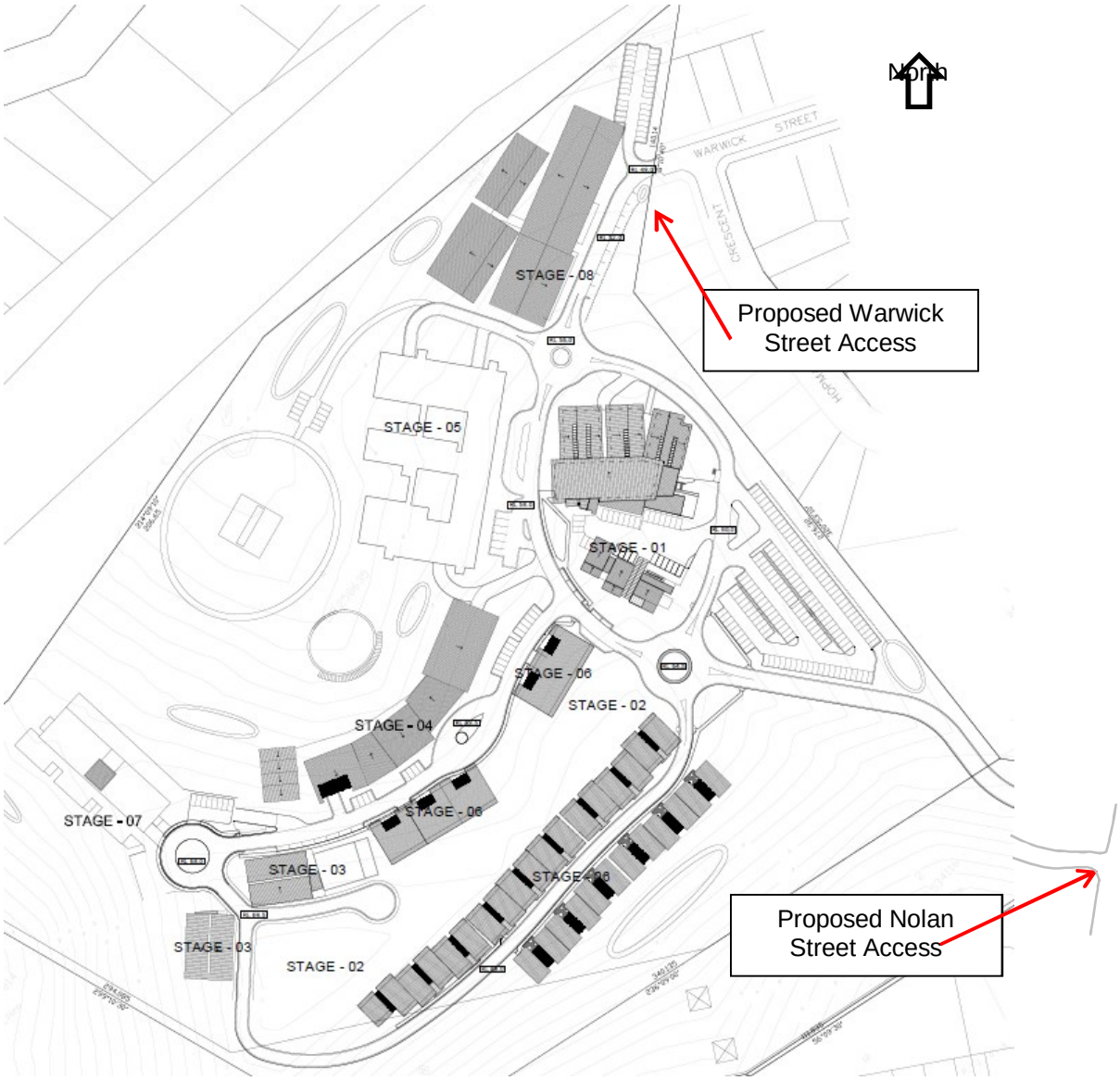
3.1 Overview – Proposed 'Life City' Development

The proposed development is a 'Hi Tech Holistic Cancer and Medical Hospital Facility' which consists of the following land uses:

- Stage 1 Medical Centre, Day Surgery, Child Care Centre and Respite Care Centre;
- Stage 2 Holistic Health Care Course;
- Stage 3 Serviced Apartments;
- Stage 4 Ancillary accommodation and Research library, lecture theatre, auditorium complex;
- Stage 5 Hi-Tech Holistic Cancer and Medical Hospital;
- Stage 6 Self-Care Seniors Housing;
- Stage 7 Residential Care Facility and Hostel; and
- Stage 8 Healthcare Technical High School.

A plan of the proposed development and the layout of these land uses are shown below in Figure 4. Access to the development is proposed at the western end of Warwick Street (where the current road terminates and at a new intersection with Nolan Street located between Hopman Crescent and Norfolk Street.

Figure 4 – Proposed Development



3.2 Projected Traffic Generation

An indication of the potential traffic generation from the 'Life City' development has been obtained from the RMS *Guide to Traffic Generating Developments (2002)*. Some of the land uses are not covered in the RMS Guide, for these, the traffic generation and assumptions used are those provided in the *Traffic Impact Assessment* undertaken by Bruce Conneeley for the Preliminary Environmental Assessment. Table 7 below outlines the traffic generation and assumptions used for each land use.

Table 7 Potential Traffic Generation

Stage	Component	Beds/Rooms/Persons	Peak Hour Traffic Generation Rate	Peak Hour Trips
1	Medical Centre, Day surgery and Respite Care Centre	30 consulting rooms (19 Specialists)	19 x 4=76	76
		10 Beds	10 x 1 = 10	10
	Childcare Centre	70 Children	0.7 trips per child	49
2	Holistic Healthcare Course	Outdoors	*Assumption from Prelim assessment: 30 persons at any time 24 @ 2 per vehicle and 6 public transport	12
3	Serviced Apartments (Medium Density)	56 x 2 bedroom 13 x 3 bedroom	0.4-0.5/dwelling (RMS Medium density)	37
4	Ancillary accommodation and research, library, lecture theatre, auditorium	30 (1 & 2 bed)	*Assumption from Prelim assessment: 100 trips -assumes high public transport usage	100
5	Hi-Tech Holistic Cancer and Medical Hospital	320 beds	*Assumption from Prelim assessment: 0.97 per bed reduced by 35 as staff accommodation on site	275
6	Self-Care seniors housing	86 units 36 x 1 bedroom 38 x 2 bedroom 12 x 3 bedroom	0.4-0.5/dwelling (RMS Medium density)	45
7	Residential Care Facility and Hostel	170 beds	0.1-0.2/dwelling (RMS)	34
8	Healthcare Technical High School	350 students	*Assumption from Prelim assessment: Car occupancy rate high and public transport use. 100 trips	100
			Total	738

Notes:

*Assumptions are from the report titled *Traffic Impact Assessment* by Bruce Conneeley (August 2010) for the Preliminary Environmental Assessment.

**vtph = vehicle trips per hour

Based on the above trip rates, the estimated peak hour traffic generation for the proposed development at each stage is provided in Table 8.

Table 8 Peak Hour Traffic Generation Potential

Stage	Morning Peak (vtph) IN	Morning Peak (vtph) OUT	Evening Peak (vtph) IN	Evening Peak (vtph) IN	Expected Timeframe
1	69	69	69	69	2014/2015
2	6	6	6	6	2014/2015
3	18	18	18	18	2015/2016
4	50	50	50	50	2016/2017
5	137	137	137	137	2017/2018
6	22	22	22	22	2018/2019
7	17	17	17	17	2018/2019
8	50	50	50	50	2020
Total	**369**	**369**	**369**	**369**	

The above table indicates the following:

- The peak movement to or from the proposed development would be in the order 738 vtph (one way) in the AM and PM peak period, which equates to 369 vph (two way).

3.3 Development Access

Vehicular access to the site would be provided by direct access to Nolan Street as well as a secondary access from Warwick Street. The proposed access on Nolan Street would be the main visual entrance to the development, and the most direct access from the freeway, via Northcliffe Drive. The majority of vehicles including servicing vehicles would access the site through the Nolan Street access. It is assumed that the majority of the high school traffic would use the Warwick Street access.

3.3.1 Sight Distance

In assessing this proposed development it is appropriate to assess the traffic safety of the proposed entry/exit locations to/from the site, by determining whether there is adequate longitudinal sight distance at the proposed access to allow drivers approaching the driveway sufficient sight distance to avoid potential conflicts. The specific sight distance criteria used in the report has been derived from the Austroads Publication “Guide to Traffic Engineering Practice, Part 5: Intersections at Grade” (2005) which specifies the following:

Approach Sight Distance (ASD)

This is the minimum requirement to provide the driver of a vehicle adequate distance to observe the road layout, including pavement markings, kerbs, islands, etc, in sufficient time to react and stop if necessary before entering the conflict area. Approach Sight Distance is measured from driver eye height (1.15m to 0.0m, i.e. the road surface).

Safe Intersection Sight Distance (SISD)

It provides sufficient sight distance for a driver of a vehicle on the major road to observe a vehicle from the minor road approach moving into a collision situation (e.g. in the worst case stalling across the traffic lanes), and to decelerate to stop before reaching the collision point. Safe Intersection Sight Distance is measured from the driver eye height (1.05m) to (1.05m).

A comparison of the required and available ASD and SISD for vehicles approaching and departing the proposed access road is set out in Table 4 for the vehicle speed of 50 km/h.

Table 9 Sight Distance Requirements

Driveway (Entry/Exit)	ASD (Minimum Requirement		SISD (Desirable Requirement)	
	Required	Measured	Required	Measured
Nolan Street 50 km/h	50 m	160 m (north) 90 m (south)	90 m	160 m (north) 90 m (south)

From the above assessment, it can be concluded that the proposed access arrangement meets a satisfactory level of traffic safety because it satisfies the sight distance requirements for both (ASD) and (SISD) measured in accordance with the definition set out in the Austroads publication.

Photo 5 - Nolan Street looking northeast with the proposed development site on the left.

3.4 Parking Requirements

Wollongong Development Control Plan 2009 Chapter E3: Carparking, Access, Servicing/loading Facilities and Traffic Management provides car parking requirements, based on a minimum parking provision, for various land uses. Where requirements could not be obtained in the DCP, the RMS *Guide to Traffic Generating Developments 2002* has been used as an alternative reference.

Table 10 Parking Requirements – Life City Wollongong

Stage	Component	Beds/Rooms/ Persons/GFA	Parking Requirements	No. Spaces (WCC DCP)	No. Spaces Provided
1	Medical Centre and day surgery Childcare Centre	6,000 m^2 GFA 70 Children	4 spaces per consulting room and 1 space per 3 employees 1 per 6 children 1 per staff present 1 accessible 2 large spaces	135 20	154 27
2	Holistic Healthcare Course	Outdoors	*Assumption: 30 persons at any time assume 20	20	0
3	Serviced Apartments	56 x 2 bedroom 13 x 3 bedroom	1 space per 1 bedroom (<70 m^2) 2 spaces per 2 bedroom (+110 m^2) 0.2 per dwelling for visitors	138	61
4	Ancillary accommodation and research, library, lecture theatre, auditorium			115	92
5	Hi Tech Holistic Cancer and Medical Hospital	320 beds	1 space per 2 beds plus 1 space per practitioner and 1 per 2 employees	224	290
6	Self-care seniors housing	36 x 1 bedroom 38 x 2 bedroom 12 x 3 bedroom	Seniors Housing 0.5 per bedroom	74	86
7	Residential Care Facility and Hostel	170 beds	1 space per 10 beds plus 1 per 2 employees	34	60
8	Healthcare Technical High School	350 students	1 space per staff and 1 space per 10 year 12 students	50	50
Total				**810**	**820**

Notes:

*Assumptions are from the report titled *Traffic Impact Assessment* by Bruce Conneeley (August 2010) for the Preliminary Environmental Assessment.

A total of 820 parking spaces in total would be provided within this development, which exceeds the required 810 parking spaces required under Wollongong City Councils DCP.

State Environmental Planning Policies – Housing for Seniors & People with a Disability (SEPP 5) does not include parking space measurement standards. Therefore, in accordance with the

Australian Standards AS 2890.1:2004 Parking Facilities, Part 1: Off-street Car Parking, the parking space measurements will be as follows:

- 2.4 m wide;
- 4.8 m long (car parking is controlled by a kerb which allows overhang); and
- Aisle width of 5.8 m.

Accessible parking spaces are to be provided in accordance with AS 2890.6 (2009) as outlined in Schedule 2 of the DCP's chapter E3, 1 space is required for every 100 car parking spaces. Therefore a total of 7 accessible parking spaces will be provided in this development.

Accessible parking measurements will be:

- 3.2 m wide; and
- 4.8 m long (car parking is controlled by a kerb which allows overhang).

A private contractor would be engaged to undertake refuse collection. A bin bay and service delivery area is located within each stage. Service areas and refuse collection would be accessed through the internal road network. Basement service areas provide turning plates to turn trucks around internally so that trucks can exit the basement in a forward direction. Turning movements have been assessed in Auto Turn for the internal road network which has confirmed that a refuse vehicle and fire truck movements can be accommodated on site and that the trucks would be able to exit the site in a forward direction.

Auto Turn was also used to assess turning movement requirements for an ambulance accessing the front of the hospital, this can be accommodated (these are attached in Appendix E).

3.5 Intersection Performance

3.5.1 Background Traffic Growth

Background traffic growth has been obtained from the Wollongong Shoalhaven (WOLSH) strategic traffic model. Background traffic growth has been obtained for 2021 (the year of full development) and also the 10 year horizon year, 2031. Background traffic growth has been added to observed 2012 volumes and traffic generated by the development added to the forecast future year volumes.

3.5.2 Proposed Traffic Distribution

Vehicles can access the development site via Nolan Street and Warwick Street, either from the south, Southern Freeway via Northcliffe Drive or the north from Princes Highway.

The Nolan Street access would be developed as the main access to the site, all visitors, deliveries, service vehicles would be expected to use this access. The Warwick Street access would provide access mainly to the High School. Based on this, it has been assumed that:

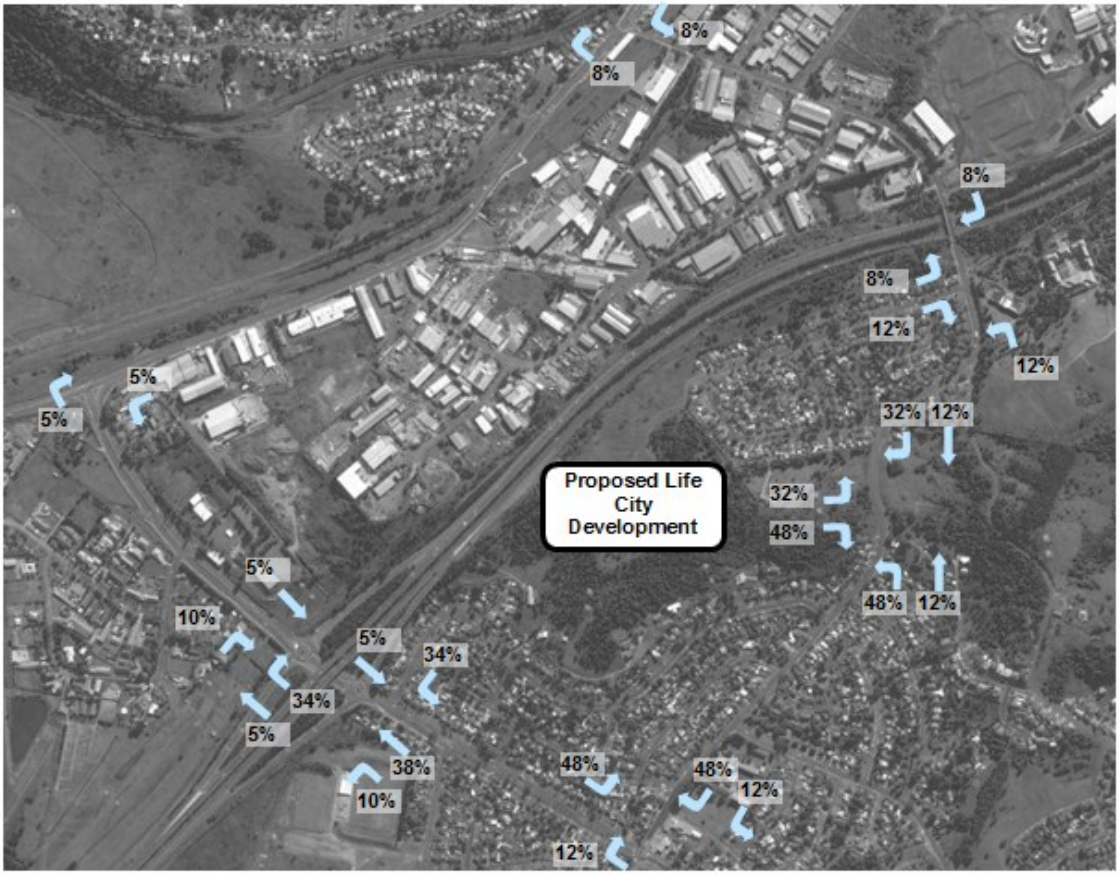
- 80% of the development traffic would enter and exit via the Nolan Street access; and
- 20% of the development traffic would enter and exit via the Warwick Street access.

The existing AM and PM peak traffic distributions on Nolan Street have been reviewed to determine the expected distribution for the development traffic. For the purpose of this assessment it has been assumed that:

- 60% of development traffic would be to/from Northcliffe Drive (Southern Freeway); and
- 40% of development traffic would be to/from the Princes Highway.

Figure 5 shows how the proposed development traffic has been assigned on the surrounding road network.

Figure 5 –Proposed Traffic Distribution



3.5.3 2021 Intersection Operating Performance

The future traffic volumes have been calculated by adding the growth rate from the WOLSH model to the 2012 surveyed traffic flows presented in Table 2 and then adding the development traffic flows. Estimated future 2021 traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area. A summary of the 2021 intersection performance is shown in Table 11.

Table 11 Intersection Performance AM and PM Peak Hour –Traffic Conditions 2021 (with development)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Life City Access	46	D	0.88	44	D	0.87
Nolan St/Northcliffe Dr	15	B	0.57	17	B	0.71
Nolan St/Warwick St	16	B	0.25	17	B	0.25
Nolan St/Princes Hwy	21	B	0.81	20	B	0.75
Northcliffe Dr/Southern Fwy Southbound on/off ramps	17	B	0.29	17	B	0.33
Northcliffe Dr/Southern Fwy Northbound on/off ramps	15	B	0.50	15	B	0.52
Princes Hwy/Northcliffe Drive	26	B	0.90	22	B	0.82

3.5.4 2031 Intersection Operating Performance

Estimated future 2031 traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area. A summary of the 2031 intersection performance is shown in Table 12.

Table 12 Intersection Performance AM and PM Peak Hour –Traffic Conditions 2031 (with development)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Life City Access	60	E	0.93	65	E	0.95
Nolan St/Northcliffe Dr	16	B	0.63	20	B	0.80
Nolan St/Warwick St	17	B	0.26	18	B	0.27
Nolan St/Princes Hwy	23	B	0.85	23	B	0.82
Northcliffe Dr/Southern Fwy Southbound on/off ramps	17	B	0.68	28	B	0.88
Northcliffe Dr/Southern Fwy Northbound on/off ramps	21	B	0.69	23	B	0.72
Princes Hwy/Northcliffe Drive	37	C	0.89	31	C	0.90

The Nolan Street/Life City Access results show that the proposed new intersection would operate satisfactorily in both the AM and PM peaks in 2021, however by 2031 the Life City access would be near capacity. Additional analysis has been undertaken and shows that this this intersection could be upgraded to a roundabout to reduce delays. A summary of the performance of this proposed roundabout is shown in Table 13 for the horizon year 2031.

The remainder of the intersections analysed indicate that with the inclusion of development traffic and predicted growth, all intersections operate satisfactorily in both the AM and PM peaks.

Table 13 Intersection Performance AM and PM Peak Hour – Proposed Traffic Conditions 2031 – Alternate Intersection Arrangement (Roundabout)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Life City Access	13	A	0.37	13	A	0.34

The proposed roundabout arrangement for the intersection of Nolan Street / Life City Access would operate satisfactorily in both the AM and PM peaks in 2031. With the inclusion of development traffic and forecast growth, the intersection would continue to operate satisfactorily in both the AM and PM peak periods.

Based on the intersection analysis undertaken in this study, it can be concluded that traffic generated by the 'Life City' development under the 2021 and 2031 horizon years can be accommodated on the existing network, with the provision of a roundabout treatment for the proposed new intersection of the Life City Access with Nolan Street. Intersection modelling has shown that a roundabout treatment would operate satisfactorily to the forecast 2031 horizon year.

3.6 Sensitivity Testing

The intersection assessment undertaken in section 3.5 has been based on mode share assumptions identified in section 3.2 for the land uses in stages 2, 4 and 8, which generally reflected an increased proportion of trips using public transport.

A sensitivity test was undertaken to determine whether the intersection requirements would change if these mode share assumptions were not realised and mode share to public transport stayed the same as is currently observed in the area. This section outlines the methodology and results of this sensitivity testing.

3.6.1 Existing Development Mode Share

In order to gain an understanding of mode share surrounding the development area, analysis of Journey to Work (JTW) data from Transport for NSW Bureau of Transport Statistics (BTS) within the area has been undertaken. A summary of the mode share statistics for the study area are shown in Table 14.

Table 14 Existing Travel Zone Mode Share

Mode Name	Percentage
Vehicle driver	45%
Vehicle passenger	9%
Other mode	12%
Not stated	5%
Worked at Home or Did not go to Work	29%

3.6.2 Mode Share Development Assessment

The potential development traffic generation as outlined in Table 7 assumes some public transport usage for the development. However it is indicated in Table 14 that public transport is not currently identified in the JTW information for this area. Therefore a sensitivity assessment has been undertaken assuming a worst case scenario that there is no public transport usage from the development.

The intersections have been re-modelled to provide a comparison assessment.

The following intersection assessments are based on:

- That the peak movement from or to the proposed development would be in the order 866 vtph in the AM and PM peak period, which equates to 433 vph.

3.6.3 2021 Intersection Operating Performance – Mode Share

The future traffic volumes have been calculated by adding the growth rate from the WOLSH model to the 2012 surveyed traffic flows presented in Table 2 and then adding the development traffic flows.

Estimated future 2021 traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area.

Table 15 Intersection Performance AM and PM Peak Hour –Traffic Conditions 2021 (with development)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Life City Access	13	A	0.36	13	A	0.46
Nolan St/Northcliffe Dr	15	B	0.61	18	B	0.76
Nolan St/Warwick St	17	B	0.28	18	B	0.29
Nolan St/Princes Hwy	21	B	0.81	20	B	0.76
Northcliffe Dr/Southern Fwy Southbound on/off ramps	17	B	0.29	17	B	0.35
Northcliffe Dr/Southern Fwy Northbound on/off ramps	15	B	0.45	17	B	0.55
Princes Hwy/Northcliffe Drive	27	B	0.90	22	B	0.82

3.6.4 2031 Intersection Operating Performance – Mode Share

Estimated future 2031 traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area. A summary of the intersection performance under the mode share sensitivity test is shown below in Table 16.

Table 16 Intersection Performance AM and PM Peak Hour –Traffic Conditions 2031 (with development)

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Nolan St/Life City Access	13	A	0.40	13	A	0.49
Nolan St/Northcliffe Dr	17	B	0.68	23	B	0.86
Nolan St/Warwick St	18	B	0.30	19	B	0.31
Nolan St/Princes Hwy	23	B	0.85	23	B	0.83
Northcliffe Dr/Southern Fwy Southbound on/off ramps	17	B	0.69	32	C	0.90
Northcliffe Dr/Southern Fwy Northbound on/off ramps	22	B	0.69	25	B	0.75
Princes Hwy/Northcliffe Drive	38	C	0.89	31	C	0.90

The results of the SIDRA analysis under the mode share sensitivity test indicate that all the intersections assessed would operate satisfactorily in both the AM and PM peak hour under the assumption that all trips to and from the site are made by car.

Intersection analysis of the traffic generation from the Life City development, both with and without public transport use shows that the road network surrounding the study area will operate satisfactorily under the 2021 and 2031 horizon years.

3.6.5 Future Public and Active Transport Opportunities

Life City aims to enhance opportunities for walking, cycling and public transport through providing:

- Pedestrian paths throughout the Life City development connecting into the existing pedestrian network on Nolan Street;
- Bicycle parking areas to encourage cycling; and
- Bus stops throughout Life City development so that existing bus services can be extended to include Life City.

In order to support higher public transport usage there is an opportunity for Life City to implement workplace travel plans. Potential elements of workplace travel plans that Life City could include are:

- Setting up a car sharing scheme;
- Developing public transport information programs and promotions;
- Providing and encouraging the use of the local pedestrian environment;
- Providing and encouraging the use of cycle facilities;
- Negotiating service requirements with transport agencies; and
- Developing attractive flexible working practises.

4. Conclusions

The following conclusions are made based on the above investigations:

4.1 Access Arrangements

- Vehicular access to the site would be provided by direct access to Nolan Street as well as a secondary access from Warwick Street. The proposed access on Nolan Street would be the main visual entrance to the development, and the most direct access from the freeway, via Northcliffe Drive. The majority of vehicles including servicing vehicles would access the site through the Nolan Street access. It is assumed that the majority of the high school traffic would use the Warwick Street access.
- The proposed Life City Access with Nolan Street provides a satisfactory level of traffic safety under the current speed environment, as it satisfies the minimum sight distance requirement (ASD) and the desirable sight distance (SISD) measured in accordance with the definition set out in the Austroads publication.
- An assessment of crash data in the vicinity of the site showed that there were 22 crashes recorded over a 5 year period on Nolan Street. These crashes appear to be spread over the route and not concentrated in one particular area and are not indicative of any traffic safety issues on the study area.
- Auto Turn assessments show that an ambulance can access the hospital and that a refuse truck/rigid vehicle can access the site along the proposed internal access roads.

4.2 Parking Arrangement

- A total of 820 parking spaces would be provided within this development, which exceeds the required parking spaces required under Wollongong City Councils DCP. Ambulances would park directly in front of the hospital doors.
- The proposed car parking spaces and vehicular access arrangements will be designed in accordance with AS 2890.1:2004 Parking Facilities, Part 1: Off-street Car Parking.

4.3 Traffic Impact

- The peak movement to or from the proposed development would be in the order 738 vehicle trips per hour (vtph) in the AM and PM peak period, which equates to 369 vehicles per hour (vph);
- Analysis of the proposed new intersection of the Life City access with Nolan Avenue would be close to capacity by 2031 under a stop-sign arrangement. Analysis of this intersection showed that it would operate satisfactorily under roundabout control by 2031. It is recommended that a roundabout be proposed at this intersection.
- The performance outputs from SIDRA intersection analysis indicate that the road network surrounding the Life City development would operate satisfactorily under forecast 2021 and 2031 traffic flows, including background traffic growth and traffic generated by the development during both AM and PM peak periods.
- A sensitivity assessment has been undertaken assuming no public transport usage to or from the development, which concluded the following:
  - The peak movement to or from the proposed development would be in the order 866 vtph in the AM and PM peak period, which equates to 433 vph.

  - SIDRA intersection analysis indicates that all the intersections assessed would continue to operate satisfactorily in both the AM and PM peak hour under the revised mode share scenario.
- Life City aims to enhance opportunities for walking, cycling and public transport through connections from the development to the existing road network.

4.4 Public Transport

- As the bus route 34 from Warrawong to Wollongong already travels through Nolan Street, there could be the opportunity extend the bus route to include a loop through the Life City Development to encourage public transport usage to the site.
- There is an opportunity for Life City to implement workplace travel plans in order to support higher public transport usage.

Therefore, it is concluded that the existing road network in the study area has sufficient capacity to accommodate the proposed Life City Wollongong Development and would continue to operate satisfactorily under the forecast 2021 and 2031 AM and PM peak.

Appendices

Appendix A - Traffic Volumes

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	BEDFORD STREET			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Pedestrians & Traffic Counts (15mins & 1hour Data)			

Prepared for

GHD

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Level 15 133 Castlereagh Street Sydney NSW 2000 Australia

Screenshot of intersection

North Bound Leg

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 7:45 | All vehicles

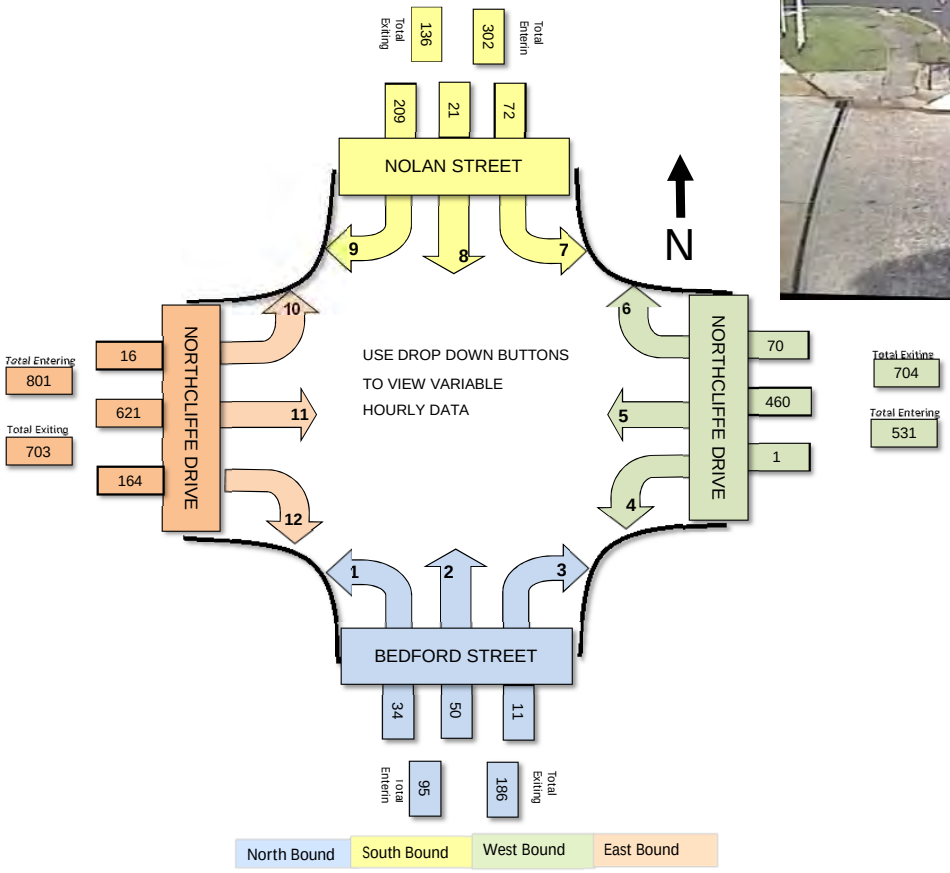
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**1729**
PM Peak	**16:00**	**to**	**17:00**	**2043**

DAILY TOTAL	AM		PM
Cars	**2226**		**3001**
Trucks	**110**		**35**
Buses	**47**		**24**
Articulated	**0**		**0**
Moterbikes	**0**		**0**

TOTALS	**2383**		3060
Total Vehicles through intersection all day			**5443**

	AM		PM
PEDESTRIANS			
Total Pedestrians through intersection all day			0



TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	BEDFORD STREET			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Pedestrians & Traffic Counts (15mins & 1hour Data)			

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Screenshot of intersection

North Bound Leg

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

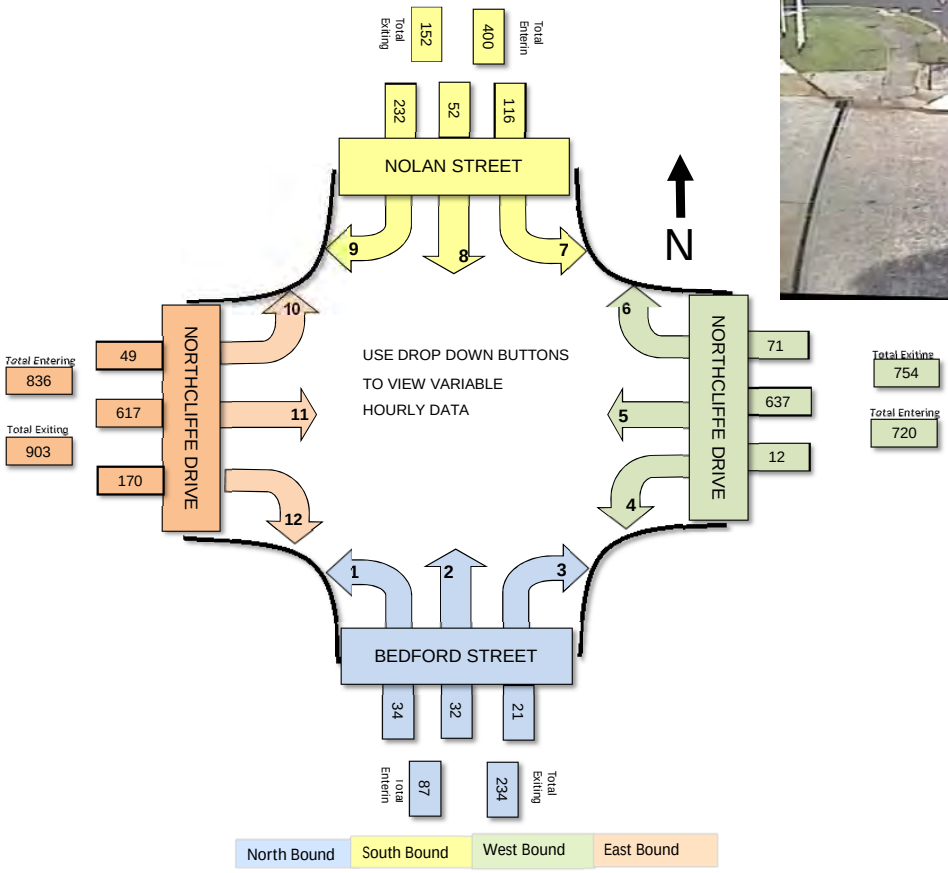
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**1729**
PM Peak	**16:00**	**to**	**17:00**	**2043**

DAILY TOTAL	AM		PM
Cars	**2226**		**3001**
Trucks	**110**		**35**
Buses	**47**		**24**
Articulated	**0**		**0**
Moterbikes	**0**		**0**

TOTALS	**2383**		3060
Total Vehicles through intersection all day			**5443**

	AM		PM
PEDESTRIANS			
Total Pedestrians through intersection all day			0



TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE		
WEATHER	11/10/2012		
survey period	7	To	9
	16	To	18
		To	
Intersection	NOLAN ST		
	ENTER STREET		
Client reference			
Description:	Traffic Counts (15mins & 1hour Data)		

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VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 7:45 | All vehicles

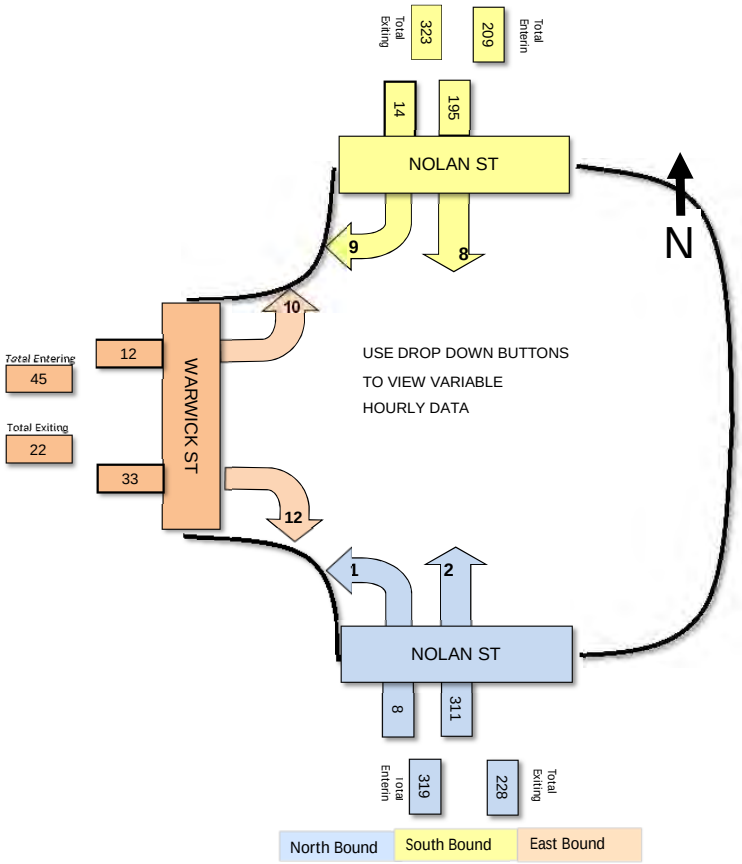
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**573**
PM Peak	**16:00**	**to**	**17:00**	**657**

DAILY TOTAL	AM		PM
Cars	**774**		**944**
Trucks	**26**		**19**
Buses	**35**		**18**
Articulated	**0**		**0**
Moterbikes	**0**		**0**

TOTALS	**835**		981
Total Vehicles through intersection all day			**1816**

	AM		PM
PEDESTRIANS			
Total Pedestrians through intersection all day			0



North Bound Leg

Screenshot of intersection

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	NOLAN ST			
	ENTER STREET			
Client reference				
Description:	Traffic Counts (15mins & 1hour Data)			

Prepared for

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VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

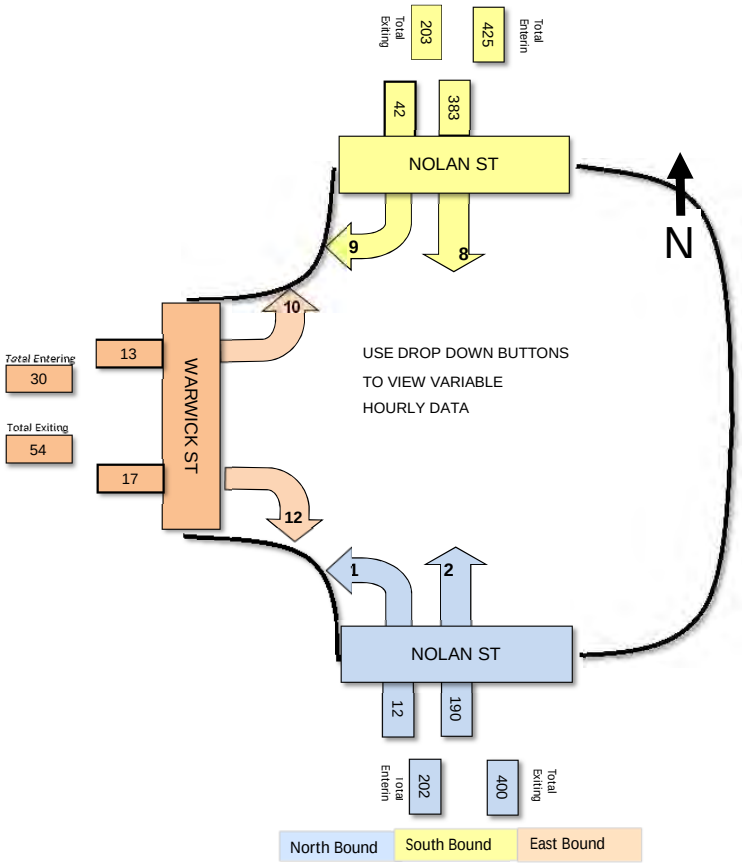
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**573**
PM Peak	**16:00**	**to**	**17:00**	**657**

DAILY TOTAL	AM		PM
Cars	**774**		**944**
Trucks	**26**		**19**
Buses	**35**		**18**
Articulated	**0**		**0**
Moterbikes	**0**		**0**

TOTALS	**835**		981
Total Vehicles through intersection all day			**1816**

	AM		PM
PEDESTRIANS			
Total Pedestrians through intersection all day			0



North Bound Leg

Screenshot of intersection

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	SOUTHERN FREEWAY NB EXIT			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Pedestrians & Traffic Counts (15mins & 1hour Data)			

Prepared for

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VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 7:45 | All vehicles

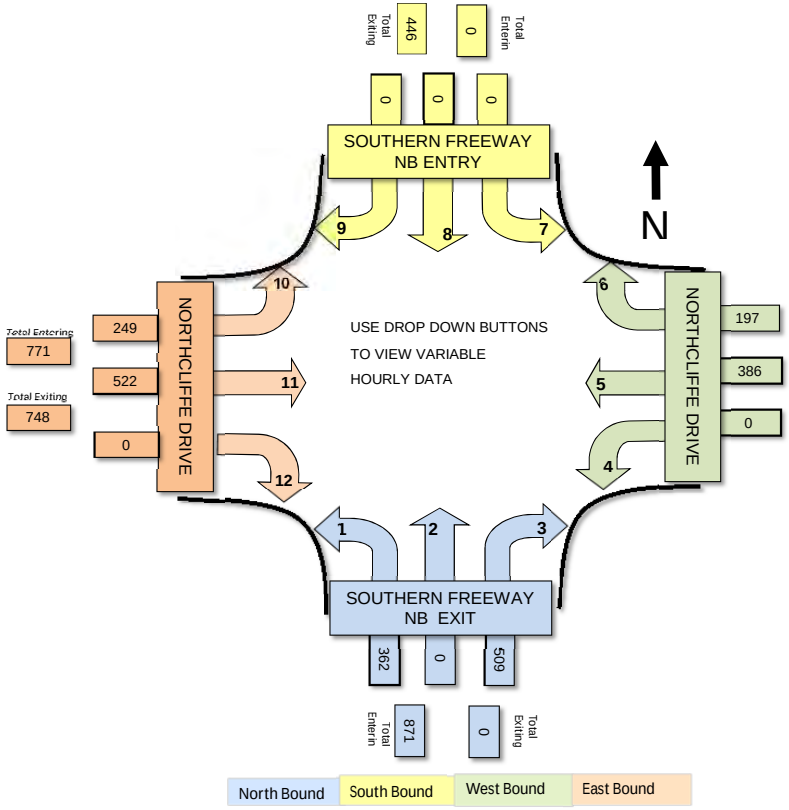
VEHICLE PEAKS

AM Peak	7:45	to	8:45	2225
PM Peak	16:00	to	17:00	2173

DAILY TOTAL	AM	PM
Cars	2900	3137
Trucks	245	84
Buses	32	14
Articulated	0	0
Moterbikes	0	0

TOTALS	3177	3235
Total Vehicles through intersection all day		6412

PEDESTRIANS	AM	PM
Total Pedestrians through intersection all day		0



Screenshot of intersection

North Bound Leg

Total Exiting 1031

Total Entering 583

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	SOUTHERN FREEWAY NB EXIT			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Pedestrians & Traffic Counts (15mins & 1hour Data)			

Prepared for

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Screenshot of intersection

North Bound Leg

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

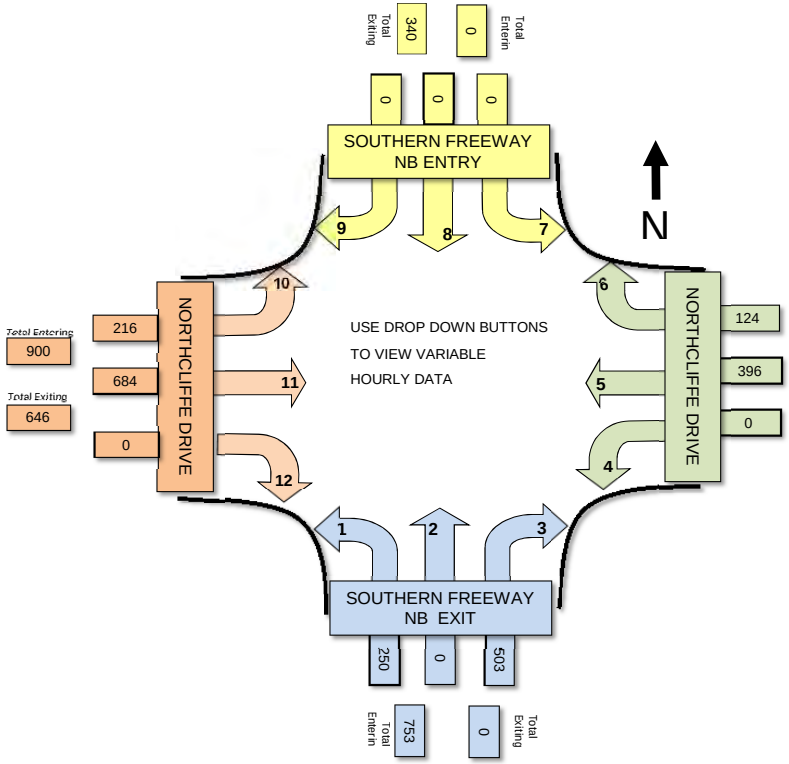
VEHICLE PEAKS

AM Peak	7:45	to	8:45	2225
PM Peak	16:00	to	17:00	2173

DAILY TOTAL	AM	PM
Cars	2900	3137
Trucks	245	84
Buses	32	14
Articulated	0	0
Moterbikes	0	0

TOTALS	3177	3235
Total Vehicles through intersection all day		6412

	AM	PM
PEDESTRIANS		
Total Pedestrians through intersection all day		0



Total Exiting 1187

Total Entering 520

North Bound | South Bound | West Bound | East Bound

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period		7	To	9
		16	To	18
			To	
Intersection	SOUTHERN FREEWAY SB ENTRY			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Traffic Counts (15mins & 1hour Data)			

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Screenshot of intersection

North Bound Leg

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 7:45 | All vehicles

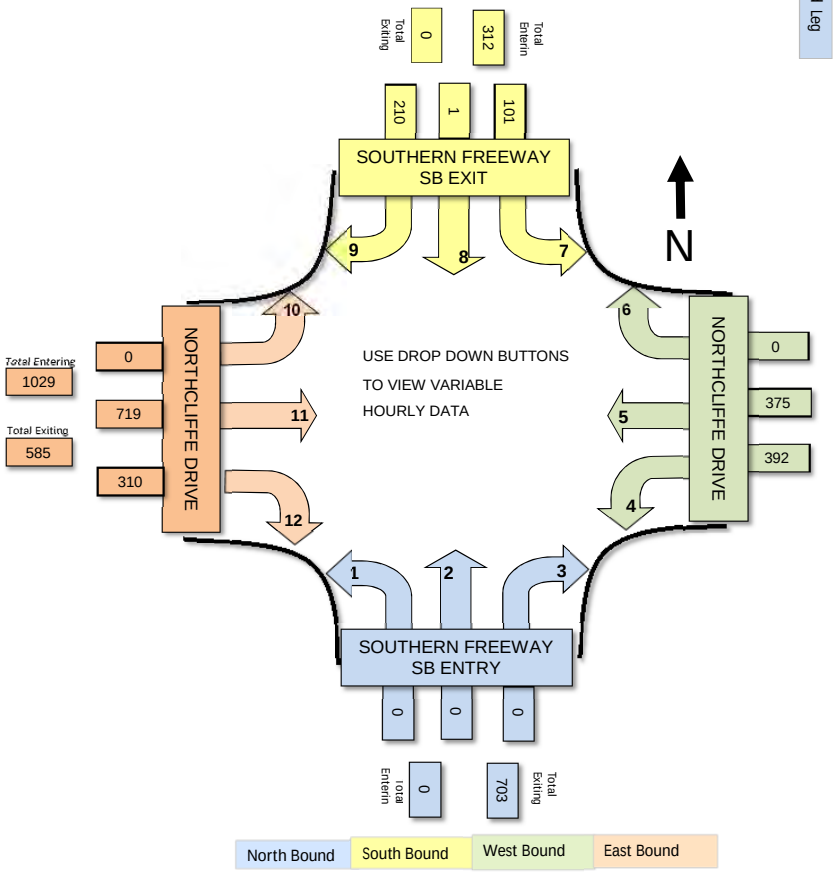
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2108**
PM Peak	**16:00**	**to**	**17:00**	**2530**

DAILY TOTAL	AM		PM
Cars	**2686**		**3748**
Trucks	**191**		**67**
Buses	**47**		**11**
Articulated	**0**		**0**
Moterbikes	**0**		**0**

TOTALS	**2924**		3826
Total Vehicles through intersection all day			**6750**

PEDESTRIANS	AM		PM
Total Pedestrians through intersection all day			0



TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE			
WEATHER	11/10/2012			
survey period	7	To	9	
	16	To	18	
		To		
Intersection	SOUTHERN FREEWAY SB ENTRY			
	NORTHCLIFFE DRIVE			
Client reference				
Description:	Traffic Counts (15mins & 1hour Data)			

Prepared for

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Screenshot of intersection

North Bound Leg

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

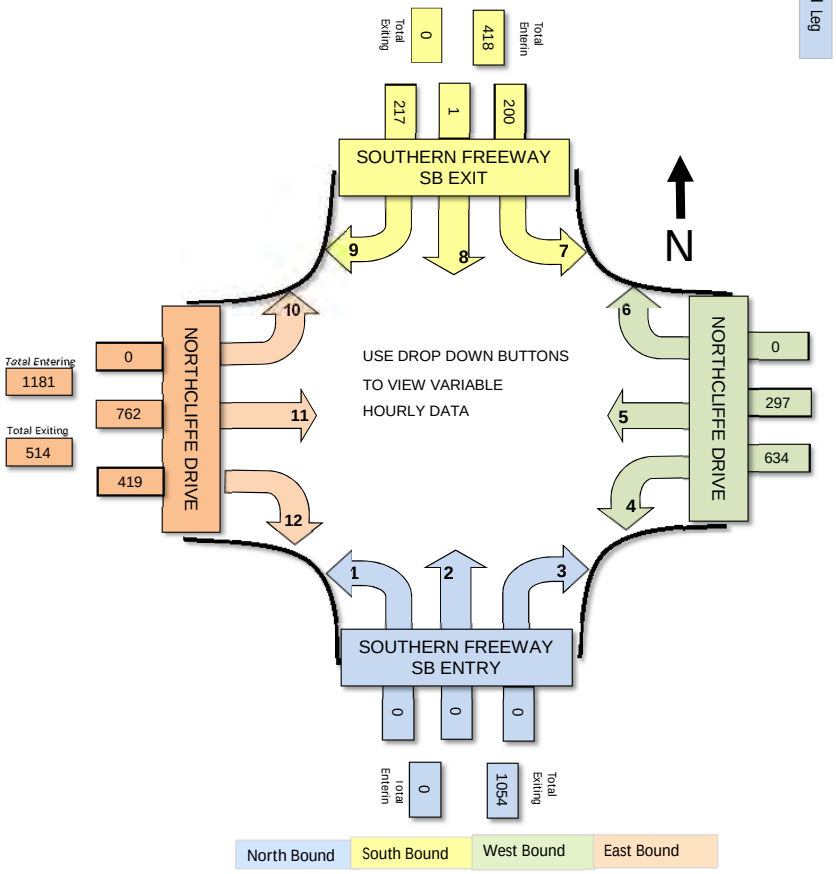
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2108**
PM Peak	**16:00**	**to**	**17:00**	**2530**

DAILY TOTAL	AM	PM
Cars	**2686**	**3748**
Trucks	**191**	**67**
Buses	**47**	**11**
Articulated	**0**	**0**
Moterbikes	**0**	**0**

TOTALS	**2924**	3826
Total Vehicles through intersection all day		**6750**

PEDESTRIANS	AM	PM
Total Pedestrians through intersection all day		0



TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE		
WEATHER	11/10/2012		
survey period	7	To	9
	16	To	18
		To	
Intersection	PRINCESS HWY		
	NOLAN STREET		
Client reference			
Description:	Traffic Counts (15mins & 1hour Data)		

Prepared for

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Level 15 133 Castlereagh Street Sydney NSW 2000 Australia

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 7:45 | All vehicles

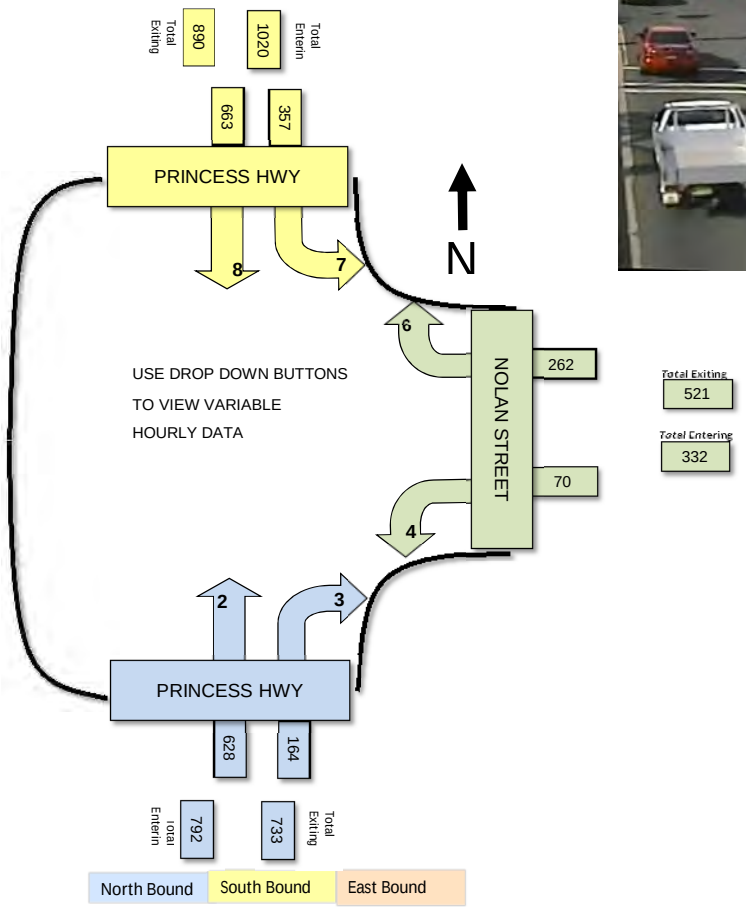
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2144**
PM Peak	**16:00**	**to**	**17:00**	**2052**

DAILY TOTAL	AM	PM
Cars	**2665**	**3001**
Trucks	**158**	**55**
Buses	**75**	**43**
Articulated	**0**	**0**
Moterbikes	**0**	**0**

TOTALS	2898	3099
Total Vehicles through intersection all day		**5997**

PEDESTRIANS	AM	PM
Total Pedestrians through intersection all day		0



Total Exiting: 521

Total Entering: 332

Screenshot of intersection

North Bound

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE		
WEATHER	11/10/2012		
survey period	7	To	9
	16	To	18
		To	
Intersection	PRINCESS HWY		
	NOLAN STREET		
Client reference			
Description:	Traffic Counts (15mins & 1hour Data)		

Prepared for

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Level 15 133 Castlereagh Street Sydney NSW 2000 Australia

Screenshot of intersection

North Bound

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

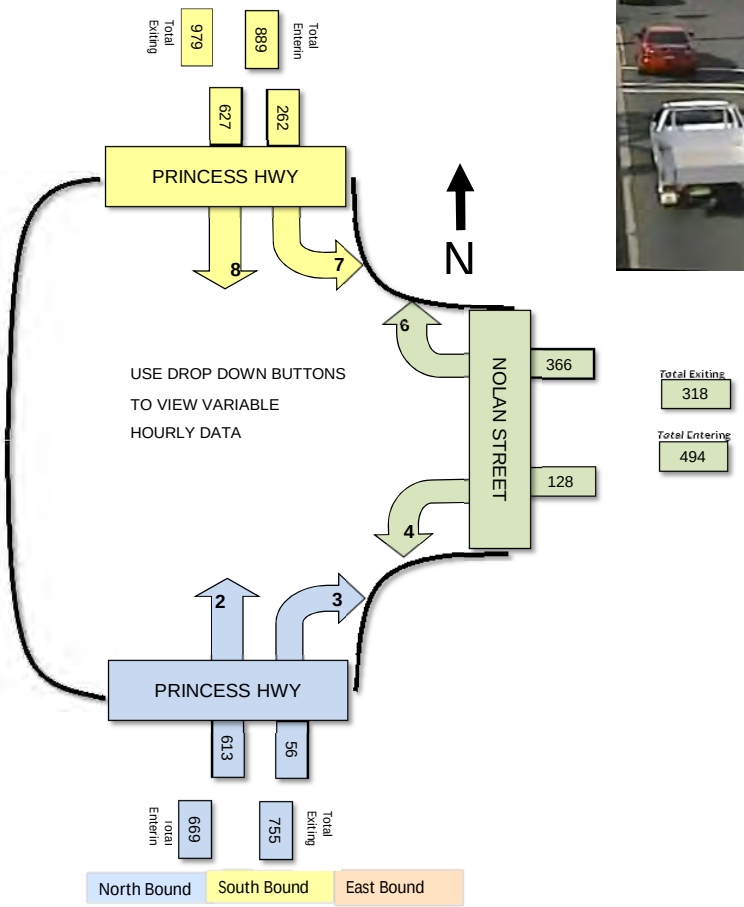
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2144**
PM Peak	**16:00**	**to**	**17:00**	**2052**

DAILY TOTAL	AM	PM
Cars	**2665**	**3001**
Trucks	**158**	**55**
Buses	**75**	**43**
Articulated	**0**	**0**
Moterbikes	**0**	**0**

TOTALS	2898	3099
Total Vehicles through intersection all day		**5997**

PEDESTRIANS	AM	PM
Total Pedestrians through intersection all day		0



Total Exiting: 318

Total Entering: 494

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE		
WEATHER	11/10/2012		
survey period	7	To	9
	16	To	18
		To	
Intersection	PRINCES HIGHWAY		
	NORTHCLIFFE DRIVE		
Client reference			
Description:	Traffic Counts (15mins & 1hour Data)		

Prepared for

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Screenshot of intersection

North Bound

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting 7:45 | All vehicles

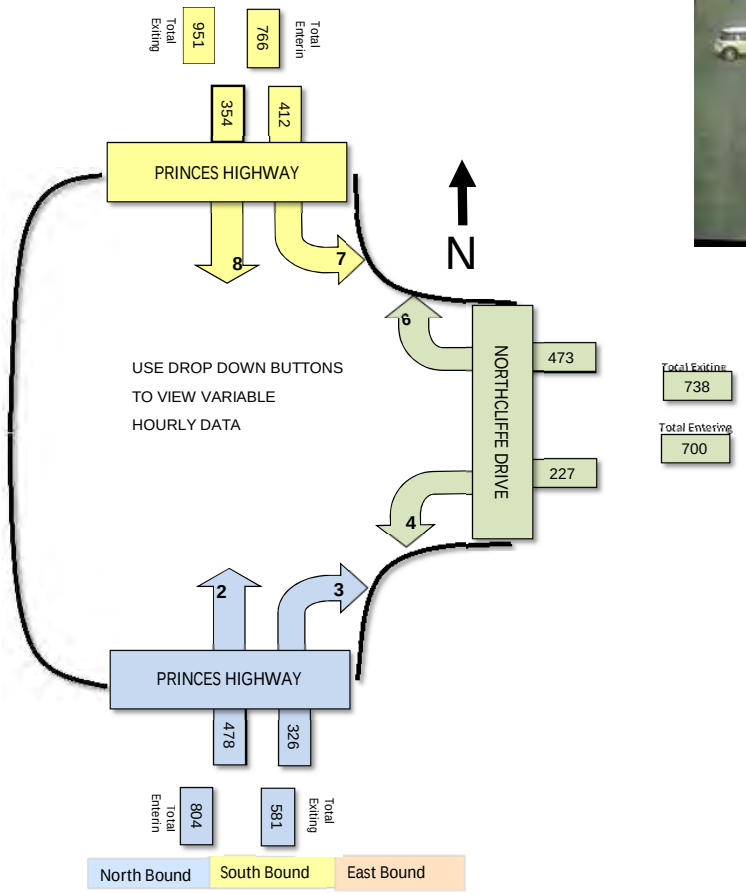
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2270**
PM Peak	**16:00**	**to**	**17:00**	**2405**

DAILY TOTAL	AM	PM
Cars	**2949**	**3437**
Trucks	**257**	**101**
Buses	**58**	**36**
Articulated	**0**	**0**
Moterbikes	**0**	**0**

TOTALS	3264	3574
Total Vehicles through intersection all day		**6838**

	AM	PM
PEDESTRIANS		
Total Pedestrians through intersection all day		0



Total Exiting
738

Total Entering
700

TCS Instruments

TCS Instruments - People and Vehicle Counting

SURVEY DETAILS

DAY /DATE	FINE		
WEATHER	11/10/2012		
survey period	7	To	9
	16	To	18
		To	
Intersection	PRINCES HIGHWAY		
	NORTHCLIFFE DRIVE		
Client reference			
Description:	Traffic Counts (15mins & 1hour Data)		

Prepared for

GHD

Traffic Consultant – Integrated Transport Planning

T: +61 2 9239 7392 | V: 217392 | E: Karen.mcnatty@ghd.com

Level 15 133 Castlereagh Street Sydney NSW 2000 Australia

Screenshot of intersection

North Bound

VARIABLE HOURLY VEHICLE SUMMARY

Hour Starting: 16:00 | All vehicles

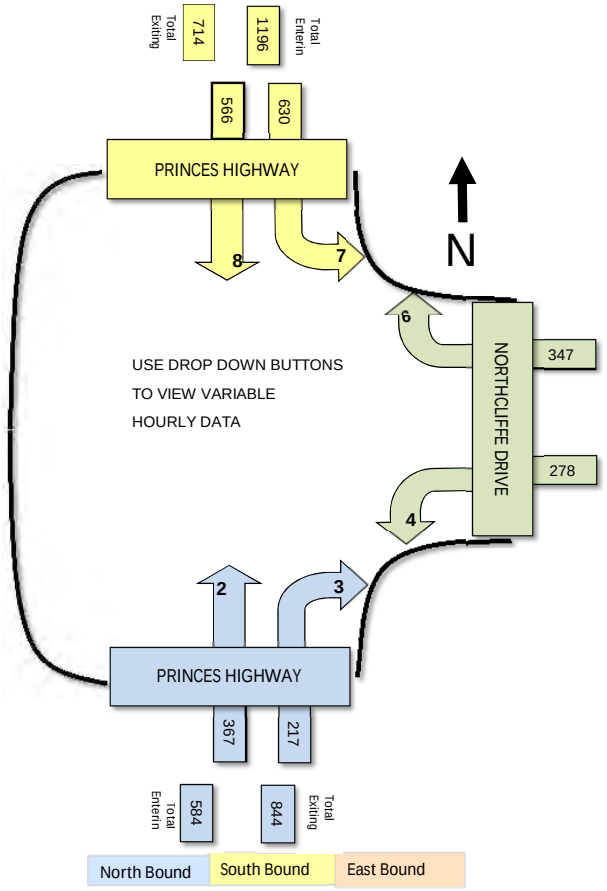
VEHICLE PEAKS

AM Peak	**7:45**	**to**	**8:45**	**2270**
PM Peak	**16:00**	**to**	**17:00**	**2405**

DAILY TOTAL	AM	PM
Cars	**2949**	**3437**
Trucks	**257**	**101**
Buses	**58**	**36**
Articulated	**0**	**0**
Moterbikes	**0**	**0**

TOTALS	3264	3574
Total Vehicles through intersection all day		**6838**

PEDESTRIANS	AM	PM
Total Pedestrians through intersection all day		0



Total Exiting
847

Total Entering
625

Appendix B – SIDRA Outputs

Nolan Street – Life City Access

N
Nolan Street North
25
Life City Access
25
Nolan Street South

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2012 Existing AM

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	248	6.0	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		249	6.0	0.132	0.0	NA	0.0	0.0	0.00	0.00	59.9
North: Nolan Street North											
8	T	261	5.0	0.138	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	1	0.0	0.001	9.3	LOS A	0.0	0.0	0.33	0.60	47.3
Approach		262	5.0	0.138	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Life City Access											
10	L	1	0.0	0.004	14.2	LOS A	0.0	0.1	0.45	0.77	43.9
12	R	1	0.0	0.004	14.1	LOS A	0.0	0.1	0.45	0.87	44.0
Approach		2	0.0	0.004	14.2	LOS A	0.0	0.1	0.45	0.82	43.9
All Vehicles		514	5.4	0.138	0.1	NA	0.0	0.1	0.00	0.01	59.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2012 Existing PM

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	155	12.0	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		156	11.9	0.086	0.1	NA	0.0	0.0	0.00	0.00	59.9
North: Nolan Street North											
8	T	325	2.0	0.169	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	1	0.0	0.001	9.0	LOS A	0.0	0.0	0.26	0.61	47.6
Approach		326	2.0	0.169	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Life City Access											
10	L	1	0.0	0.004	13.7	LOS A	0.0	0.1	0.38	0.77	44.2
12	R	1	0.0	0.004	13.6	LOS A	0.0	0.1	0.38	0.88	44.3
Approach		2	0.0	0.004	13.7	LOS A	0.0	0.1	0.38	0.83	44.2
All Vehicles		484	5.2	0.169	0.1	NA	0.0	0.1	0.00	0.01	59.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev AM
(Scenario 1)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	186	0.0	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	272	6.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		458	3.6	0.145	3.3	NA	0.0	0.0	0.00	0.27	55.0
North: Nolan Street North											
8	T	280	5.0	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	124	0.0	0.137	10.7	LOS A	0.6	3.9	0.49	0.77	46.3
Approach		404	3.5	0.148	3.3	NA	0.6	3.9	0.15	0.24	55.0
West: Life City Access											
10	L	124	0.0	0.880	46.2	LOS D	11.0	77.1	0.85	1.85	26.9
12	R	186	0.0	0.880	46.2	LOS D	11.0	77.1	0.85	1.61	26.9
Approach		311	0.0	0.880	46.2	LOS D	11.0	77.1	0.85	1.70	26.9
All Vehicles		1173	2.6	0.880	14.7	NA	11.0	77.1	0.28	0.64	43.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev PM
(Scenario 1)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	186	0.0	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	182	12.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		368	5.9	0.101	4.1	NA	0.0	0.0	0.00	0.34	53.9
North: Nolan Street North											
8	T	369	2.0	0.192	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	124	0.0	0.139	10.2	LOS A	0.5	3.6	0.44	0.73	46.8
Approach		494	1.5	0.192	2.6	NA	0.5	3.6	0.11	0.18	56.0
West: Life City Access											
10	L	124	0.0	0.866	44.4	LOS D	10.7	75.1	0.80	1.69	27.5
12	R	186	0.0	0.866	44.3	LOS D	10.7	75.1	0.80	1.55	27.5
Approach		311	0.0	0.866	44.4	LOS D	10.7	75.1	0.80	1.61	27.5
All Vehicles		1173	2.5	0.866	14.1	NA	10.7	75.1	0.26	0.61	43.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2031 + Growth + Dev AM
(Scenario 1)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	186	0.0	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	296	6.0	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		482	3.7	0.158	3.2	NA	0.0	0.0	0.00	0.26	55.2
North: Nolan Street North											
8	T	291	5.0	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	124	0.0	0.141	10.9	LOS A	0.6	4.0	0.50	0.78	46.1
Approach		415	3.5	0.154	3.3	NA	0.6	4.0	0.15	0.23	55.1
West: Life City Access											
10	L	124	0.0	0.934	59.8	LOS E	14.0	98.0	0.89	2.13	23.1
12	R	186	0.0	0.934	59.7	LOS E	14.0	98.0	0.89	1.81	23.1
Approach		311	0.0	0.934	59.8	LOS E	14.0	98.0	0.89	1.94	23.1
All Vehicles		1207	2.7	0.934	17.8	NA	14.0	98.0	0.28	0.68	40.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2031 + Growth + Dev PM
(Scenario 1)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	186	0.0	0.100	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	205	12.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		392	6.3	0.113	3.9	NA	0.0	0.0	0.00	0.32	54.2
North: Nolan Street North											
8	T	399	2.0	0.207	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	124	0.0	0.140	10.3	LOS A	0.5	3.6	0.45	0.74	46.6
Approach		523	1.5	0.207	2.4	NA	0.5	3.6	0.11	0.18	56.2
West: Life City Access											
10	L	124	0.0	0.946	65.4	LOS E	15.3	107.1	0.85	2.16	21.8
12	R	186	0.0	0.946	65.3	LOS E	15.3	107.1	0.85	1.84	21.8
Approach		311	0.0	0.946	65.3	LOS E	15.3	107.1	0.85	1.97	21.8
All Vehicles		1225	2.7	0.946	18.8	NA	15.3	107.1	0.26	0.67	39.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev AM
(Scenario 2)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.118	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	272	6.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		491	3.3	0.145	3.7	NA	0.0	0.0	0.00	0.30	54.5
North: Nolan Street North											
8	T	280	5.0	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	146	0.0	0.168	11.0	LOS A	0.7	4.8	0.51	0.79	46.0
Approach		426	3.3	0.168	3.8	NA	0.7	4.8	0.18	0.27	54.4
West: Life City Access											
10	L	146	0.0	1.102	150.6	LOS F	36.4	254.7	1.00	3.61	11.8
12	R	219	0.0	1.102	150.5	LOS F	36.4	254.7	1.00	2.84	11.8
Approach		365	0.0	1.102	150.5	LOS F	36.4	254.7	1.00	3.15	11.8
All Vehicles		1282	2.4	1.102	45.5	NA	36.4	254.7	0.34	1.10	26.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev PM
(Scenario 2)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.118	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	182	12.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		401	5.4	0.118	4.5	NA	0.0	0.0	0.00	0.36	53.4
North: Nolan Street North											
8	T	369	2.0	0.192	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	146	0.0	0.165	10.4	LOS A	0.6	4.4	0.46	0.75	46.6
Approach		516	1.4	0.192	3.0	NA	0.6	4.4	0.13	0.21	55.5
West: Life City Access											
10	L	146	0.0	1.085	139.5	LOS F	34.7	242.9	1.00	3.34	12.5
12	R	219	0.0	1.085	139.4	LOS F	34.7	242.9	1.00	2.66	12.5
Approach		365	0.0	1.085	139.4	LOS F	34.7	242.9	1.00	2.93	12.5
All Vehicles		1282	2.3	1.085	42.3	NA	34.7	242.9	0.34	1.03	27.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2031 + Growth + Dev AM
(Scenario 2)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.118	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	296	6.0	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		515	3.4	0.158	3.5	NA	0.0	0.0	0.00	0.28	54.8
North: Nolan Street North											
8	T	291	5.0	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	146	0.0	0.173	11.2	LOS A	0.7	4.9	0.53	0.80	45.8
Approach		437	3.3	0.173	3.7	NA	0.7	4.9	0.18	0.27	54.4
West: Life City Access											
10	L	146	0.0	1.171	206.3	LOS F	46.1	323.0	1.00	4.20	9.0
12	R	219	0.0	1.171	206.2	LOS F	46.1	323.0	1.00	3.28	9.0
Approach		365	0.0	1.171	206.2	LOS F	46.1	323.0	1.00	3.65	9.0
All Vehicles		1317	2.5	1.171	59.8	NA	46.1	323.0	0.34	1.21	22.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

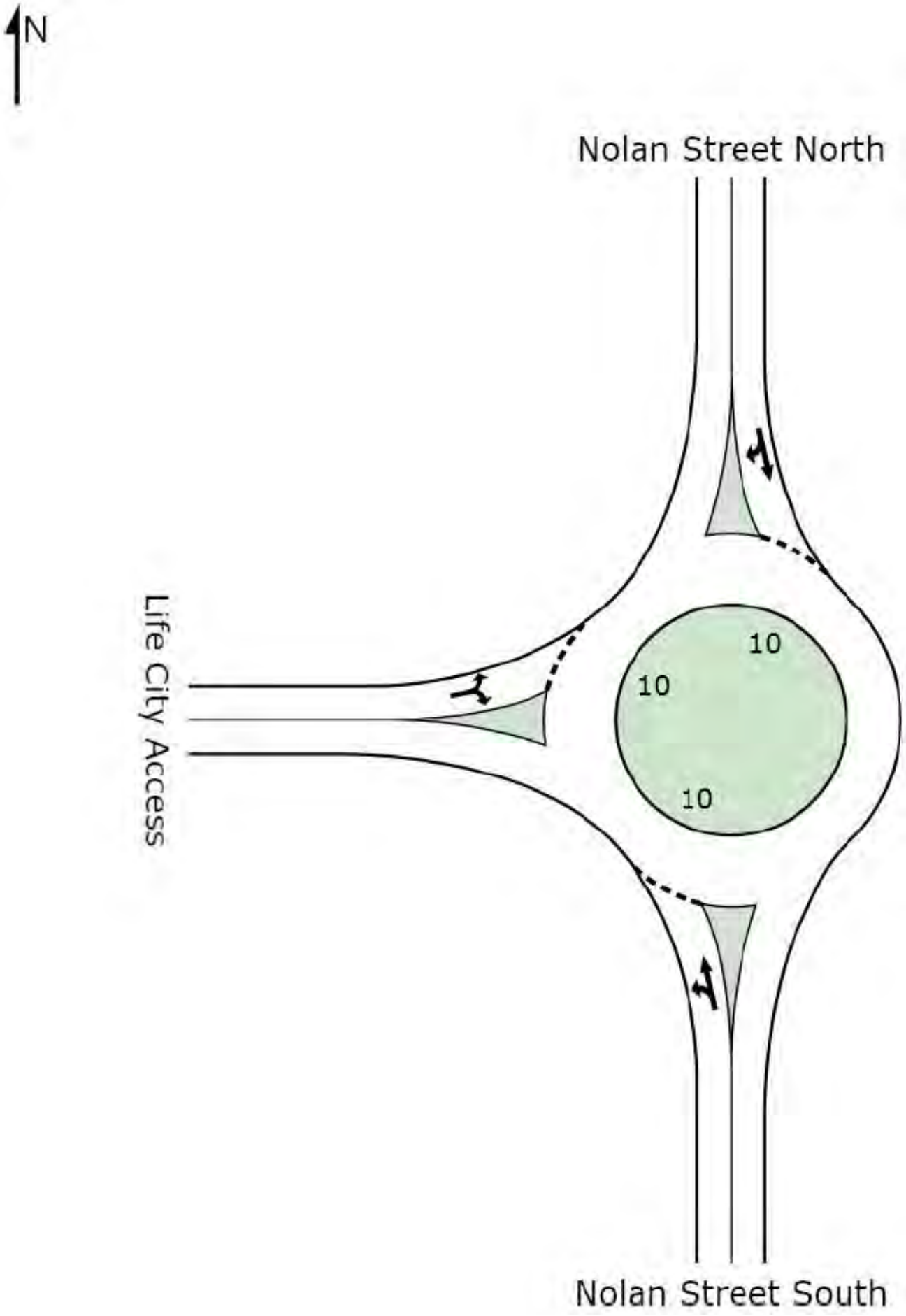
Site: Life City Access/Nolan Street
2031 + Growth + Dev PM
(Scenario 2)

Life City Access/Nolan Drive
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.118	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	205	12.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		424	5.8	0.118	4.2	NA	0.0	0.0	0.00	0.34	53.7
North: Nolan Street North											
8	T	399	2.0	0.207	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	146	0.0	0.167	10.6	LOS A	0.6	4.5	0.48	0.76	46.4
Approach		545	1.5	0.207	2.8	NA	0.6	4.5	0.13	0.20	55.7
West: Life City Access											
10	L	146	0.0	1.188	222.4	LOS F	49.2	344.1	1.00	4.35	8.5
12	R	219	0.0	1.188	222.3	LOS F	49.2	344.1	1.00	3.29	8.5
Approach		365	0.0	1.188	222.3	LOS F	49.2	344.1	1.00	3.71	8.5
All Vehicles		1335	2.4	1.188	63.3	NA	49.2	344.1	0.33	1.21	22.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.


N
Nolan Street North
Life City Access
10
10
10
Nolan Street South

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev AM
(Scenario 2)

Life City Access/Nolan Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.406	8.3	LOS A	3.3	23.9	0.49	0.61	47.8
2	T	272	6.0	0.406	7.8	LOS A	3.3	23.9	0.49	0.56	47.9
Approach		491	3.3	0.406	8.0	LOS A	3.3	23.9	0.49	0.58	47.9
North: Nolan Street North											
8	T	280	5.0	0.391	8.3	LOS A	3.0	21.9	0.58	0.61	47.3
9	R	146	0.0	0.391	12.7	LOS A	3.0	21.9	0.58	0.75	45.3
Approach		426	3.3	0.391	9.8	LOS A	3.0	21.9	0.58	0.66	46.6
West: Life City Access											
10	L	146	0.0	0.359	9.3	LOS A	2.6	18.3	0.61	0.67	46.8
12	R	219	0.0	0.359	13.1	LOS A	2.6	18.3	0.61	0.74	44.6
Approach		365	0.0	0.359	11.6	LOS A	2.6	18.3	0.61	0.72	45.4
All Vehicles		1282	2.4	0.406	9.6	LOS A	3.3	23.9	0.55	0.65	46.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2021 + Growth + Dev PM
(Scenario 2)

Life City Access/Nolan Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.346	8.3	LOS A	2.6	19.4	0.47	0.61	47.9
2	T	182	12.0	0.346	7.9	LOS A	2.6	19.4	0.47	0.56	48.0
Approach		401	5.4	0.346	8.1	LOS A	2.6	19.4	0.47	0.58	47.9
North: Nolan Street North											
8	T	369	2.0	0.464	8.4	LOS A	3.8	27.2	0.61	0.63	47.1
9	R	146	0.0	0.464	12.8	LOS A	3.8	27.2	0.61	0.76	45.3
Approach		516	1.4	0.464	9.6	LOS A	3.8	27.2	0.61	0.66	46.6
West: Life City Access											
10	L	146	0.0	0.325	8.6	LOS A	2.3	16.4	0.51	0.61	47.3
12	R	219	0.0	0.325	12.4	LOS A	2.3	16.4	0.51	0.71	44.9
Approach		365	0.0	0.325	10.9	LOS A	2.3	16.4	0.51	0.67	45.8
All Vehicles		1282	2.3	0.464	9.5	LOS A	3.8	27.2	0.54	0.64	46.8

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2031 + Growth + Dev AM
(Scenario 2)

Life City Access/Nolan Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.425	8.3	LOS A	3.6	25.6	0.50	0.61	47.8
2	T	296	6.0	0.425	7.8	LOS A	3.6	25.6	0.50	0.56	47.8
Approach		515	3.4	0.425	8.0	LOS A	3.6	25.6	0.50	0.58	47.8
North: Nolan Street North											
8	T	291	5.0	0.401	8.3	LOS A	3.2	22.8	0.59	0.62	47.2
9	R	146	0.0	0.401	12.7	LOS A	3.2	22.8	0.59	0.75	45.3
Approach		437	3.3	0.401	9.8	LOS A	3.2	22.8	0.59	0.66	46.6
West: Life City Access											
10	L	146	0.0	0.370	9.5	LOS A	2.7	18.9	0.63	0.69	46.7
12	R	219	0.0	0.370	13.3	LOS A	2.7	18.9	0.63	0.76	44.4
Approach		365	0.0	0.370	11.8	LOS A	2.7	18.9	0.63	0.73	45.3
All Vehicles		1317	2.5	0.425	9.7	LOS A	3.6	25.6	0.57	0.65	46.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Life City Access/Nolan Street
2031 + Growth + Dev PM
(Scenario 2)

Life City Access/Nolan Drive
Roundabout

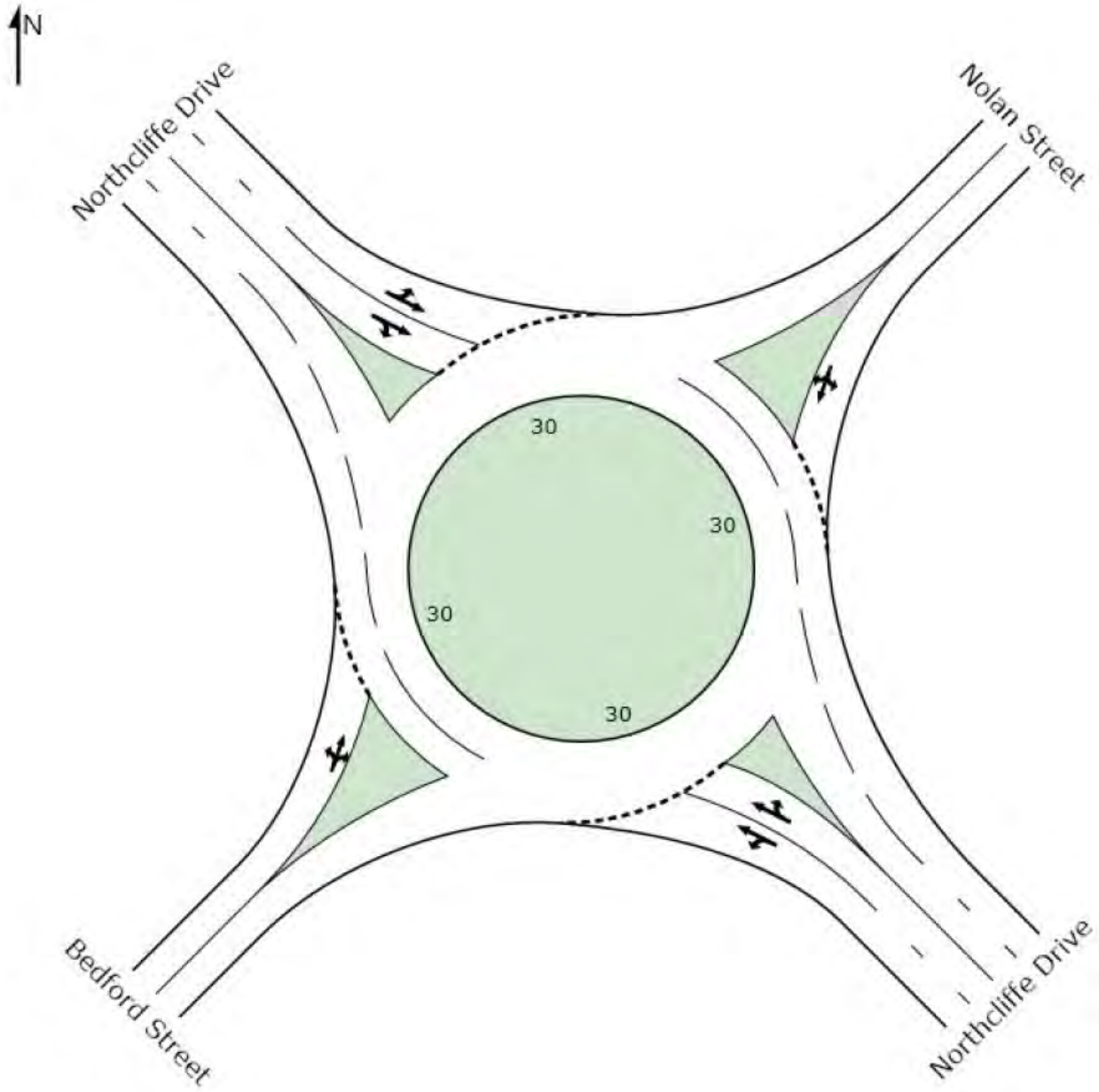
Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	219	0.0	0.366	8.3	LOS A	2.9	21.1	0.48	0.61	47.8
2	T	205	12.0	0.366	7.9	LOS A	2.9	21.1	0.48	0.56	47.9
Approach		424	5.8	0.366	8.1	LOS A	2.9	21.1	0.48	0.59	47.9
North: Nolan Street North											
8	T	399	2.0	0.490	8.4	LOS A	4.2	29.7	0.63	0.63	47.1
9	R	146	0.0	0.490	12.9	LOS A	4.2	29.7	0.63	0.76	45.2
Approach		545	1.5	0.490	9.6	LOS A	4.2	29.7	0.63	0.67	46.5
West: Life City Access											
10	L	146	0.0	0.336	8.8	LOS A	2.4	17.0	0.54	0.63	47.1
12	R	219	0.0	0.336	12.6	LOS A	2.4	17.0	0.54	0.72	44.8
Approach		365	0.0	0.336	11.1	LOS A	2.4	17.0	0.54	0.68	45.7
All Vehicles		1335	2.4	0.490	9.6	LOS A	4.2	29.7	0.56	0.64	46.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

Nolan Street – Northcliffe Drive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Northcliffe Drive
Nolan Street
Bedford Street
Northcliffe Drive
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MOVEMENT SUMMARY

Site: Nolan St / Princes Hwy 2012
Existing AM

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	555	5.0	0.461	10.5	LOS A	8.5	61.9	0.69	0.60	49.3
3	R	112	15.0	0.461	25.2	LOS B	4.7	36.0	0.86	0.84	39.1
Approach		666	6.7	0.461	13.0	LOS A	8.5	61.9	0.72	0.64	47.5
East: Nolan Street											
4	L	54	14.0	0.193	17.6	LOS B	0.9	6.8	0.58	0.71	37.7
6	R	229	8.0	0.490	28.7	LOS C	5.9	44.0	0.89	0.81	31.7
Approach		283	9.1	0.490	26.6	LOS B	5.9	44.0	0.83	0.79	32.7
North: Princes Hwy North											
7	L	308	7.0	0.673	21.9	LOS B	8.8	64.8	0.88	0.90	41.3
8	T	594	5.0	0.673	17.6	LOS B	11.1	81.2	0.91	0.80	41.9
Approach		902	5.7	0.673	19.0	LOS B	11.1	81.2	0.90	0.84	41.7
All Vehicles		1852	6.6	0.673	18.0	LOS B	11.1	81.2	0.82	0.76	41.8

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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan / Northcliffe 2012
Existing PM

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	11	0.0	0.239	7.7	LOS A	1.5	10.8	0.54	0.64	53.2
22	T	523	1.0	0.239	8.0	LOS A	1.5	10.8	0.55	0.61	53.8
23	R	56	11.0	0.239	13.4	LOS A	1.4	10.3	0.56	0.84	49.0
Approach		589	1.9	0.239	8.5	LOS A	1.5	10.8	0.55	0.63	53.3
North East: Nolan Street											
24	L	98	4.0	0.345	6.8	LOS A	1.6	11.2	0.53	0.62	44.3
25	T	40	3.0	0.345	4.3	LOS A	1.6	11.2	0.53	0.48	43.0
26	R	195	1.0	0.345	13.1	LOS A	1.6	11.2	0.53	0.84	42.0
Approach		333	2.1	0.345	10.2	LOS A	1.6	11.2	0.53	0.73	42.7
North West: Northcliffe Drive											
27	L	45	0.0	0.170	6.5	LOS A	1.0	6.9	0.25	0.54	55.0
28	T	318	2.0	0.170	6.7	LOS A	1.0	7.0	0.26	0.46	56.3
29	R	159	7.0	0.170	11.8	LOS A	1.0	7.0	0.27	0.70	49.1
Approach		522	3.3	0.170	8.2	LOS A	1.0	7.0	0.26	0.54	53.8
South West: Bedford Street											
30	L	24	0.0	0.085	7.2	LOS A	0.4	2.6	0.57	0.67	44.4
31	T	27	0.0	0.085	4.8	LOS A	0.4	2.6	0.57	0.54	43.1
32	R	17	6.0	0.085	13.7	LOS A	0.4	2.6	0.57	0.86	42.0
Approach		68	1.5	0.085	7.8	LOS A	0.4	2.6	0.57	0.67	43.2
All Vehicles		1513	2.4	0.345	8.7	LOS A	1.6	11.2	0.44	0.62	50.1

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2021
Existing + Growth + Dev AM
(Scenario 1)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	1	0.0	0.300	9.1	LOS A	2.2	16.5	0.73	0.74	52.1
22	T	462	8.0	0.300	9.7	LOS A	2.2	16.5	0.74	0.73	52.2
23	R	116	13.0	0.300	15.4	LOS B	2.0	14.9	0.74	0.87	46.9
Approach		579	9.0	0.300	10.8	LOS A	2.2	16.5	0.74	0.76	51.1
North East: Nolan Street											
24	L	118	11.0	0.568	8.4	LOS A	3.8	28.0	0.67	0.80	43.4
25	T	23	0.0	0.568	5.7	LOS A	3.8	28.0	0.67	0.69	41.8
26	R	385	3.0	0.568	14.6	LOS B	3.8	28.0	0.67	0.93	40.9
Approach		526	4.7	0.568	12.8	LOS A	3.8	28.0	0.67	0.89	41.5
North West: Northcliffe Drive											
27	L	213	0.0	0.246	6.9	LOS A	1.6	11.5	0.38	0.55	53.8
28	T	261	9.0	0.246	7.3	LOS A	1.6	11.5	0.39	0.50	54.8
29	R	208	11.0	0.246	12.3	LOS A	1.5	11.5	0.41	0.70	48.6
Approach		682	6.8	0.246	8.7	LOS A	1.6	11.5	0.39	0.58	52.4
South West: Bedford Street											
30	L	31	3.0	0.125	8.5	LOS A	0.6	4.3	0.68	0.78	44.0
31	T	46	2.0	0.125	6.0	LOS A	0.6	4.3	0.68	0.67	42.6
32	R	8	0.0	0.125	14.8	LOS B	0.6	4.3	0.68	0.92	41.3
Approach		85	2.2	0.125	7.8	LOS A	0.6	4.3	0.68	0.74	43.0
All Vehicles		1873	6.7	0.568	10.5	LOS A	3.8	28.0	0.59	0.73	47.8

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2021
Existing + Growth + Dev PM
(Scenario 1)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	13	0.0	0.390	9.5	LOS A	3.2	22.5	0.82	0.79	51.5
22	T	611	1.0	0.390	10.0	LOS A	3.2	22.5	0.82	0.77	51.6
23	R	112	11.0	0.390	15.8	LOS B	2.8	20.3	0.82	0.91	46.7
Approach		735	2.5	0.390	10.9	LOS A	3.2	22.5	0.82	0.79	50.8
North East: Nolan Street											
24	L	158	4.0	0.707	10.8	LOS A	6.0	42.6	0.80	1.01	41.8
25	T	45	3.0	0.707	8.3	LOS A	6.0	42.6	0.80	0.97	40.4
26	R	407	1.0	0.707	17.1	LOS B	6.0	42.6	0.80	1.08	39.4
Approach		611	1.9	0.707	14.8	LOS B	6.0	42.6	0.80	1.05	40.0
North West: Northcliffe Drive											
27	L	248	0.0	0.312	6.8	LOS A	2.2	15.4	0.39	0.55	53.8
28	T	438	2.0	0.312	7.0	LOS A	2.2	15.4	0.40	0.50	54.8
29	R	219	7.0	0.312	12.2	LOS A	2.1	15.3	0.41	0.73	48.9
Approach		905	2.7	0.312	8.2	LOS A	2.2	15.4	0.40	0.57	53.0
South West: Bedford Street											
30	L	24	0.0	0.114	9.1	LOS A	0.6	4.0	0.73	0.81	43.6
31	T	27	0.0	0.114	6.6	LOS A	0.6	4.0	0.73	0.74	42.0
32	R	17	6.0	0.114	15.6	LOS B	0.6	4.0	0.73	0.92	40.8
Approach		68	1.5	0.114	9.7	LOS A	0.6	4.0	0.73	0.81	42.2
All Vehicles		2319	2.4	0.707	10.8	LOS A	6.0	42.6	0.65	0.77	47.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2031
Existing + Growth + Dev AM
(Scenario 1)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	1	0.0	0.376	9.9	LOS A	3.0	22.2	0.81	0.79	51.6
22	T	545	8.0	0.376	10.5	LOS A	3.0	22.2	0.81	0.79	51.6
23	R	128	13.0	0.376	16.3	LOS B	2.6	19.8	0.81	0.91	46.1
Approach		675	8.9	0.376	11.6	LOS A	3.0	22.2	0.81	0.81	50.5
North East: Nolan Street											
24	L	120	11.0	0.631	9.8	LOS A	4.6	33.5	0.75	0.94	42.6
25	T	24	0.0	0.631	7.1	LOS A	4.6	33.5	0.75	0.87	41.2
26	R	393	3.0	0.631	16.0	LOS B	4.6	33.5	0.75	1.02	40.1
Approach		537	4.7	0.631	14.2	LOS A	4.6	33.5	0.75	1.00	40.6
North West: Northcliffe Drive											
27	L	220	0.0	0.308	7.0	LOS A	2.1	15.6	0.42	0.56	53.6
28	T	345	9.0	0.308	7.4	LOS A	2.1	15.6	0.43	0.52	54.5
29	R	276	11.0	0.308	12.5	LOS A	2.0	15.5	0.45	0.70	48.3
Approach		841	7.3	0.308	8.9	LOS A	2.1	15.6	0.44	0.59	52.1
South West: Bedford Street											
30	L	31	3.0	0.138	9.0	LOS A	0.7	4.9	0.72	0.82	43.8
31	T	46	2.0	0.138	6.5	LOS A	0.7	4.9	0.72	0.73	42.3
32	R	8	0.0	0.138	15.3	LOS B	0.7	4.9	0.72	0.94	41.1
Approach		85	2.2	0.138	8.3	LOS A	0.7	4.9	0.72	0.78	42.7
All Vehicles		2138	6.9	0.631	11.1	LOS A	4.6	33.5	0.64	0.77	47.6

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2031
Existing + Growth + Dev PM
(Scenario 1)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	14	0.0	0.477	10.6	LOS A	4.3	30.6	0.90	0.85	51.1
22	T	697	1.0	0.477	11.3	LOS A	4.3	30.6	0.90	0.87	50.8
23	R	121	11.0	0.477	17.8	LOS B	4.0	28.8	0.89	0.98	45.0
Approach		832	2.4	0.477	12.3	LOS A	4.3	30.6	0.90	0.88	49.9
North East: Nolan Street											
24	L	166	4.0	0.801	13.7	LOS A	8.0	56.9	0.88	1.15	39.6
25	T	48	3.0	0.801	11.3	LOS A	8.0	56.9	0.88	1.13	38.1
26	R	424	1.0	0.801	20.1	LOS B	8.0	56.9	0.88	1.19	37.6
Approach		639	1.9	0.801	17.7	LOS B	8.0	56.9	0.88	1.18	38.2
North West: Northcliffe Drive											
27	L	263	0.0	0.372	6.9	LOS A	2.8	19.8	0.43	0.56	53.5
28	T	537	2.0	0.372	7.1	LOS A	2.8	19.8	0.44	0.51	54.4
29	R	268	7.0	0.372	12.3	LOS A	2.7	19.6	0.46	0.72	48.8
Approach		1068	2.8	0.372	8.4	LOS A	2.8	19.8	0.44	0.58	52.7
South West: Bedford Street											
30	L	24	0.0	0.128	9.7	LOS A	0.7	4.6	0.77	0.85	43.1
31	T	27	0.0	0.128	7.3	LOS A	0.7	4.6	0.77	0.80	41.8
32	R	17	6.0	0.128	16.2	LOS B	0.7	4.6	0.77	0.95	40.4
Approach		68	1.5	0.128	10.3	LOS A	0.7	4.6	0.77	0.85	41.8
All Vehicles		2607	2.4	0.801	12.0	LOS A	8.0	56.9	0.70	0.83	46.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2021
Existing + Growth + Dev AM
(Scenario 2)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	1	0.0	0.316	9.4	LOS A	2.4	17.9	0.77	0.76	51.9
22	T	462	8.0	0.316	9.9	LOS A	2.4	17.9	0.77	0.75	51.9
23	R	124	13.0	0.316	15.7	LOS B	2.1	16.1	0.77	0.88	46.5
Approach		587	9.0	0.316	11.2	LOS A	2.4	17.9	0.77	0.77	50.7
North East: Nolan Street											
24	L	125	11.0	0.613	8.9	LOS A	4.5	33.1	0.70	0.86	43.2
25	T	23	0.0	0.613	6.2	LOS A	4.5	33.1	0.70	0.76	41.5
26	R	418	3.0	0.613	15.1	LOS B	4.5	33.1	0.70	0.95	40.6
Approach		566	4.6	0.613	13.3	LOS A	4.5	33.1	0.70	0.92	41.2
North West: Northcliffe Drive											
27	L	244	0.0	0.259	6.9	LOS A	1.7	12.3	0.40	0.55	53.6
28	T	261	9.0	0.259	7.3	LOS A	1.7	12.4	0.41	0.50	54.6
29	R	208	11.0	0.259	12.4	LOS A	1.6	12.4	0.43	0.71	48.6
Approach		714	6.5	0.259	8.7	LOS A	1.7	12.4	0.41	0.58	52.4
South West: Bedford Street											
30	L	31	3.0	0.130	8.8	LOS A	0.6	4.5	0.70	0.79	43.9
31	T	46	2.0	0.130	6.3	LOS A	0.6	4.5	0.70	0.70	42.5
32	R	8	0.0	0.130	15.1	LOS B	0.6	4.5	0.70	0.93	41.2
Approach		85	2.2	0.130	8.1	LOS A	0.6	4.5	0.70	0.76	42.8
All Vehicles		1953	6.5	0.613	10.7	LOS A	4.5	33.1	0.62	0.75	47.5

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2021
Existing + Growth + Dev PM
(Scenario 2)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	13	0.0	0.411	9.8	LOS A	3.5	24.4	0.85	0.80	51.3
22	T	611	1.0	0.411	10.3	LOS A	3.5	24.4	0.85	0.79	51.3
23	R	120	11.0	0.411	16.3	LOS B	3.0	22.1	0.85	0.92	46.3
Approach		743	2.6	0.411	11.3	LOS A	3.5	24.4	0.85	0.81	50.4
North East: Nolan Street											
24	L	165	4.0	0.756	11.8	LOS A	7.2	51.0	0.84	1.07	41.0
25	T	45	3.0	0.756	9.3	LOS A	7.2	51.0	0.84	1.03	39.6
26	R	439	1.0	0.756	18.1	LOS B	7.2	51.0	0.84	1.12	38.8
Approach		649	1.9	0.756	15.9	LOS B	7.2	51.0	0.84	1.10	39.3
North West: Northcliffe Drive											
27	L	281	0.0	0.326	6.9	LOS A	2.3	16.5	0.40	0.55	53.6
28	T	438	2.0	0.326	7.1	LOS A	2.3	16.5	0.42	0.51	54.6
29	R	219	7.0	0.326	12.2	LOS A	2.2	16.3	0.43	0.73	48.9
Approach		938	2.6	0.326	8.2	LOS A	2.3	16.5	0.42	0.57	52.9
South West: Bedford Street											
30	L	24	0.0	0.119	9.4	LOS A	0.6	4.3	0.75	0.82	43.3
31	T	27	0.0	0.119	7.0	LOS A	0.6	4.3	0.75	0.77	41.9
32	R	17	6.0	0.119	15.9	LOS B	0.6	4.3	0.75	0.93	40.6
Approach		68	1.5	0.119	10.0	LOS A	0.6	4.3	0.75	0.83	42.0
All Vehicles		2399	2.4	0.756	11.3	LOS A	7.2	51.0	0.67	0.80	47.2

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2031
Existing + Growth + Dev AM
(Scenario 2)

Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	1	0.0	0.397	10.2	LOS A	3.2	24.1	0.85	0.81	51.4
22	T	545	8.0	0.397	10.8	LOS A	3.2	24.1	0.85	0.81	51.3
23	R	137	13.0	0.397	16.8	LOS B	2.8	21.5	0.84	0.93	45.6
Approach		683	9.0	0.397	12.0	LOS A	3.2	24.1	0.85	0.83	50.1
North East: Nolan Street											
24	L	128	11.0	0.683	10.5	LOS A	5.5	40.1	0.79	0.98	42.0
25	T	24	0.0	0.683	7.9	LOS A	5.5	40.1	0.79	0.94	40.7
26	R	425	3.0	0.683	16.7	LOS B	5.5	40.1	0.79	1.06	39.6
Approach		578	4.7	0.683	15.0	LOS B	5.5	40.1	0.79	1.04	40.1
North West: Northcliffe Drive											
27	L	253	0.0	0.323	7.0	LOS A	2.3	16.6	0.44	0.56	53.4
28	T	345	9.0	0.323	7.4	LOS A	2.3	16.6	0.45	0.52	54.2
29	R	276	11.0	0.323	12.5	LOS A	2.2	16.5	0.47	0.71	48.3
Approach		874	7.0	0.323	8.9	LOS A	2.3	16.6	0.45	0.59	52.0
South West: Bedford Street											
30	L	31	3.0	0.143	9.3	LOS A	0.7	5.2	0.74	0.83	43.6
31	T	46	2.0	0.143	6.8	LOS A	0.7	5.2	0.74	0.76	42.2
32	R	8	0.0	0.143	15.6	LOS B	0.7	5.2	0.74	0.95	40.9
Approach		85	2.2	0.143	8.6	LOS A	0.7	5.2	0.74	0.81	42.6
All Vehicles		2220	6.8	0.683	11.4	LOS A	5.5	40.1	0.67	0.79	47.2

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Nolan / Northcliffe 2031
Existing + Growth + Dev PM
(Scenario 2)

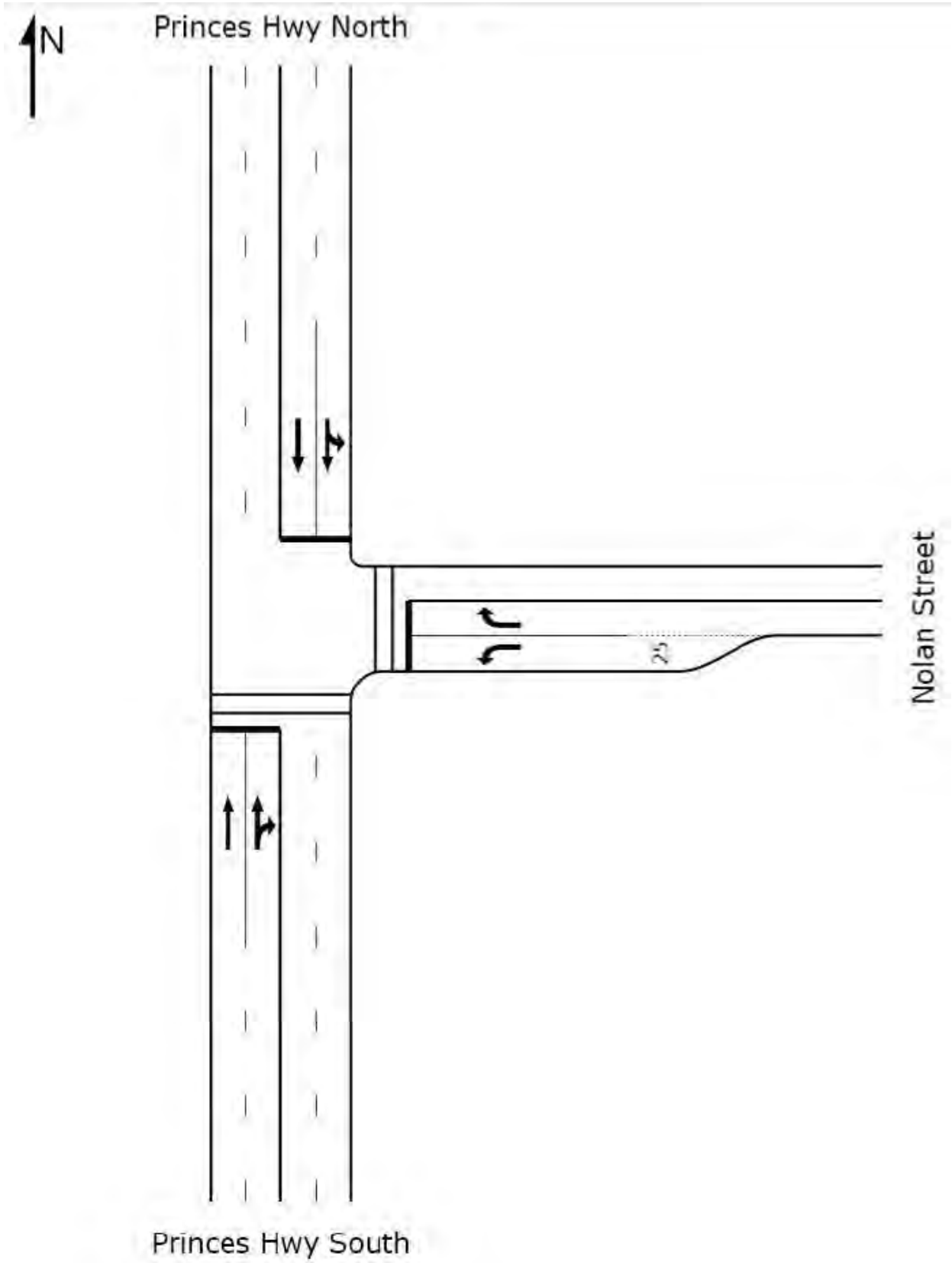
Nolan St / Northcliffe Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	14	0.0	0.506	11.4	LOS A	5.0	35.0	0.94	0.89	50.8
22	T	697	1.0	0.506	12.2	LOS A	5.0	35.0	0.93	0.91	50.2
23	R	129	11.0	0.506	18.8	LOS B	4.4	32.3	0.92	1.01	44.1
Approach		840	2.5	0.506	13.2	LOS A	5.0	35.0	0.93	0.93	49.2
North East: Nolan Street											
24	L	175	4.0	0.859	16.4	LOS B	10.3	73.2	0.93	1.27	37.9
25	T	48	3.0	0.859	13.9	LOS A	10.3	73.2	0.93	1.26	36.3
26	R	457	1.0	0.859	22.7	LOS B	10.3	73.2	0.93	1.30	36.2
Approach		680	1.9	0.859	20.4	LOS B	10.3	73.2	0.93	1.29	36.6
North West: Northcliffe Drive											
27	L	295	0.0	0.386	7.0	LOS A	3.0	21.1	0.45	0.56	53.4
28	T	537	2.0	0.386	7.2	LOS A	3.0	21.1	0.46	0.52	54.2
29	R	268	7.0	0.386	12.3	LOS A	2.8	20.7	0.48	0.73	48.8
Approach		1100	2.7	0.386	8.4	LOS A	3.0	21.1	0.46	0.58	52.6
South West: Bedford Street											
30	L	24	0.0	0.134	10.1	LOS A	0.7	5.0	0.79	0.86	42.7
31	T	27	0.0	0.134	7.7	LOS A	0.7	5.0	0.79	0.82	41.5
32	R	17	6.0	0.134	16.6	LOS B	0.7	5.0	0.79	0.95	40.2
Approach		68	1.5	0.134	10.7	LOS A	0.7	5.0	0.79	0.87	41.6
All Vehicles		2688	2.4	0.859	13.0	LOS A	10.3	73.2	0.73	0.88	46.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Nolan Street – Princes Highway


N
Princes Hwy North
Nolan Street
Princes Hwy South

MOVEMENT SUMMARY

Site: Nolan St / Princes Hwy 2012
Existing AM

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	555	5.0	0.461	10.5	LOS A	8.5	61.9	0.69	0.60	49.3
3	R	112	15.0	0.461	25.2	LOS B	4.7	36.0	0.86	0.84	39.1
Approach		666	6.7	0.461	13.0	LOS A	8.5	61.9	0.72	0.64	47.5
East: Nolan Street											
4	L	54	14.0	0.193	17.6	LOS B	0.9	6.8	0.58	0.71	37.7
6	R	229	8.0	0.490	28.7	LOS C	5.9	44.0	0.89	0.81	31.7
Approach		283	9.1	0.490	26.6	LOS B	5.9	44.0	0.83	0.79	32.7
North: Princes Hwy North											
7	L	308	7.0	0.673	21.9	LOS B	8.8	64.8	0.88	0.90	41.3
8	T	594	5.0	0.673	17.6	LOS B	11.1	81.2	0.91	0.80	41.9
Approach		902	5.7	0.673	19.0	LOS B	11.1	81.2	0.90	0.84	41.7
All Vehicles		1852	6.6	0.673	18.0	LOS B	11.1	81.2	0.82	0.76	41.8

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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan St / Princes Hwy 2012
Existing PM

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	515	3.0	0.340	10.1	LOS A	5.8	41.7	0.66	0.55	50.0
3	R	51	23.0	0.340	21.3	LOS B	4.5	33.4	0.72	0.94	43.7
Approach		565	4.8	0.340	11.1	LOS A	5.8	41.7	0.66	0.59	49.4
East: Nolan Street											
4	L	111	4.0	0.359	17.0	LOS B	1.8	12.9	0.58	0.73	37.8
6	R	307	2.0	0.592	28.4	LOS B	8.0	57.1	0.91	0.83	31.8
Approach		418	2.5	0.592	25.4	LOS B	8.0	57.1	0.83	0.80	33.2
North: Princes Hwy North											
7	L	228	6.0	0.590	22.0	LOS B	7.1	51.6	0.86	0.89	41.4
8	T	524	2.0	0.590	17.2	LOS B	9.1	64.8	0.88	0.76	42.3
Approach		753	3.2	0.590	18.7	LOS B	9.1	64.8	0.88	0.80	42.0
All Vehicles		1736	3.6	0.592	17.8	LOS B	9.1	64.8	0.80	0.73	41.4

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 used.

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	Across S approach	53	23.4	LOS C	0.1	0.1	0.88	0.88
P3	Across E approach	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		106	21.3	LOS C			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: Nolan St / Princes Hwy 2021
Existing + Growth + Dev AM
(Scenario 1)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	692	5.0	0.600	11.6	LOS A	12.3	89.5	0.76	0.67	47.9
3	R	139	15.0	0.600	28.9	LOS C	6.0	46.1	0.95	0.84	36.5
Approach		831	6.7	0.600	14.5	LOS B	12.3	89.5	0.79	0.70	45.8
East: Nolan Street											
4	L	57	14.0	0.205	17.6	LOS B	0.9	7.2	0.58	0.71	37.6
6	R	273	8.0	0.582	29.4	LOS C	7.2	53.9	0.92	0.82	31.4
Approach		329	9.0	0.582	27.3	LOS B	7.2	53.9	0.86	0.81	32.4
North: Princes Hwy North											
7	L	394	7.0	0.806	27.5	LOS B	14.0	103.6	0.95	1.00	37.1
8	T	698	5.0	0.806	22.8	LOS B	15.6	113.9	0.97	0.95	38.1
Approach		1092	5.7	0.806	24.5	LOS B	15.6	113.9	0.96	0.97	37.8
All Vehicles		2252	6.6	0.806	21.2	LOS B	15.6	113.9	0.88	0.84	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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan St / Princes Hwy 2021
Existing + Growth + Dev PM
(Scenario 1)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	651	3.0	0.445	11.2	LOS A	8.1	58.5	0.71	0.61	48.6
3	R	64	23.0	0.445	23.4	LOS B	6.0	44.6	0.79	0.91	42.0
Approach		715	4.8	0.445	12.3	LOS A	8.1	58.5	0.72	0.63	48.0
East: Nolan Street											
4	L	129	4.0	0.421	17.1	LOS B	2.1	15.3	0.59	0.74	37.8
6	R	391	2.0	0.753	31.9	LOS C	11.5	82.1	0.97	0.91	30.3
Approach		520	2.5	0.753	28.2	LOS B	11.5	82.1	0.87	0.87	31.9
North: Princes Hwy North											
7	L	307	6.0	0.731	24.9	LOS B	10.7	77.5	0.92	0.94	39.1
8	T	634	2.0	0.731	20.0	LOS B	12.5	89.2	0.94	0.87	40.0
Approach		941	3.3	0.731	21.6	LOS B	12.5	89.2	0.93	0.89	39.7
All Vehicles		2176	3.6	0.753	20.1	LOS B	12.5	89.2	0.85	0.80	39.6

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 used.

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	Across S approach	53	23.4	LOS C	0.1	0.1	0.88	0.88
P3	Across E approach	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		106	21.3	LOS C			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: Nolan St / Princes Hwy 2031
Existing + Growth + Dev AM
(Scenario 1)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	781	5.0	0.686	12.6	LOS A	15.0	109.8	0.81	0.73	46.8
3	R	157	15.0	0.686	32.0	LOS C	7.0	53.5	0.98	0.90	34.7
Approach		938	6.7	0.686	15.8	LOS B	15.0	109.8	0.84	0.76	44.5
East: Nolan Street											
4	L	57	14.0	0.205	17.6	LOS B	0.9	7.2	0.58	0.71	37.6
6	R	273	8.0	0.582	29.4	LOS C	7.2	53.9	0.92	0.82	31.4
Approach		329	9.0	0.582	27.3	LOS B	7.2	53.9	0.86	0.81	32.4
North: Princes Hwy North											
7	L	414	7.0	0.850	31.5	LOS C	16.8	124.1	0.97	1.05	34.7
8	T	737	5.0	0.850	26.2	LOS B	17.8	129.8	0.99	1.02	36.0
Approach		1151	5.7	0.850	28.1	LOS B	17.8	129.8	0.98	1.03	35.6
All Vehicles		2418	6.5	0.850	23.2	LOS B	17.8	129.8	0.91	0.89	38.0

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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan St / Princes Hwy 2031
Existing + Growth + Dev PM
(Scenario 1)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	777	3.0	0.543	12.3	LOS A	10.7	76.5	0.76	0.66	47.3
3	R	76	23.0	0.543	25.5	LOS B	7.5	55.9	0.86	0.89	40.5
Approach		853	4.8	0.543	13.5	LOS A	10.7	76.5	0.77	0.68	46.7
East: Nolan Street											
4	L	140	4.0	0.455	17.2	LOS B	2.3	16.7	0.59	0.74	37.7
6	R	420	2.0	0.810	34.5	LOS C	13.3	94.6	0.99	0.96	29.3
Approach		560	2.5	0.810	30.2	LOS C	13.3	94.6	0.89	0.90	31.0
North: Princes Hwy North											
7	L	343	6.0	0.823	30.3	LOS C	14.8	107.2	0.97	1.02	35.5
8	T	716	2.0	0.823	24.6	LOS B	15.9	113.4	0.98	0.98	36.9
Approach		1059	3.3	0.823	26.5	LOS B	15.9	113.4	0.98	0.99	36.5
All Vehicles		2472	3.6	0.823	22.8	LOS B	15.9	113.4	0.89	0.86	37.9

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 used.

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	Across S approach	53	23.4	LOS C	0.1	0.1	0.88	0.88
P3	Across E approach	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		106	21.3	LOS C			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: Nolan St / Princes Hwy 2021
Existing + Growth + Dev AM
(Scenario 2)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	692	5.0	0.600	11.6	LOS A	12.3	89.6	0.76	0.67	47.9
3	R	139	15.0	0.600	29.0	LOS C	6.0	46.1	0.95	0.84	36.5
Approach		831	6.7	0.600	14.5	LOS B	12.3	89.6	0.79	0.70	45.8
East: Nolan Street											
4	L	57	14.0	0.205	17.6	LOS B	0.9	7.2	0.58	0.71	37.6
6	R	278	8.0	0.593	29.4	LOS C	7.4	55.1	0.92	0.83	31.4
Approach		335	9.0	0.593	27.4	LOS B	7.4	55.1	0.86	0.81	32.3
North: Princes Hwy North											
7	L	399	7.0	0.809	27.6	LOS B	14.1	104.3	0.95	1.00	37.1
8	T	698	5.0	0.809	22.9	LOS B	15.7	114.7	0.97	0.95	38.0
Approach		1097	5.7	0.809	24.6	LOS B	15.7	114.7	0.96	0.97	37.7
All Vehicles		2262	6.6	0.809	21.3	LOS B	15.7	114.7	0.88	0.85	39.3

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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan St / Princes Hwy 2021
Existing + Growth + Dev PM
(Scenario 2)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	651	3.0	0.445	11.2	LOS A	8.2	58.5	0.71	0.61	48.6
3	R	64	23.0	0.445	23.4	LOS B	6.0	44.6	0.80	0.91	42.0
Approach		715	4.8	0.445	12.3	LOS A	8.2	58.5	0.72	0.64	48.0
East: Nolan Street											
4	L	129	4.0	0.421	17.1	LOS B	2.1	15.3	0.59	0.74	37.8
6	R	396	2.0	0.763	32.3	LOS C	11.8	84.1	0.97	0.92	30.1
Approach		525	2.5	0.763	28.6	LOS C	11.8	84.1	0.88	0.87	31.7
North: Princes Hwy North											
7	L	313	6.0	0.734	24.9	LOS B	10.7	78.0	0.92	0.94	39.1
8	T	634	2.0	0.734	20.1	LOS B	12.6	89.8	0.94	0.87	40.0
Approach		946	3.3	0.734	21.7	LOS B	12.6	89.8	0.93	0.89	39.7
All Vehicles		2186	3.6	0.763	20.3	LOS B	12.6	89.8	0.85	0.80	39.6

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 used.

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	Across S approach	53	23.4	LOS C	0.1	0.1	0.88	0.88
P3	Across E approach	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		106	21.3	LOS C			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: Nolan St / Princes Hwy 2031
Existing + Growth + Dev AM
(Scenario 2)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	781	5.0	0.686	12.6	LOS A	15.0	109.9	0.81	0.73	46.8
3	R	157	15.0	0.686	32.0	LOS C	7.0	53.5	0.98	0.90	34.7
Approach		938	6.7	0.686	15.8	LOS B	15.0	109.9	0.84	0.76	44.5
East: Nolan Street											
4	L	57	14.0	0.205	17.6	LOS B	0.9	7.2	0.58	0.71	37.6
6	R	278	8.0	0.593	29.4	LOS C	7.4	55.1	0.92	0.83	31.4
Approach		335	9.0	0.593	27.4	LOS B	7.4	55.1	0.86	0.81	32.3
North: Princes Hwy North											
7	L	419	7.0	0.853	31.6	LOS C	17.0	125.2	0.97	1.05	34.6
8	T	737	5.0	0.853	26.4	LOS B	17.9	130.9	0.99	1.03	35.9
Approach		1156	5.7	0.853	28.3	LOS B	17.9	130.9	0.98	1.03	35.5
All Vehicles		2428	6.5	0.853	23.4	LOS B	17.9	130.9	0.91	0.90	37.9

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 used.

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	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	18.4	LOS B	0.1	0.1	0.78	0.78
All Pedestrians		106	21.4	LOS C			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: Nolan St / Princes Hwy 2031
Existing + Growth + Dev PM
(Scenario 2)

Nolan Street / Princes Hwy
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Princes Hwy South											
2	T	777	3.0	0.543	12.3	LOS A	10.7	76.5	0.76	0.66	47.3
3	R	76	23.0	0.543	25.5	LOS B	7.5	55.9	0.86	0.89	40.5
Approach		853	4.8	0.543	13.5	LOS A	10.7	76.5	0.77	0.68	46.7
East: Nolan Street											
4	L	140	4.0	0.455	17.2	LOS B	2.3	16.7	0.59	0.74	37.7
6	R	426	2.0	0.822	35.3	LOS C	13.7	97.7	0.99	0.97	29.0
Approach		566	2.5	0.822	30.8	LOS C	13.7	97.7	0.89	0.91	30.8
North: Princes Hwy North											
7	L	348	6.0	0.826	30.4	LOS C	14.9	108.2	0.97	1.02	35.5
8	T	716	2.0	0.826	24.8	LOS B	16.0	114.3	0.98	0.99	36.8
Approach		1064	3.3	0.826	26.6	LOS B	16.0	114.3	0.98	1.00	36.4
All Vehicles		2483	3.6	0.826	23.1	LOS B	16.0	114.3	0.89	0.87	37.7

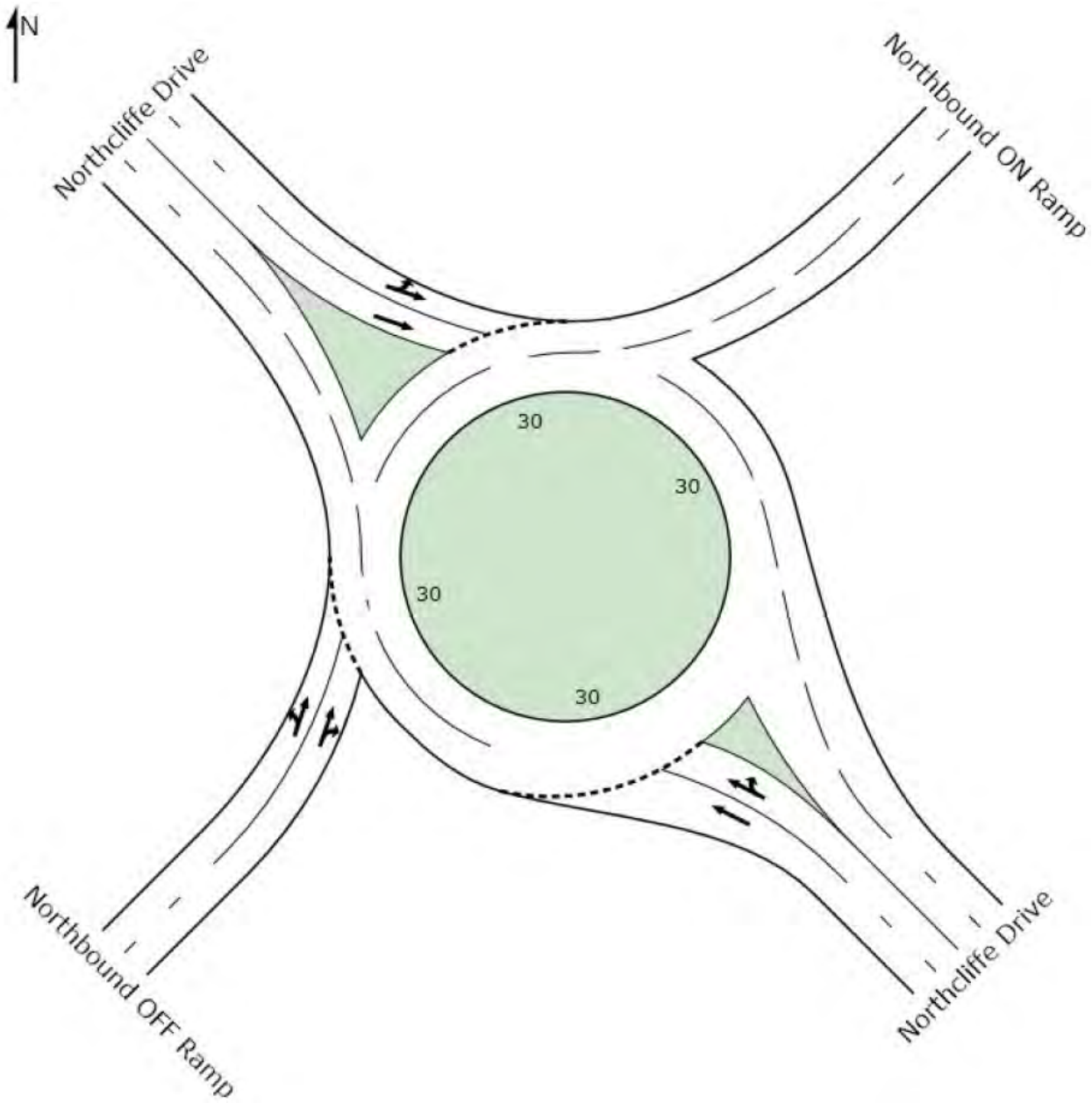
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

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	Across S approach	53	23.4	LOS C	0.1	0.1	0.88	0.88
P3	Across E approach	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		106	21.3	LOS C			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.

Northcliffe Drive – Southern Freeway Northbound On/Off Ramps


N
Northcliffe Drive
Northbound ON Ramp
30
30
30
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Northbound OFF Ramp
Northcliffe Drive

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2012 Existing AM

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	320	11.0	0.145	6.6	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	169	6.0	0.145	15.4	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		489	9.3	0.145	9.6	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	217	13.0	0.367	12.4	LOS A	2.2	16.8	0.66	0.79	56.5
28	T	456	9.0	0.367	9.7	LOS A	2.2	16.8	0.66	0.73	52.9
Approach		673	10.3	0.367	10.5	LOS A	2.2	16.8	0.66	0.75	54.1
South West: Northbound OFF Ramp											
30	L	307	8.0	0.314	8.6	LOS A	1.3	9.8	0.49	0.68	49.5
31	T	1	0.0	0.314	8.5	LOS A	1.3	9.8	0.49	0.64	53.8
32	R	420	4.0	0.347	14.0	LOS A	1.5	11.1	0.47	0.78	45.4
Approach		728	5.7	0.347	11.7	LOS A	1.5	11.1	0.48	0.74	47.0
All Vehicles		1891	8.3	0.367	10.8	LOS A	2.2	16.8	0.42	0.70	52.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2012 Existing PM

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	335	5.0	0.122	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	94	1.0	0.122	15.2	LOS B	0.0	0.0	0.00	0.86	55.4
Approach		428	4.1	0.122	8.3	LOS A	0.0	0.0	0.00	0.56	57.9
North West: Northcliffe Drive											
27	L	171	4.0	0.367	11.4	LOS A	2.2	16.0	0.62	0.76	56.8
28	T	578	3.0	0.367	8.9	LOS A	2.2	16.0	0.63	0.68	53.2
Approach		748	3.2	0.367	9.5	LOS A	2.2	16.0	0.62	0.70	54.1
South West: Northbound OFF Ramp											
30	L	224	7.0	0.234	8.3	LOS A	0.9	6.9	0.45	0.66	49.7
31	T	1	0.0	0.234	8.3	LOS A	0.9	6.9	0.45	0.62	54.2
32	R	435	3.0	0.349	13.8	LOS A	1.6	11.2	0.45	0.76	45.5
Approach		660	4.4	0.349	11.9	LOS A	1.6	11.2	0.45	0.73	46.8
All Vehicles		1837	3.8	0.367	10.1	LOS A	2.2	16.0	0.41	0.68	52.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2021 Existing + Growth + Dev AM (Scenario 1)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	395	11.0	0.179	6.6	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	208	6.0	0.179	15.4	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		603	9.3	0.179	9.6	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	215	13.0	0.449	14.7	LOS B	3.2	24.8	0.80	0.92	54.9
28	T	471	9.0	0.449	12.3	LOS A	3.2	24.8	0.80	0.91	51.1
Approach		685	10.3	0.449	13.1	LOS A	3.2	24.8	0.80	0.91	52.4
South West: Northbound OFF Ramp											
30	L	400	8.0	0.435	9.5	LOS A	2.1	15.8	0.58	0.78	48.9
31	T	1	0.0	0.435	9.5	LOS A	2.1	15.8	0.58	0.73	53.1
32	R	584	4.0	0.499	15.0	LOS B	2.7	19.8	0.57	0.87	45.0
Approach		985	5.6	0.499	12.8	LOS A	2.7	19.8	0.57	0.84	46.5
All Vehicles		2274	8.0	0.499	12.0	LOS A	3.2	24.8	0.49	0.79	50.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2021 Existing + Growth + Dev PM (Scenario 1)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	409	5.0	0.185	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
23	R	240	1.0	0.185	15.2	LOS B	0.0	0.0	0.00	0.79	55.4
Approach		649	3.5	0.185	9.7	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	184	4.0	0.534	15.9	LOS B	4.7	33.6	0.87	0.98	53.5
28	T	643	3.0	0.534	13.8	LOS A	4.7	33.6	0.86	0.98	49.4
Approach		827	3.2	0.534	14.3	LOS A	4.7	33.6	0.86	0.98	50.4
South West: Northbound OFF Ramp											
30	L	295	7.0	0.343	9.3	LOS A	1.4	10.6	0.55	0.75	49.1
31	T	1	0.0	0.343	9.2	LOS A	1.4	10.6	0.55	0.69	53.3
32	R	608	3.0	0.522	15.2	LOS B	3.0	21.5	0.59	0.89	45.0
Approach		904	4.3	0.522	13.2	LOS A	3.0	21.5	0.58	0.84	46.2
All Vehicles		2381	3.7	0.534	12.6	LOS A	4.7	33.6	0.52	0.82	50.4

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2031 Existing + Growth + Dev AM (Scenario 1)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	554	11.0	0.251	6.6	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	293	6.0	0.251	15.4	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		846	9.3	0.251	9.6	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	299	13.0	0.685	21.3	LOS B	7.7	59.0	0.95	1.15	48.7
28	T	647	9.0	0.685	19.2	LOS B	7.7	59.0	0.94	1.14	44.4
Approach		946	10.3	0.685	19.9	LOS B	7.7	59.0	0.95	1.14	45.8
South West: Northbound OFF Ramp											
30	L	408	8.0	0.490	11.0	LOS A	2.6	19.3	0.65	0.88	47.9
31	T	1	0.0	0.490	10.9	LOS A	2.6	19.3	0.65	0.86	52.5
32	R	595	4.0	0.541	16.1	LOS B	3.2	23.3	0.64	0.95	44.5
Approach		1004	5.6	0.541	14.0	LOS A	3.2	23.3	0.65	0.93	45.7
All Vehicles		2797	8.3	0.685	14.7	LOS B	7.7	59.0	0.55	0.90	48.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2031 Existing + Growth + Dev PM (Scenario 1)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	623	5.0	0.263	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	300	1.0	0.263	15.2	LOS B	0.0	0.0	0.00	0.82	55.4
Approach		923	3.7	0.263	9.3	LOS A	0.0	0.0	0.00	0.58	57.5
North West: Northcliffe Drive											
27	L	224	4.0	0.722	23.0	LOS B	9.3	66.7	0.99	1.21	47.0
28	T	779	3.0	0.722	21.3	LOS B	9.3	66.7	0.98	1.20	42.6
Approach		1003	3.2	0.722	21.7	LOS B	9.3	66.7	0.99	1.20	43.6
South West: Northbound OFF Ramp											
30	L	312	7.0	0.398	10.6	LOS A	1.8	13.4	0.62	0.85	48.2
31	T	1	0.0	0.398	10.6	LOS A	1.8	13.4	0.62	0.82	52.8
32	R	642	3.0	0.589	16.6	LOS B	3.8	27.4	0.68	0.98	44.0
Approach		955	4.3	0.589	14.6	LOS B	3.8	27.4	0.66	0.94	45.2
All Vehicles		2881	3.7	0.722	15.4	LOS B	9.3	66.7	0.56	0.92	48.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2021 Existing + Growth + Dev AM (Scenario 2)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	395	11.0	0.179	6.6	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	208	6.0	0.179	15.4	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		603	9.3	0.179	9.6	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	215	13.0	0.454	14.9	LOS B	3.3	25.4	0.81	0.92	54.8
28	T	474	9.0	0.454	12.5	LOS A	3.3	25.4	0.80	0.91	51.0
Approach		688	10.2	0.454	13.2	LOS A	3.3	25.4	0.80	0.92	52.3
South West: Northbound OFF Ramp											
30	L	400	8.0	0.436	9.6	LOS A	2.1	15.8	0.58	0.79	48.9
31	T	1	0.0	0.436	9.5	LOS A	2.1	15.8	0.58	0.73	53.1
32	R	591	4.0	0.504	15.0	LOS B	2.8	20.3	0.58	0.87	45.0
Approach		992	5.6	0.504	12.8	LOS A	2.8	20.3	0.58	0.84	46.5
All Vehicles		2283	8.0	0.504	12.1	LOS A	3.3	25.4	0.49	0.80	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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2021 Existing + Growth + Dev PM (Scenario 2)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	413	5.0	0.192	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
23	R	262	1.0	0.192	15.2	LOS B	0.0	0.0	0.00	0.79	55.4
Approach		675	3.4	0.192	9.8	LOS A	0.0	0.0	0.00	0.60	57.3
North West: Northcliffe Drive											
27	L	184	4.0	0.553	16.7	LOS B	5.0	36.3	0.89	1.01	52.7
28	T	647	3.0	0.553	14.7	LOS B	5.0	36.3	0.88	1.01	48.5
Approach		832	3.2	0.553	15.1	LOS B	5.0	36.3	0.88	1.01	49.5
South West: Northbound OFF Ramp											
30	L	295	7.0	0.348	9.4	LOS A	1.4	10.7	0.56	0.75	49.0
31	T	1	0.0	0.348	9.3	LOS A	1.4	10.7	0.56	0.70	53.3
32	R	616	3.0	0.532	15.3	LOS B	3.1	22.4	0.60	0.90	44.9
Approach		912	4.3	0.532	13.4	LOS A	3.1	22.4	0.59	0.85	46.1
All Vehicles		2418	3.7	0.553	13.0	LOS A	5.0	36.3	0.52	0.84	50.1

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Processed: Friday, 9 November 2012 9:35:59 AM
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Project: G:\21\21878\Tech\SIDRA Modelling\Northcliffe Dr_Freeway ON-OFF ramp NTHBD.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2031 Existing + Growth + Dev AM (Scenario 2)

Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	554	11.0	0.251	6.6	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	293	6.0	0.251	15.4	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		846	9.3	0.251	9.6	LOS A	0.0	0.0	0.00	0.59	57.4
North West: Northcliffe Drive											
27	L	299	13.0	0.692	21.7	LOS B	7.9	60.6	0.96	1.16	48.3
28	T	651	9.0	0.692	19.6	LOS B	7.9	60.6	0.95	1.15	44.0
Approach		949	10.3	0.692	20.3	LOS B	7.9	60.6	0.95	1.15	45.5
South West: Northbound OFF Ramp											
30	L	408	8.0	0.491	11.0	LOS A	2.6	19.3	0.65	0.88	47.8
31	T	1	0.0	0.491	11.0	LOS A	2.6	19.3	0.65	0.86	52.5
32	R	601	4.0	0.547	16.1	LOS B	3.3	23.8	0.65	0.96	44.4
Approach		1011	5.6	0.547	14.0	LOS A	3.3	23.8	0.65	0.93	45.7
All Vehicles		2806	8.3	0.692	14.8	LOS B	7.9	60.6	0.56	0.90	48.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe/Northbd on/off ramps 2031 Existing + Growth + Dev PM (Scenario 2)

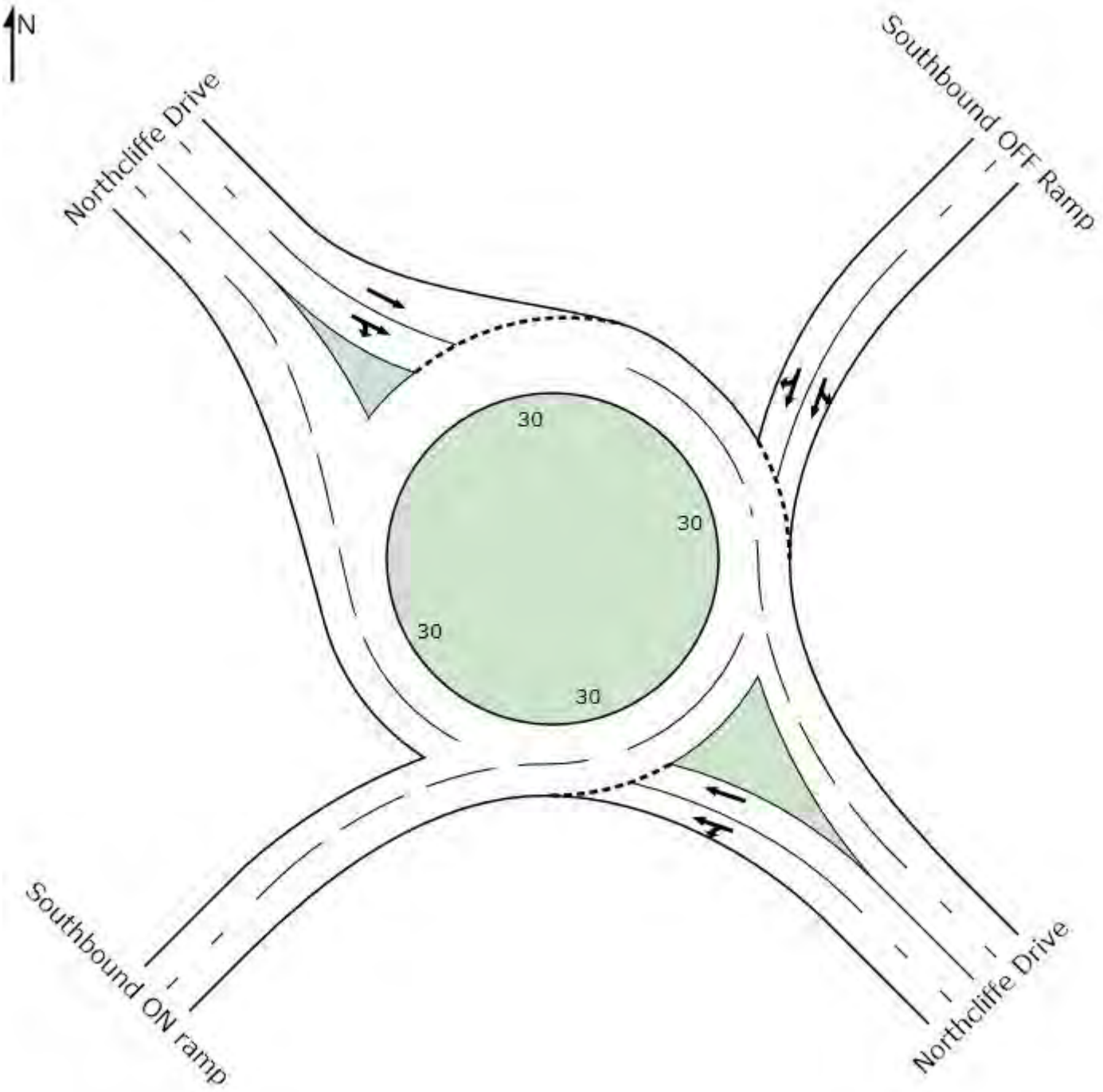
Northcliffe Dr / Southern Fwy on/off ramps Northbound
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
22	T	626	5.0	0.270	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
23	R	322	1.0	0.270	15.2	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		948	3.6	0.270	9.4	LOS A	0.0	0.0	0.00	0.59	57.5
North West: Northcliffe Drive											
27	L	224	4.0	0.748	25.2	LOS B	10.3	73.9	1.00	1.25	45.3
28	T	783	3.0	0.748	23.6	LOS B	10.3	73.9	1.00	1.24	40.9
Approach		1007	3.2	0.748	24.0	LOS B	10.3	73.9	1.00	1.24	41.9
South West: Northbound OFF Ramp											
30	L	312	7.0	0.402	10.8	LOS A	1.8	13.6	0.63	0.85	48.1
31	T	1	0.0	0.402	10.7	LOS A	1.8	13.6	0.63	0.83	52.7
32	R	648	3.0	0.598	16.8	LOS B	3.9	28.3	0.68	0.99	43.9
Approach		961	4.3	0.598	14.8	LOS B	3.9	28.3	0.67	0.94	45.1
All Vehicles		2917	3.7	0.748	16.2	LOS B	10.3	73.9	0.56	0.93	47.3

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Northcliffe Drive – Southern Freeway Southbound On/Off Ramps


N
Northcliffe Drive
Southbound OFF Ramp
30
30
30
30
Southbound ON ramp
Northcliffe Drive

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2012
Existing AM

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	331	6.0	0.307	11.1	LOS A	1.7	12.4	0.54	0.71	57.0
22	T	326	6.0	0.307	8.6	LOS A	1.7	12.4	0.55	0.66	53.9
Approach		657	6.0	0.307	9.9	LOS A	1.7	12.4	0.54	0.68	55.6
North East: Southbound OFF Ramp											
24	L	87	10.0	0.117	9.7	LOS A	0.4	3.2	0.53	0.75	49.2
25	T	1	100.0	0.117	12.7	LOS A	0.4	3.2	0.53	0.61	56.6
26	R	166	14.0	0.171	15.1	LOS B	0.6	5.1	0.52	0.83	45.2
Approach		255	13.0	0.171	13.2	LOS A	0.6	5.1	0.53	0.80	46.5
North West: Northcliffe Drive											
28	T	606	5.0	0.253	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
29	R	267	10.0	0.253	15.6	LOS B	0.0	0.0	0.00	0.82	55.4
Approach		874	6.5	0.253	9.2	LOS A	0.0	0.0	0.00	0.58	57.6
All Vehicles		1785	7.3	0.307	10.0	LOS A	1.7	12.4	0.28	0.65	55.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2012
Existing PM

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	533	2.0	0.485	12.0	LOS A	3.3	23.6	0.67	0.79	56.1
22	T	236	4.0	0.283	9.5	LOS A	1.5	10.6	0.60	0.72	53.6
Approach		768	2.6	0.485	11.3	LOS A	3.3	23.6	0.65	0.77	55.4
North East: Southbound OFF Ramp											
24	L	167	2.0	0.195	9.4	LOS A	0.7	5.3	0.56	0.77	49.0
25	T	1	0.0	0.179	8.8	LOS A	0.7	5.1	0.54	0.65	52.9
26	R	189	5.0	0.179	14.8	LOS B	0.7	5.1	0.54	0.84	45.2
Approach		358	3.6	0.195	12.3	LOS A	0.7	5.3	0.55	0.80	46.9
North West: Northcliffe Drive											
28	T	662	3.0	0.288	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
29	R	351	3.0	0.288	15.3	LOS B	0.0	0.0	0.00	0.80	55.4
Approach		1013	3.0	0.288	9.5	LOS A	0.0	0.0	0.00	0.59	57.4
All Vehicles		2139	3.0	0.485	10.6	LOS A	3.3	23.6	0.32	0.69	54.7

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Processed: Thursday, 8 November 2012 4:58:52 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21878\Tech\SIDRA Modelling\Northcliffe Dr_Freeway ON-OFF ramp STHBD.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE
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www.sidrasolutions.com

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2021 Existing + Growth + Dev AM (Scenario 1)

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	442	6.0	0.499	12.5	LOS A	3.5	26.1	0.69	0.82	56.1
22	T	549	6.0	0.499	10.3	LOS A	3.5	26.1	0.70	0.80	52.6
Approach		992	6.0	0.499	11.3	LOS A	3.5	26.1	0.70	0.81	54.3
North East: Southbound OFF Ramp											
24	L	243	10.0	0.249	9.4	LOS A	1.0	7.7	0.57	0.75	49.0
25	T	1	100.0	0.249	12.4	LOS A	1.0	7.7	0.57	0.60	56.2
26	R	215	14.0	0.290	16.6	LOS B	1.1	8.9	0.61	0.89	44.2
Approach		459	12.1	0.290	12.8	LOS A	1.1	8.9	0.59	0.81	46.5
North West: Northcliffe Drive											
28	T	728	5.0	0.301	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
29	R	313	10.0	0.301	15.6	LOS B	0.0	0.0	0.00	0.82	55.4
Approach		1041	6.5	0.301	9.2	LOS A	0.0	0.0	0.00	0.58	57.6
All Vehicles		2492	7.3	0.499	10.7	LOS A	3.5	26.1	0.39	0.71	54.0

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2021 Existing + Growth + Dev PM (Scenario 1)

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	697	2.0	0.687	16.2	LOS B	7.7	54.8	0.86	1.00	52.6
22	T	441	4.0	0.536	12.1	LOS A	4.1	29.8	0.77	0.90	51.4
Approach		1138	2.8	0.687	14.6	LOS B	7.7	54.8	0.82	0.96	52.2
North East: Southbound OFF Ramp											
24	L	334	2.0	0.328	9.5	LOS A	1.4	10.2	0.62	0.77	48.7
25	T	1	0.0	0.302	10.6	LOS A	1.2	8.9	0.63	0.78	52.1
26	R	231	5.0	0.302	16.6	LOS B	1.2	8.9	0.63	0.90	44.1
Approach		565	3.2	0.328	12.4	LOS A	1.4	10.2	0.63	0.82	46.6
North West: Northcliffe Drive											
28	T	809	3.0	0.349	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
29	R	419	3.0	0.349	15.3	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		1228	3.0	0.349	9.4	LOS A	0.0	0.0	0.00	0.59	57.5
All Vehicles		2932	3.0	0.687	12.0	LOS A	7.7	54.8	0.44	0.78	53.1

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2021 Existing + Growth + Dev AM (Scenario 2)

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	449	6.0	0.515	12.7	LOS A	3.8	27.9	0.70	0.83	56.0
22	T	575	6.0	0.515	10.4	LOS A	3.8	27.9	0.71	0.82	52.5
Approach		1024	6.0	0.515	11.4	LOS A	3.8	27.9	0.70	0.82	54.2
North East: Southbound OFF Ramp											
24	L	265	10.0	0.272	9.4	LOS A	1.1	8.5	0.58	0.75	48.9
25	T	1	100.0	0.272	12.4	LOS A	1.1	8.5	0.58	0.61	56.2
26	R	215	14.0	0.293	16.7	LOS B	1.2	9.0	0.61	0.89	44.1
Approach		481	12.0	0.293	12.7	LOS A	1.2	9.0	0.60	0.81	46.6
North West: Northcliffe Drive											
28	T	732	5.0	0.302	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
29	R	313	10.0	0.302	15.6	LOS B	0.0	0.0	0.00	0.82	55.4
Approach		1044	6.5	0.302	9.2	LOS A	0.0	0.0	0.00	0.58	57.6
All Vehicles		2549	7.3	0.515	10.7	LOS A	3.8	27.9	0.40	0.72	53.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2021 Existing + Growth + Dev PM (Scenario 2)

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	703	2.0	0.694	16.3	LOS B	7.9	56.1	0.86	1.01	52.5
22	T	467	4.0	0.563	12.5	LOS A	4.6	33.0	0.78	0.92	51.0
Approach		1171	2.8	0.694	14.8	LOS B	7.9	56.1	0.83	0.97	51.9
North East: Southbound OFF Ramp											
24	L	357	2.0	0.351	9.6	LOS A	1.6	11.3	0.63	0.80	48.6
25	T	1	0.0	0.304	10.6	LOS A	1.2	9.0	0.64	0.79	52.1
26	R	231	5.0	0.304	16.7	LOS B	1.2	9.0	0.64	0.90	44.0
Approach		588	3.2	0.351	12.4	LOS A	1.6	11.3	0.63	0.84	46.6
North West: Northcliffe Drive											
28	T	813	3.0	0.350	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
29	R	419	3.0	0.350	15.3	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		1232	3.0	0.350	9.4	LOS A	0.0	0.0	0.00	0.59	57.5
All Vehicles		2991	3.0	0.694	12.1	LOS A	7.9	56.1	0.45	0.79	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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21878\Tech\SIDRA Modelling\Northcliffe Dr_Freeway ON-OFF ramp STHBD.sip
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MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2031 Existing + Growth + Dev AM (Scenario 2)

Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	549	6.0	0.686	16.6	LOS B	7.5	55.2	0.87	1.03	52.5
22	T	674	6.0	0.686	14.8	LOS B	7.5	55.2	0.87	1.05	48.4
Approach		1223	6.0	0.686	15.6	LOS B	7.5	55.2	0.87	1.04	50.3
North East: Southbound OFF Ramp											
24	L	308	10.0	0.329	10.0	LOS A	1.4	10.9	0.63	0.80	48.6
25	T	2	100.0	0.329	12.9	LOS A	1.4	10.9	0.63	0.64	55.7
26	R	295	14.0	0.420	18.2	LOS B	2.0	15.5	0.68	0.95	42.9
Approach		605	12.3	0.420	14.0	LOS A	2.0	15.5	0.65	0.87	45.6
North West: Northcliffe Drive											
28	T	828	5.0	0.343	6.4	LOS A	0.0	0.0	0.00	0.47	58.9
29	R	356	10.0	0.343	15.6	LOS B	0.0	0.0	0.00	0.82	55.4
Approach		1184	6.5	0.343	9.2	LOS A	0.0	0.0	0.00	0.58	57.6
All Vehicles		3013	7.5	0.686	12.8	LOS A	7.5	55.2	0.48	0.82	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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Northcliffe Dr / Southern FWY Southbd on/off ramps 2031 Existing + Growth + Dev PM (Scenario 2)

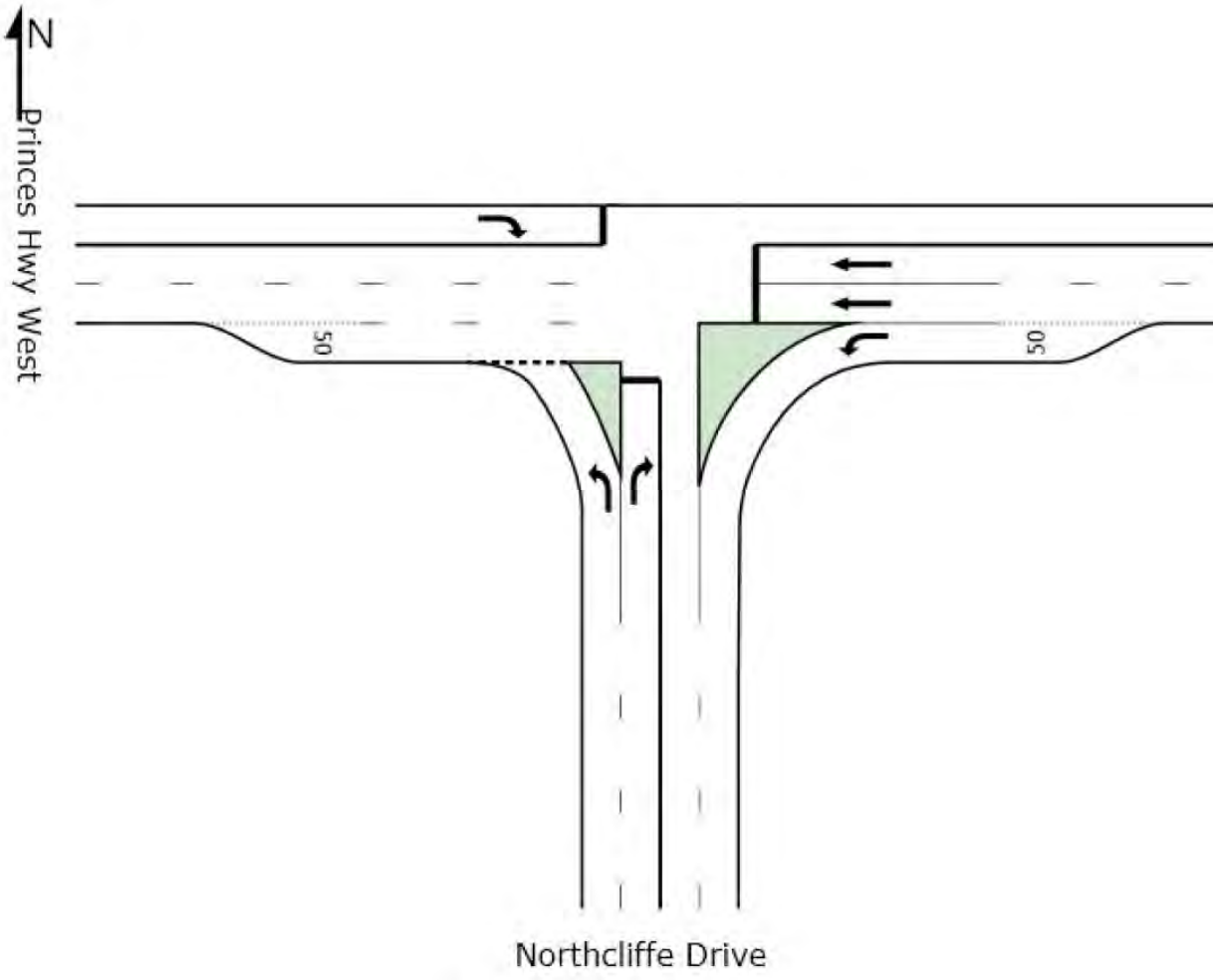
Northcliffe Drive / Southern Freeway SOUTHBOUND on/off ramps
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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 East: Northcliffe Drive											
21	L	821	2.0	0.904	32.2	LOS C	21.2	151.0	1.00	1.50	40.3
22	T	519	4.0	0.713	18.2	LOS B	7.9	57.5	0.92	1.13	45.3
Approach		1340	2.8	0.904	26.8	LOS B	21.2	151.0	0.97	1.36	41.9
North East: Southbound OFF Ramp											
24	L	427	2.0	0.433	10.6	LOS A	2.3	16.2	0.68	0.89	48.0
25	T	1	0.0	0.424	12.2	LOS A	2.1	15.1	0.69	0.88	50.7
26	R	311	5.0	0.424	18.2	LOS B	2.1	15.1	0.69	0.96	42.8
Approach		739	3.3	0.433	13.8	LOS A	2.3	16.2	0.69	0.92	45.6
North West: Northcliffe Drive											
28	T	895	3.0	0.386	6.4	LOS A	0.0	0.0	0.00	0.48	58.9
29	R	462	3.0	0.386	15.3	LOS B	0.0	0.0	0.00	0.81	55.4
Approach		1357	3.0	0.386	9.4	LOS A	0.0	0.0	0.00	0.59	57.5
All Vehicles		3436	3.0	0.904	17.1	LOS B	21.2	151.0	0.53	0.96	47.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Northcliffe Drive – Princes Highway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Northcliffe Drive

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2012 Existing AM

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	197	19.0	0.171	12.2	LOS A	1.0	8.2	0.36	0.72	53.4
3	R	353	7.0	0.712	29.7	LOS C	8.6	63.5	0.95	0.89	36.9
Approach		549	11.3	0.712	23.5	LOS B	8.6	63.5	0.74	0.83	41.7
East: Princes Hwy East											
4	L	353	8.0	0.201	9.6	X	X	X	X	0.65	54.6
5	T	292	7.6	0.654	25.4	LOS B	3.8	28.3	1.00	0.84	37.8
Approach		644	7.8	0.654	16.8	LOS B	3.8	28.3	0.45	0.74	45.2
West: Princes Hwy West											
12	R	281	10.0	0.676	31.4	LOS C	6.8	51.8	0.96	0.86	38.0
Approach		281	10.0	0.676	31.4	LOS C	6.8	51.8	0.96	0.86	38.0
All Vehicles		1475	9.5	0.712	22.0	LOS B	8.6	63.5	0.66	0.79	42.4

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2012 Existing PM

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	235	4.0	0.215	12.5	LOS A	1.4	9.9	0.48	0.75	52.6
3	R	312	6.0	0.778	29.6	LOS C	6.8	50.0	0.99	0.95	36.9
Approach		546	5.1	0.778	22.3	LOS B	6.8	50.0	0.77	0.86	42.6
East: Princes Hwy East											
4	L	515	3.0	0.283	9.5	X	X	X	X	0.65	54.6
5	T	486	3.0	0.726	19.7	LOS B	5.1	37.0	1.00	0.90	41.4
Approach		1001	3.0	0.726	14.5	LOS A	5.1	37.0	0.48	0.77	47.0
West: Princes Hwy West											
12	R	189	6.0	0.709	31.1	LOS C	4.1	29.9	1.00	0.88	38.1
Approach		189	6.0	0.709	31.1	LOS C	4.1	29.9	1.00	0.88	38.1
All Vehicles		1737	4.0	0.778	18.7	LOS B	6.8	50.0	0.63	0.81	44.5

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2021
Existing + Growth + Dev AM
(Scenario 1)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	271	19.0	0.239	12.6	LOS A	1.6	13.2	0.40	0.74	53.0
3	R	503	7.0	0.889	39.0	LOS C	15.9	117.7	1.00	1.05	32.1
Approach		774	11.2	0.889	29.8	LOS C	15.9	117.7	0.79	0.94	37.5
East: Princes Hwy East											
4	L	441	8.0	0.251	9.6	X	X	X	X	0.65	54.6
5	T	349	8.0	0.786	27.8	LOS B	4.8	36.2	1.00	0.93	36.5
Approach		791	8.0	0.786	17.6	LOS B	4.8	36.2	0.44	0.77	44.5
West: Princes Hwy West											
12	R	301	10.0	0.868	40.5	LOS C	9.1	68.9	1.00	1.02	33.0
Approach		301	10.0	0.868	40.5	LOS C	9.1	68.9	1.00	1.02	33.0
All Vehicles		1865	9.6	0.889	26.4	LOS B	15.9	117.7	0.68	0.88	39.3

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2021
Existing + Growth + Dev PM
(Scenario 1)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	294	4.0	0.254	13.0	LOS A	2.3	16.5	0.48	0.75	52.0
3	R	408	6.0	0.764	30.5	LOS C	10.3	76.2	0.97	0.92	36.4
Approach		702	5.2	0.764	23.2	LOS B	10.3	76.2	0.76	0.85	41.9
East: Princes Hwy East											
4	L	612	3.0	0.336	9.5	X	X	X	X	0.65	54.6
5	T	560	3.0	0.813	26.5	LOS B	7.8	55.7	1.00	0.97	37.2
Approach		1172	3.0	0.813	17.6	LOS B	7.8	55.7	0.48	0.80	44.3
West: Princes Hwy West											
12	R	233	6.0	0.816	38.2	LOS C	6.6	48.2	1.00	0.95	34.1
Approach		233	6.0	0.816	38.2	LOS C	6.6	48.2	1.00	0.95	34.1
All Vehicles		2106	4.1	0.816	21.7	LOS B	10.3	76.2	0.63	0.84	42.2

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2031
Existing + Growth + Dev AM
(Scenario 1)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	298	19.0	0.235	12.7	LOS A	2.7	21.7	0.30	0.72	53.1
3	R	553	7.0	0.879	50.4	LOS D	27.5	204.0	1.00	0.98	27.7
Approach		851	11.2	0.879	37.2	LOS C	27.5	204.0	0.76	0.89	33.6
East: Princes Hwy East											
4	L	485	8.0	0.276	9.6	X	X	X	X	0.65	54.6
5	T	385	8.0	0.850	49.9	LOS D	9.5	71.3	1.00	0.97	27.6
Approach		871	8.0	0.850	27.5	LOS B	9.5	71.3	0.44	0.79	37.6
West: Princes Hwy West											
12	R	497	10.0	0.890	55.0	LOS D	25.6	194.3	1.00	0.98	27.3
Approach		497	10.0	0.890	55.0	LOS D	25.6	194.3	1.00	0.98	27.3
All Vehicles		2218	9.7	0.890	37.4	LOS C	27.5	204.0	0.69	0.87	33.3

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2031
Existing + Growth + Dev PM
(Scenario 1)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	376	4.0	0.304	13.5	LOS A	4.0	28.8	0.44	0.75	51.6
3	R	517	6.0	0.883	45.5	LOS D	21.2	155.9	1.00	1.00	29.4
Approach		893	5.2	0.883	32.0	LOS C	21.2	155.9	0.76	0.90	36.2
East: Princes Hwy East											
4	L	679	3.0	0.373	9.5	X	X	X	X	0.65	54.6
5	T	623	3.0	0.877	39.7	LOS C	12.6	90.6	1.00	1.03	31.1
Approach		1302	3.0	0.877	23.9	LOS B	12.6	90.6	0.48	0.83	39.7
West: Princes Hwy West											
12	R	367	6.0	0.903	52.7	LOS D	15.8	116.0	1.00	1.02	28.0
Approach		367	6.0	0.903	52.7	LOS D	15.8	116.0	1.00	1.02	28.0
All Vehicles		2562	4.2	0.903	30.9	LOS C	21.2	155.9	0.65	0.88	36.4

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2021
Existing + Growth + Dev AM
(Scenario 2)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	271	19.0	0.239	12.6	LOS A	1.6	13.2	0.40	0.74	53.0
3	R	506	7.0	0.895	39.8	LOS C	16.2	120.3	1.00	1.06	31.8
Approach		777	11.2	0.895	30.3	LOS C	16.2	120.3	0.79	0.95	37.2
East: Princes Hwy East											
4	L	444	8.0	0.253	9.6	X	X	X	X	0.65	54.6
5	T	349	8.0	0.786	27.8	LOS B	4.8	36.2	1.00	0.93	36.5
Approach		794	8.0	0.786	17.6	LOS B	4.8	36.2	0.44	0.77	44.5
West: Princes Hwy West											
12	R	301	10.0	0.868	40.5	LOS C	9.1	68.9	1.00	1.02	33.0
Approach		301	10.0	0.868	40.5	LOS C	9.1	68.9	1.00	1.02	33.0
All Vehicles		1872	9.6	0.895	26.6	LOS B	16.2	120.3	0.68	0.88	39.2

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2021
Existing + Growth + Dev PM
(Scenario 2)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	294	4.0	0.254	13.0	LOS A	2.3	16.5	0.48	0.75	52.0
3	R	412	6.0	0.770	30.8	LOS C	10.5	77.3	0.97	0.92	36.2
Approach		705	5.2	0.770	23.4	LOS B	10.5	77.3	0.76	0.85	41.7
East: Princes Hwy East											
4	L	615	3.0	0.338	9.5	X	X	X	X	0.65	54.6
5	T	560	3.0	0.813	26.5	LOS B	7.8	55.7	1.00	0.97	37.2
Approach		1175	3.0	0.813	17.6	LOS B	7.8	55.7	0.48	0.80	44.4
West: Princes Hwy West											
12	R	233	6.0	0.816	38.2	LOS C	6.6	48.2	1.00	0.95	34.1
Approach		233	6.0	0.816	38.2	LOS C	6.6	48.2	1.00	0.95	34.1
All Vehicles		2113	4.1	0.816	21.8	LOS B	10.5	77.3	0.63	0.84	42.1

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2031
Existing + Growth + Dev AM
(Scenario 2)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	298	19.0	0.235	12.7	LOS A	2.7	21.7	0.30	0.72	53.1
3	R	556	7.0	0.884	51.2	LOS D	28.0	207.5	1.00	0.98	27.4
Approach		854	11.2	0.884	37.7	LOS C	28.0	207.5	0.76	0.89	33.3
East: Princes Hwy East											
4	L	488	8.0	0.278	9.6	X	X	X	X	0.65	54.6
5	T	385	8.0	0.850	49.9	LOS D	9.5	71.3	1.00	0.97	27.6
Approach		874	8.0	0.850	27.4	LOS B	9.5	71.3	0.44	0.79	37.7
West: Princes Hwy West											
12	R	497	10.0	0.890	55.0	LOS D	25.6	194.3	1.00	0.98	27.3
Approach		497	10.0	0.890	55.0	LOS D	25.6	194.3	1.00	0.98	27.3
All Vehicles		2224	9.7	0.890	37.5	LOS C	28.0	207.5	0.69	0.87	33.3

X: Not applicable for Continuous movement.

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 used.

MOVEMENT SUMMARY

Site: Northcliffe/Princes Hwy 2031
Existing + Growth + Dev PM
(Scenario 2)

Northcliffe Dr / Princes Hwy
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Northcliffe Drive											
1	L	376	4.0	0.304	13.5	LOS A	4.0	28.8	0.44	0.75	51.6
3	R	520	6.0	0.889	46.3	LOS D	21.6	158.9	1.00	1.01	29.1
Approach		896	5.2	0.889	32.5	LOS C	21.6	158.9	0.76	0.90	36.0
East: Princes Hwy East											
4	L	682	3.0	0.375	9.5	X	X	X	X	0.65	54.6
5	T	623	3.0	0.877	39.7	LOS C	12.6	90.6	1.00	1.03	31.1
Approach		1305	3.0	0.877	23.9	LOS B	12.6	90.6	0.48	0.83	39.7
West: Princes Hwy West											
12	R	367	6.0	0.903	52.7	LOS D	15.8	116.0	1.00	1.02	28.0
Approach		367	6.0	0.903	52.7	LOS D	15.8	116.0	1.00	1.02	28.0
All Vehicles		2568	4.2	0.903	31.0	LOS C	21.6	158.9	0.65	0.88	36.3

X: Not applicable for Continuous movement.

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 used.

Nolan Street – Warwick Street

N
Nolan Street North
Warrick Street
Nolan Street South

MOVEMENT SUMMARY

Site: Warwick / Nolan 2012
Existing AM

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	8	0.0	0.139	6.4	LOS A	0.0	0.0	0.00	0.91	43.3
2	T	254	5.0	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		262	4.8	0.139	0.2	NA	0.0	0.0	0.00	0.03	49.8
North: Nolan Street North											
8	T	172	9.0	0.105	1.2	LOS A	0.7	5.1	0.40	0.00	45.2
9	R	13	0.0	0.105	8.0	LOS A	0.7	5.1	0.40	0.87	43.0
Approach		184	8.4	0.105	1.7	NA	0.7	5.1	0.40	0.06	45.0
West: Warrick Street											
10	L	11	10.0	0.070	14.1	LOS A	0.3	1.8	0.50	0.82	38.2
12	R	25	0.0	0.070	13.5	LOS A	0.3	1.8	0.50	0.96	38.3
Approach		36	2.9	0.070	13.7	LOS A	0.3	1.8	0.50	0.92	38.3
All Vehicles		482	6.1	0.139	1.8	NA	0.7	5.1	0.19	0.11	46.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2012
Existing PM

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	9	0.0	0.096	6.4	LOS A	0.0	0.0	0.00	0.90	43.3
2	T	164	12.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		174	11.3	0.096	0.3	NA	0.0	0.0	0.00	0.05	49.6
North: Nolan Street North											
8	T	318	2.0	0.193	0.9	LOS A	1.3	9.5	0.36	0.00	45.6
9	R	34	0.0	0.193	7.7	LOS A	1.3	9.5	0.36	0.85	42.9
Approach		352	1.8	0.193	1.6	NA	1.3	9.5	0.36	0.08	45.3
West: Warrick Street											
10	L	11	0.0	0.049	13.7	LOS A	0.2	1.2	0.45	0.79	38.1
12	R	15	0.0	0.049	13.5	LOS A	0.2	1.2	0.45	0.98	38.3
Approach		25	0.0	0.049	13.6	LOS A	0.2	1.2	0.45	0.90	38.2
All Vehicles		551	4.7	0.193	1.7	NA	1.3	9.5	0.25	0.11	46.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2021
Existing + Growth + Dev AM
(Scenario 1)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	56	0.0	0.176	6.4	LOS A	0.0	0.0	0.00	0.85	43.3
2	T	276	5.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		332	4.2	0.176	1.1	NA	0.0	0.0	0.00	0.14	48.7
North: Nolan Street North											
8	T	200	9.0	0.154	1.7	LOS A	1.0	7.7	0.47	0.00	44.3
9	R	46	0.0	0.154	8.5	LOS A	1.0	7.7	0.47	0.86	42.6
Approach		246	7.3	0.154	3.0	NA	1.0	7.7	0.47	0.16	44.0
West: Warrick Street											
10	L	42	10.0	0.250	16.3	LOS B	1.0	7.3	0.59	0.91	36.8
12	R	72	0.0	0.250	15.7	LOS B	1.0	7.3	0.59	1.02	37.0
Approach		114	3.7	0.250	15.9	LOS B	1.0	7.3	0.59	0.98	36.9
All Vehicles		692	5.2	0.250	4.2	NA	1.0	7.7	0.26	0.29	44.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2021
Existing + Growth + Dev PM
(Scenario 1)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	58	0.0	0.137	6.4	LOS A	0.0	0.0	0.00	0.82	43.3
2	T	191	12.0	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		248	9.2	0.137	1.5	NA	0.0	0.0	0.00	0.19	48.3
North: Nolan Street North											
8	T	365	2.0	0.252	1.5	LOS A	1.9	13.5	0.46	0.00	44.4
9	R	69	0.0	0.252	8.2	LOS A	1.9	13.5	0.46	0.85	42.8
Approach		435	1.7	0.252	2.6	NA	1.9	13.5	0.46	0.14	44.1
West: Warrick Street											
10	L	42	0.0	0.250	17.0	LOS B	1.0	6.9	0.57	0.85	36.1
12	R	61	0.0	0.250	16.8	LOS B	1.0	6.9	0.57	1.02	36.2
Approach		103	0.0	0.250	16.9	LOS B	1.0	6.9	0.57	0.95	36.2
All Vehicles		786	3.8	0.252	4.1	NA	1.9	13.5	0.33	0.26	44.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

Processed: Thursday, 8 November 2012 4:44:14 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21878\Tech\SIDRA Modelling\Warwick St _Nolan St.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE
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MOVEMENT SUMMARY

Site: Warwick / Nolan 2031
Existing + Growth + Dev AM
(Scenario 1)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	57	0.0	0.189	6.4	LOS A	0.0	0.0	0.00	0.85	43.3
2	T	300	5.0	0.189	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		357	4.2	0.189	1.0	NA	0.0	0.0	0.00	0.14	48.8
North: Nolan Street North											
8	T	201	9.0	0.156	1.9	LOS A	1.1	8.0	0.48	0.00	44.1
9	R	46	0.0	0.156	8.7	LOS A	1.1	8.0	0.48	0.86	42.5
Approach		247	7.3	0.156	3.2	NA	1.1	8.0	0.48	0.16	43.8
West: Warrick Street											
10	L	42	10.0	0.262	16.9	LOS B	1.1	7.8	0.60	0.93	36.4
12	R	72	0.0	0.262	16.4	LOS B	1.1	7.8	0.60	1.03	36.6
Approach		114	3.7	0.262	16.6	LOS B	1.1	7.8	0.60	0.99	36.5
All Vehicles		718	5.2	0.262	4.2	NA	1.1	8.0	0.26	0.28	44.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2031
Existing + Growth + Dev PM
(Scenario 1)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	59	0.0	0.149	6.4	LOS A	0.0	0.0	0.00	0.83	43.3
2	T	212	12.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		271	9.4	0.149	1.4	NA	0.0	0.0	0.00	0.18	48.4
North: Nolan Street North											
8	T	384	2.0	0.266	1.7	LOS A	2.1	14.7	0.49	0.00	44.1
9	R	72	0.0	0.266	8.4	LOS A	2.1	14.7	0.49	0.86	42.8
Approach		456	1.7	0.266	2.7	NA	2.1	14.7	0.49	0.13	43.9
West: Warrick Street											
10	L	42	0.0	0.270	18.2	LOS B	1.1	7.6	0.60	0.88	35.4
12	R	61	0.0	0.270	18.1	LOS B	1.1	7.6	0.60	1.03	35.5
Approach		103	0.0	0.270	18.1	LOS B	1.1	7.6	0.60	0.97	35.4
All Vehicles		829	4.0	0.270	4.2	NA	2.1	14.7	0.34	0.25	43.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2021
Existing + Growth + Dev AM
(Scenario 2)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	64	0.0	0.181	6.4	LOS A	0.0	0.0	0.00	0.84	43.3
2	T	276	5.0	0.181	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		340	4.1	0.181	1.2	NA	0.0	0.0	0.00	0.16	48.6
North: Nolan Street North											
8	T	200	9.0	0.160	1.8	LOS A	1.1	8.0	0.47	0.00	44.2
9	R	52	0.0	0.160	8.6	LOS A	1.1	8.0	0.47	0.85	42.6
Approach		252	7.2	0.160	3.2	NA	1.1	8.0	0.47	0.18	43.8
West: Warrick Street											
10	L	47	10.0	0.284	16.8	LOS B	1.2	8.8	0.60	0.93	36.5
12	R	80	0.0	0.284	16.3	LOS B	1.2	8.8	0.60	1.04	36.6
Approach		127	3.7	0.284	16.5	LOS B	1.2	8.8	0.60	1.00	36.6
All Vehicles		719	5.1	0.284	4.6	NA	1.2	8.8	0.27	0.31	44.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2021
Existing + Growth + Dev PM
(Scenario 2)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	65	0.0	0.140	6.4	LOS A	0.0	0.0	0.00	0.81	43.3
2	T	191	12.0	0.140	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		256	8.9	0.140	1.6	NA	0.0	0.0	0.00	0.21	48.1
North: Nolan Street North											
8	T	365	2.0	0.258	1.5	LOS A	1.9	13.8	0.47	0.00	44.3
9	R	75	0.0	0.258	8.3	LOS A	1.9	13.8	0.47	0.85	42.8
Approach		440	1.7	0.258	2.7	NA	1.9	13.8	0.47	0.14	44.0
West: Warrick Street											
10	L	47	0.0	0.289	17.7	LOS B	1.2	8.5	0.58	0.88	35.6
12	R	69	0.0	0.289	17.6	LOS B	1.2	8.5	0.58	1.04	35.8
Approach		117	0.0	0.289	17.7	LOS B	1.2	8.5	0.58	0.97	35.7
All Vehicles		813	3.7	0.289	4.5	NA	1.9	13.8	0.34	0.28	43.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2031
Existing + Growth + Dev AM
(Scenario 2)

Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	64	0.0	0.193	6.4	LOS A	0.0	0.0	0.00	0.84	43.3
2	T	300	5.0	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		364	4.1	0.193	1.1	NA	0.0	0.0	0.00	0.15	48.7
North: Nolan Street North											
8	T	201	9.0	0.162	2.0	LOS A	1.1	8.2	0.49	0.00	44.0
9	R	52	0.0	0.162	8.7	LOS A	1.1	8.2	0.49	0.86	42.5
Approach		253	7.2	0.162	3.4	NA	1.1	8.2	0.49	0.18	43.7
West: Warrick Street											
10	L	47	10.0	0.297	17.6	LOS B	1.3	9.3	0.62	0.96	36.1
12	R	80	0.0	0.297	17.0	LOS B	1.3	9.3	0.62	1.04	36.2
Approach		127	3.7	0.297	17.2	LOS B	1.3	9.3	0.62	1.01	36.1
All Vehicles		744	5.1	0.297	4.6	NA	1.3	9.3	0.27	0.31	44.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Warwick / Nolan 2031
Existing + Growth + Dev PM
(Scenario 2)

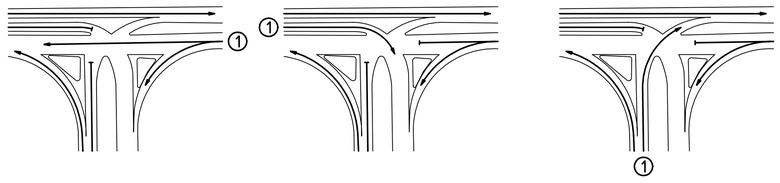
Warrick St / Nolan St
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Nolan Street South											
1	L	67	0.0	0.153	6.4	LOS A	0.0	0.0	0.00	0.82	43.3
2	T	212	12.0	0.153	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		279	9.1	0.153	1.5	NA	0.0	0.0	0.00	0.20	48.2
North: Nolan Street North											
8	T	384	2.0	0.271	1.7	LOS A	2.1	15.1	0.50	0.00	43.9
9	R	77	0.0	0.271	8.5	LOS A	2.1	15.1	0.50	0.86	42.8
Approach		461	1.7	0.271	2.9	NA	2.1	15.1	0.50	0.14	43.7
West: Warrick Street											
10	L	47	0.0	0.312	19.1	LOS B	1.3	9.4	0.61	0.91	34.8
12	R	69	0.0	0.312	19.0	LOS B	1.3	9.4	0.61	1.05	35.0
Approach		117	0.0	0.312	19.0	LOS B	1.3	9.4	0.61	1.00	34.9
All Vehicles		857	3.9	0.312	4.6	NA	2.1	15.1	0.35	0.28	43.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

Appendix C – RMS Signal Plans



A PHASE B PHASE C PHASE

MOVEMENT DIAGRAMS

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	TABLE TYPE	REMARKS
A/B/C	3	Continuous Green Arrow

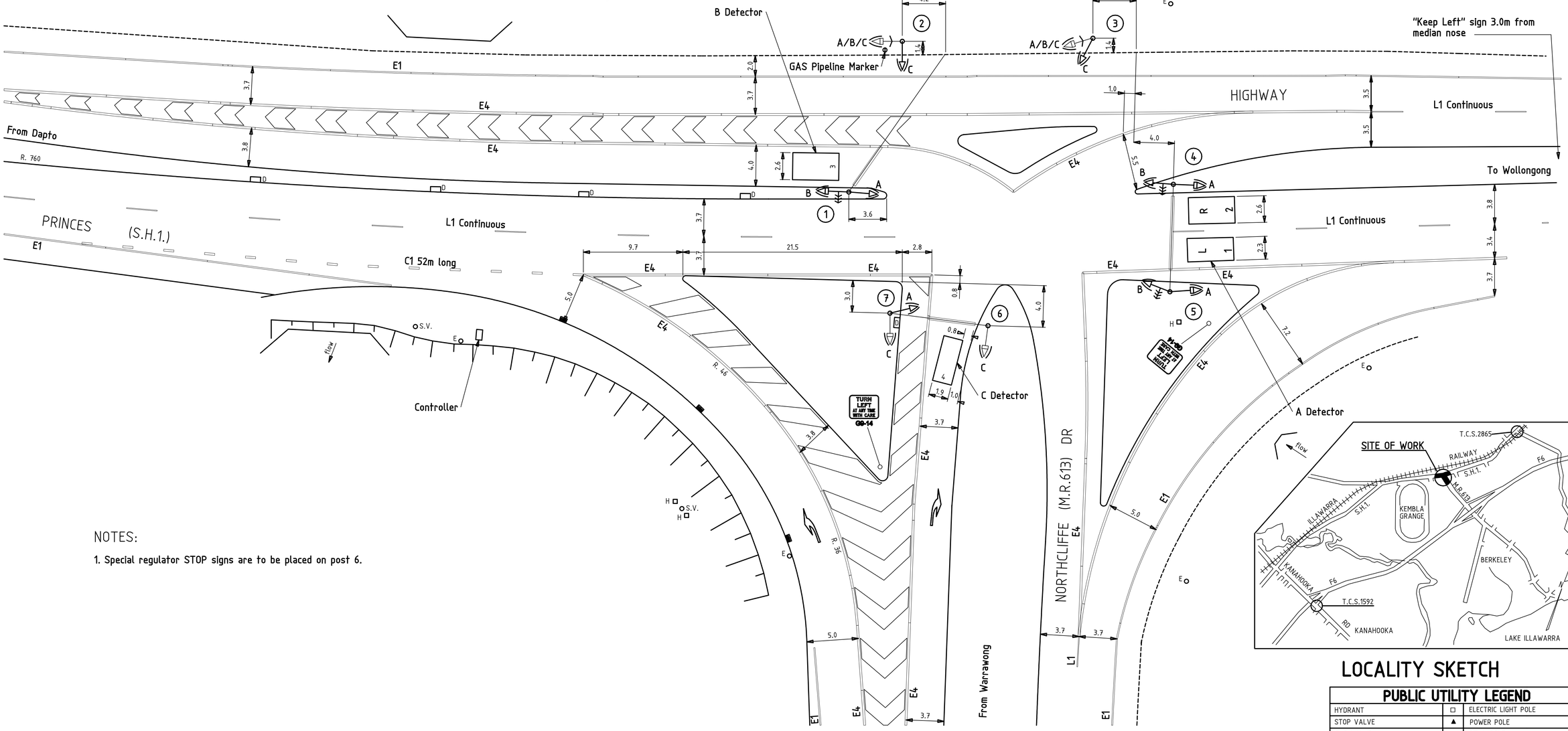
POST CHART

POST	TYPE	HEIGHT	KERB OFFSET
1	2	4.1	–
2	2	4.1	–
3	2	4.1	–
4	2	4.1	–
5	2	4.1	1.0
6	2	4.1	1.0
7	2	4.1	1.0

CONTROLLER SCHEDULE

DETECTOR	SPECIFICATION		
A	FN	A(L)	A(E1)
	SG	$\overline{A}$	A
	DS	–	–
B	FN	B(L)	B(E1)
	SG	$\overline{B}$	B
	DS	–	–
C	FN	C(L)	C(E1)
	SG	$\overline{C}$	C
	DS	–	–

Date in Service: 23/06/75
Reconstructed: 19/05/87
1st Reconstruction: 19/08/88
2nd Reconstruction:



NOTES:

1. Special regulator STOP signs are to be placed on post 6.

LOCALITY SKETCH

PUBLIC UTILITY LEGEND

HYDRANT	□	ELECTRIC LIGHT POLE	⌀		
STOP VALVE	▲	POWER POLE	○		
GAS VALVE	⌗	STAY POLE	⚲		
SEWER MANHOLE	⊕	TELEPHONE BOX	⊟		
TELECOM PIT	▰	TELECOM PILLAR	◔		
FILE NAME :	tcs/kembla_grange/sh1_northcliffe_dr/vv0130_11a.dgn				
SURVEY FILE :					

DESIGN LAYOUT

A ORIGINAL ISSUE
ISSUE A JJ ILL 1388 10/08/99
Special regulatory Stop Sign on post 6.
W.A.E. 15/03/99
S.E. 06/01/03

REFERENCE PLANS	
Symbols & Abb.	VD003-6
Standard Posit.	VD001-5
Det. Sched. Exp.	VD018-10
Pres. Detectors	VC005-17
SSG Dis. Seq.	VD018-8
Type 2 Posts	VM202-1
Type 5 Mast Arm	VM211-6

U.B.D.REF. MAP 40 D6
I.S.G. E
CO-ORDS N
K.P. 01/87
G.B. 01/87
DESIGNED
G.B. 01/87
J.K. 01/87
CHECKED
F.M. 01/87
PASSED

THESE DRAWINGS HAVE BEEN EXAMINED AND ARE RECOMMENDED FOR APPROVAL
SIGNATURE... SEE ISSUE B SHEET 8
NAME... SEE ISSUE B SHEET 8
POSITION... ENGINEER (TRAFFIC)
DATE... 20/02/87

APPROVED
SIGNATURE... SEE ISSUE B SHEET 8
NAME... SEE ISSUE B SHEET 8
POSITION... DIVISONAL ENGINEER
DATE... 20/02/87

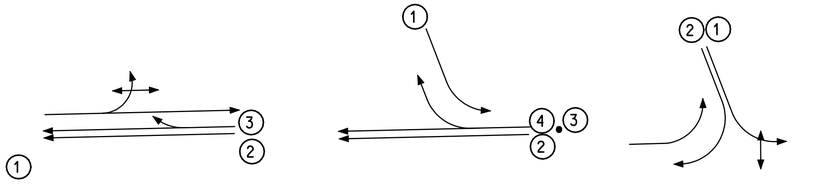
Quality Endorsed Company QEC 9443

Roads and Traffic Authority of NSW
CITY OF WOLLONGONG
PRINCES HWY & NORTHCLIFFE DR
KEMBLA GRANGE

REGION : SOUTHERN REGIONAL OFFICE
SCALE 5 0 5 10
FILE 497.TS.130
SUPERSEDES SHEET 8
REGN. 0001.497.VV.0130

SHEET 11
ISSUE A

Date in Service ..22.4.92....



A PHASE
(Also acts as Train Phase)

B PHASE

C PHASE
(Also acts as Queue - Clearing Phase)

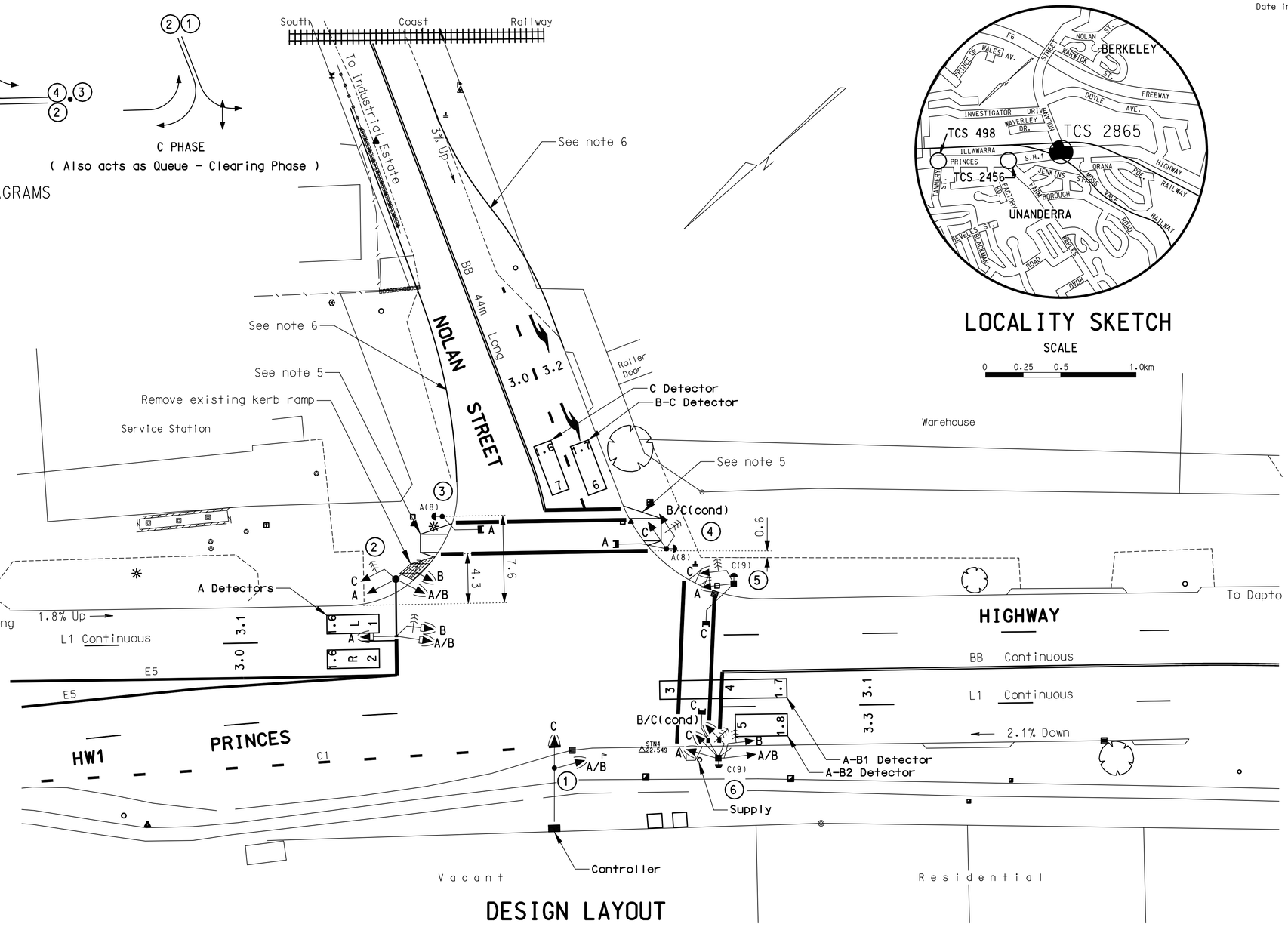
MOVEMENT DIAGRAMS

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS
1	2	4.1	1.0	EXISTING
2	5L	–	1.0	EXISTING
3	2	3.2	1.0	NEW
4	2	4.1	1.0	EXISTING
5	6	–	1.0	EXISTING
6	6	–	1.0	EXISTING

DETECTOR SPECIFICATION

Detector		Specifications			
A	FN	A(L)	A(E1)		
	SG/PS	$\overline{A}$	A		
	DS	–	–		
A–B1 Depart. + Approach	FN	B(PR)	B(E4)		
	SG/PS	A	B		
	DS	–	A(NEXT)		
A–B1 Approach	FN	A(L).B(L)	A(E3)		B(E3)
	SG/PS	$\overline{A/B}$	A		B
	DS	–	$\overline{A–B1(PR).B(NEXT)}$		$\overline{A(NEXT)}$
A–B2	FN	A(L)	A(E2)	B(E2)	
	SG/PS	$\overline{A/B}$	A	B	
	DS	–	$\overline{B(NEXT)}$	$\overline{A(NEXT)}$	
B–C	FN	B(PR)	B(E1)	C(E1)	
	SG/PS	$\overline{B.C}$	B	C	
	DS	$\overline{C}$	$\overline{C(NEXT)}$	$\overline{B(NEXT)}$	
C	FN	C(L)	C(E2)		
	SG/PS	$\overline{C}$	C		
	DS	–	–		
A P.B.	FN	A(PB)	C(L)		
	SG/PS	$\overline{A(WALK)}$	$A.\overline{A(WALK)}$		
	DS	–	$\overline{B.C}$		
C P.B.	FN	C(PB)	A(L)		
	SG/PS	$\overline{C(WALK)}$	$C.\overline{C(WALK)}$		
	DS	–	A.B.		



LOCALITY SKETCH

SCALE
0 0.25 0.5 1.0km

DESIGN LAYOUT

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	TABLE TYPE	REMARKS
A	1	—
A/B	3	—
B(RT)	39	Timed R.A. protection for 'A' pedestrians. *
B/C COND (LT)	14	Timed R.A. protection for 'C' pedestrians. #
C	1	—
C (LT)	21	Timed R.A. protection for 'A' pedestrians. *

* Push button on post 4 extends R.A. protection subject to timer.
\# Push button on post 6 extends R.A. protection subject to timer.

NOTES

1. Regulatory special stop sign placed on post 4.
2. Arterial on A phase. (Isolated)
3. This site forms part of the WOLSCATS system.
4. All push buttons are audio tactile.
5. Kerb ramps to be constructed at all pedestrian crossings in accordance with Model Drawing MD.R173.B01.A.1.
6. Proposed kerb designed by Wollongong City Council as part of the Improvements to the South Coast Railway Level Crossing.

PUBLIC UTILITY LEGEND

HYDRANT	□	ELECTRIC POLE	○
STOP VALVE	▼	LIGHT POLE	☼
GAS VALVE	#	SEWER MANHOLE	⊕
H.P. GAS LINE MARKER	⊥	TELEPHONE BOX	◫
GAS TEST POINT	⚠	TELECOM PIT	◪

DGOS DRAWING FILE : user/tcs/unanderra/sh1_nolan/vv2865_1i.dgn
ARCHIVE FILE:

A ORIGINAL ISSUE

B Issue J.I. ILL. 854 28.11.91
(M.A.E. 22.4.92)
Train facility not connected.
N.B.

C Issue J.I. ILL. 987 10.8.93
WAE-21.10.92 Train facility
connected.
WAE-10.11.93 Telecom lines
connected.
D.L.H.

D Issue. J/ ILL.1167 6.11.95
Pedestrian Phase added to SH1
D.M. Dec/'95.

E Issue. J/ ILL.1167 6.11.95
Pedestrian Phase removed from
Nolan Street.
Special operation for Train
Phase Revised.
R.T.A.T. July/'96

F Issue. J/ ILL.1171
M.A.E. 25.8.96
R.E.J. Sept/'95.

G Issue J/ ILL 1255 7.11.97
Change approach numbers in
A & B phase.
MFB Nov 96

H Issue J/ ILL 1426 11.1.00
M.A.E. 17.2.00
New PROM to change site
conditions when extended train
demands during truck work.
S.H.

I Issue J/ ILL 1884 7/11/06
Added ped crossing on
eastern approach and post
detectors around SG5. notes
and detector spec.
N. Cooke 28/11/06

REFERENCE PLANS	
Symbols & Abb.	VD003-6
Standard Posit.	VD001-5
Det. Sched. Exp.	VD018-10
Pres. Detectors	VC005-7
SSG Dis. Seq.	VD018-8
Type 5 Mast Arm	VM211-6
Channelisation	SH. 4
Operation Design	SH. 5

U.B.D.REF. 9 G9
I.S.G. ..E285056..206.....
CO-ORDS N..1185133..688...

G. BIRCH
DESIGNED
N.F. BURKE 10/91
CHECKED
N.F. BURKE 10/91
PASSED

THESE DRAWINGS HAVE BEEN EXAMINED AND ARE RECOMMENDED FOR APPROVAL
SIGNATURE Refer to Issue A
NAME G. BRISBANE
POSITION TF & RSM
DATE 11.10.91

APPROVED
SIGNATURE Refer to Issue A
NAME N. C. LAMB
POSITION DIVISIONAL ENGINEER
DATE 14.10.91

ROADS AND TRAFFIC AUTHORITY OF NSW

CITY OF WOLLONGONG
INTERSECTION OF HW1 PRINCES HIGHWAY
AND NOLAN STREET
UNANDERRA

REGION : SOUTHERN REGION
DIVISION : ILLAWARRA DIVISION
SCALE 5 0 5 10
FILE 497.TS.467
SUPERSEDES SHEET
REGN. 0001.497.VV.2865
SHEET 1
ISSUE A B C D E F G H I

Appendix D - Crash Data

Detailed Crash Report

Transport Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					A S F
Southern Region																					
Wollongong City LGA																					
Berkeley																					
Cheshire St																					
557266	20/01/2007	Sat	09:43		at	NOLAN ST	TJN	STR	Fine	Dry	50	1	UTE	M31	N in NOLAN ST	70 Proceeding in lane		I	0	1	S
E29443004							RUM:	73	Off rd rght => obj				Tree/bush								
Gallop St																					
715411	25/06/2010	Fri	10:15		at	NOLAN ST	TJN	STR	Fine	Dry	50	2	CAR	F78	N in NOLAN ST	20 Turning right		I	0	1	
E42292416							RUM:	21	Right through				BUS	M74	S in NOLAN ST	40 Proceeding in lane					
719335	23/07/2010	Fri	09:20		at	NOLAN ST	TJN	STR	Fine	Dry	50	2	CAR	F47	W in GALLOP ST	5 Turning right		I	0	1	
E41898971							RUM:	13	Right near				WAG	M51	S in NOLAN ST	40 Proceeding in lane					
Hopman Cres																					
763906	15/08/2011	Mon	18:30		at	NOLAN ST	TJN	STR	Fine	Dry	50	2	CAR	M19	S in NOLAN ST	20 Proceeding in lane		I	0	1	
E45319347							RUM:	32	Right rear				CAR	M63	S in NOLAN ST	0 Wait turn right					
Nolan St																					
561738	16/03/2007	Fri	19:10	5 m	N	CHESHIRE ST	TJN	CRV	Raining	Wet	50	2	CAR	M36	S in NOLAN ST	50 Proceeding in lane		N	0	0	
E29818479							RUM:	32	Right rear				CAR	M49	S in NOLAN ST	15 Turning right					
759875	29/04/2011	Fri	19:30	245 m	N	HOPMAN CRES	2WY	CRV	Raining	Wet	50	1	CAR	F24	N in NOLAN ST	20 Proceeding in lane		N	0	0	S
E44280154							RUM:	87	Off lft/lft bnd=>obj				Building								
607693	04/02/2008	Mon	17:00		at	NORFOLK ST	TJN	STR	Raining	Wet	50	2	4WD	F17	W in NORFOLK ST	5 Proceeding in lane		I	0	2	
E33010558							RUM:	10	Cross traffic				CAR	F35	S in NOLAN ST	40 Proceeding in lane					
607319	08/12/2007	Sat	00:20	75 m	N	NORFOLK ST	2WY	CRV	Fine	Dry	50	2	TRK	M26	W in NOLAN ST	5 Forward from drive		I	0	1	A
E32110776							RUM:	47	Emerging from drive				M/C	M20	N in NOLAN ST	Unk Along footpath					
666514	07/05/2009	Thu	22:15	300 m	N	NOTTINGHAM ST	2WY	CRV	Fine	Dry	60	2	CAR	F19	S in NOLAN ST	60 Proceeding in lane		I	0	3	S
E37505703							RUM:	87	Off lft/lft bnd=>obj				TRK		S in NOLAN ST	0 Parked					
621933	25/04/2008	Fri	07:30		at	ROCHE PL	TJN	STR	Fine	Dry	50	2	CAR	M20	N in NOLAN ST	30 Incorrect side		I	0	1	F
E33340475							RUM:	20	Head on				4WD	M42	S in NOLAN ST	15 Proceeding in lane					
763461	30/07/2011	Sat	14:00		at	WARWICK ST	TJN	STR	Fine	Dry	60	2	CAR	M24	E in WARWICK ST	5 Turning right		N	0	0	
E47750088							RUM:	11	Right far				CAR	F31	S in NOLAN ST	60 Proceeding in lane					
Unanderra																					
Doyle Ave																					

Detailed Crash Report

Transport Centre for Road Safety — NSW Government

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					A S F
779836	21/11/2011	Mon	10:30		at	NOLAN ST	TJN	STR	Overcast	Dry	50	2	CAR	M21	E in DOYLE AVE	30	Proceeding in lane	N	0	0	
E48158085							RUM:	32	Right rear				UTE	M66	E in DOYLE AVE	0	Wait turn right				
Investigator Dr																					
628015	20/06/2008	Fri	11:29		at	NOLAN ST	TJN	STR	Fine	Dry	60	2	4WD	M55	S in INVESTIGATOR DR	10	Turning right	N	0	0	
E34170506							RUM:	13	Right near				CAR	F62	E in NOLAN ST	60	Proceeding in lane				
755772	07/06/2011	Tue	10:15		at	NOLAN ST	TJN	STR	Fine	Dry	50	2	TRK	M68	S in INVESTIGATOR DR	30	Proceeding in lane	N	0	0	
E46588980							RUM:	10	Cross traffic				CAR	F54	W in NOLAN ST	50	Proceeding in lane				
Nolan St																					
748469	09/04/2011	Sat	21:30	100 m	E	DOYLE AVE	2WY	CRV	Fine	Dry	60	1	CAR	M18	E in NOLAN ST	Unk	Proceeding in lane	N	0	0	A S F
E44345340							RUM:	81	Off left/rt bnd=>obj				Fence								
688268	03/11/2009	Tue	17:50	20 m	E	PRINCES HWY	2WY	STR	Fine	Dry	50	2	CAR	M84	W in NOLAN ST	40	Proceeding in lane	I	0	1	A
E39597642							RUM:	30	Rear end				CAR	F43	W in NOLAN ST	0	Stationary				
602449	10/11/2007	Sat	07:00	60 m	E	PRINCES HWY	2WY	STR	Raining	Wet	60	1	P/C	F U	NOLAN ST		Proceeding in lane	I	0	1	
E32542158							RUM:	74	On road-out of cont.												
671162	15/06/2009	Mon	09:55	200 m	E	PRINCES HWY	2WY	STR	Fine	Dry	60	2	CAR	M24	E in NOLAN ST	40	Turning right	I	0	1	
E38169067							RUM:	21	Right through				CAR	F53	W in NOLAN ST	40	Proceeding in lane				
767815	17/09/2011	Sat	09:20	175 m	N	SOUTHERN EXPRE OP	2WY	CRV	Fine	Dry	60	1	CAR	M U	N in NOLAN ST	Unk	Proceeding in lane	I	0	1	S F
E47868084							RUM:	85	Off rt/lft bnd=>obj				Fence								
667678	24/02/2009	Tue	17:00		at	WAVERLEY DR	TJN	STR	Fine	Dry	50	1	M/C	M44	W in NOLAN ST	20	Proceeding in lane	I	0	1	
E37801177							RUM:	74	On road-out of cont.												
685358	08/10/2009	Thu	08:50		at	WAVERLEY DR	TJN	STR	Fine	Dry	50	2	TRK	M47	S in WAVERLEY DR	20	Turning right	N	0	0	
E39176674							RUM:	13	Right near				CAR	F48	E in NOLAN ST	40	Proceeding in lane				
759420	08/07/2011	Fri	14:10		at	WAVERLEY DR	TJN	STR	Fine	Dry	50	2	LOR	M42	W in NOLAN ST	20	Turning right	N	0	0	
E44915006							RUM:	39	Other same direction				TRK	M38	W in NOLAN ST	5	Proceeding in lane				

Report Totals: Total Crashes: 22 Fatal Crashes: 0 Injury Crashes: 13 Killed: 0 Injured: 16

Crashid dataset Nolan St - Berkeley - Jan 2007 to Dec 2011

Summary Crash Report

Transport Centre for Road Safety

# Crash Type		
Car Crash	18	81.8%
Light Truck Crash	5	22.7%
Rigid Truck Crash	1	4.5%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(1)	(4.5%)
Bus Crash	1	4.5%
"Heavy Vehicle Crash	(2)	(9.1%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	2	9.1%
Pedal Cycle Crash	1	4.5%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	14	63.6%
Non intersection	8	36.4%

* Up to 10 metres from an intersection

~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	6	27.3%
Multi Vehicle	16	72.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	0	0.0%
Unclassified Road	22	100.0%

Contributing Factors		
Speeding	5	22.7%
Fatigue	3	13.6%
Alcohol	3	13.6%

Weather		
Fine	17	77.3%
Rain	4	18.2%
Overcast	1	4.5%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	4	18.2%
Dry	18	81.8%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	16	72.7%
Dusk	0	0.0%
Darkness	6	27.3%

Crash Movement		
Intersection, adjacent approaches	6	27.3%
Head-on (not overtaking)	1	4.5%
Opposing vehicles; turning	2	9.1%
U-turn	0	0.0%
Rear-end	4	18.2%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	1	4.5%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	1	4.5%
Out of control on straight	2	9.1%
Off road, on curve	0	0.0%
Off road on curve, hit object	4	18.2%
Out of control on curve	0	0.0%
Other crash type	1	4.5%

CRASHES	22	
Fatal crash	0	0.0%
Injury crash	13	59.1%
Non-casualty crash	9	40.9%

CASUALTIES	16	
Killed	0	0.0%
Injured	16	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	1	4.5%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	2	9.1%	4.2%
08:00 - 08:59	1	4.5%	4.2%
09:00 - 09:59	4	18.2%	4.2%
10:00 - 10:59	3	13.6%	4.2%
11:00 - 11:59	1	4.5%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	2	9.1%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	3	13.6%	4.2%
18:00 - 18:59	1	4.5%	4.2%
19:00 - 19:59	2	9.1%	4.2%
20:00 - 21:59	1	4.5%	8.3%
22:00 - 24:00	1	4.5%	8.3%

Crashes		Casualties
8	2011	2
2	2010	2
5	2009	6
3	2008	3
4	2007	3

~ School Travel Time		
Involvement	3	13.6%

Street Lighting Off/Nil		% of Dark
0	of 6 in Dark	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	0 0.0%
50 km/h zone	15	68.2%	90 km/h zone	0 0.0%
60 km/h zone	7	31.8%	100 km/h zone	0 0.0%
70 km/h zone	0	0.0%	110 km/h zone	0 0.0%
~ 40km/h or less	0	0.0%		

McLean Periods			% Week
A	2	9.1%	17.9%
B	1	4.5%	7.1%
C	7	31.8%	17.9%
D	3	13.6%	3.5%
E	0	0.0%	3.6%
F	4	18.2%	10.7%
G	2	9.1%	7.1%
H	0	0.0%	7.1%
I	0	0.0%	12.5%
J	3	13.6%	10.7%

Day of the Week						# Holiday Periods		
Monday	4	18.2%	Thursday	2	9.1%	Sunday	0	0.0%
Tuesday	3	13.6%	Friday	7	31.8%	WEEKDAY	16	72.7%
Wednesday	0	0.0%	Saturday	6	27.3%	WEEKEND	6	27.3%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	2	9.1%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	1	4.5%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	4.5%
Anzac Day	1	4.5%	January SH	1	4.5%	December SH	0	0.0%

Crashid dataset Nolan St - Berkeley - Jan 2007 to Dec 2011

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Appendix E – Auto Turn Plans

STAGE - 07
STAGE - 02
STAGE - 06
STAGE - 02
F6 SOUTHE
HOPMAN CRESCENT
2
D.P.534116
1.77ha
340.135
236°09'00"
D. P. 1 0 0 8 8 7 7
12
13
56°08'40"
130.45
279°18'00"
89.785
PUBLIC RESERVE
ELECTRICAL EASEMENT

RL 58.0

RL 60.0

RL 64.5

STAGE - 01

STAGE - 06

50

52

54

56

58

60

HOPMAN CRESC

RL 56.0

RL 58.0

RL 60.0

RL 64.5

RL 63.5

STAGE - 01

STAGE - 06

STAGE - 02

STAGE - 04

46

48

50

54

56

58

60

HOPMAN CRESCENT

RL 56.0

RL 58.0

RL 60.0

RL 64.5

RL 63.5

STAGE - 01

STAGE - 02

STAGE - 04

STAGE - 06

46

48

50

54

56

58

60

GHD

133 Castlereagh St Sydney NSW 2000

-

T: 2 9239 7100 F: 2 9239 7199 E: sydmail@ghd.com.au

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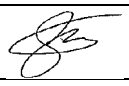
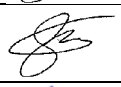
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	K McNatty	I Smith		S Konstas		15/11/12
2	K McNatty	I Smith		S Konstas		23/11/12
3	J.Ticinovic	S.Konstas		S Konstas		06/02/13

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