Telopea Urban Renewal Master Plan Traffic and Transport Assessment

Client // Land and Housing Corporation

Office // NSW

Reference // 16S1627000

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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Executive Summary

The renewal of Telopea will build upon Telopea's key assets to create a more vibrant community which is located within proximity to Parramatta's growing city centre.

Telopea in its end state proposes to provide between 3,500 to 4,500 additional residential dwellings, 7,000 square metres of retail space (including a supermarket) and 3,000 square metres of new community space.

GTA Consultants has been engaged by the NSW Land and Housing Corporation (LaHC) to assess the traffic and transport impacts relating to the Telopea Master Plan.

The Master Plan area is located to the east of Telopea Railway Station, with Kissing Point Road to the south and connections to Pennant Hills Road (Cumberland Highway) in the north via collector routes Sturt Street, Marshall Road, Adderton Road and Evans Road.

Telopea is serviced by Telopea Railway Station (Carlingford Line) operated by Sydney Trains and bus services operated by Sydney buses. There are currently two existing bus services (545 and 513) which connect Telopea to key destinations including Parramatta, Chatswood, Meadowbank and Carlingford. The NSW Government announced Telopea as a preferred light rail stop as part of the proposed Parramatta Light Rail project. The Parramatta Light Rail project is expected to benefit Telopea through linkage with the Greater Parramatta area and replace the heavy rail with a more frequent light rail service.

The indicative yields indicate the development will likely generate an additional 1,689 trips during the AM peak and 1,811 trips during the PM peak. The additional trips in combination with the existing traffic data collected were used to model the future operation of internal and external intersections.

A structured road hierarchy defines the internal road network well and would assist in managing the impacts because of the associated development traffic generation. New road connections will increase the site accessibility and permeability, though traffic calming measures would be considered to discourage through traffic and rat-running.

To encourage the use of public transportation and reduce reliance on private vehicle use, a balanced approach to parking rates should be applied to developments both within the core development area adjacent to the station and development external to this.

The following key internal intersections within the Master Plan area were assessed in terms of existing and future performance:

- Adderton Road/ Manson Street
- Sturt Street/ Manson Street
- Sturt Street/ Evans Road
- Shortland Street/ Evans Road.

Intersection analysis and site observations indicate that while these intersections currently operate satisfactorily, traffic exiting Telopea onto the arterial roads Pennant Hills Road and Kissing Point Road experience delays during peak periods due to the existing congestion. With appropriate intersection upgrades to address significant traffic volume increases, the above intersections would operate satisfactorily with the Master Plan area.

A new road connection across the railway corridor linking Sturt Street and Adderton Road is proposed to provide an alternate local access option, improving site linkage and circulation, as well as providing access to improve public transport interchange facilities that would be delivered as part of the Parramatta Light Rail project as well as the Master Plan. Traffic signals would be required for the rail crossing, integrated with Adderton Road.

The following key external intersections that provide access to the Master Plan area were assessed in terms of existing and future performance:

- Pennant Hills Road/ Adderton Road
- Pennant Hills Road/ Coleman Avenue
- Pennant Hills Road/ Evans Road
- Kissing Point Road/ Sturt Street
- Kissing Point Road/ Adderton Road.

Intersection analysis and site observations indicate that these intersections generally operate satisfactorily under existing conditions, however some movements are approaching capacity and experience extended delays. It is evident the arterial roads Kissing Point Road and Pennant Hills Road experience significant corridor delays during peak periods. It is understood that Roads and Maritime Services (Roads and Maritime) is investigating signalisation of the Pennant Hills Road/ Evans Road intersection and it is assumed that these works could be undertaken in the short to medium term.

With appropriate intersection upgrades (including signal optimisation and changes to linemarking) to address the traffic volume increases, the analysed intersections could operate satisfactorily with the Master Plan, except for the Pennant Hills Road/ Adderton Road intersection. Intersection modelling suggests that an additional right turn lane on Pennant Hills Road and additional short left turn lane on Adderton Road are required at this location to maintain satisfactory intersection operation. This will require further detailed design and discussions with Roads and Maritime.

Mid-block traffic surveys indicate a significant amount of through traffic on local roads such as Evans Road and Marshall Road for connectivity between Pennant Hills Road and Kissing Point Road, with speeds slightly exceeding posted speed limits. Traffic calming measures to discourage through traffic on local roads would need to be considered, while still maintaining appropriate bus access and travel times

The inclusion of new pedestrian and cycling links, construction of pedestrianised/ shared roads could potentially improve the permeability of the active transport network throughout the study area, access to the core town centre and Telopea Railway Station.

1. Introduction

1.1 Overview

The NSW Land and Housing Corporation (LAHC) in partnership with Parramatta City Council (PCC) has commissioned a master plan for the Telopea renewal precinct, aimed at accommodating additional housing, including social housing.

GTA Consultants (GTA) has been engaged to prepare a traffic and transport study to inform the Master Plan.

The Master Plan area currently comprises the following land uses:

- around 1,360 dwellings including a mix of private, social and affordable housing
- Telopea Railway Station & Sydney Trains rail corridor
- Waratah Shopping Centre, consisting of a cluster of small retail outlets around an IGA supermarket
- Parramatta City Council library
- Telopea Primary School
- childcare centre.

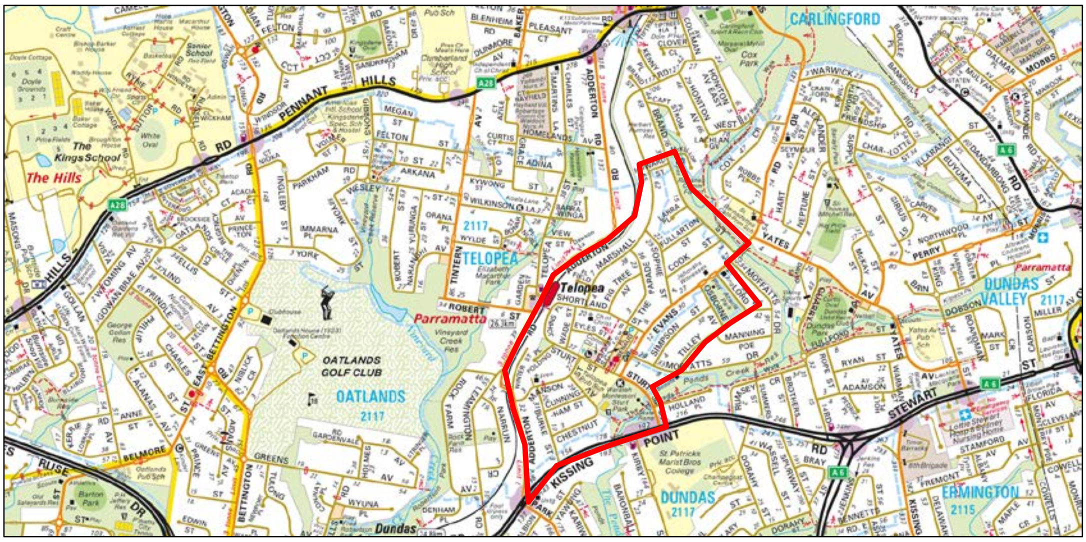
1.2 Site Context

The Telopea Master Plan area is in Parramatta City Council Local Government Area (LGA), around five kilometres north-east from Parramatta CBD and 17 kilometres north-west from Sydney CBD.

The Master Plan area is generally bounded to the south by Kissing Point Road, to the west by Adderton Road and the Carlingford Railway Line, to the north by Howard Street (with Pennant Hills Road further north of the Master Plan area), and to the east by The Ponds Creek reserve.

Figure 1.1 shows Telopea in context within the surrounding local area.

Figure 1.1: Master Plan Context



Source: Sydway Publishing Pty Ltd

1.3 Report Structure

This report documents the key findings of GTA's review and assessment that seek to assess the traffic and transport aspects of the Telopea Master Plan, including identification of key issues and the necessary transport upgrades to support any additional population because of the Master Plan.

Following this introductory section, the remainder of this report is structured as follows:

- review of existing travel patterns
- review of existing and future road, public transport and active transport network
- issues and opportunities
- assessment of the development traffic generation and study area intersection impacts
- overview of the Telopea Master Plan
- overview of the strategic modelling process
- review of the residential parking controls
- intersection upgrades delivery plan.

1.4 Expert Panel Review

Prior to the Master Plan finalisation, an Expert Review Panel (facilitated by GoldbergBlaise) reviewed the draft Telopea Master Plan. Following the review, the document *Expert Review: Draft Telopea Master Plan, October 2016* was prepared by GoldbergBlaise which included key recommendations and comments for consideration to finalise the draft Telopea Master Plan.

In relation to the traffic, parking, public transport and accessibility recommendations from the Expert Panel Review have been incorporated and/or resolved as part of the Traffic and Transport Assessment for finalisation of the Telopea Master Plan as summarised in Table 1.1.

Table 1.1: Expert Panel Review Comments and Responses

Expert Review Comments and Responses	Section of this report
"A road hierarchy diagram is produced clarifying the function of each road. The hierarchy diagram should include pedestrian and cycle routes. Particular attention is required to Eyles Street." The existing road network did not show clear paths of travel for vehicles, which resulted in some local roads exceeding the Roads and Maritime environmental limits for daily traffic volumes. The document A Vision for Telopea, Background Report (Urbis, 2017) considers a more structured road hierarchy and clearly states the functions of surrounding roads which would manage the impacts of the eventual uplift in traffic.	Section 3.2.1
"Further consideration be made of a road through Sturt Park bordering the school." Although not proposed in the Master Plan, there is potential for a new street to run through Sturt Park adjacent to the Telopea Public School eastern boundary which would be subject to further consideration by both Council and Department of Education for any future Telopea Public School master plan.	Section 3.2.2

1.5 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- *Telopea Renewal Project Transport Studies* (Arup, 2010)
- *Telopea Urban Renewal Project – Response to Submissions*, (Arup 2010)
- Parramatta City Council *Development Control Plan (DCP) 2011*
- *A Vision for Telopea Master Plan Report* (Urbis, 2017)
- *A Vision for Telopea Background Report* (Urbis, 2017)
- traffic surveys undertaken by Austraffic Traffic Data as referenced in the context of this report
- other documents and data as referenced in this report.

2. Existing Transport Conditions

2.1 Road Network

As indicated in Figure 1.1, the Telopea Master Plan area is located south of Pennant Hills Road (Cumberland Highway). To its south is Kissing Point Road. Adderton Road, Evans Road and Sturt Street act as collector routes allowing traffic originating from within Telopea Master Plan area to access the arterial road network. The speed limit on Pennant Hills Road and Kissing Point Road near the study area is 60km/h, the speed limit on the collector routes and local roads is 50km/h. A summary of the adjoining road attributes is shown in Table 2.1.

Table 2.1: Selected Road Attributes

Road Name	Road Hierarchy Category	Carriageway Width (metres)	No. of Lanes (each direction)	Speed Limit (km/h)
Pennant Hills Road (Cumberland Highway)	Arterial	13	2	60
Kissing Point Road		23	3	60
Adderton Road	Collector	10	1	50
Evans Road		10	1	50
Sturt Street		10	1	50

Figure 2.1 shows an image of Pennant Hills Road, while Figure 2.2 shows an image of Kissing Point Road.

Figure 2.1: Pennant Hills Road

Figure 2.2: Kissing Point Road

2.2 Intersection Capacity Assessment

2.2.1 Intersection Counts

Traffic movement counts were completed at the following key priority-controlled intersections within the Telopea study area:

- Adderton Road/ Manson Street
- Sturt Street/ Manson Street
- Sturt Street/ Evans Road
- Shortland Street/ Evans Road.

The counts were completed on Tuesday 15 March 2016 between 7am and 9am and between 4pm and 6pm. The AM and PM peak hour traffic volumes were found to be between 8am to 9am and 5pm to 6pm respectively and summarised in Figure 2.3 and Figure 2.4, with full results included in Appendix A.

Traffic movement counts were also undertaken for the following key external intersections that provide access to the Telopea Master Plan area:

- Pennant Hills Road (Cumberland Highway)/ Adderton Road
- Pennant Hills Road (Cumberland Highway)/ Coleman Avenue
- Pennant Hills Road (Cumberland Highway)/ Evans Road
- Kissing Point Road/ Sturt Street
- Kissing Point Road/ Adderton Road.

The counts were completed on Thursday 23 June 2016 between 7am and 9am and between 4pm and 6pm. The AM and PM peak hour traffic volumes were found to be between 7:45am to 8:45am and 4:45pm to 5:45pm respectively and summarised in Figure 2.5 and Figure 2.6, with full results included in Appendix A.

Figure 2.3: Existing Weekday AM Peak Hour Traffic Volumes – Internal Intersections

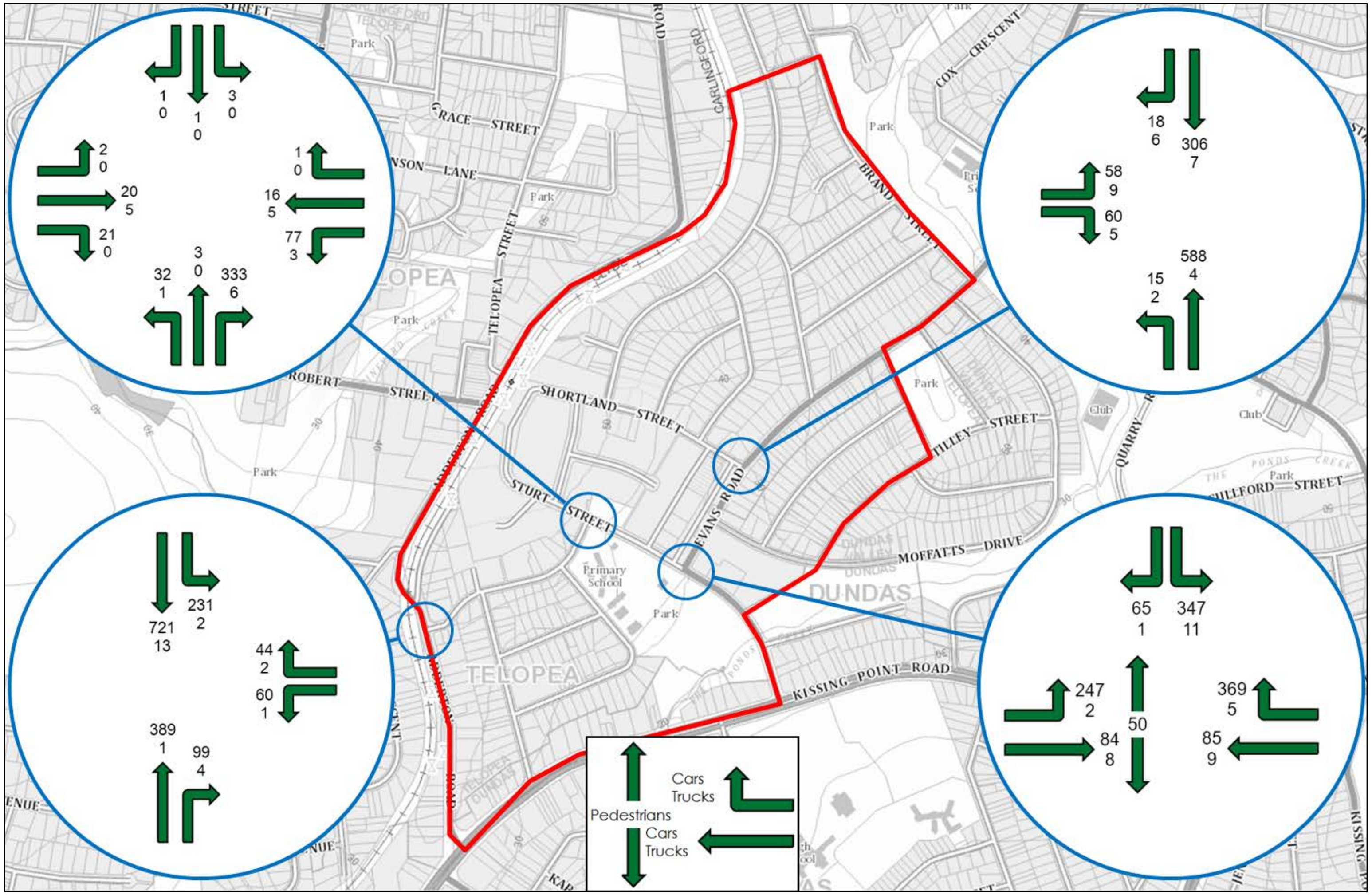


Figure 2.4: Existing Weekday PM Peak Hour Traffic Volumes – Internal Intersections

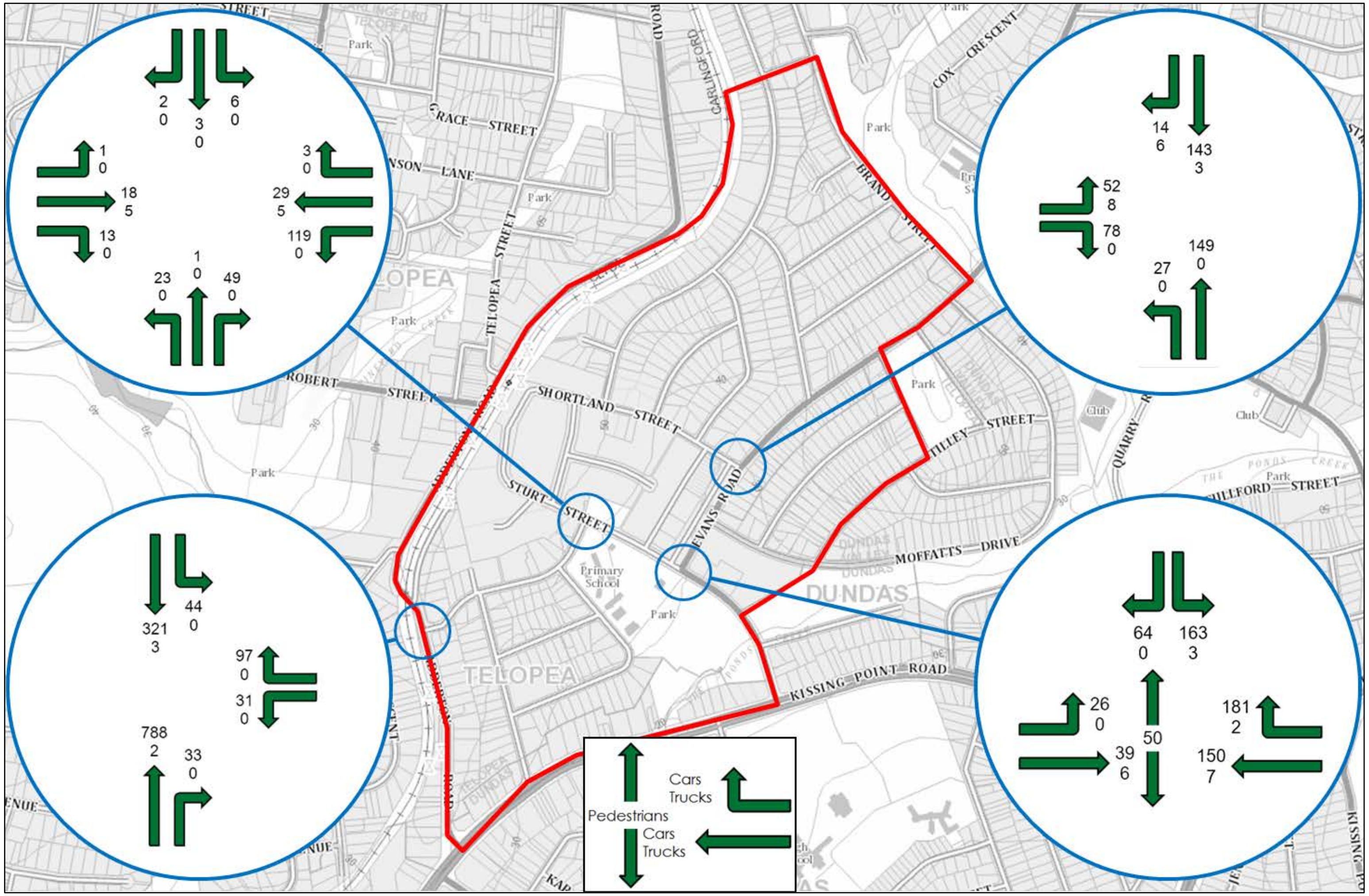


Figure 2.5: Existing Weekday AM Peak Hour Traffic Volumes – External Intersections

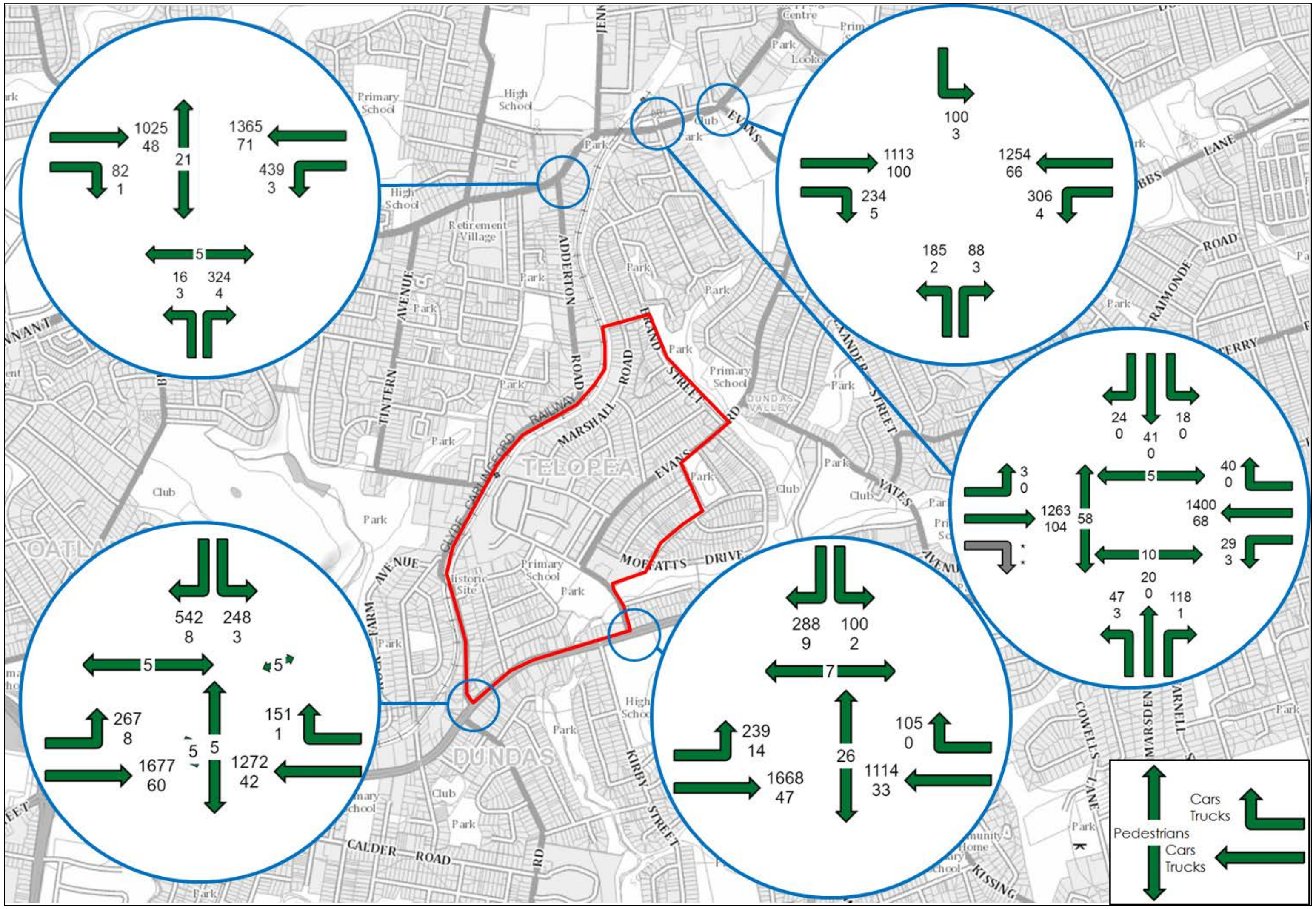
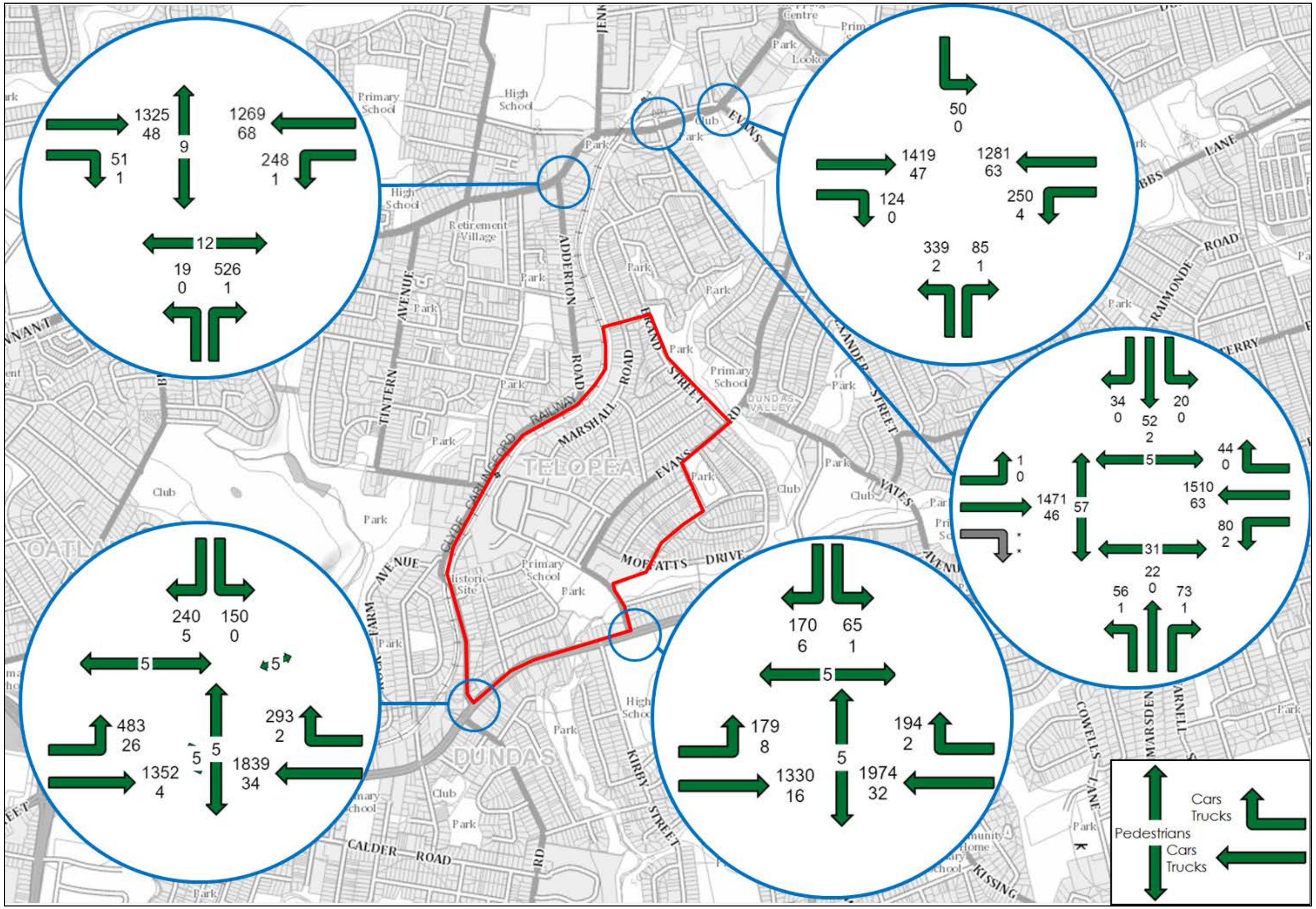


Figure 2.6: Existing Weekday PM Peak Hour Traffic Volumes – External Intersections



GTAconsultants

2.2.2 Intersection Operation

The operation of key intersections has been assessed using SIDRA INTERSECTION, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the Roads and Maritime Services (Roads and Maritime), is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.2 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2.2: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (seconds)	Traffic Signals, Roundabout	Give Way & Stop Sign
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	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Existing Operating Conditions – Key Internal Intersections

Table 2.3 presents a summary of the existing operation of the surveyed internal intersections, all of which are un-signalised, with full results presented in Appendix B of this report.

Table 2.3: Existing Operating Conditions – Internal Intersections (un-signalised)

Intersection	Peak	Degree of Saturation (DOS) [1]	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Adderton Road/ Manson Street	AM	0.36	18	9	B
	PM	0.40	17	11	C
Sturt Street/ Manson Street	AM	0.00	6	0	A
	PM	0.01	6	0	A
Evans Road/ Sturt Street	AM	0.40	5	15	A
	PM	0.21	6	6	A
Evans Road/ Shortland Street	AM	0.27	11	8	B
	PM	0.14	6	4	A

[1] A measure of how much demand an intersection is experiencing compared to the total capacity. Also, known as the volume/capacity ratio where v/c > 1.0 represents oversaturated conditions.

Note: The worst performing turning movement is taken to represent the operation of the overall intersection for un-signalised intersections.

Based on the above assessment, the key intersections within the Telopea Master Plan area operate satisfactorily. These existing conditions are exhibited considering Telopea is bounded by Pennant Hills Road to the north and Kissing Point Road to the south, both of which experience significant delays during the AM and the PM peak periods.

Site observations in the AM peak period confirm that queue lengths are generally shorter than those shown in the SIDRA INTERSECTION outputs. The surveyed intersections were found to operate at a satisfactory level of service with minimal queues and delays.

Existing Operating Conditions – Key External Intersections

The Master Plan is likely to impact intersections outside of the Telopea study area. There are key external intersections which provide a link to the arterial roads Pennant Hills Road (Cumberland Highway) in the north and Kissing Point Road in the south.

Table 2.4 presents a summary of the existing operation of the surveyed external intersections, all of which are signalised except for the Pennant Hills Road/ Evans Road/ Lloyds Avenue priority controlled intersection. Full results are presented in Appendix C of this report.

Table 2.4: Existing Operating Conditions – External Intersections

Intersection	Peak	Degree of Saturation (DOS) [1]	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	1.2	26	318	B
	PM	0.99	22		B
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	0.78	14	175	A
	PM	0.69	13	223	A
Pennant Hills Road (Cumberland Highway)/ Evans Road (un-signalised	AM	0.91	66	23	E
	PM	0.86	58	19	E
Kissing Point Road/ Sturt Street	AM	0.73	16	154	B
	PM	0.94	14	136	A
Kissing Point Road/ Adderton Road	AM	0.81	27	250	B
	PM	0.91	25	225	B

Based on the above assessment, overall the intersections are operating with acceptable delays except for the unsignalised intersection of Pennant Hills Road/ Evans Road which is operating at capacity in both the AM and PM peaks. This is consistent with site observations.

Based on analysis and observations, there is a safety concern for right turn movements at the Evans Road intersection. Right turn movements were observed to be dependent on whether Pennant Hills Road through traffic stops and gives way, as well as gap acceptance by drivers. Vehicles were observed to take dangerous/ insufficient gaps in traffic and would often queue across the westbound lane as shown in Figure 2.7. This was also a common behaviour for drivers exiting Evans Road and Lloyds Avenue.

Factors such as the critical gap [1] and minimum departures[2] were adjusted for the Pennant Hills Road/ Evans Road/ Lloyds Avenue intersection to reflect the observed driver behaviour during the site visit. In addition to the above, during particularly congested periods on Pennant Hills Road, each through traffic vehicle would often give way to one left-turning vehicle exiting from a local road before proceeding.

Figure 2.7: Unsafe Traffic Movement at the Pennant Hills Rd/ Evans Rd/ Lloyds Av Intersection

Site observations indicated some level of through traffic congestion at each key intersection along Kissing Point Road and Pennant Hills Road. However, except for the Pennant Hills Road/ Evans Road/ Lloyds Avenue intersection, traffic which exited Telopea onto these roads local streets was not observed to experience any major delays.

2.3 Midblock Capacity Assessment

2.3.1 Environmental Capacity and Speed Performance Standards

The *Guide to Traffic Generating Developments* (Roads and Maritime, 2002) defines environmental limits for each road class, which are detailed in Table 2.5.

A further criterion specified by Roads and Maritime is that heavy vehicles should preferably not amount to more than five percent of total traffic on local roads.

1 Critical Gap is the minimum time (headway) between successive vehicles in the opposing (major) traffic stream that is acceptable for entry by opposing (minor) stream vehicles.

2 Minimum Departures is the minimum number of departures per lane per minute, similar to the number of departures at the end of the green period at signalised intersections.

Table 2.5: Environmental Capacity and Speed Performance Standards

Road Class	Road Type	Maximum Speed (km/h) [1]	Max Peak hour volume (veh/hr)	Daily volume (veh/day) [2]
Local	Access way	25	100	1,000
	Street	40	200 (desirable) and 300 (maximum)	2,000 (desirable) and 3,000 (maximum)
Collector	Street	50	300 (desirable) and 500 (maximum)	3,000 (desirable) and 5,000 (maximum)

[2] In existing areas, maximum speeds relate to 85th percentile speeds.

[3] Traffic data obtained for this study was largely daily volumes. As such, the maximum peak hour volumes have been converted to daily volume by assuming a peak to daily ratio of 10per cent.

Source: Guide to Traffic Generating Developments (Roads and Maritime, 2002)

The standards are based on Roads and Maritime research relating to safety (pedestrians' ability to cross, visibility and delay) and amenity (noise and air quality) on residential roads. These standards were developed to assist practitioners in the design of residential subdivisions, to ensure an appropriate level of safety and amenity is maintained when designing these types of roads.

In practice, if these standards or limits are met, it is reasonable to assume that the street can be crossed safely and with minimal delay, and that the traffic noise and air quality levels would be acceptable.

In addition to the above target maximum speeds (25 to 50km/h), as a general guide, all local roads have a 50km/h speed limit unless designated otherwise.

2.3.2 Traffic and Speed Assessment

Midblock 24-hour counts and speed checks were completed on key roads within the Telopea study area to determine the existing mid-block traffic volumes and speeds at key locations.

The roads with traffic volumes, heavy vehicle percentage and speeds that exceeded the environmental capacity and speed performance are highlighted in red in Table 2.6.

Table 2.6: **Evaluation of Environmental Capacity & Speed Performance**

Street Name	Section	Surveyed			Functional Classification	Assessment Against Roads and Maritime Environmental Performance		
		Average Daily Traffic (vehicles)	85th Percentile Speed (km/h) [1]	Percent Heavy Vehicles [3]		Traffic Volume	Speed	Heavy Vehicle Composition
Adderton Road	Between Manson Street & Kissing Point Road	13,222	56 [2]	2.4	Collector	No	No	Yes
Evans Road	Between Brand Street & Yates Avenue	6,587	51 [2]	4.3	Collector	No	No	Yes
Marshall Road	Between Howard Street & Brand Street	958	53 [2]	7.3	Local	Yes	No	No
Sturt Street	Between Evans Road & Holland Place	7,612	45	4.3	Collector	No	Yes	Yes

[1] The '85th percentile speed' is a key statistic used in traffic planning and analysis. It represents the speed at or below which 85 percent of all vehicular traffic are observed to travel under free-flowing conditions (or 15 per cent would exceed it). Based on research, vehicles traveling between the 50th and 90th percentile of speed have been found to have the lowest risk of crashing due to speed. For safety reasons, the speed limit is typically set at or below the 85th percentile speed.

[2] The surveyed roads have posted speed limits of 50 km/h. The 85th percentile speeds at these locations exceed the signposted limits.

The preference is no more than five per cent of total traffic on local roads (refer to Section 4.1).

The results indicate the following observations in relation to the environmental capacity and speed performance of local roads:

- Existing daily traffic volumes along Evans Road and Sturt Street, which function as collector roads within the Telopea study area, exceed the maximum limit (5,000 vehicles per day) by up to 50 per cent.
- Existing daily traffic volumes along Adderton Road, which also functions as a collector road through Telopea, exceed the maximum limit by 165 per cent. From both a connectivity and traffic volume perspective, Adderton Road has a higher order function.
- The 85th percentile speed exceeds the 50km/h speed limit on Adderton Road, Evans Road and Marshall Street.
- The proportion of heavy vehicles to total traffic on Marshall Road exceeds the preferred maximum of five per cent of total traffic. However, this is mainly due to Marshall Road being a designated bus route rather than a heavy vehicle route through Telopea, as well as construction traffic from nearby developments.

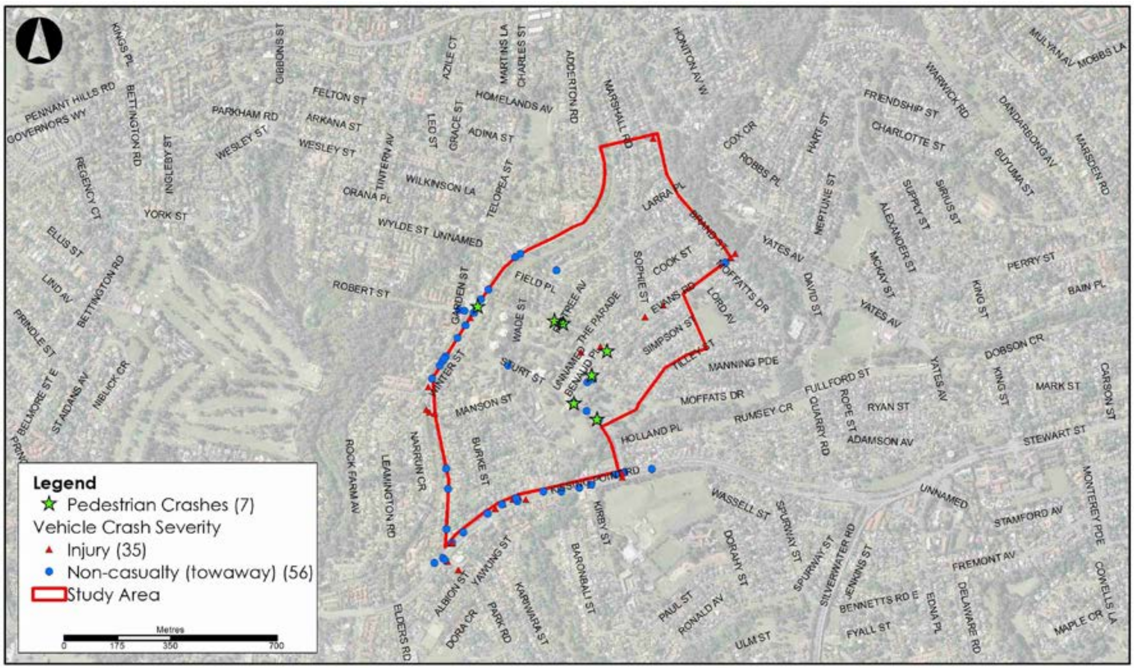
The observations from the mid-block traffic flows against desirable Roads and Maritime environmental limits for local roads indicate that the Telopea road network tends to function as short-cuts between Kissing Point Road and Pennant Hills Road. Traffic calming measures to discourage through traffic through local roads would need to be considered. The key collector roads carry higher volumes than the desirable environmental limits. The implication for the Master Plan l is to reinforce a road hierarchy that through traffic is diverted away from local streets, which are also expected to generate higher levels of activity with the Master Plan.

It is noted that a broader transport study is being undertaken for the Telopea Precinct proposal.

2.4 Traffic Safety

Recorded road crash history was provided by Roads and Maritime for a five-year period (January 2010 to December 2014) within the Telopea Master Plan area. The data was analysed to identify any potential road safety deficiencies within the Master Plan area, particularly pedestrian-related incidents. Figure 2.8 shows a visualisation of the crash data categorised as pedestrian crashes, vehicle crashes resulting in injuries and non-casualty vehicle crashes (tow-away). There were no fatalities recorded within the study area over the five-year period (2010–2014).

Figure 2.8: Recorded Road Crash History



Data source: Roads and Maritime Services

Of the seven pedestrian-related crashes occurred along Shortland Street, Evans Road and Sturt Street, four crashes occurred at T-intersections, whilst the remaining three occurred mid-block (two-way undivided road). One pedestrian crash occurred along Adderton Road adjacent to Telopea Railway Station. A summary of the pedestrian crashes are as follows[3]:

- four crashes involved vehicles colliding with pedestrians crossing from the near side (kerbside)
- two crashes involved vehicles colliding with pedestrians playing, working, lying or standing on the carriageway
- one crash involved a vehicle colliding with a pedestrian crossing from the far side.

Further analysis of the crash statistics indicates that the pedestrian crashes most often occurred near busy pedestrian areas such as bus stops, shops, schools, the skate park and the church.

Another observation made during the site visit was the effect of on-street parking along bus routes in the study area, particularly Marshall Road, Shortland Street and Sturt Street. These site observations indicate that the combination of parked cars on either side of the road at certain sections and the existing road width is not sufficient for two opposing vehicles to pass each other safely. Vehicles would usually have to give-way in the event of insufficient road width to allow for

3 Crash data follows the Roads and Maritime Services - Road User Movement coding

safe passage. In addition, roads such as Marshall Road, Shortland Street and Sturt Street are designated bus routes which experience buses frequently stopping and slowing down traffic.

In seeking to reduce through traffic, consideration should also be given to the impacts of local area traffic management measures would have on bus operations.

The narrow road widths and bus routes along Marshall Road are expected to discourage additional through traffic using this road. The existing layout and function of the road is considered sufficient to discourage major increases in through traffic.

2.5 Car Parking

2.5.1 Existing Parking Conditions

Parking within the Telopea Master Plan area predominantly comprises unrestricted kerbside parking along most roads, with the following exceptions:

- six one-hour time restricted parking spaces along Adderton Road adjacent to Telopea Railway Station between 8:30am to 6pm Monday to Friday and 8:30am to 12:30pm on Saturdays
- 39 one-hour time restricted parking spaces, 18 two-hour time restricted parking spaces, two accessible parking spaces and two taxi drop off/ set down spaces within Benaud Place, Waratah Shopping Centre
- “No Parking” restrictions along Sturt Street opposite Telopea Public School and Marshall Road near the Shortland Street intersection
- Several accessible parking spaces located on Polding Place near the cul-de-sac.
- Resident-only parking lots for apartment blocks.

The amount of unrestricted kerbside parking spaces within the Telopea Master Plan area allows for sufficient visitor parking during peak parking periods observed. Surrounding local streets have a reasonably low demand, except near Telopea Public School, Waratah shops and parking close to Telopea Railway Station.

Parking within 100 metres of the station is full by about 7:30am, which is due to residents using these spaces for non-commuting purposes, as shown in Figure 2.9. Parking near the station could benefit with the introduction of parking restrictions, although there is sufficient unrestricted kerbside parking available within the local streets beyond 100 metres from the station.

Figure 2.9: Parking Situation at Telopea Railway Station, AM Peak

Informal kiss and ride activities were observed along Shortland Street adjacent to a 'No Stopping' zone at the railway station.

2.6 Existing Demographics and Travel Characteristics

2.6.1 2011 Journey to Work Data – Telopea Study Area

The Journey to Work (JTW) data published by the Bureau of Transport Statistics[4] (BTS) from 2011 Census data by the Australian Bureau of Statistics provides the most robust picture of travel patterns to/ from the Telopea Master Plan area.

The smallest geographical area for which JTW data is available is a Travel Zone (TZ). JTW data was analysed for the Telopea Master Plan area catchment[5], to better understand the current travel patterns for people who live and work in the area.

Figure 2.10 shows the selected catchment of the Telopea Master Plan area represented as a Travel Zone (TZ 1131).

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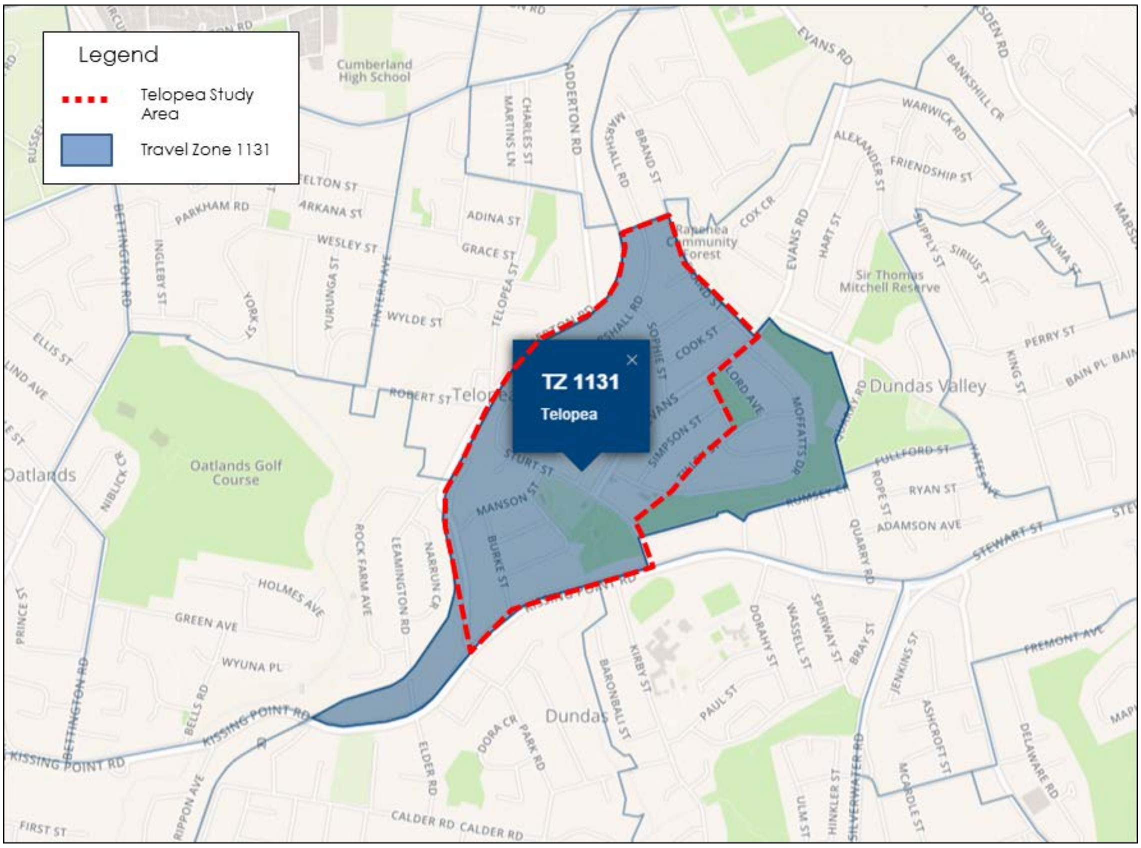
4 Now the "Transport Performance and Analytics" section of Transport for NSW.

5 Corresponding to TZ #1131.

Figure 2.10: Telopea Master Plan Area Travel Zone



Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#1131, accessed 14 March 2016

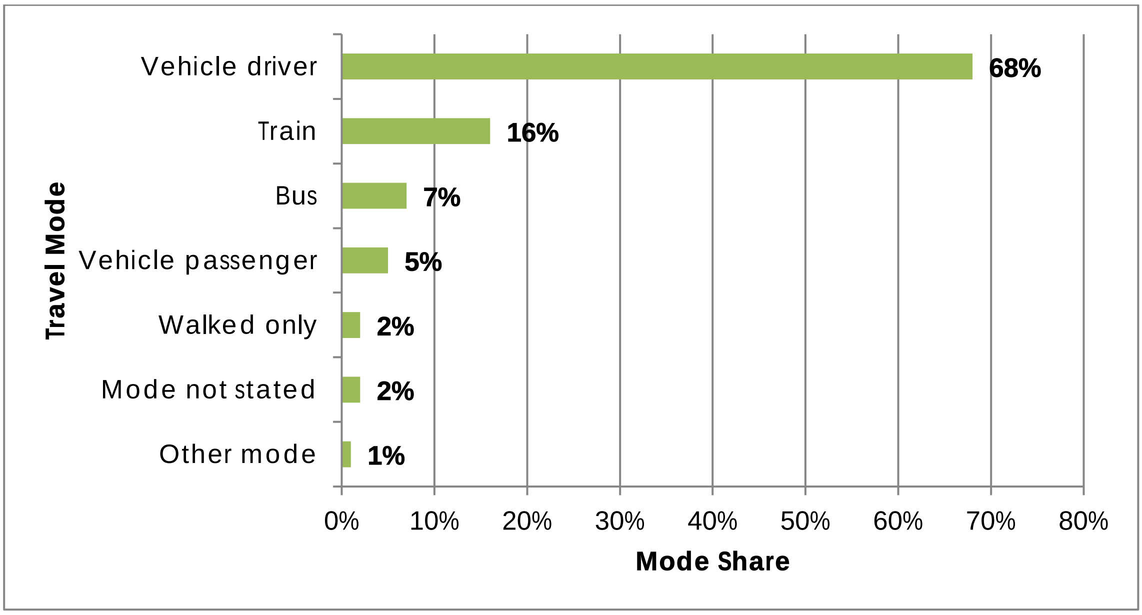
2.6.2 Travel from the Telopea Master Plan Area

The 2011 JTW data indicates that a total of 2,987 people live in the selected Travel Zone. Out of the 2,987 residents, there are a total number of 1,131 people who work.

Travel Modes from Telopea

Figure 2.11 indicates 73 per cent of working residents in the selected Travel Zone travel to work by car as the driver (68 per cent) or a passenger (five per cent). Public transport modes such as train (16 per cent) or bus (seven per cent) make up 23 per cent of total commuter travel modes.

Figure 2.11: JTW Travel Modes by Residents from Selected TZ

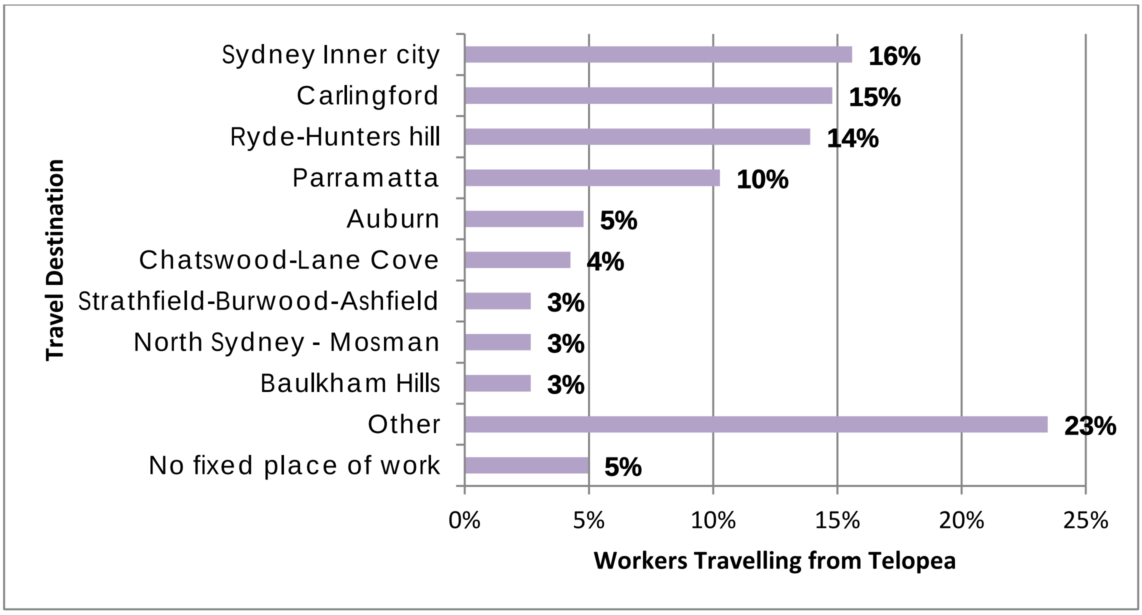


Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#1131, accessed 14 March 2016

Travel Destinations from Telopea

The BTS data also provides the destination areas for these workers travelling from the selected Travel Zone, as shown in Figure 2.12. Of these, the Sydney CBD (16per cent), Carlingford (15 per cent), Ryde (14 per cent) and Parramatta (10 per cent) are the most popular destinations, with a minority travelling to suburbs including Auburn, Chatswood, Strathfield, Burwood, North Sydney and Baulkham Hills. It is noted that 265 residents work in other destinations not listed below to other minor destinations, namely Baulkham Hills (29), Pennant Hills – Epping (26), Bankstown (20), Merrylands – Guildford (17) and Warringah (16).

Figure 2.12: Top Destination Areas for Workers Commuting from Telopea



Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#1131, accessed 14 March 2016

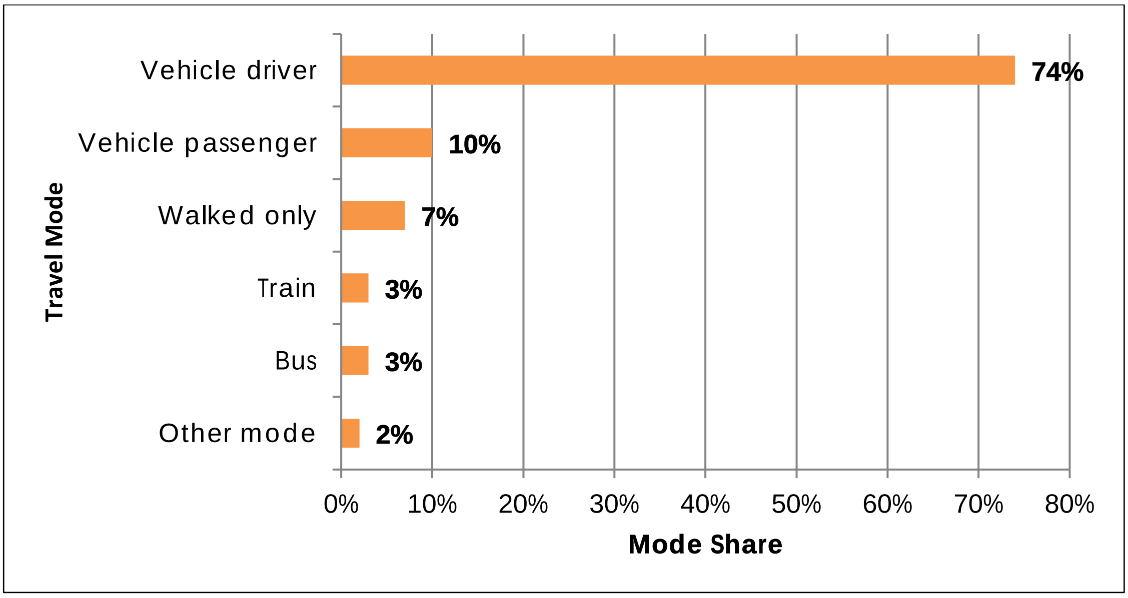
2.6.3 Travel to the Telopea Study Area

The BTS 2011JTW data indicates that a total of 260 people work within the selected Travel Zone.

Travel Modes to Telopea

Figure 2.13 shows the distribution of travel modes by the workers employed in the Travel Zone selected in Figure 2.10, which indicates that approximately 84 per cent of workers travel to Telopea by private vehicle to work as a driver or passenger, with only about six per cent travelling via train or bus. It is also noted that seven per cent of workers prefer to walk to work, most likely residents.

Figure 2.13: JTW Travel Modes by Workers to the Selected TZ

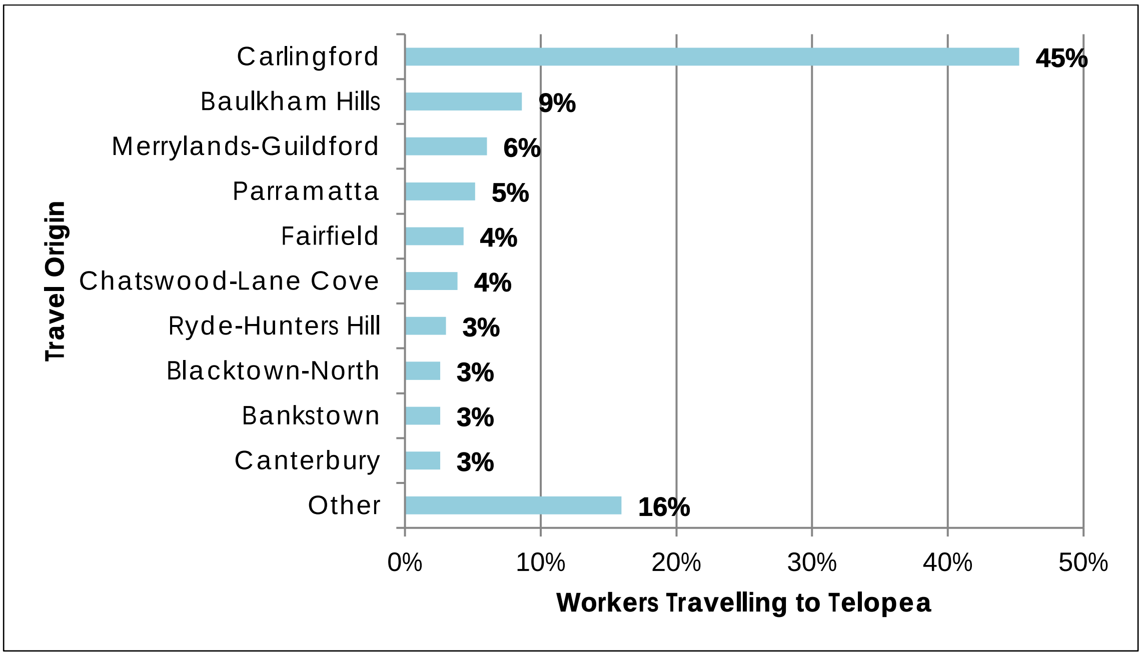


Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#1131, accessed 14 March 2016

Travel Origins to Telopea

Figure 2.14 represents the top origins of the 260 workers travelling to the selected Travel Zones in Telopea. These areas consist mainly within the neighbouring Carlingford area, with 105 out of the 232 workers (45 per cent) originating from here. Baulkham Hills, Merrylands, Parramatta and Fairfield also indicate a significant number of origins.

Figure 2.14: Top Origin Areas for Workers Commuting to Telopea



Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#1131, accessed 14 March 2016

2.7 Public Transport

Public transport services in the Master Plan area is provided by the Carlingford Line operated by Sydney Trains, and bus services operated by Sydney Buses.

2.7.1 Train Services

Telopea Railway Station is located on Sturt Street along the western boundary of the Master Plan area. It is also accessible from Adderton Road opposite Telopea Street.

There are limited train services on the Carlingford Line, serving as a shuttle line between Carlingford Railway Station and Clyde Railway Station, where interchange to other train lines is available.

Services at Telopea Railway Station to Clyde during the AM peak is about every 30 minutes, reducing to an hourly service outside the peak periods. Due to the infrequent services, patronage on the train is low.

The following train station barrier counts at Telopea Railway Station are available from BTS based on 2014 data:

- AM peak (6:00–9:30am) – 260 in/ 30 out
- PM peak (3:00–6:30pm) – 20 in/ 130 out
- 24-hour period – 340 in/ 340 out.

2.7.2 Bus services

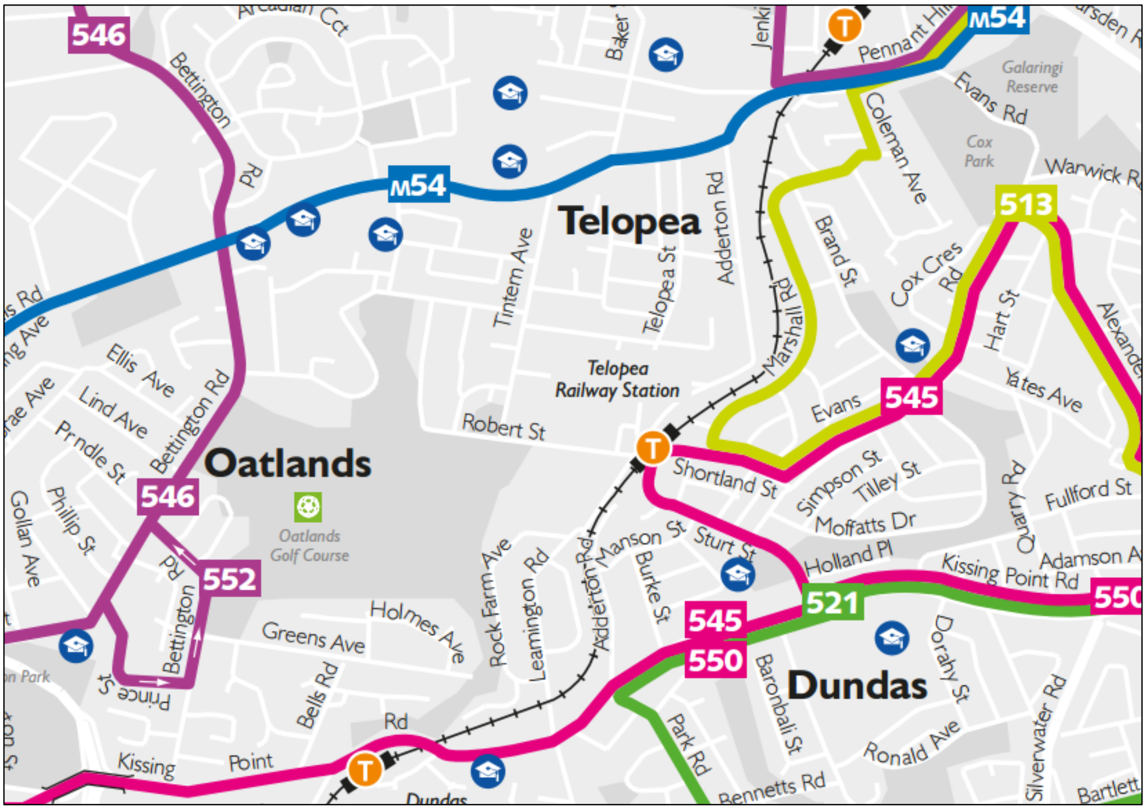
Sydney Buses operates two routes through Telopea, as indicated in Table 2.7. Figure 2.15 shows the bus network map near Telopea.

Table 2.7: Bus Services through Telopea

Route #	Route Description	Peak Headways (Frequency)	Off Peak Headways (Frequency)
545	Parramatta to Chatswood	10 minutes	15 minutes
513	Meadowbank Wharf to Carlingford	30 minutes	1 hour

Buses operate along Marshall Road, Shortland Street and Sturt Street, connecting with Pennant Hills Road in the north and Kissing Point Road in the south. Telopea Railway Station is serviced by the Parramatta to Chatswood (Route 545) service primarily using Kissing Point Road.

Figure 2.15: Bus Transport Network



Source: Sydney Buses – Western Region Guide

2.8 Active Transport

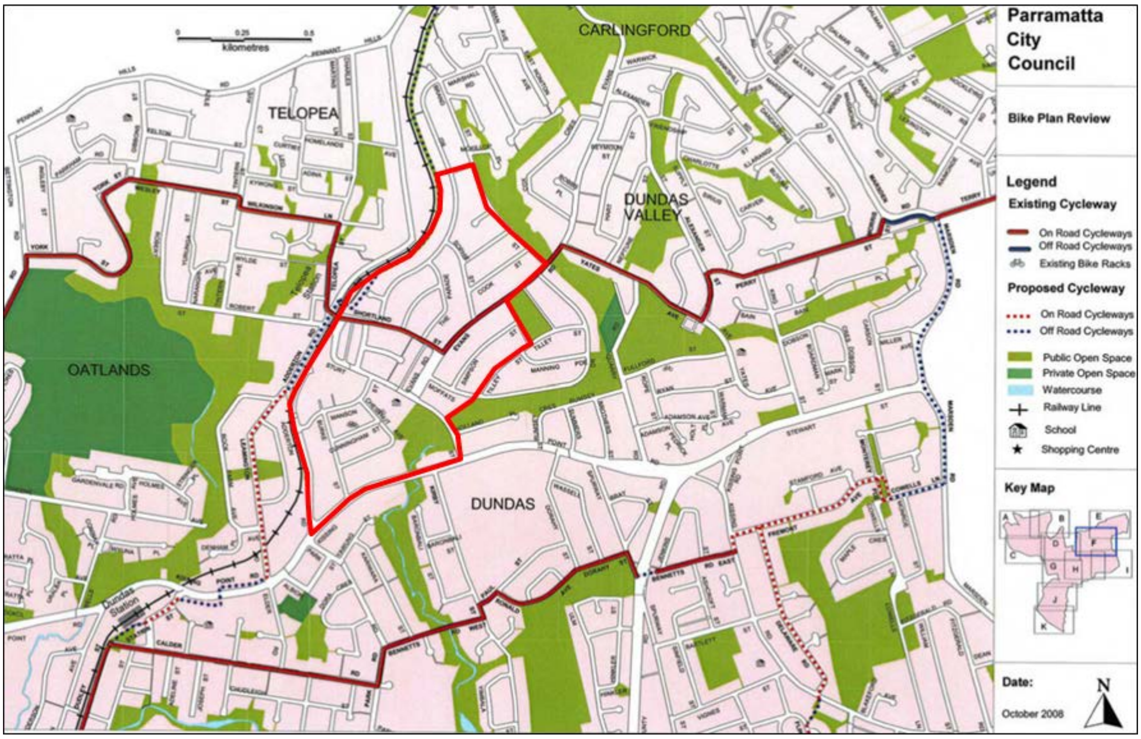
2.8.1 Cycling

Parramatta City Council released the Parramatta Bike Plan in 2009, indicating the following upgrades near the Telopea Master Plan area:

- off-road cycleway parallel to Adderton Road from Field Place to Pennant Hills Road
- off-road cycleway from Telopea Station to Carlingford Station via an existing corridor linking with an existing route
- off-road cycleway between Tiptrees Avenue and Coleman Avenue along Pennant Hills Road.

A map of the Parramatta Bike Plan (2009) with respect to Telopea is shown in Figure 2.16.

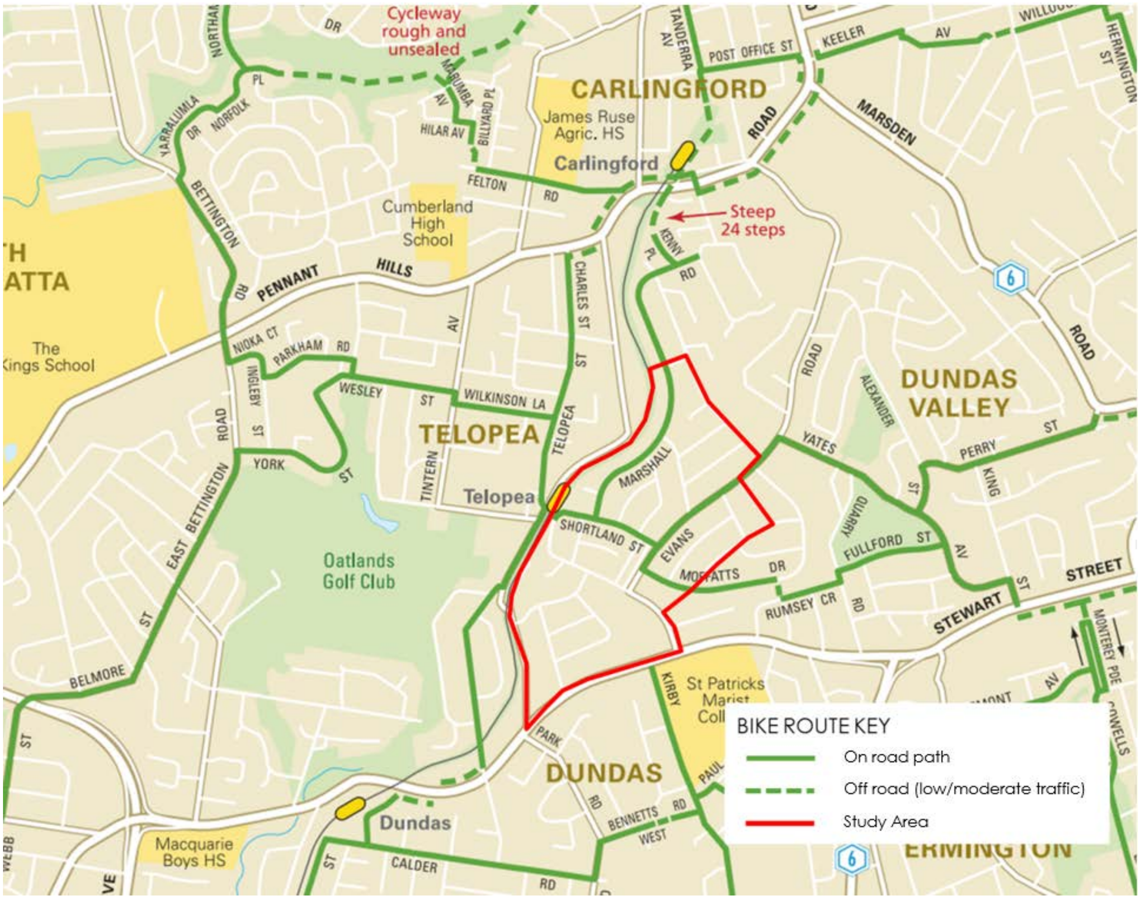
Figure 2.16: Telopea Master Plan Area within the Parramatta Bike Plan (2009)



Source: [Parramatta Bike Plan]

Currently, the Telopea Master Plan area has on-road cycling facilities on local streets including Shortland Street and Evans Road, allowing connections to key destinations including Telopea Railway Station, schools and surrounding suburbs. Proposed cycling links include an off-road facility along the railway corridor connecting to Pennant Hills Road in the north and an on-road facility along Leamington Road/ Adderton Road to Kissing Point Road in the south. The current cycling network near the study area is illustrated in Figure 2.17.

Figure 2.17: Cycling Network



Source: Westmead and Parramatta Bicycle Route Map

2.8.2 Walking

There are limited pedestrian footpaths in the area, resulting in poor pedestrian connectivity. Site observations indicate pedestrians frequently walked within the road carriageway along local streets as no footpaths are provided. These were observed on Wade Street, Eyles Street, The Parade, Fig Tree Avenue, Holland Place and Polding Place.

During the morning site visit, pedestrians were observed to cross the rail corridor from the west side of the station via a pedestrian level crossing to access the bus services along Shortland Street on the eastern side of the station. The pedestrian desire lines are shown in Figure 2.18.

Figure 2.18: Telopea Railway Station Pedestrian Desire Lines – AM Peak Period

Basemap source: Google Maps, accessed 11 March 2016

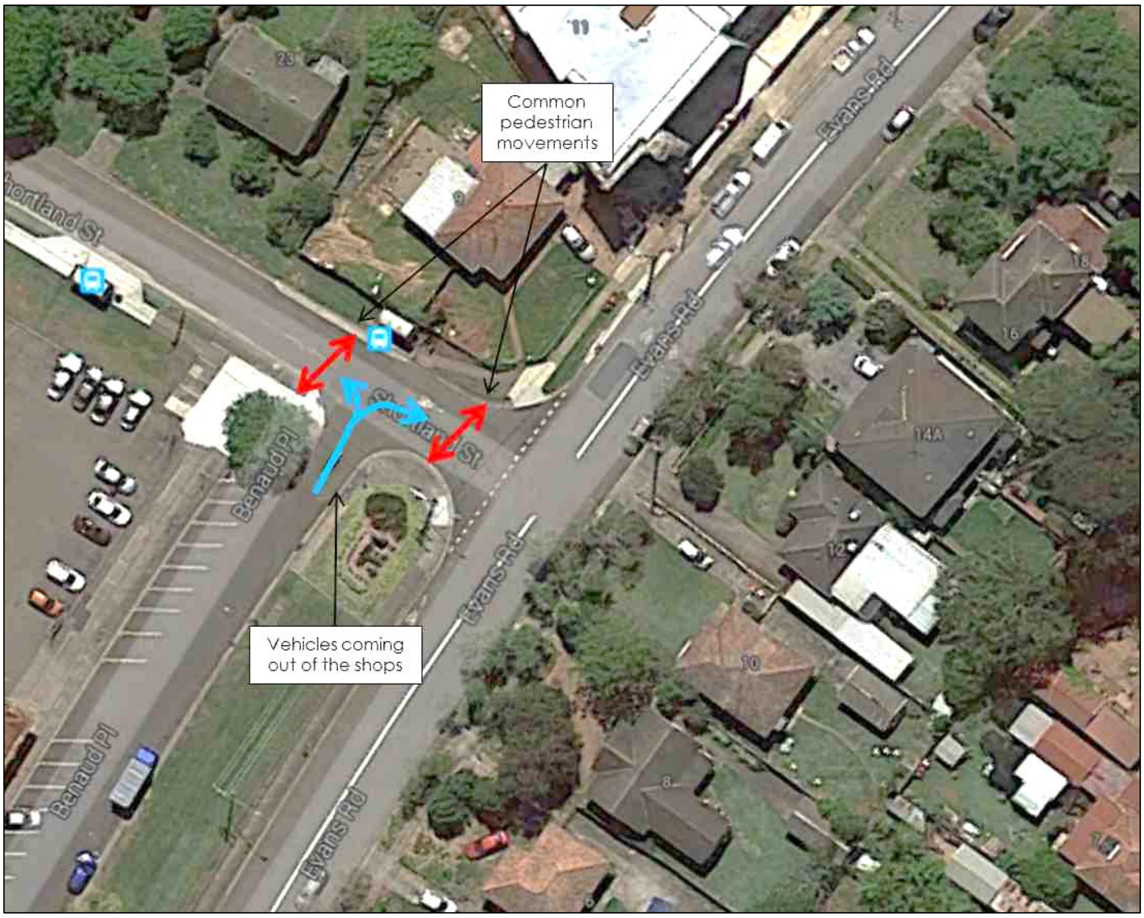
There are currently no formal pedestrian facilities to cross Shortland Street and vehicles were observed to maintain their speed around this area even with increased pedestrian activity.

Despite this, the Roads and Maritime crash data from Figure 2.8 indicates that there have been no crashes here within the past five-year period.

Pedestrian and vehicle conflicts were observed along Shortland Street near Evans Road. There are no formal pedestrian crossing facilities provided at this location. Bus patrons crossing from/ to the bus facilities along Shortland Street would often conflict with oncoming vehicles, most notably vehicles exiting Benaud Place (from the shops). This pedestrian behaviour is indicated in Figure 2.19.

The crash data indicates there have been four pedestrian crashes at this intersection and the surrounding bus stops, generally due to pedestrians crossing the road from the near side of a vehicle to the kerb/ road shoulder as shown in Figure 2.20 (refer to Figure 2.8 for legend).

Figure 2.19: Pedestrian/ Vehicle Conflicts



Basemap source: Google Maps viewed 11 March 2016.

Figure 2.20: Incidents near the Evans Road and Shortland Street Intersection

The Telopea Master Plan area slopes downwards from Telopea Railway Station towards the creek line near Evans Street in the southeast due to a ridgeline generally running in a north-south direction.

The Telopea Master Plan area topography creates a difficult walking environment around Telopea with long walking distances between key destinations. The walking distance between the Waratah Shopping Centre and Telopea Railway Station is about 400 metres, with steep grades along Shortland Street and Sturt Street.

A signalised pedestrian crossing is provided along Adderton Road near Telopea Railway Station. Most pedestrians were observed to cross at this facility without waiting for the pedestrian signal to turn green. The crash data analysed indicates there has only been one pedestrian crash at the Adderton Road signalised crossing near Telopea Station in the last five-year period due to a pedestrian crossing from the near side.

Raised markings are generally provided in high pedestrian activity areas such as Telopea Public School and Waratah Shopping Centre.

2.8.3 School Activities

Telopea Public School is a small community school located in the southern end of the Telopea Master Plan area, bound by Sturt Street, Chestnut Avenue and Manson Street. Based on the School Plan 2015-2017, the school only operated three classes in 2015; a combined Kindergarten/ Year 1 class, a Year 2, 3 and 4 class and a Year 5 and 6 class. Traffic generated by the school during the AM school peak period (8–9:30am) was observed to cause minimal congestion during the site visit.

School drop-off activity was observed along Chestnut Avenue in a No Parking zone (8–9:30am and 2:30–4pm school days) near the school entrance. There were only two vehicles observed to drop off school children at any one time. School children were also dropped off along Sturt Street, west of Manson Street and used the pedestrian refuge on Manson Street to safely cross the road. Drop-off activities were also observed in Benaud Place, with the raised pedestrian crossing facility on Sturt Street providing a safe crossing point for students.

A small portion of students arrived via buses servicing the bus stop on Sturt Street adjacent to the Dundas Branch Library. Students and/ or parents were observed to cross Sturt Street via the pedestrian refuge provided near the bus stop.

Overall, the traffic, pedestrians and parking conditions around the school during the peak AM school period was observed to have minimal delays caused by the school activity.

Students and parents were observed to appropriately use the pedestrian facilities around the school. The existing pick-up and drop facilities servicing the school are expected to be maintained.

2.8.4 Pedestrians

Site Topography

The topography in the main centre of Telopea can be considered steep in relation to pedestrian amenity.

The slope (around 1 in 10) towards the creek near Evans Street in the south-east with the higher ground being the railway line makes walking towards Telopea Station from the east difficult. There are relatively long distances between key destinations such as the Waratah Shopping Centre and Telopea Station.

Redevelopment in the town centre would need to consider not only pedestrian desire lines to key trip attractors, but also the topography that would be encountered along those desire lines and how building form in combination with the public domain can best address this challenge.

3. Master Plan

3.1 Land Uses

The Master Plan includes the construction of residential, including a mix of private, affordable and social housing, a retail centre and community uses, with the indicative areas summarised in Table 3.1.

Table 3.1: Indicative Land Uses

Use	No. of Apartments/ Area
Residential	Between 3,500 – 4,500 mixed residential dwellings
Retail	7,000 m^2 (including a 3,000-4,000 m^2 supermarket)
Community	3,000 m^2 (approx.)

The core area opposite the light rail stop will consist of high-density buildings and retail services, providing a clear urban structure around the light rail stop. Medium to low density uses are proposed outside of the core, with densities and building heights decreasing as development moves outwards from the core area and light rail stop.

The community centre would facilitate a new neighbourhood centre and a new branch library to replace the existing Dundas Area Neighbourhood Centre.

In addition to the above land uses, public spaces such as parks, reserves and a new arrival plaza at the light rail stop is proposed throughout the Telopea Master Plan.

A land use strategy map showing the proposed land uses within the Telopea Master Plan area is shown in Figure 3.1.

Figure 3.1: Land Use Strategy Map

Source: A Vision for Telopea Master Plan Report, Urbis 2017

3.2 Site Layout and Access

3.2.1 Road Hierarchy

The design is permeable for both north-south and east-west movements, with the proposed site layout shown in Figure 3.1. From the regional road network, the site is accessed via Pennant Hills Road to the north and Kissing Point Road to the south. Adderton Road, Evans Road, Marshall Road and Sturt Street are collector roads which intersect with the regional road network providing access to the site. The proposed road hierarchy and mixture of traffic calming measures will limit the amount of through-traffic movement passing the site.

The document *A Vision for Telopea, Background Report* (Urbis, 2017) considers a more structured road hierarchy which clearly states the functions of surrounding roads which would manage the impacts of the eventual uplift in traffic.

The road hierarchy diagram is pictured in Figure 3.2 and summarised in Table 3.2.

Figure 3.2: Telopea Road Hierarchy Plan

Source: A Vision for Telopea Background Report, Urbis 2017

Table 3.2: Road Hierarchy Summary

Hierarchy	Role and Function	Streets
Sub Arterial Road	• Provide regional traffic and public transport connections	• Kissing Point Road • Pennant Hills Road
Collector Roads	• Provide the main connections between sub-arterial roads, in the case of Telopea provide the key links between Kissing Point Road and Pennant Hills Road • Ability to accommodate local bus movements • Traffic movement and safety will be prioritised over on-street parking	• Adderton Road • Evans Road • Sturt Street • Shortland Avenue • Marshall Road • Manson Street
Local Roads	• Predominantly to be used for local traffic, with slow vehicular traffic with on-street parking and pedestrian amenities	• All streets that are not collector or sub-arterial
Minor Connectors	• Predominantly thoroughfares that prioritises pedestrian movements, may be a pedestrian street and/or shared street	• Eyles Street extension – east of Benaud Lane • Eyles Street extension – west of Wade Street

Source: A Vision for Telopea Background Report, Urbis 2017

3.2.2 New Connections

The Master Plan seeks to provide new connections to increase site permeability to assist with the expected increase vehicle, cycling and pedestrian movements as follows:

- A new road crossing over the rail line linking Adderton Road and Sturt Street, providing an alternative crossing option from the existing narrow Manson Street crossing. This new crossing will improve the movements of vehicles across the light rail corridor for traffic travelling east-west through the core area.
- Relocation of Wade Street to link Manson Street and Marshall Road to improve the north-south movement and permeability through the core area, although traffic calming measures will be used to discourage through traffic.
- Benaud Lane upgraded to create verge with footpaths and landscape area to improve permeability through the core area, but will also use traffic calming measures to discourage through traffic.
- Eyles Street may also be extended to link Evans Road and the light rail stops. However, this extension is more likely to be delivered as a pedestrian link in full and not provide a complete road/ traffic connection.

In addition to the above, a new road connecting Sturt Street to Chestnut Avenue parallel to the eastern boundary of Telopea Public School is to be considered by Council and Department of Education for any future master plan for the school.

The addition of this link would create an opportunity for a ‘kiss and ride’ facility servicing the school. This would also improve access to the residential areas south of Sturt Street and increase the general area permeability.

4. Car Parking

4

4.1 Off-Street Car Parking Requirements

The off-street car parking provision requirements for different development types are set out in City of Parramatta Council's Development Control Plan (DCP 2011). Social and affordable housing land uses can use rates as per the State Environmental Planning Policy (SEPP) Affordable Rental Housing 2009.

A review of the car parking requirements for proposed developments within the Telopea Master Plan area is summarised in Table 4.1.

Table 4.1: DCP and SEPP Parking Requirements

DCP/ SEPP Land Use	Minimum Parking Rate	Reference
Dwelling houses and dual occupancies	1 space for dwellings less than or equal to 125m^2 2 paces for dwellings equal to or greater than 125m^2	City of Parramatta Council DCP 2011
Residential flat buildings	1 space per 1 or 2-bedroom unit 1.2 spaces per 3-bedroom unit 2 spaces per 4-bedroom unit 0.25 spaces per dwelling for visitor parking (car wash bay may also be a visitor space)	City of Parramatta Council DCP 2011
Business and Office	1 space per 50m^2 GFA 1 loading bay per 400m^2 GFA	City of Parramatta Council DCP 2011
Retail	1 space per 30m^2 GFA 1 loading bay per 400m^2 GFA	City of Parramatta Council DCP 2011
New affordable housing/ social housing	0.4 spaces per 1 bedroom unit 0.5 spaces per 2-bedroom unit 1 space per 3 or more-bedroom unit	SEPP Affordable Rental Housing 2009

4.2 Off-Street Recommended Parking Rates

A key redevelopment objective of the Master Plan is to encourage the use of public transportation and reduce reliance on private cars. There is potential for balanced parking provisions in lieu of planned transport infrastructure development (i.e. the Parramatta Light Rail) within the vicinity of the site to ensure effective use of public transportation and ease parking congestion within the area.

It is recommended that Council consider amending the existing parking rates in Telopea to respond to future demand and encourage the use of the future Parramatta Light Rail. The recommended rates are included in Table 4.2 below and allow for reduced parking in areas within 400 metres walking distance from the light rail stop as shown in Figure 4.1.

Figure 4.1: Light Rail Stop 400 metre Catchment

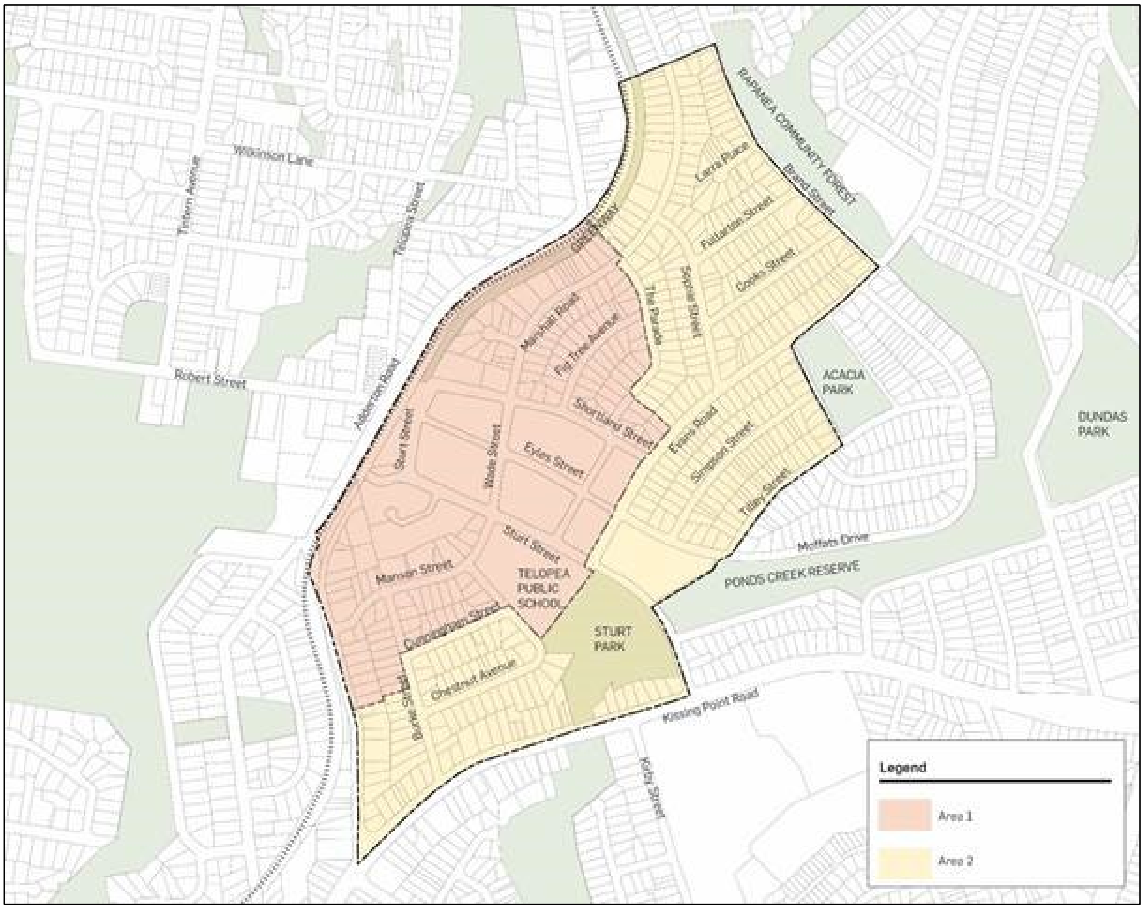


Table 4.2: Recommended Telopea Local Area Parking Rates

Development Type		Area 1	Area 2
Residential Flat Buildings	1 bed	0.6 per unit	1 per unit
	2 bed	0.9 per unit	1.25 per unit
	3+ bed	1.4 per unit	1.5 per unit
	Visitor	1 per 10 unit	1 per 7 units
Retail	Supermarket	1 space per 25m^2 GLFA [3]	
	Specialty	1 space per 25m^2 GLFA	
Commercial (including Medical and Professional Consulting uses)		1 space per 40m^2 GLFA	
Community		Assessed on merits, will take in to account integration of retail/ community uses and ability to share car parking as it would facilitate multi-stop facilities	
Car Share Spaces		A minimum of 1 space is to be allocated to car share for developments with 50 or more dwellings. If agreement with a car share provider is not obtained, then the car share space is to be used for addition visitor parking until such time a car share provider agreement is obtained.	

[3] Gross leasable floor area

The retail rates in Table 4.2 are lower than Council and Roads and Maritime rates as they adopt an integrated approach to retail shopping activities. The shops are centrally located within a predominantly local retail catchment and the lower parking rates will encourage walking to the shops, commuters shopping on their way home throughout the week, and acknowledges the proposed densities with immediate vicinity (around 200 metres) of the new shops. These rates are consistent with other recent renewal precincts, including Carter Street, Homebush.

4.3 Bicycle Parking

DCP 2011 sets out requirements for bicycle parking which must be provided in an undercover safe a secure bicycle parking facility with rates set out in Table 4.3 below.

Table 4.3: DCP Bicycle Parking Requirements

Land Use	DCP Bicycle Parking Rate
Residential flat buildings	1 space per 2 dwellings
Business premises, office premises, retail and industrial developments	1 space per 200 m^2 GFA

End-of-trip facilities (showers, lockers, change rooms, etc.) must be provided for business premises, office premises and retail developments.

4.4 On-street Parking Provisions

There are currently concerns regarding on-street parking at certain locations within the study area. Existing on-street parking is available on both sides of the road throughout most internal roads which reduces the two-way traffic carriageway widths and has been observed to be an issue particularly along bus routes such as Marshall Road, Evans Road and Sturt Street.

To reflect high-density residential volumes and maintain appropriate bus access, it is recommended on-street parking restrictions are introduced based on the following carriageway widths (with potential exceptions for minor streets and school frontages):

- less than eight metres – no on-street parking to be provided
- between eight to 10.5 metres – parking on one side only
- more than 10.5 metres – parking allowable on both sides.

It is recommended that the on-street parking strategy applies to all roads initially where redevelopment is proposed, with exceptions made for low volume and/or terminating roads following specific assessment (including sight lines and passing opportunities).

It is noted activities associated with the local Church along Manson Street has been observed to cause on-street parking on Adderton Road, Winter Street and Manson Street to reach capacity on weekends. These impacts could be reviewed by Council to determine an appropriate outcome for the Church and the community.

5. Sustainable Transport Infrastructure

5.1 Walking and Cycling Network

The Master Plan access and movement strategy indicates the provision of better pedestrian and cycling connections throughout the neighbourhood and the existing surrounding cycling network as a key development principle.

The precinct will be integrated with the City of Parramatta cycling strategy to provide key cycling links and facilities including the Greenway Corridor to service the precinct. Cycleways are proposed to connect with the Light Rail stop and the local area.

Pedestrian connections and footpaths will be provided as new development occurs.

5.2 Public Transport

5.2.1 Parramatta Light Rail

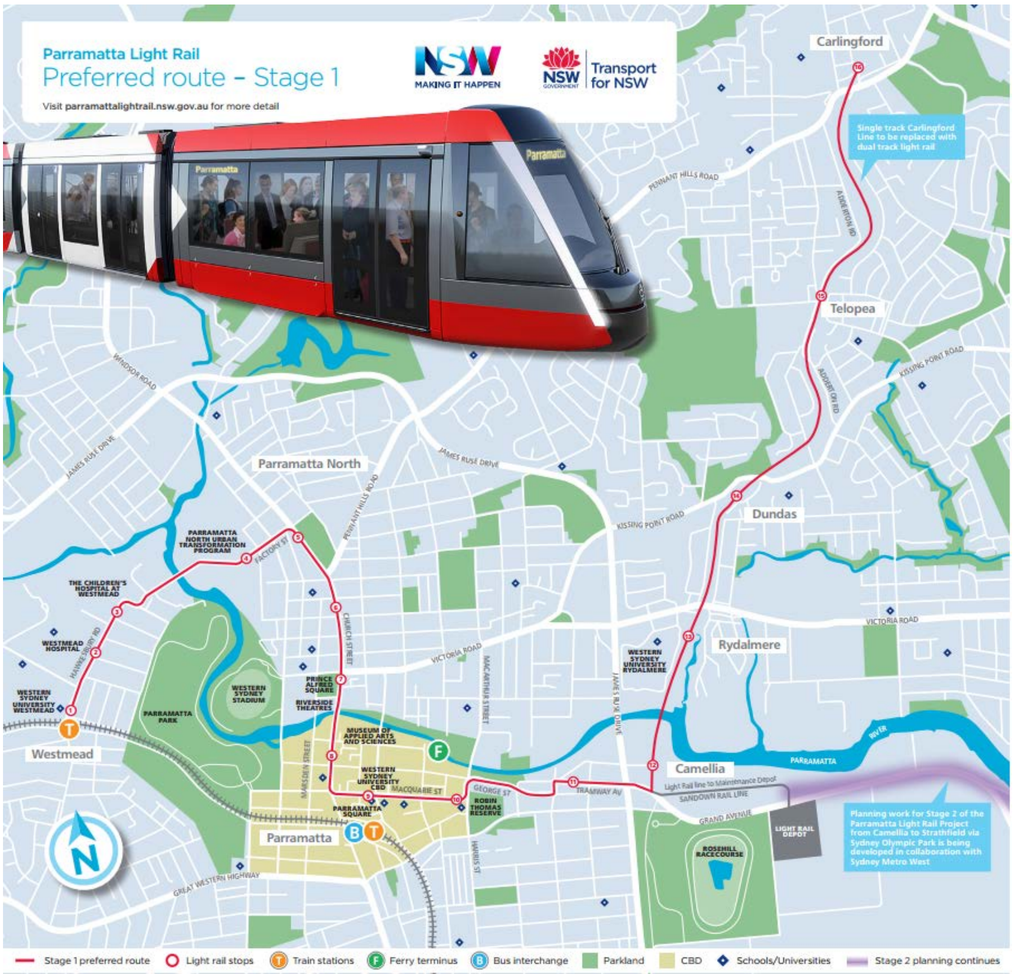
A preferred light rail network for Parramatta was recently announced by the NSW Government, following studies undertaken to investigate opportunities to support the creation of new communities, employment opportunities and encourage urban growth across the Greater Parramatta to Olympic Peninsula Priority Growth Area.

Stage 1 of the network announced by the Government will include:

- a core spine linking precincts within Greater Parramatta including Westmead health precinct, Parramatta CBD and Camellia
- the replacement of the existing heavy rail service between Camellia and Carlingford with a more frequent light rail service.

Figure 5.1 shows the indicative alignment of the Parramatta Light Rail Stage 1 announced in February 2017.

Figure 5.1: **Indicative Alignment of the Parramatta Light Rail Stage 1 Network**



Source: Transport for NSW – [Parramatta Light Rail preferred network]

Given the reasonably low demand for heavy rail, the conversion of Telopea Rail Station to light rail could be of significant benefit to the local area. The proposed Parramatta Light Rail will provide enhanced public transport service to Telopea, in terms of potential for more frequent services during peaks and throughout the day. The proposed Parramatta Light Rail will also provide Telopea with direct links to key destinations in the surrounding region, including Parramatta, Westmead, Strathfield and Sydney Olympic Park, thereby increasing its accessibility. However, the same level of accessibility could also bring about negative impacts to the study area such as higher demand for all-day commuter parking from external generators.

5.3 Promotion of Sustainable Transport

5.3.1 Light Rail Transportation Hub

A light rail precinct which includes both the light rail stop and adjoining plaza will be the key public transportation node servicing Telopea. This public space will be complimented with cycling end-of-trip facilities, taxi ranks and a bus interchange and create a welcoming environment for both residents and visitors through detailed architecture.

5.3.2 Green Travel Plan

A Green Travel Plan is a way in which a development can manage the transport needs of residents and visitors. The aim of the plan is to reduce the environmental impact of travel to and from a given site and in association with its operation. The plan encourages more efficient use of motor vehicles as well as alternatives to single occupant car usage.

5.3.3 Reduction in Private Vehicle Usage

Encouraging the use of public transport and walking and cycling as modes of transport is central to reducing motor vehicle usage. With the addition of the light rail transportation hub, the site will be easily accessible by public transport.

The Master Plan is a prime opportunity to promote this vision by encouraging the use of public transport, cycling, and walking and not encouraging an abundance of car parking within this area and in turn, an over use and unnecessary use of private vehicles. The internal movement and access network should reinforce this complimented with high quality wayfinding.

6. Traffic Impact Assessment

6.1 Traffic Generation

Traffic generation estimates for the residential land uses have been based on information on trip rates sourced from the *Guide to Traffic Generating Developments* (Roads and Maritime, 2002).[6]

This study takes a conservative approach and assumes the following with respect to traffic generation:

- medium density buildings (3-6 storeys) follow the rate for three-bedroom units
- high density buildings (six storeys or more) follow the rate for metropolitan sub-regional centres
- retail traffic generation has been based on 6.7 vehicles per 100 square metres of GFA for retail land uses between 0 to 10,000 square metres of GFA, this is the Roads and Maritime rate based on a typical Friday night.

To represent expected retail activity, discounted AM and PM peak hour traffic generation rates for the retail land uses have been adopted based on the following:

- 25 per cent of trips are from the surrounding local residential developments within the study area (internal/ linked trips already accounted for within residential traffic generation)
- 25 per cent of people will prefer to walk to the shops
- 50 per cent of trips are to/ from external sources (including linked trips).

The assumptions used to estimate the traffic generation of the proposal are based on yield estimates provided by Urbis and LaHC. These are outlined in Table 6.1.

Table 6.1: Traffic Generation Estimates

Land Use	No. of Additional Dwellings/ Units	Weekday Peak Hour Generation Rate (trips)	Traffic Generation Estimates (trips/ peak hour)
Medium Density Residential (three or more bedrooms)	725	0.65 per dwelling	471
High Density Residential (Metropolitan Sub-Regional Centres)	3,775	0.29 per unit	1,095
		Total residential trips	**1,566**
Land Use	**GFA (m^2)**	**Discounted Weekday Peak Hour Generation Rate (trips)**	**Traffic Generation Estimates (trips/ peak hour)**
Retail - AM	7,000[7]	1.75/ 100 m^2	123
Retail - PM		3.5/ 100 m^2	245
		AM peak total trips	**1,689**
		PM peak total trips	**1,811**

Source: Information provided by Urbis and LaHC

[6] The traffic generation rates provided in Roads and Maritime Technical Direction 2013-04a only provided rates for low density and high density residential developments. For consistency, GTA adopted rates for low-, medium- and high-density residential developments provided in the *Guide to Traffic Generating Developments* (RMS, 2002).

[7] This is the total retail area.

In combination, the development is expected to generate a maximum of 1,689 and 1,811 trips during the AM and the PM peak hours, respectively.

A detailed assessment of the traffic impacts on key internal intersections in the Master Plan area was undertaken for the proposed development yields and based on traffic generation per block and associated distribution. This assessment, discussed in Section 6.3.1 and Section 6.3.2 and detailed in Appendix B, also included some minor additional traffic (in the order of five percent) which would account for any local circulation, variations in traffic generation/ distribution or similar and provides a robust assessment of internal intersection treatments.

6.2 Distribution and Assignment

Development traffic is expected to access the Master Plan area via four main access/ egress points:

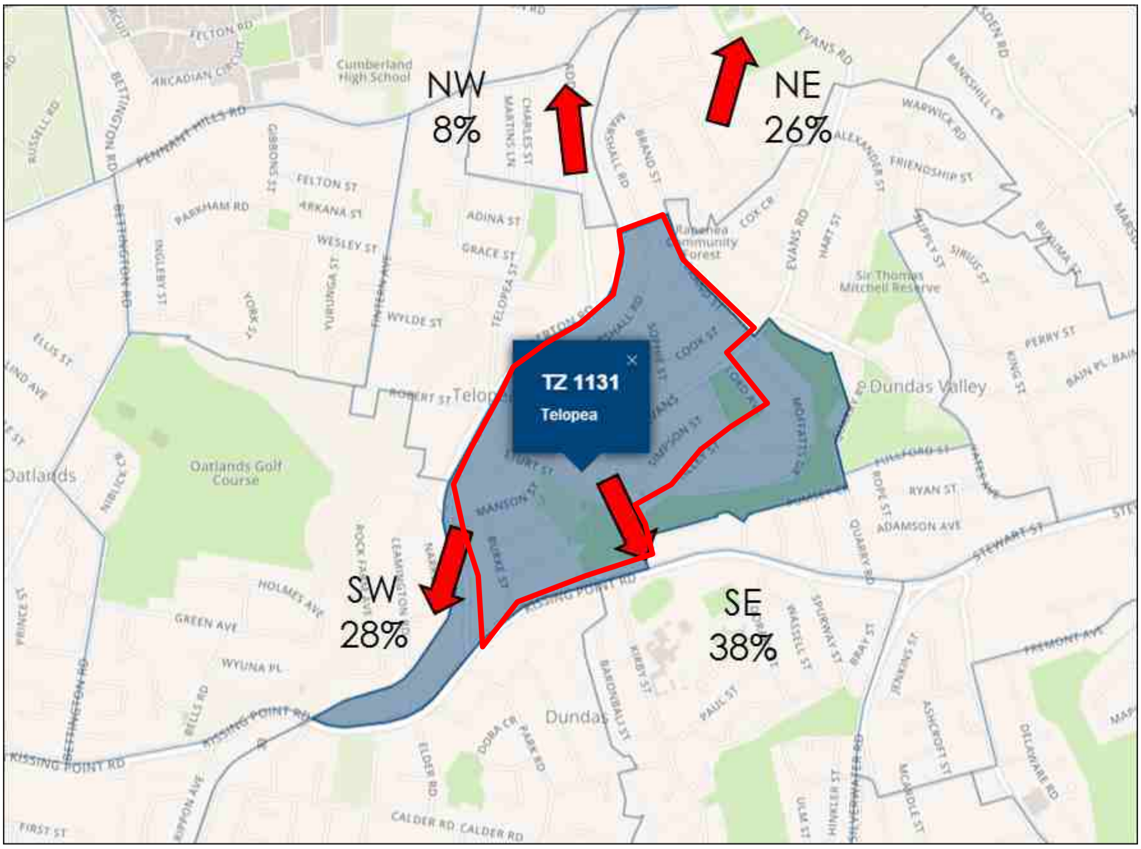
- Pennant Hills Road/ Adderton Road (to the northwest)
- Pennant Hills Road/ Coleman Avenue (to the north)
- Pennant Hills Road/ Evans Road (to the northeast)
- Kissing Point Road/ Adderton Road (to the southwest)
- Kissing Point Road/ Sturt Street (to the southeast).

The distribution and assignment of traffic generated by the proposed development has been assessed using the following assumptions:

- work-related traffic follows current journey-to-work (JTW) travel patterns
- retail/ leisure-related traffic has been equally allocated throughout all access/ egress points in consideration of the road network and access configuration.

The distribution of JTW travel patterns for work-related trips in the Telopea Master Plan area across the four-main access/ egress points is shown in Figure 6.1.

Figure 6.1: Telopea Master Plan Area Work-Related Travel Patterns



Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwdynamic/, accessed 10 June 2016

The retail development proposed as part of the proposal would likely attract external trips from the surrounding areas. Traffic distribution has been assumed to be equally distributed across all main access/ egress points (25 per cent in each direction) as the study area is surrounded by residential development.

In addition, the directional split of traffic during peak hours (i.e. the ratio between the inbound and outbound traffic movements) has been estimated based on patterns at similar developments and taken as the following:

- residential AM peak hour: 20 per cent inbound, 80 per cent outbound
- residential PM peak hour: 80 per cent inbound, 20 per cent outbound
- retail AM peak hour: 80 per cent inbound, 20 per cent outbound (workers travelling to work and minimal retail activity in the morning)
- retail PM peak hour: 50 per cent inbound, 50 per cent outbound.

6.3 Traffic Impacts

6.3.1 Internal Intersections – Operating Conditions

Table 6.2 presents the results of the intersection assessment for the key internal intersections within the study area. It demonstrates that under existing layout arrangements, these key internal intersections would not satisfactorily accommodate the forecasted peak hour traffic generation.

Full results of the internal intersections assessment are presented in Appendix B.

Table 6.2: Internal Intersections – Performance with Development Traffic and Existing Layouts

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS) with Development Traffic
Adderton Road/ Manson Street	AM	1.00	80	145	F
	PM	1.30	373	277	F
Sturt Street/ Manson Street	AM	1.19	192	540	F
	PM	0.60	14	29	B
Evans Road/ Sturt Street	AM	1.94	923	1,694	F
	PM	1.40	415	704	F
Evans Road/ Shortland Street	AM	0.78	21	42	C
	PM	0.29	10	9	B
Adderton Road/ New link road across railway line	AM	0.18	19	4	C
	PM	0.13	18	3	C
Sturt Street/ New link road through Sturt Park	AM	0.04	6	1	A
	PM	0.04	66	1	A

Table 6.2 shows the traffic generated by the Master Plan (without further mitigating measures) is expected to have a significant impact during the peak periods to the operation of the following key internal intersections:

- **Adderton Road/ Manson Street** – The give-way priority control measure at the Adderton Road/ Manson Street intersection would not accommodate development traffic. The key traffic movement at this intersection is recognised to be the left turn movement from Manson Street to Adderton Road heading south.
- **Sturt Street/ Manson Street** – The intersection is shown to exceed capacity during the AM peak. The Manson Street approach is restricted to a single-lane arrangement heading north, which delays traffic movements from this approach, mainly because of right-turning vehicles giving way to Sturt Street through traffic.
- **Evans Road/ Sturt Street** – The intersection has been assessed as a four-leg intersection as per the Telopea Master Plan, which indicates Evans Road is proposed to connect with Cunningham Street through Sturt Park to the south. The existing give-way priority control at this intersection would not accommodate the forecast additional peak hour traffic generated by the proposal. Significant delays would be experienced on both approaches of Evans Road, largely caused by giving way to Sturt Street traffic.
- **Evans Road/ Shortland Street** – The intersection would operate satisfactory with the existing intersection layout arrangement, considering the additional traffic generated by the proposal. Most of the additional traffic would be through movements along Evans Road, which do not have to stop and give way at the intersection.
- **New at-grade crossing of rail corridor** – The proposed rail level crossing linking Sturt Street and Adderton Road has been assessed as having give-way, priority control intersections at both ends, although it is noted that any at-grade crossing of the light rail tracks would be signalised, particularly for safety considerations. A one-lane per direction layout is expected to accommodate the forecast traffic, with localised widening at the intersections.

6.3.2 Internal Intersections – Mitigating Measures and Intersection Works

The additional peak hour traffic that is expected to be generated by the development cannot be accommodated by the existing intersection layouts and upgrades need to occur.

Table 6.3 outlines recommended mitigation measures, involving intersection upgrades to manage the impacts on operational efficiency of these intersections, because of the additional traffic generated by the development.

Table 6.3: Recommended Mitigating and Intersection Works – Internal Intersections

Intersection	Proposed Works
Adderton Road/ Manson Street	- Add an extra lane to the Manson Street approach to separate right/ left turning vehicles. - Assume Adderton Road widened to be two travel lanes per direction post-development (at least at intersections). - Convert the intersection to signal control (circa 60 second cycle time).
Sturt Street/ Manson Street	- Convert the intersection to a roundabout with a single lane each direction.
Evans Road/ Sturt Street	- Convert the intersection to a roundabout with a single lane each direction.
Evans Road/ Shortland Street	- No mitigating works required, however convert the intersection to a roundabout with a single lane each direction, for consistency purposes. Existing priority control still assessed as part of intersection modelling.
Adderton Road/ New Link Road	- Upgrade the intersection to signal controlled (circa 60 second cycle time).
Sturt Street/ New Link Road	- New priority controlled intersection, potentially with Sturt Street (west) as the terminating leg. This would allow continuous movement between Adderton Road and the Telopea Station (with future bus interchange).

The above outline potential treatments that would mitigate the traffic impacts of the Telopea Master Plan. The detailed design of intersection upgrades will occur as part of future studies and in conjunction with Council.

The future operation of the key internal intersections including the mitigating and intersection works have been assessed using SIDRA INTERSECTION and a summary of the future operation shown in Table 6.4, with full results in Appendix B of this report.

Table 6.4: Post-Development Operating Conditions with Upgrades – Internal Intersections

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Adderton Road/ Manson Street	AM	0.75	16	79	B
	PM	0.63	11	107	B
Sturt Street/ Manson Street	AM	0.73	25	71	C
	PM	0.13	10	6	A
Evans Road/ Sturt Street	AM	0.94	24	159	C
	PM	0.05	14	2	B
Evans Road/ Shortland Street	AM	0.78	20	42	C
	PM	0.29	8	9	A
Adderton Road/ New link road across the railway line	AM	0.58	6	88	A
	PM	0.63	6	99	A
Sturt Street/ New link road across the railway line	AM	0.09	13	10	B
	PM	0.11	13	12	B

As shown in Table 6.4, the recommended mitigating and intersection works on the internal study intersections are expected to provide sufficient peak hour traffic capacity for the Master Plan, with all movements indicating satisfactory performance.

A summary of the existing, "without Mitigation Works" and "with Mitigation Works" scenarios for the peak hour operating conditions of the internal intersections is shown in Table 6.5.

Table 6.5: Internal Intersections Operating Conditions

Intersection	Peak	Leg with Worst Movement – Existing	Existing LOS	Leg with Worst Movement – Master Plan	LOS with but without Mitigation Works	Recommended Mitigation Works	LOS with Mitigation Works
Adderton Road/ Manson Street	AM	East	B	East	F	Add an extra lane to the Manson Street approach to separate right/ left turning vehicles. Assume Adderton Road widened to be two travel lanes per direction post-development (at least at intersections). Convert the intersection to signal control (circa 60 second cycle time).	B
	PM	East	C	East	F		B
Sturt Street/ Manson Street	AM	North	A	South	F	Convert the intersection to a priority-controlled roundabout with a single lane each direction.	C
	PM	North	A	South	B		A
Evans Road/ Sturt Street	AM	North	A	North	F	Convert the intersection to a priority-controlled roundabout with a single lane each direction.	C
	PM	North	A	North	F		B

Intersection	Peak	Leg with Worst Movement – Existing	Existing LOS	Leg with Worst Movement – Master Plan	LOS with but without Mitigation Works	Recommended Mitigation Works	LOS with Mitigation Works
Evans Road/ Shortland Street	AM	West	B	West	C	No mitigating works required, however convert the intersection to a priority-controlled roundabout with a single lane each direction, for consistency purposes. Existing priority control still assessed as part of intersection modelling.	C
	PM	West	A	West	B		A
Adderton Road/ New link road across the railway line	AM	n/a	**n/a**	East	C	Although these two intersections of the new link road would operate satisfactorily during the peak period as priority intersections, the at-grade rail crossing and Adderton Road would need to be signalised, to avoid situations in which vehicles queue across the light rail tracks on the new link road. Sturt Street intersection design needs to minimise the risk of queuing back across the rail tracks.	A
	PM	n/a	**n/a**	East	C		A
Sturt Street/ New link road across the railway line	AM	n/a	**n/a**	West	A		B
	PM	n/a	**n/a**	West	A		B

6.3.3 External Intersections – Operating Conditions

Intersection analysis using SIDRA INTERSECTION was undertaken for the key intersections on the arterial road network likely to be used as access and/ or egress by the additional traffic generated by the Master Plan, to investigate potential impacts on their operation during the road network peak periods:

- Pennant Hills Road/ Adderton Road
- Pennant Hills Road/ Coleman Avenue
- Pennant Hills Road/ Evans Road
- Kissing Point Road/ Sturt Street
- Kissing Point Road/ Adderton Road.

The existing peak-hour operating conditions at these intersections have been presented in Table 2.4, which indicated generally satisfactory overall intersection levels of service, with all five key external intersections operating at or below capacity during the peak periods.

Table 6.6 shows the operating conditions of the key external intersections with the additional traffic expected to be generated by the proposal, keeping existing intersection layouts and signal phasing arrangements. Summary findings are provided below.

- **Pennant Hills Road/ Adderton Road** – The existing intersection layout and signal arrangements at this intersection is not able to accommodate the traffic generated by the Master Plan. Due to the existing through traffic conditions along Pennant Hills Road, traffic exiting Adderton Road will likely be impacted by additional traffic generated by the Master Plan, increasing delays. The south and east legs would operate beyond capacity during the AM and PM peak hours.
- **Pennant Hills Road/ Coleman Avenue** – The additional peak period traffic generated by the Master Plan would not cause any major changes in operation at this intersection. Although traffic exiting the Master Plan area via Coleman Avenue is expected to experience slightly higher delays and longer queues, the overall intersection performance is expected to remain within satisfactory limits.
- **Pennant Hills Road/ Evans Road** – The priority-control arrangement of this intersection is shown to be inefficient for the existing traffic, with LOS E on the south approach. It is not expected to accommodate the increase in traffic from the Master Plan, with the south leg condition deteriorating to LOS F in both AM and PM peaks.
- **Kissing Point Road/ Sturt Street** – The traffic generated by the Master Plan is expected to cause minor increases in delay at this intersection, although the intersection is still expected to operate within satisfactory limits. A key movement detected from the modelling is the right-turn movement from Sturt Street onto Kissing Point Road. The additional traffic generated by the Master Plan is likely to cause this movement to operate above capacity during the PM peak period.
- **Kissing Point Road/ Adderton Road** – The existing arrangement of this intersection is expected to accommodate additional traffic generated by the Master Plan, with slightly higher delays during the AM peak period. The levels of service with and without the Master Plan would remain at the same level during the PM peak period.

Full results of the intersection assessment for the scenario “with Master Plan without Mitigation Works” are presented in Appendix C.

Table 6.6: **Development Operating Conditions with Existing Arrangements – External Intersections**

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	0.99	61	693	E
	PM	1.05	86	714	F
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	0.79	27	292	B
	PM	0.78	18	306	B
Pennant Hills Road (Cumberland Highway)/ Evans Road	AM	1.41	416	218	F
	PM	1.28	304	155	F
Kissing Point Road/ Sturt Street	AM	0.88	38	319	C
	PM	0.96	29	253	C
Kissing Point Road/ Adderton Road	AM	0.85	32	294	C
	PM	0.83	21	273	B

6.3.4 External Intersections – Recommended Mitigating Measures and Intersection Works

The existing arrangements of the key external intersections will not be sufficient to accommodate the forecast growth envisaged by the Master Plan, mainly due to the existing traffic congestion along Pennant Hills Road and Kissing Point Road.

Table 6.7 outlines potential mitigation and intersection works on the existing layout and signal phasing arrangements to minimise any adverse effects on road safety and operational efficiency resulting from the Master Plan. It is noted that the external intersections are either out of the Master Plan area and/ or connect with a State road, under the administrative jurisdiction of Roads and Maritime.

This section outlines potential mitigation measures that do not require significant reconfiguration of existing intersection layouts, to assess whether such measures would be sufficient to address traffic impacts of the additional traffic generation. These measures include proposed signal optimisation and changes to linemarking. Where inadequate, other mitigation works will need to be investigated, which could involve reconfiguration of intersection layouts such as additional turning bays or traffic lanes. This will involve further more detailed discussions with Roads and Maritime.

It is also understood that Roads and Maritime is proposing to upgrade the Pennant Hills Road/ Evans Road/ Lloyds Avenue intersection into a signalised intersection at some point in the future, however no funding has yet been committed. For purposes of assessment, this upgrade has been included as part of the recommended mitigation measures. The potential upgrades would mitigate the traffic impacts of the Telopea Master Plan. The detailed design of upgrades will occur as part of future studies and in conjunction with Roads and Maritime.

Table 6.7: **Recommended Mitigation and Intersection Works – External Intersections**

Intersection	Recommended Mitigation Works
Pennant Hills Road (Cumberland Highway)/ Adderton Road	○ signal optimisation (retain 130 second cycle time) ○ line marking for extra right turn movement on western leg (two right turn movements from the west into Adderton Road) ○ removal of kerbside parking on southern leg exit lane
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	○ signal optimisation (retain 130 seconds' cycle time)
Pennant Hills Road (Cumberland Highway)/ Evans Road/ Lloyds Avenue	○ construct a signalised intersection (using 130 second cycle time)
Kissing Point Road/ Sturt Street	○ signal optimisation (retain 120 seconds' cycle time)
Kissing Point Road/ Adderton Road	○ signal optimisation (retain 120 seconds' cycle time)

The future operation of the key external intersections including the mitigation and intersection works have been assessed using SIDRA INTERSECTION and a summary of the future operation shown in Table 6.8, with full results in Appendix B of this report.

Table 6.8: **Post-Development Operating Conditions with Upgrades – External Intersections**

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	0.95	46	584	D
	PM	0.97	64	634	E
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	0.80	23	308	B
	PM	0.80	15	321	B
Pennant Hills Road (Cumberland Highway)/ Evans Road	AM	0.77	24	279	B
	PM	0.79	23	280	B
Kissing Point Road/ Sturt Street	AM	0.76	27	245	B
	PM	0.78	25	208	B
Kissing Point Road/ Adderton Road	AM	0.86	32	294	C
	PM	0.83	21	273	B

Although there are intersections that are approaching capacity in 2036, the level of traffic generated by the Master Plan is not expected to result in any significant delays with the mitigation measures shown in Table 6.8.

It is noted that further detailed investigation and potential intersection works may be required at the Pennant Hills Road/ Adderton Road intersection to be able to accommodate appropriate future intersection operation. Intersection modelling suggests that an additional right turn lane on Pennant Hills Road and additional short left turn lane on Adderton Road are required at this location to maintain satisfactory intersection operation. These potential upgrades would require detailed discussions with Roads and Maritime. Discussions with Council indicate that traffic could potentially be encouraged through Robert Street/ Tintern Avenue to reduce pressure on the Pennant Hills Road/ Adderton Road intersection.

It is further noted that the Parramatta Light Rail project is likely to result in further local and regional traffic impacts, both because of station access and circulations, as well as other redevelopment activity. Given the scale of development and significant amount of development traffic (66 per cent) expected to use Kissing Point Road, intersection works at the connections to Sturt Street and Adderton Road may be required and is subject to further investigation.

A summary of the existing, "Master Plan without Mitigation Works" and "Master Plan with Mitigation Works" scenarios for the peak hour operating conditions of the key external intersections to the Master Plan area is shown in Table 6.9.

Table 6.9: External Intersections Operating Conditions – Post Development – 15 years

Intersection	Peak	Existing LOS	Leg with Worst Movement – Development Traffic	LOS with Development Traffic with Mitigation Works
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	**E**	signal optimisation (retain 130 second cycle time) linemarking for extra right turn movement on western leg (2 right turn movements from the west) removal of kerbside parking on southern leg exit lane	**D**
	PM	**F**		**E**
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	**B**	signal optimisation (retain 130 second cycle time)	**B**
	PM	**B**		**B**
Pennant Hills Road (Cumberland Highway)/ Evans Road	AM	**F**	convert to traffic signals (130 second cycle time)	**B**
	PM	**F**		**B**
Kissing Point Road/ Sturt Street	AM	**C**	signal optimisation (retain 120 second cycle time)	**B**
	PM	**C**		**B**
Kissing Point Road/ Adderton Road	AM	**C**	signal optimisation (retain 120 second cycle time)	**C**
	PM	**B**		**B**

6.4 Intersection Upgrades Delivery Plan

For assessment purposes, future background growth along Pennant Hills Road (Cumberland Highway) and Kissing Point Road has not been considered in modelling future year scenarios and will be discussed with Transport for NSW at a later stage.

The Telopea Master Plan proposes to deliver between 3,500 to 4,500 new dwellings over a 20-year period. As a result, development traffic will gradually increase and intersection upgrades will be required at different stages throughout development. Without the provision of a development staging plan, the following assumptions have been made for assessment purpose:

- high-density residential development at Polding Place and Moffatts Drive will be completed within five years
- private and social/ affordable housing outside of the core will be progressively developed throughout the project an assumed rate of around 250 dwellings per year
- development in the core area will commence after five years and be progressively developed throughout the remainder of the project
- the light rail project and light rail crossing will be completed at the same time.

The impacts of the proposed development traffic have been assessed at the following stages:

- development at five years
- development at 15 years.

6.4.1 Internal Intersections

The impacts of development traffic for the first five years and first fifteen years in relation to internal intersections[8] have been assessed with full results in Table 6.1 and Table 6.13 respectively. For assessment purposes, it is assumed the Parramatta Light Rail project will be completed after the five-year mark and hence the light rail crossing will not be available in the first five years of development.

Table 6.10: Five Years - Operating Conditions – Internal Intersections (without mitigation measures)

Intersection	Peak	Worst Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS) with Development 0-5 Years
Adderton Road/ Manson Street	AM	East	0.54	30	17	C
	PM	East	0.52	24	15	C
Sturt Street/ Manson Street	AM	South	0.42	5	14	A
	PM	South	0.08	6	2	A
Evans Road/ Sturt Street	AM	North	0.20	3	0	A
	PM	North	0.05	5	0	A
Evans Road/ Shortland Street	AM	West	0.28	14	8	B
	PM	West	0.14	6	4	A

8 This staging is for traffic management upgrades only and not reflective of confirmed development staging.

Table 6.11: 15 Years Operating Conditions – Internal Intersections (without mitigation measures)

Intersection	Peak	Worst Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS) with Development0-15 Years
Adderton Road/ Manson Street	AM	East	0.69	36	25	C
	PM	East	0.57	29	17	D
Sturt Street/ Manson Street	AM	South	0.53	7	27	A
	PM	South	0.14	6	4	A
Evans Road/ Sturt Street	AM	North	0.26	3	0	A
	PM	North	0.10	5	0	A
Evans Road/ Shortland Street	AM	West	0.30	14	9	B
	PM	West	0.15	6	4	A

Table 6.10 shows that all internal intersections are expected to operate satisfactorily in the first five years of development. As such, it is anticipated that mitigation works for intersections serving the area will not be required in the first five years of development on a traffic capacity basis. However, it is expected that some intersection upgrades would be implemented from a traffic management and/or safety perspective, depending on the overall development staging strategy.

Table 6.11 indicates minor increases in delay to the internal intersections, particularly Adderton Road and Manson Street. The internal intersections are expected to perform satisfactorily up to 15 years, although the proposed upgrades in Table 6.5 should commence to accommodate for additional traffic generation proposed as part of the development's completion.

6.4.2 External Intersections

The impacts of development traffic at five years and 15 years in relation to the external intersections have been assessed with full results in Table 6.12 and Table 6.13 respectively.

Table 6.12: 5 Years Operating Conditions – External Intersections (without mitigation measures)

Intersection	Peak	Leg	Degree of Saturation (DOS) [1]	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	Overall	1.29	27	319	B
	PM	Overall	1.22	26	246	B
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	Overall	0.91	15	176	B
	PM	Overall	0.70	14	234	A
Pennant Hills Road (Cumberland Highway)/ Evans Road (unsignalised)	AM	South	1.16	205	101	F
	PM	South	0.89	62	21	E
Kissing Point Road/ Sturt Street	AM	Overall	0.84	18	156	B
	PM	Overall	1.25	29	322	C
Kissing Point Road/ Adderton Road	AM	Overall	0.85	28	254	B
	PM	Overall	0.92	26	235	B

Table 6.13: 15 Years Operating Conditions – External Intersections (without mitigations measures)

Intersection	Peak	Leg	Degree of Saturation (DOS) [1]	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Pennant Hills Road (Cumberland Highway)/ Adderton Road	AM	Overall	1.33	29	321	C
	PM	Overall	2.56	76	325	F
Pennant Hills Road (Cumberland Highway)/ Coleman Avenue	AM	Overall	1.08	20	177	B
	PM	Overall	0.69	14	31	A
Pennant Hills Road (Cumberland Highway)/ Evans Road (unsignalised)	AM	South	1.38	390	204	F
	PM	South	0.89	63	3	E
Kissing Point Road/ Sturt Street	AM	Overall	0.94	22	158	B
	PM	Overall	1.51	49	490	D
Kissing Point Road/ Adderton Road	AM	Overall	0.88	29	257	C
	PM	Overall	0.96	27	246	B

The Pennant Hills Road and Evans Road intersection would likely require the Roads and Maritime proposed signal conversion upgrade within the next five years. The existing priority-control arrangement will result in LOS F for the south approach and significant delays. The Pennant Hills Road and Coleman Avenue intersection was found to operate satisfactorily within five years, although the south approach operates at LOS F during the AM peak period.

The Pennant Hills Road and Adderton Road intersection would likely require the mitigation measures in Table 6.7 within 15 years, as it was found to operate at LOS F during the PM peak period. The right turn from Pennant Hills Road into Adderton Road is expected to experience significant delays with the existing intersection arrangements. Traffic exiting Adderton Road onto Pennant Hills Road is also expected to experience significant delays operating with LOS E during any peak period.

The Kissing Point Road and Sturt Street intersection was found to operate satisfactorily within 15 years, although the east leg was found to operate at LOS F in the PM peak due to the right turn movement from Kissing Point Road to Sturt Street. In addition to signal optimisation, future intersection works may also be required at this location given the scale of development proposed.

Although the intersection of Kissing Point Road and Adderton Road was found to operate satisfactorily within 15 years, intersection works are likely required due to the scale of development and is subject to further investigation.

7. Local Area Traffic Management

7.1 Overview

Local Area Traffic Management (LATM) is concerned with the planning and management of road space usage on local and collector roads, which is primarily the responsibility of local government.

The primary aim of LATM is to change driver behaviour, both directly by physical influence on vehicle operation, and indirectly by influencing the driver's perceptions of what is appropriate behaviour in that street. The objective of LATM is to reduce traffic volumes and speeds in local roads to increase liveability and improve safety and access for pedestrians and cyclists.

LATM involves the use of physical devices, streetscaping treatments and other measures (including regulations and other non-physical measures) to influence vehicle operation to create safer and more pleasant roads in local areas.

7.2 LATM Treatment Types

An analysis of traffic volumes and speeds, together with input from the stakeholders generally informs the selection of the most suitable traffic control devices.

Two types of control devices are available - regulatory and geometric. Regulatory controls can be used as alternatives to or in addition to the geometric controls where necessary.

7.2.1 Geometric Controls

Geometric controls suitable to LATM schemes include:

- road closures
- restriction/ channelisation
- T-Intersection priority
- thresholds, both at entries and mid-block locations
- staggered T-intersection
- carriageway narrowing
- slow points
- road Humps
- kerb Extensions
- wombat Crossings
- roundabouts
- medians
- pedestrian crossings, refuges/ mid-block islands.

7.2.2 Regulatory Controls

Regulatory signs (Type R for example 'Stop' signs) are used to regulate the movement of traffic by indicating where or when a legal requirement applies. Failure to comply with regulatory signs constitutes a traffic offence.

Signage as well as linemarking can be used to regulate traffic movements and/ or calm traffic. It may discourage speeding, prevent vehicle conflicts, and prevent through traffic from short-cutting along a street. The primary aims of signs and linemarking are to aid in the safe and orderly movement of traffic.

7.2.3 Summary of LATM Devices

Table 7.1 provides a summary of typical LATM devices, which has been reproduced from *Austroads Guide to Traffic Management Part 8*, (2008). The guideline provides a clear indication of the type of treatments available, which issues they best address, and the advantages and disadvantages of each treatment.

Table 7.1: Use of LATM Devices

Measure		Reduce Speeds	Reduce Traffic Volumes	Reduce Crash Risks	Increase Pedestrian Safety	Increase Bicycle Safety
Vertical Deflection Devices	Watt Profile Road Humps	✓	✓	✓	-	-
	Road Cushions	✓	✓	✓	-	✓
	Flat Top Road Humps	✓	✓	✓	-	✓
	Wombat Crossings	✓	✓	✓	✓	✓
	Raised Pavements	✓	✓	✓		✓
Horizontal Deflection Devices	Lane Narrowing/ Kerb Extension	✓	-	-	✓	-
	Slow Points	✓	✓	-	-	-
	Centre Blister Islands	✓	✓	-	✓	-
	Driveway Links	✓	✓	-	✓	✓
	Mid-Block Median Treatments	✓	-	✓	✓	✓
Diversion Devices	Full Road Closure	-	✓	✓	✓	✓
	Half Road Closure	-	✓	✓	✓	✓
	Diagonal Road Closure	-	✓	✓	✓	✓
	Modified 'T' Intersection	✓	✓	✓	✓	✓
	Left-In/ Left-Out Islands	-	✓	✓	✓	-
Other treatments	Marked Pedestrian Crossings	-	-	✓	✓	✓
	Threshold Treatments	✓	✓	✓	-	✓
	Tactile Surface Treatments	✓	-	-	-	-
	Bicycle Facilities	-	-	✓	-	✓

Source: Reproduced from Austroads – Guide to Traffic Management Part 8: Local Area Traffic Management

7.3 Application of LATM to Telopea

The key objective for the Telopea study area is to achieve a network that will allow better connectivity for both internal traffic movement and the broader road network. In doing so, appropriate traffic calming measures are required to reduce average travel speeds on collector road routes, such that there is no significant competitive advantage to avoiding major roads. On these collector roads, it is recommended that a combination of the following is provided:

- roundabouts with appropriate channelisation at key intersections (or other treatment such as stop signs, with appropriate LATM considerations).
- kerb extensions at regular intervals (between two and six parking bays) to visually narrow the carriageway
- vertical or horizontal deflection at 80-120 metre intervals.

LATM devices should seek to incorporate and/or integrate with pedestrian facilities wherever possible to improve road user safety outcomes.

- on local roads, it is recommended that a combination of the following is provided:
  - entry treatments, including kerb extensions, at intersections with collector roads (as appropriate).
  - One-lane slow points at appropriate mid-block locations on longer streets.

The carriageway widths on roads within Telopea are variable and do not necessarily match the future hierarchy. In addition to the above treatments, it is recommended that edge lines are marked on all collector roads to visually narrow the carriageway to 6-7 metres wide and provide a level of uniformity with respect to travel lane widths. This will also better delineate available on-street parking.

7.4 Pedestrian Safety

The addition of roundabouts at key intersections within the core area would create a slow-speed environment and the incorporation of refuge islands in to roundabout design would be able to accommodate localised pedestrian movements.

The addition of localised pedestrian management schemes would be considered during the detailed design stage in-line with the LATM design which would ensure safe pedestrian desire lines.

8. Conclusion

Based on the analysis and discussion presented within this report, the following conclusions are made:

i Telopea in its end state proposes to provide between 3,500 to 4,500 additional residential dwellings, 7,000 square metres of retail space (including a supermarket) and 3,000 square metres of new community space.

ii An Expert Panel Review assessed the draft Telopea Master Plan and provided commentary and recommendations which have been addressed in the finalisation of the Telopea Master Plan.

iii The existing operation of key internal and external intersections were assessed based on 2016 traffic counts. The key internal intersections were found to operate satisfactorily with minimal delays, whilst the key external intersections were found to operate with acceptable delays except for the Pennant Hills Road and Evans Road intersection which currently operates above capacity.

iv A midblock capacity assessment for key roads within the study area indicated some roads exceeded the Roads and Maritime environmental capacity, namely Evans Road, Sturt Street and Adderton Road. The proportion of heavy vehicles on Marshall Road also exceeds environmental capacity.

v The planned road hierarchy structure provides a fine-grained network which would manage the impacts of the eventual traffic uplift and limit the existing high through-traffic volumes to desired roads. New vehicle, pedestrian and cycling connections would increase site permeability and remove existing key movement barriers.

vi Off-street recommended parking rates would create a balance for parking provisions in light of the future Parramatta Light Rail and light rail stop to encourage the use of public transportation.

vii On-street parking restrictions based on carriageway widths and including time restrictions for remaining parking should be introduced to avoid insufficient carriageway widths for two-way traffic on high-density roads and discourage all-day on-street parking.

viii The Parramatta Light Rail would significantly benefit the local area through the provision of frequent services with direct links to key destinations. The Telopea light rail precinct will be a key transportation node servicing the local area and potentially attract more public transportation users through the addition of more facilities.

ix The site is expected to generate approximately 1,689 and 1,811 additional trips during the AM and PM peaks respectively.

x To manage the development traffic impacts on both internal and external intersections, mitigating measures would be required.

xi All internal intersections are expected to operate satisfactorily within the first 15 years of development, although the proposed intersection upgrades should form part of the local area traffic management strategy, which should be prepared as part of the detailed design to manage traffic movement and speeds.

xii The external intersections assessed would likely require intersection upgrades within 15 years, particularly the Pennant Hills Road and Evans Road intersection, noting that changes to local traffic patterns as a result of the Parramatta Light Rail would require further assessment.

xiii The Pennant Hills Road (Cumberland Highway) and Adderton Road intersection would be nearing capacity in the PM peak in 15 years with mitigation measures, future monitoring of this intersection would be required.

Appendix A

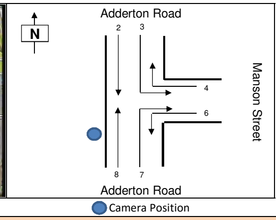
Survey Results

Intersection of Adderton Road and Manson Street

Tuesday, 15 March 2016

Austraffic

Survey Start	7:00 AM	16:00 PM	
Intersection Type	T Junction		
Intersection No.	1		
North Approach	Adderton Road		
East Approach	Manson Street		
South Approach	Adderton Road		
West Approach			
Date	15/03/16		
Classification	Light Heavy Cyc		



TIME PERIOD	VEHICLE MOVEMENT																											
	2				3				4				6				7				8				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
7:00 - 7:15	154	2	0	156	34	0	0	34	6	0	0	6	4	0	0	4	12	1	0	13	63	2	0	65	273	5	0	278
7:15 - 7:30	159	1	1	161	44	0	0	44	8	0	0	8	3	0	0	3	9	0	0	9	79	2	1	82	302	3	2	307
7:30 - 7:45	163	1	0	164	9	1	0	10	10	0	0	10	37	2	0	39	19	1	0	20	74	2	0	76	312	7	0	319
7:45 - 8:00	175	0	0	175	42	0	0	42	10	0	0	10	15	0	0	15	25	0	0	25	73	2	0	75	340	2	0	342
8:00 8:15	153	4	0	157	46	0	0	46	7	1	0	8	9	0	0	9	28	2	0	30	95	0	0	95	338	7	0	345
8:15 8:30	183	3	0	186	50	0	0	50	11	0	0	11	15	0	0	15	22	1	0	23	115	0	0	115	396	4	0	400
8:30 8:45	211	3	0	214	80	1	0	81	4	0	0	4	25	0	0	25	26	0	0	26	92	1	0	93	438	5	0	443
8:45 9:00	174	3	0	177	55	1	0	56	22	1	0	23	11	1	0	12	23	1	0	24	87	0	0	87	372	7	0	379
Σ	1372	17	1	1390	360	3	0	363	78	2	0	80	119	3	0	122	164	6	0	170	678	9	1	688	2771	40	2	2813

TIME PERIOD	VEHICLE MOVEMENT																											
	2				3				4				6				7				8				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
16:00 - 16:15	89	2	0	91	11	0	0	11	28	0	0	28	2	0	0	2	5	0	0	5	190	0	0	190	325	2	0	327
16:15 - 16:30	70	0	0	70	8	0	0	8	19	0	0	19	6	1	0	7	4	0	0	4	156	1	0	157	263	2	0	265
16:30 - 16:45	69	2	0	71	17	0	0	17	17	0	0	17	9	0	0	9	4	0	0	4	165	0	0	165	281	2	0	283
16:45 - 17:00	66	2	0	68	7	0	0	7	29	1	0	30	5	0	0	5	5	1	0	6	162	1	0	163	274	5	0	279
17:00 - 17:15	76	0	0	76	8	0	0	8	30	0	0	30	11	0	0	11	7	0	0	7	188	0	0	188	320	0	0	320
17:15 - 17:30	77	1	0	78	12	0	0	12	23	0	0	23	6	0	0	6	9	0	0	9	216	1	0	217	343	2	0	345
17:30 - 17:45	77	0	0	77	17	0	0	17	22	0	0	22	8	0	0	8	7	0	0	7	208	1	0	209	339	1	0	340
17:45 - 18:00	91	2	0	93	7	0	0	7	22	0	0	22	6	0	0	6	10	0	0	10	176	0	0	176	312	2	0	314
Σ	615	9	0	624	87	0	0	87	190	1	0	191	53	1	0	54	51	1	0	52	1461	4	0	1465	2457	16	0	2473

HOURLY FLOW

TIME PERIOD	VEHICLE MOVEMENT																												
	2				3				4				6				7				8				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
7:00 - 8:00	651	4	1	656	129	1	0	130	34	0	0	34	59	2	0	61	65	2	0	67	289	8	1	298	1227	17	2	1246	
7:15 - 8:15	650	6	1	657	141	1	0	142	35	1	0	36	64	2	0	66	81	3	0	84	321	6	1	328	1292	19	2	1313	
7:30 - 8:30	674	8	0	682	147	1	0	148	38	1	0	39	76	2	0	78	94	4	0	98	357	4	0	361	1386	20	0	1406	
7:45 - 8:45	722	10	0	732	218	1	0	219	32	1	0	33	64	0	0	64	101	3	0	104	375	3	0	378	1512	18	0	1530	
8:00 - 9:00	**721**	**13**	**0**	**734**	**231**	**2**	**0**	**233**	**44**	**2**	**0**	**46**	**60**	**1**	**0**	**61**	**99**	**4**	**0**	**103**	**389**	**1**	**0**	**390**	**1544**	**23**	**0**	**1567**	**Peak**

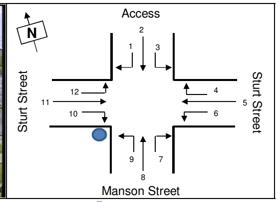
TIME PERIOD	VEHICLE MOVEMENT																												
	2				3				4				6				7				8				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
16:00 - 17:00	294	6	0	300	43	0	0	43	93	1	0	94	22	1	0	23	18	1	0	19	673	2	0	675	1143	11	0	1154	
16:15 - 17:15	281	4	0	285	40	0	0	40	95	1	0	96	31	1	0	32	20	1	0	21	671	2	0	673	1138	9	0	1147	
16:30 - 17:30	288	5	0	293	44	0	0	44	99	1	0	100	31	0	0	31	25	1	0	26	731	2	0	733	1218	9	0	1227	
16:45 - 17:45	296	3	0	299	44	0	0	44	104	1	0	105	30	0	0	30	28	1	0	29	774	3	0	777	1276	8	0	1284	
17:00 - 18:00	**321**	**3**	**0**	**324**	**44**	**0**	**0**	**44**	**97**	**0**	**0**	**97**	**31**	**0**	**0**	**31**	**33**	**0**	**0**	**33**	**788**	**2**	**0**	**790**	**1314**	**5**	**0**	**1319**	**Peak**

Intersection of Sturt Street and Manson Street

Tuesday, 15 March 2016

Austraffic

Survey Start	7:00 AM	16:00 PM
Intersection Type	Cross Junction	
Intersection No.	2	
North Approach	Access	
East Approach	Sturt Street	
South Approach	Manson Street	
West Approach	Sturt Street	
Date	15/03/16	
Classification	Light Heavy Cyc	



VEHICLE MOVEMENT

TIME PERIOD	1				2				3				4				5				6				7				8				9				10				11				12				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	4	6	0	0	6	18	0	0	18	0	0	0	0	5	0	0	5	3	0	0	3	3	1	0	4	0	0	0	0	37	3	0	40
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	7	0	0	7	35	0	0	35	0	0	0	0	4	0	0	4	1	0	0	1	3	1	0	4	0	0	0	0	53	1	0	54
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	6	7	1	0	8	57	2	0	59	1	0	0	1	6	0	0	6	2	0	0	2	9	2	0	11	0	0	0	0	87	6	0	93
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	15	1	0	16	72	1	0	73	0	0	0	0	5	0	0	5	4	0	0	4	7	1	0	8	0	0	0	0	106	4	0	110
8:00 8:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6	2	0	8	10	1	0	11	71	3	0	74	1	0	0	1	6	0	0	6	4	0	0	4	2	1	0	3	0	0	0	0	101	7	0	108
8:15 8:30	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	3	1	0	4	11	0	0	11	71	1	0	72	0	0	0	0	4	0	0	4	7	0	0	7	9	2	0	11	0	0	0	0	106	4	0	110
8:30 8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	28	0	0	28	104	1	0	105	1	0	0	1	9	0	0	9	7	0	0	7	6	0	0	6	1	0	0	1	159	2	0	161
8:45 9:00	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	4	1	0	5	28	2	0	30	87	1	0	88	1	0	0	1	13	1	0	14	3	0	0	3	3	2	0	5	1	0	0	1	142	7	0	149
Σ	0	0	0	0	0	0	0	0	3	0	0	3	1	0	0	1	29	9	0	38	112	5	0	117	515	9	0	524	4	0	0	4	52	1	0	53	31	0	0	31	42	10	0	52	2	0	0	2	791	34	0	825

VEHICLE MOVEMENT

TIME PERIOD	1				2				3				4				5				6				7				8				9				10				11				12				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
16:00 - 16:15	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	4	3	0	7	34	0	0	34	13	0	0	13	1	0	0	1	5	0	0	5	2	0	0	2	4	0	0	4	0	0	0	0	65	3	0	68
16:15 - 16:30	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	11	1	0	12	26	1	0	27	4	0	0	4	0	0	0	0	6	0	0	6	2	0	0	2	8	2	0	10	0	0	0	0	59	4	0	63
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	7	2	0	9	27	0	0	27	13	0	0	13	0	0	0	0	7	0	0	7	5	0	0	5	7	0	0	7	0	0	0	0	69	2	0	71
16:45 - 17:00	0	0	0	0	1	0	0	1	0	0	0	0	4	0	0	4	3	2	0	5	33	0	0	33	11	1	0	12	0	0	0	0	6	0	0	6	7	1	0	8	3	0	0	3	0	0	0	0	68	4	0	72
17:00 - 17:15	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	5	0	0	5	35	0	0	35	8	0	0	8	0	0	0	0	5	0	0	5	3	0	0	3	6	3	0	9	0	0	0	0	64	3	0	67
17:15 - 17:30	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	2	7	2	0	9	29	0	0	29	15	0	0	15	0	0	0	0	6	0	0	6	2	0	0	2	6	0	0	6	0	0	0	0	68	2	0	70
17:30 - 17:45	1	0	0	1	1	0	0	1	2	0	0	2	1	0	0	1	8	1	0	9	31	0	0	31	18	0	0	18	0	0	0	0	6	0	0	6	4	0	0	4	4	2	0	6	0	0	0	0	76	3	0	79
17:45 - 18:00	0	0	0	0	2	0	0	2	2	0	0	2	0	0	0	0	9	2	0	11	24	0	0	24	8	0	0	8	0	0	0	0	6	0	0	6	4	0	0	4	2	0	0	2	0	0	0	0	57	2	0	59
Σ	2	0	0	2	5	0	0	5	8	0	0	8	11	0	0	11	54	13	0	67	239	1	0	240	90	1	0	91	1	0	0	1	47	0	0	47	29	1	0	30	40	7	0	47	0	0	0	0	526	23	0	549

HOURLY FLOW

VEHICLE MOVEMENT

TIME PERIOD	1				2				3				4				5				6				7				8				9				10				11				12				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
7:00 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	4	0	17	35	2	0	37	182	3	0	185	1	0	0	1	20	0	0	20	10	0	0	10	22	5	0	27	0	0	0	0	283	14	0	297	
7:15 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	17	4	0	21	39	3	0	42	235	6	0	241	2	0	0	2	21	0	0	21	11	0	0	11	21	5	0	26	0	0	0	0	347	18	0	365	
7:30 - 8:30	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	17	5	0	22	43	3	0	46	271	7	0	278	2	0	0	2	21	0	0	21	17	0	0	17	27	6	0	33	0	0	0	0	400	21	0	421	
7:45 - 8:45	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	15	5	0	20	64	2	0	66	318	6	0	324	2	0	0	2	24	0	0	24	22	0	0	22	24	4	0	28	1	0	0	1	472	17	0	489	
8:00 - 9:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**3**	**1**	**0**	**0**	**1**	**16**	**5**	**0**	**21**	**77**	**3**	**0**	**80**	**333**	**6**	**0**	**339**	**3**	**0**	**0**	**3**	**32**	**1**	**0**	**33**	**21**	**0**	**0**	**21**	**20**	**5**	**0**	**25**	**2**	**0**	**0**	**2**	**508**	**20**	**0**	**528**	**Peak**

VEHICLE MOVEMENT

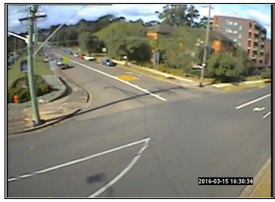
TIME PERIOD	1				2				3				4				5				6				7				8				9				10				11				12				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
16:00 - 17:00	0	0	0	0	2	0	0	2	2	0	0	2	8	0	0	8	25	8	0	33	120	1	0	121	41	1	0	42	1	0	0	1	24	0	0	24	16	1	0	17	22	2	0	24	0	0	0	0	261	13	0	274	
16:15 - 17:15	1	0	0	1	2	0	0	2	2	0	0	2	7	0	0	7	26	5	0	31	121	1	0	122	36	1	0	37	0	0	0	0	24	0	0	24	17	1	0	18	24	5	0	29	0	0	0	0	260	13	0	273	
16:30 - 17:30	1	0	0	1	1	0	0	1	2	0	0	2	9	0	0	9	22	6	0	28	124	0	0	124	47	1	0	48	0	0	0	0	24	0	0	24	17	1	0	18	22	3	0	25	0	0	0	0	269	11	0	280	
16:45 - 17:45	**2**	**0**	**0**	**2**	**2**	**0**	**0**	**2**	**4**	**0**	**0**	**4**	**7**	**0**	**0**	**7**	**23**	**5**	**0**	**28**	**128**	**0**	**0**	**128**	**52**	**1**	**0**	**53**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**23**	**16**	**1**	**0**	**17**	**19**	**5**	**0**	**24**	**0**	**0**	**0**	**0**	**276**	**12**	**0**	**288**	**Peak**
17:00 - 18:00	2	0	0	2	3	0	0	3	6	0	0	6	3	0	0	3	29	5	0	34	119	0	0	119	49	0	0	49	0	0	0	0	23	0	0	23	13	0	0	13	18	5	0	23	0	0	0	0	265	10	0	275	

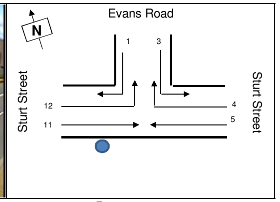
Intersection of Sturt Street and Evans Road

Tuesday, 15 March 2016

Austraffic

Survey Start	7:00	AM	16:00 PM
Intersection Type	T Junction		
Intersection No.	3		
North Approach	Evans Road		
East Approach	Sturt Street		
South Approach			
West Approach	Sturt Street		
Date	15/03/16		
Classification	Light Heavy Bus		





Camera Position

TIME PERIOD	1				3				4				5				11				12				GRAND TOTAL			
VEHICLE MOVEMENT	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
7:00 - 7:15	6	2	0	8	50	1	0	51	38	2	0	40	15	3	0	18	7	2	0	9	13	0	0	13	129	10	0	139
7:15 - 7:30	9	0	0	9	68	4	0	72	47	3	0	50	15	1	0	16	14	1	0	15	22	0	0	22	175	9	0	184
7:30 - 7:45	6	0	0	6	67	2	0	69	74	4	0	78	18	3	0	21	19	2	0	21	46	1	0	47	230	12	0	242
7:45 - 8:00	9	0	0	9	77	2	0	79	63	1	0	64	15	2	0	17	20	2	0	22	57	0	0	57	241	7	0	248
8:00 8:15	13	0	0	13	79	2	0	81	64	1	0	65	14	2	0	16	16	3	0	19	57	1	0	58	243	9	0	252
8:15 8:30	14	0	0	14	98	6	0	104	96	2	0	98	13	1	0	14	24	2	0	26	53	0	0	53	298	11	0	309
8:30 8:45	14	0	0	14	92	1	0	93	112	0	0	112	28	2	0	30	30	0	0	30	74	1	0	75	350	4	0	354
8:45 9:00	24	1	0	25	78	2	0	80	97	2	0	99	30	4	0	34	14	3	0	17	63	0	0	63	306	12	0	318
Σ	95	3	0	98	609	20	0	629	591	15	0	606	148	18	0	166	144	15	0	159	385	3	0	388	1972	74	0	2046

TIME PERIOD	1				3				4				5				11				12				GRAND TOTAL			
VEHICLE MOVEMENT	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
16:00 - 16:15	20	0	0	20	33	1	0	34	30	1	0	31	36	6	0	42	7	0	0	7	4	0	0	4	130	8	0	138
16:15 - 16:30	21	0	0	21	60	0	0	60	35	0	0	35	40	1	0	41	9	2	0	11	1	0	0	1	166	3	0	169
16:30 - 16:45	19	1	0	20	36	1	0	37	42	0	0	42	40	1	0	41	10	0	0	10	4	0	0	4	151	3	0	154
16:45 - 17:00	13	0	0	13	39	0	0	39	47	1	0	48	32	2	0	34	9	0	0	9	4	1	0	5	144	4	0	148
17:00 - 17:15	13	0	0	13	40	0	0	40	34	0	0	34	38	0	0	38	11	3	0	14	3	0	0	3	139	3	0	142
17:15 - 17:30	16	0	0	16	49	1	0	50	51	1	0	52	42	3	0	45	4	0	0	4	8	0	0	8	170	5	0	175
17:30 - 17:45	20	0	0	20	37	1	0	38	52	1	0	53	35	1	0	36	13	3	0	16	9	0	0	9	166	6	0	172
17:45 - 18:00	15	0	0	15	37	1	0	38	44	0	0	44	35	3	0	38	11	0	0	11	6	0	0	6	148	4	0	152
Σ	137	1	0	138	331	5	0	336	335	4	0	339	298	17	0	315	74	8	0	82	39	1	0	40	1214	36	0	1250

HOURLY FLOW

TIME PERIOD	1				3				4				5				11				12				GRAND TOTAL				
VEHICLE MOVEMENT	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
7:00 - 8:00	30	2	0	32	262	9	0	271	222	10	0	232	63	9	0	72	60	7	0	67	138	1	0	139	775	38	0	813	
7:15 - 8:15	37	0	0	37	291	10	0	301	248	9	0	257	62	8	0	70	69	8	0	77	182	2	0	184	889	37	0	926	
7:30 - 8:30	42	0	0	42	321	12	0	333	297	8	0	305	60	8	0	68	79	9	0	88	213	2	0	215	1012	39	0	1051	
7:45 - 8:45	50	0	0	50	346	11	0	357	335	4	0	339	70	7	0	77	90	7	0	97	241	2	0	243	1132	31	0	1163	
8:00 - 9:00	**65**	**1**	**0**	**66**	**347**	**11**	**0**	**358**	**369**	**5**	**0**	**374**	**85**	**9**	**0**	**94**	**84**	**8**	**0**	**92**	**247**	**2**	**0**	**249**	**1197**	**36**	**0**	**1233**	**Peak**

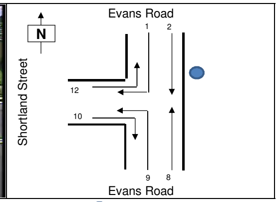
TIME PERIOD	1				3				4				5				11				12				GRAND TOTAL				
VEHICLE MOVEMENT	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
16:00 - 17:00	73	1	0	74	168	2	0	170	154	2	0	156	148	10	0	158	35	2	0	37	13	1	0	14	591	18	0	609	
16:15 - 17:15	66	1	0	67	175	1	0	176	158	1	0	159	150	4	0	154	39	5	0	44	12	1	0	13	600	13	0	613	
16:30 - 17:30	61	1	0	62	164	2	0	166	174	2	0	176	152	6	0	158	34	3	0	37	19	1	0	20	604	15	0	619	
16:45 - 17:45	62	0	0	62	165	2	0	167	184	3	0	187	147	6	0	153	37	6	0	43	24	1	0	25	619	18	0	637	
17:00 - 18:00	**64**	**0**	**0**	**64**	**163**	**3**	**0**	**166**	**181**	**2**	**0**	**183**	**150**	**7**	**0**	**157**	**39**	**6**	**0**	**45**	**26**	**0**	**0**	**26**	**623**	**18**	**0**	**641**	**Peak**

Intersection of Shortland Street and Evans Road

Tuesday, 15 March 2016

Austraffic

Survey Start	**7:00** AM	**16:00** PM
Intersection Type	**T Junction**	
Intersection No.	**4**	
North Approach	**Evans Road**	
East Approach		
South Approach	**Evans Road**	
West Approach	**Shortland Street**	
Date	**15/03/16**	
Classification	**Light Heavy Cyc**	



Camera Position

TIME PERIOD	VEHICLE MOVEMENT 1				2				8				9				10				12				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
7:00 - 7:15	4	0	0	4	41	1	0	42	49	2	0	51	2	0	0	2	13	1	0	14	7	1	0	8	116	5	0	121
7:15 - 7:30	4	2	0	6	49	2	0	51	68	3	0	71	3	0	0	3	16	1	0	17	11	2	0	13	151	10	0	161
7:30 - 7:45	4	2	0	6	53	1	0	54	115	2	0	117	5	2	0	7	13	1	0	14	10	4	0	14	200	12	0	212
7:45 - 8:00	2	3	0	5	71	1	0	72	114	0	0	114	4	1	0	5	14	1	0	15	9	2	0	11	214	8	0	222
8:00 8:15	1	1	0	2	73	1	0	74	116	2	0	118	3	0	0	3	10	1	0	11	8	3	0	11	211	8	0	219
8:15 8:30	7	2	0	9	84	5	0	89	142	1	0	143	4	1	0	5	15	1	0	16	13	1	0	14	265	11	0	276
8:30 8:45	5	1	0	6	81	0	0	81	178	1	0	179	3	0	0	3	19	1	0	20	20	1	0	21	306	4	0	310
8:45 9:00	5	2	0	7	68	1	0	69	152	0	0	152	5	1	0	6	16	2	0	18	17	4	0	21	263	10	0	273
Σ	32	13	0	45	520	12	0	532	934	11	0	945	29	5	0	34	116	9	0	125	95	18	0	113	1726	68	0	1794

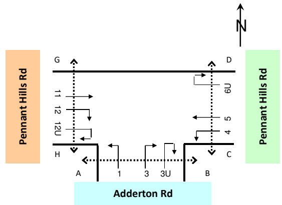
TIME PERIOD	VEHICLE MOVEMENT 1				2				8				9				10				12				GRAND TOTAL			
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ
16:00 - 16:15	5	0	0	5	30	0	0	30	28	1	0	29	4	0	0	4	22	1	0	23	14	4	0	18	103	6	0	109
16:15 - 16:30	3	3	0	6	55	0	0	55	20	0	0	20	9	0	0	9	19	0	0	19	10	2	0	12	116	5	0	121
16:30 - 16:45	6	1	0	7	36	2	0	38	23	0	0	23	7	0	0	7	20	0	0	20	17	3	0	20	109	6	0	115
16:45 - 17:00	7	0	0	7	32	0	0	32	39	1	0	40	8	0	0	8	14	0	0	14	13	1	0	14	113	2	0	115
17:00 - 17:15	3	4	0	7	28	0	0	28	28	0	0	28	4	0	0	4	19	0	0	19	9	2	0	11	91	6	0	97
17:15 - 17:30	3	0	0	3	45	1	0	46	34	0	0	34	13	0	0	13	17	0	0	17	9	1	0	10	121	2	0	123
17:30 - 17:45	5	2	0	7	37	1	0	38	51	0	0	51	6	0	0	6	25	0	0	25	18	3	0	21	142	6	0	148
17:45 - 18:00	3	0	0	3	33	1	0	34	36	0	0	36	4	0	0	4	17	0	0	17	16	2	0	18	109	3	0	112
Σ	35	10	0	45	296	5	0	301	259	2	0	261	55	0	0	55	153	1	0	154	106	18	0	124	904	36	0	940

HOURLY FLOW

TIME PERIOD	VEHICLE MOVEMENT 1				2				8				9				10				12				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
7:00 - 8:00	14	7	0	21	214	5	0	219	346	7	0	353	14	3	0	17	56	4	0	60	37	9	0	46	681	35	0	716	
7:15 - 8:15	11	8	0	19	246	5	0	251	413	7	0	420	15	3	0	18	53	4	0	57	38	11	0	49	776	38	0	814	
7:30 - 8:30	14	8	0	22	281	8	0	289	487	5	0	492	16	4	0	20	52	4	0	56	40	10	0	50	890	39	0	929	
7:45 - 8:45	15	7	0	22	309	7	0	316	550	4	0	554	14	2	0	16	58	4	0	62	50	7	0	57	996	31	0	1027	
8:00 - 9:00	**18**	**6**	**0**	**24**	**306**	**7**	**0**	**313**	**588**	**4**	**0**	**592**	**15**	**2**	**0**	**17**	**60**	**5**	**0**	**65**	**58**	**9**	**0**	**67**	**1045**	**33**	**0**	**1078**	**Peak**

TIME PERIOD	VEHICLE MOVEMENT 1				2				8				9				10				12				GRAND TOTAL				
	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	Light	Heavy	Cyc	Σ	
16:00 - 17:00	21	4	0	25	153	2	0	155	110	2	0	112	28	0	0	28	75	1	0	76	54	10	0	64	441	19	0	460	
16:15 - 17:15	19	8	0	27	151	2	0	153	110	1	0	111	28	0	0	28	72	0	0	72	49	8	0	57	429	19	0	448	
16:30 - 17:30	19	5	0	24	141	3	0	144	124	1	0	125	32	0	0	32	70	0	0	70	48	7	0	55	434	16	0	450	
16:45 - 17:45	**18**	**6**	**0**	**24**	**142**	**2**	**0**	**144**	**152**	**1**	**0**	**153**	**31**	**0**	**0**	**31**	**75**	**0**	**0**	**75**	**49**	**7**	**0**	**56**	**467**	**16**	**0**	**483**	**Peak**
17:00 - 18:00	14	6	0	20	143	3	0	146	149	0	0	149	27	0	0	27	78	0	0	78	52	8	0	60	463	17	0	480	

Job No.	: N2467
Client	: GTA
Suburb	: Telopea
Location	: 1. Pennant Hills Rd / Adderton Rd
Day/Date	: Thu, 23rd June 2016
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



MATRIX
Traffic and Transport Data

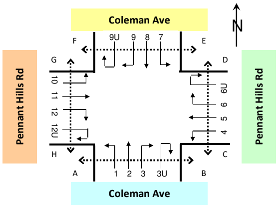
	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

Approach	Adderton Rd											
Direction	Direction 1 (Left Turn)				Direction 3 (Right Turn)				Direction 3U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	0	0	0	**0**	65	3	0	**68**	0	0	0	**0**
7:15 to 7:30	3	0	0	**3**	79	2	0	**81**	0	0	0	**0**
7:30 to 7:45	2	0	0	**2**	62	3	0	**65**	0	0	0	**0**
7:45 to 8:00	4	0	0	**4**	88	2	0	**90**	0	0	0	**0**
8:00 to 8:15	6	2	0	**8**	72	0	0	**72**	0	0	0	**0**
8:15 to 8:30	3	0	0	**3**	94	1	0	**95**	0	0	0	**0**
8:30 to 8:45	3	1	0	**4**	70	1	0	**71**	0	0	0	**0**
8:45 to 9:00	1	0	0	**1**	58	2	0	**60**	0	0	0	**0**
AM Totals	**22**	**3**	**0**	**25**	**588**	**14**	**0**	**602**	**0**	**0**	**0**	**0**
16:00 to 16:15	10	0	0	**10**	118	0	0	**118**	0	0	0	**0**
16:15 to 16:30	5	0	0	**5**	121	0	0	**121**	0	0	0	**0**
16:30 to 16:45	4	0	0	**4**	125	2	0	**127**	0	0	0	**0**
16:45 to 17:00	3	0	0	**3**	123	1	0	**124**	0	0	0	**0**
17:00 to 17:15	8	0	0	**8**	108	0	0	**108**	0	0	0	**0**
17:15 to 17:30	5	0	0	**5**	165	0	0	**165**	0	0	0	**0**
17:30 to 17:45	3	0	0	**3**	130	0	0	**130**	0	0	0	**0**
17:45 to 18:00	4	0	0	**4**	118	0	0	**118**	0	0	0	**0**
PM Totals	**42**	**0**	**0**	**42**	**1,008**	**3**	**0**	**1,011**	**0**	**0**	**0**	**0**

Approach	Pennant Hills Rd											
Direction	Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	89	2	0	**91**	282	15	0	**297**	0	0	0	**0**
7:15 to 7:30	99	1	0	**100**	349	16	0	**365**	0	0	0	**0**
7:30 to 7:45	101	1	0	**102**	360	18	0	**378**	0	0	0	**0**
7:45 to 8:00	94	0	0	**94**	363	20	0	**383**	0	0	0	**0**
8:00 to 8:15	116	0	0	**116**	383	19	0	**402**	0	0	0	**0**
8:15 to 8:30	125	1	0	**126**	327	16	0	**343**	0	0	0	**0**
8:30 to 8:45	104	2	0	**106**	292	16	0	**308**	0	0	0	**0**
8:45 to 9:00	116	1	0	**117**	284	22	0	**306**	0	0	0	**0**
AM Totals	**844**	**8**	**0**	**852**	**2,640**	**142**	**0**	**2,782**	**0**	**0**	**0**	**0**
16:00 to 16:15	67	1	0	**68**	330	14	0	**344**	0	0	0	**0**
16:15 to 16:30	54	2	0	**56**	336	26	0	**362**	0	0	0	**0**
16:30 to 16:45	57	1	0	**58**	323	18	0	**341**	0	0	0	**0**
16:45 to 17:00	56	1	0	**57**	325	24	1	**350**	0	0	0	**0**
17:00 to 17:15	61	0	0	**61**	335	17	0	**352**	0	0	0	**0**
17:15 to 17:30	56	0	0	**56**	297	16	0	**313**	0	0	0	**0**
17:30 to 17:45	75	0	0	**75**	312	11	0	**323**	0	0	0	**0**
17:45 to 18:00	59	1	0	**60**	332	14	0	**346**	0	0	0	**0**
PM Totals	**485**	**6**	**0**	**491**	**2,590**	**140**	**1**	**2,731**	**0**	**0**	**0**	**0**

Approach	Pennant Hills Rd												Crossing Pedestrians						
Direction	Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)										
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	G	H	Total
7:00 to 7:15	318	38	1	**357**	15	1	0	**16**	0	0	0	**0**	1	2	0	0	0	0	**3**
7:15 to 7:30	330	26	0	**356**	17	0	0	**17**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:30 to 7:45	287	29	0	**316**	16	0	0	**16**	0	0	0	**0**	0	0	0	0	5	0	**5**
7:45 to 8:00	272	23	0	**295**	10	0	0	**10**	0	0	0	**0**	0	0	0	0	5	0	**5**
8:00 to 8:15	245	30	0	**275**	23	0	0	**23**	0	0	0	**0**	1	0	0	0	2	1	**4**
8:15 to 8:30	246	21	0	**267**	28	0	0	**28**	0	0	0	**0**	1	0	0	0	3	0	**4**
8:30 to 8:45	262	32	0	**294**	21	0	0	**21**	0	0	0	**0**	0	1	0	0	9	1	**11**
8:45 to 9:00	232	23	0	**255**	51	0	0	**51**	0	0	0	**0**	2	0	0	0	9	1	**12**
AM Totals	**2,192**	**222**	**1**	**2,415**	**181**	**1**	**0**	**182**	**0**	**0**	**0**	**0**	**5**	**3**	**0**	**0**	**33**	**3**	**44**
16:00 to 16:15	290	16	0	**306**	22	0	0	**22**	0	0	0	**0**	2	1	0	0	2	10	**15**
16:15 to 16:30	306	12	0	**318**	7	0	0	**7**	0	0	0	**0**	1	0	0	0	1	8	**10**
16:30 to 16:45	311	8	0	**319**	8	0	0	**8**	0	0	0	**0**	3	1	0	0	1	1	**6**
16:45 to 17:00	314	19	0	**333**	13	1	0	**14**	0	0	0	**0**	2	0	0	0	0	0	**2**
17:00 to 17:15	357	5	0	**362**	13	0	0	**13**	0	0	0	**0**	4	1	0	0	1	5	**11**
17:15 to 17:30	304	8	0	**312**	14	0	0	**14**	0	0	0	**0**	2	1	0	0	0	2	**5**
17:30 to 17:45	350	16	0	**366**	11	0	0	**11**	0	0	0	**0**	2	0	0	0	1	0	**3**
17:45 to 18:00	292	12	0	**304**	12	0	0	**12**	0	0	0	**0**	0	0	0	0	1	1	**2**
PM Totals	**2,524**	**96**	**0**	**2,620**	**100**	**1**	**0**	**101**	**0**	**0**	**0**	**0**	**16**	**4**	**0**	**0**	**7**	**27**	**54**

Job No.	: N2467
Client	: GTA
Suburb	: Telopea
Location	: 2. Pennant Hills Rd / Coleman Ave
Day/Date	: Thu, 23rd June 2016
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

Approach	Coleman Ave															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	7	0	0	**7**	0	0	0	**0**	23	0	0	**23**	0	0	0	**0**
7:15 to 7:30	9	0	0	**9**	8	0	0	**8**	27	1	0	**28**	0	0	0	**0**
7:30 to 7:45	18	0	0	**18**	2	0	0	**2**	26	0	0	**26**	0	0	0	**0**
7:45 to 8:00	8	0	0	**8**	4	0	0	**4**	29	0	0	**29**	0	0	0	**0**
8:00 to 8:15	14	2	0	**16**	1	0	0	**1**	27	0	0	**27**	0	0	0	**0**
8:15 to 8:30	9	1	0	**10**	7	0	0	**7**	25	1	0	**26**	0	0	0	**0**
8:30 to 8:45	16	0	0	**16**	8	0	0	**8**	37	0	0	**37**	0	0	0	**0**
8:45 to 9:00	10	1	0	**11**	7	0	0	**7**	25	2	0	**27**	0	0	0	**0**
AM Totals	**91**	**4**	**0**	**95**	**37**	**0**	**0**	**37**	**219**	**4**	**0**	**223**	**0**	**0**	**0**	**0**
16:00 to 16:15	10	0	0	**10**	2	0	0	**2**	19	1	0	**20**	0	0	0	**0**
16:15 to 16:30	12	0	0	**12**	3	0	0	**3**	14	2	0	**16**	0	0	0	**0**
16:30 to 16:45	9	0	0	**9**	4	0	0	**4**	20	1	0	**21**	0	0	0	**0**
16:45 to 17:00	14	0	0	**14**	6	0	0	**6**	25	0	0	**25**	0	0	0	**0**
17:00 to 17:15	22	0	0	**22**	4	0	0	**4**	15	0	0	**15**	0	0	0	**0**
17:15 to 17:30	10	0	0	**10**	7	0	0	**7**	19	1	0	**20**	0	0	0	**0**
17:30 to 17:45	10	1	0	**11**	5	0	0	**5**	14	0	0	**14**	0	0	0	**0**
17:45 to 18:00	16	1	0	**17**	2	0	0	**2**	28	0	0	**28**	0	0	0	**0**
PM Totals	**103**	**2**	**0**	**105**	**33**	**0**	**0**	**33**	**154**	**5**	**0**	**159**	**0**	**0**	**0**	**0**

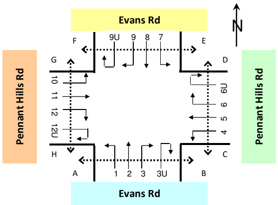
Approach	Pennant Hills Rd															
Direction	Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	4	0	0	**4**	307	18	0	**325**	4	0	0	**4**	0	0	0	**0**
7:15 to 7:30	4	1	0	**5**	340	15	0	**355**	3	0	0	**3**	0	0	0	**0**
7:30 to 7:45	3	0	0	**3**	358	19	0	**377**	7	0	0	**7**	0	0	0	**0**
7:45 to 8:00	8	1	0	**9**	362	18	0	**380**	7	0	0	**7**	0	0	0	**0**
8:00 to 8:15	5	1	0	**6**	365	15	0	**380**	14	0	0	**14**	0	0	0	**0**
8:15 to 8:30	5	0	0	**5**	352	17	0	**369**	9	0	0	**9**	0	0	0	**0**
8:30 to 8:45	11	1	0	**12**	321	18	0	**339**	10	0	0	**10**	0	0	0	**0**
8:45 to 9:00	12	0	0	**12**	306	23	0	**329**	7	1	0	**8**	0	0	0	**0**
AM Totals	**52**	**4**	**0**	**56**	**2,711**	**143**	**0**	**2,854**	**61**	**1**	**0**	**62**	**0**	**0**	**0**	**0**
16:00 to 16:15	17	0	0	**17**	347	16	0	**363**	13	0	0	**13**	0	0	0	**0**
16:15 to 16:30	17	0	0	**17**	370	27	0	**397**	12	0	0	**12**	0	0	0	**0**
16:30 to 16:45	28	1	0	**29**	406	20	0	**426**	15	0	0	**15**	0	0	0	**0**
16:45 to 17:00	19	0	0	**19**	385	21	1	**407**	14	0	0	**14**	0	0	0	**0**
17:00 to 17:15	19	1	0	**20**	378	18	0	**396**	10	0	0	**10**	0	0	0	**0**
17:15 to 17:30	25	0	0	**25**	364	13	0	**377**	11	0	0	**11**	0	0	0	**0**
17:30 to 17:45	17	1	0	**18**	383	11	0	**394**	9	0	0	**9**	0	0	0	**0**
17:45 to 18:00	38	0	0	**38**	374	15	0	**389**	5	0	0	**5**	0	0	0	**0**
PM Totals	**180**	**3**	**0**	**183**	**3,007**	**141**	**1**	**3,149**	**89**	**0**	**0**	**89**	**0**	**0**	**0**	**0**

Approach	Coleman Ave															
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	6	0	0	**6**	5	0	0	**5**	4	0	0	**4**	0	0	0	**0**
7:15 to 7:30	11	0	0	**11**	10	0	0	**10**	10	1	0	**11**	0	0	0	**0**
7:30 to 7:45	12	0	0	**12**	14	0	0	**14**	4	0	0	**4**	0	0	0	**0**
7:45 to 8:00	5	0	0	**5**	7	0	0	**7**	4	0	0	**4**	0	0	0	**0**
8:00 to 8:15	6	0	0	**6**	11	0	0	**11**	7	0	0	**7**	0	0	0	**0**
8:15 to 8:30	4	0	0	**4**	12	0	0	**12**	5	0	0	**5**	0	0	0	**0**
8:30 to 8:45	3	0	0	**3**	11	0	0	**11**	8	0	0	**8**	0	0	0	**0**
8:45 to 9:00	7	0	0	**7**	13	0	0	**13**	6	0	0	**6**	0	0	0	**0**
AM Totals	**54**	**0**	**0**	**54**	**83**	**0**	**0**	**83**	**48**	**1**	**0**	**49**	**0**	**0**	**0**	**0**
16:00 to 16:15	5	0	0	**5**	7	0	0	**7**	10	0	0	**10**	0	0	0	**0**
16:15 to 16:30	5	0	0	**5**	9	0	0	**9**	6	0	0	**6**	0	0	0	**0**
16:30 to 16:45	2	0	0	**2**	16	0	0	**16**	4	0	0	**4**	0	0	0	**0**
16:45 to 17:00	5	0	0	**5**	14	1	0	**15**	10	0	0	**10**	0	0	0	**0**
17:00 to 17:15	8	0	0	**8**	16	0	0	**16**	9	0	0	**9**	0	0	0	**0**
17:15 to 17:30	5	0	0	**5**	12	0	0	**12**	5	0	0	**5**	0	0	0	**0**
17:30 to 17:45	2	0	0	**2**	10	1	0	**11**	10	0	0	**10**	0	0	0	**0**
17:45 to 18:00	8	0	0	**8**	18	0	0	**18**	11	0	0	**11**	0	0	0	**0**
PM Totals	**40**	**0**	**0**	**40**	**102**	**2**	**0**	**104**	**65**	**0**	**0**	**65**	**0**	**0**	**0**	**0**

Approach	Pennant Hills Rd															
Direction	Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	0	0	0	**0**	366	35	1	**402**	0	0	0	**0**	0	0	0	**0**
7:15 to 7:30	3	0	0	**3**	406	27	0	**433**	0	0	0	**0**	0	0	0	**0**
7:30 to 7:45	0	0	0	**0**	354	26	0	**380**	0	0	0	**0**	0	0	0	**0**
7:45 to 8:00	0	0	0	**0**	343	21	0	**364**	0	0	0	**0**	0	0	0	**0**
8:00 to 8:15	0	0	0	**0**	305	29	0	**334**	0	0	0	**0**	0	0	0	**0**
8:15 to 8:30	1	0	0	**1**	323	23	0	**346**	0	0	0	**0**	0	0	0	**0**
8:30 to 8:45	2	0	0	**2**	292	31	0	**323**	0	0	0	**0**	0	0	0	**0**
8:45 to 9:00	1	0	0	**1**	318	24	0	**342**	0	0	0	**0**	0	0	0	**0**
AM Totals	**7**	**0**	**0**	**7**	**2,707**	**216**	**1**	**2,924**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 to 16:15	0	0	0	**0**	335	17	0	**352**	0	0	0	**0**	0	0	0	**0**
16:15 to 16:30	0	0	0	**0**	342	12	0	**354**	0	0	0	**0**	0	0	0	**0**
16:30 to 16:45	0	0	0	**0**	321	10	0	**331**	0	0	0	**0**	0	0	0	**0**
16:45 to 17:00	0	0	0	**0**	346	19	1	**366**	0	0	0	**0**	0	0	0	**0**
17:00 to 17:15	0	0	0	**0**	383	7	0	**390**	1	0	0	**1**	0	0	0	**0**
17:15 to 17:30	0	0	0	**0**	378	6	0	**384**	0	0	0	**0**	0	0	0	**0**
17:30 to 17:45	1	0	0	**1**	364	14	0	**378**	0	0	0	**0**	0	0	0	**0**
17:45 to 18:00	0	0	0	**0**	345	15	0	**360**	0	0	0	**0**	0	0	0	**0**
PM Totals	**1**	**0**	**0**	**1**	**2,814**	**100**	**1**	**2,915**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

	Crossing Pedestrians								
Time Period	A	B	C	D	E	F	G	H	Total
7:00 to 7:15	1	0	0	0	0	0	3	3	**7**
7:15 to 7:30	1	0	0	0	0	1	18	1	**21**
7:30 to 7:45	2	1	0	0	0	0	7	7	**17**
7:45 to 8:00	3	1	0	0	0	0	16	1	**21**
8:00 to 8:15	1	1	0	0	0	0	17	3	**22**
8:15 to 8:30	1	0	0	0	0	0	4	0	**5**
8:30 to 8:45	3	0	0	0	1	0	14	3	**21**
8:45 to 9:00	1	4	0	0	0	0	2	3	**10**
AM Totals	**13**	**7**	**0**	**0**	**1**	**1**	**81**	**21**	**124**
16:00 to 16:15	5	4	0	0	0	0	8	8	**25**
16:15 to 16:30	1	1	0	1	0	0	5	4	**12**
16:30 to 16:45	2	3	0	0	0	0	6	12	**23**
16:45 to 17:00	2	4	0	0	0	0	5	13	**24**
17:00 to 17:15	3	3	0	0	0	3	6	3	**18**
17:15 to 17:30	2	7	0	0	0	0	1	17	**27**
17:30 to 17:45	4	6	0	0	0	0	6	6	**22**
17:45 to 18:00	3	4	0	0	0	1	2	11	**21**
PM Totals	**22**	**32**	**0**	**1**	**0**	**4**	**39**	**74**	**172**

Job No.	: N2467
Client	: GTA
Suburb	: Telopea
Location	: 3. Pennant Hills Rd / Evans Rd
Day/Date	: Thu, 23rd June 2016
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

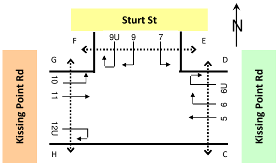
Approach	Evans Rd															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	32	3	0	**35**	0	0	0	**0**	18	1	0	**19**	0	0	0	**0**
7:15 to 7:30	27	1	0	**28**	0	0	0	**0**	21	0	0	**21**	0	0	0	**0**
7:30 to 7:45	46	3	0	**49**	0	0	0	**0**	28	1	0	**29**	0	0	0	**0**
7:45 to 8:00	36	0	0	**36**	0	0	0	**0**	30	1	0	**31**	0	0	0	**0**
8:00 to 8:15	50	0	0	**50**	0	0	0	**0**	18	1	0	**19**	0	0	0	**0**
8:15 to 8:30	45	2	0	**47**	0	0	0	**0**	20	0	0	**20**	0	0	0	**0**
8:30 to 8:45	54	0	0	**54**	0	0	0	**0**	20	1	0	**21**	0	0	0	**0**
8:45 to 9:00	43	4	0	**47**	0	0	0	**0**	16	1	0	**17**	0	0	0	**0**
AM Totals	**333**	**13**	**0**	**346**	**0**	**0**	**0**	**0**	**171**	**6**	**0**	**177**	**0**	**0**	**0**	**0**
16:00 to 16:15	69	0	0	**69**	0	0	0	**0**	16	0	0	**16**	0	0	0	**0**
16:15 to 16:30	78	0	0	**78**	1	0	0	**1**	27	1	0	**28**	0	0	0	**0**
16:30 to 16:45	80	0	0	**80**	0	0	0	**0**	23	0	0	**23**	0	0	0	**0**
16:45 to 17:00	79	0	0	**79**	0	0	0	**0**	24	0	0	**24**	0	0	0	**0**
17:00 to 17:15	83	2	0	**85**	0	0	0	**0**	19	1	0	**20**	0	0	0	**0**
17:15 to 17:30	76	0	0	**76**	1	0	0	**1**	17	0	0	**17**	0	0	0	**0**
17:30 to 17:45	101	0	0	**101**	0	0	0	**0**	25	0	0	**25**	0	0	0	**0**
17:45 to 18:00	95	0	0	**95**	0	0	0	**0**	23	0	0	**23**	0	0	0	**0**
PM Totals	**661**	**2**	**0**	**663**	**2**	**0**	**0**	**2**	**174**	**2**	**0**	**176**	**0**	**0**	**0**	**0**

Approach	Pennant Hills Rd															
Direction	Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	39	0	0	**39**	256	15	0	**271**	0	0	0	**0**	0	0	0	**0**
7:15 to 7:30	55	0	0	**55**	317	15	0	**332**	0	0	0	**0**	0	0	0	**0**
7:30 to 7:45	40	1	0	**41**	308	18	0	**326**	0	0	0	**0**	0	0	0	**0**
7:45 to 8:00	56	0	0	**56**	333	17	0	**350**	0	0	0	**0**	0	0	0	**0**
8:00 to 8:15	91	2	0	**93**	326	16	0	**342**	0	0	0	**0**	0	0	0	**0**
8:15 to 8:30	67	0	0	**67**	318	14	0	**332**	0	0	0	**0**	0	0	0	**0**
8:30 to 8:45	92	2	0	**94**	277	19	0	**296**	0	0	0	**0**	0	0	0	**0**
8:45 to 9:00	69	1	0	**70**	286	20	0	**306**	0	0	0	**0**	0	0	0	**0**
AM Totals	**509**	**6**	**0**	**515**	**2,421**	**134**	**0**	**2,555**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 to 16:15	72	2	0	**74**	317	17	0	**334**	0	0	0	**0**	0	0	0	**0**
16:15 to 16:30	56	3	0	**59**	314	26	0	**340**	0	0	0	**0**	0	0	0	**0**
16:30 to 16:45	68	3	0	**71**	361	22	0	**383**	0	0	0	**0**	0	0	0	**0**
16:45 to 17:00	50	1	0	**51**	327	21	0	**348**	1	0	0	**1**	0	0	0	**0**
17:00 to 17:15	57	1	0	**58**	334	19	0	**353**	0	0	0	**0**	0	0	0	**0**
17:15 to 17:30	74	1	0	**75**	313	11	0	**324**	0	0	0	**0**	0	0	0	**0**
17:30 to 17:45	69	1	0	**70**	307	12	0	**319**	0	0	0	**0**	0	0	0	**0**
17:45 to 18:00	78	0	0	**78**	326	15	0	**341**	0	0	0	**0**	0	0	0	**0**
PM Totals	**524**	**12**	**0**	**536**	**2,599**	**143**	**0**	**2,742**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

Approach	Evans Rd															
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	5	0	0	**5**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
7:15 to 7:30	23	0	0	**23**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
7:30 to 7:45	17	0	0	**17**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
7:45 to 8:00	23	2	0	**25**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
8:00 to 8:15	22	0	0	**22**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
8:15 to 8:30	30	1	0	**31**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
8:30 to 8:45	25	0	0	**25**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
8:45 to 9:00	18	1	0	**19**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
AM Totals	**163**	**4**	**0**	**167**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 to 16:15	17	0	0	**17**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**
16:15 to 16:30	17	0	0	**17**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
16:30 to 16:45	8	0	0	**8**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**
16:45 to 17:00	18	0	0	**18**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
17:00 to 17:15	14	0	0	**14**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
17:15 to 17:30	9	0	0	**9**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
17:30 to 17:45	9	0	0	**9**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
17:45 to 18:00	7	0	0	**7**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
PM Totals	**99**	**0**	**0**	**99**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Approach	Pennant Hills Rd																Crossing Pedestrians								
Direction	Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	E	F	G	H	Total
7:00 to 7:15	0	0	0	**0**	336	37	1	**374**	49	0	0	**49**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:15 to 7:30	0	0	0	**0**	381	26	0	**407**	60	0	0	**60**	0	0	0	**0**	1	1	0	0	0	2	0	0	**4**
7:30 to 7:45	1	0	0	**1**	312	25	0	**337**	73	1	0	**74**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:45 to 8:00	0	0	0	**0**	317	22	0	**339**	51	0	0	**51**	0	0	0	**0**	0	1	0	0	0	1	0	0	**2**
8:00 to 8:15	0	0	0	**0**	249	24	0	**273**	58	1	0	**59**	0	0	0	**0**	1	1	0	0	0	1	0	0	**3**
8:15 to 8:30	2	0	0	**2**	305	24	0	**329**	76	3	0	**79**	0	0	0	**0**	0	0	0	0	2	0	0	0	**2**
8:30 to 8:45	0	0	0	**0**	242	30	0	**272**	49	1	0	**50**	0	0	0	**0**	1	2	0	0	0	0	0	0	**3**
8:45 to 9:00	0	0	0	**0**	287	26	0	**313**	76	0	0	**76**	0	0	0	**0**	0	0	0	0	6	2	0	0	**8**
AM Totals	**3**	**0**	**0**	**3**	**2,429**	**214**	**1**	**2,644**	**492**	**6**	**0**	**498**	**0**	**0**	**0**	**0**	**3**	**5**	**0**	**0**	**8**	**6**	**0**	**0**	**22**
16:00 to 16:15	0	0	0	**0**	309	16	0	**325**	36	0	0	**36**	0	0	0	**0**	2	2	0	0	1	4	0	0	**9**
16:15 to 16:30	0	0	0	**0**	322	14	0	**336**	31	1	0	**32**	0	0	0	**0**	1	2	0	0	2	1	0	0	**6**
16:30 to 16:45	1	0	0	**1**	316	11	0	**327**	28	0	0	**28**	0	0	0	**0**	5	1	0	0	1	4	0	0	**11**
16:45 to 17:00	0	0	0	**0**	340	19	1	**360**	30	0	0	**30**	0	0	0	**0**	1	1	0	0	2	4	0	0	**8**
17:00 to 17:15	0	0	0	**0**	376	7	0	**383**	29	0	0	**29**	0	0	0	**0**	2	2	0	0	5	4	0	0	**13**
17:15 to 17:30	0	0	0	**0**	369	7	0	**376**	34	0	0	**34**	0	0	0	**0**	3	3	0	0	2	1	0	0	**9**
17:30 to 17:45	0	0	0	**0**	334	14	0	**348**	31	0	0	**31**	0	0	0	**0**	4	2	0	0	1	1	0	0	**8**
17:45 to 18:00	0	0	0	**0**	347	15	0	**362**	30	0	0	**30**	0	0	0	**0**	2	6	0	0	1	3	0	0	**12**
PM Totals	**1**	**0**	**0**	**1**	**2,713**	**103**	**1**	**2,817**	**249**	**1**	**0**	**250**	**0**	**0**	**0**	**0**	**20**	**19**	**0**	**0**	**15**	**22**	**0**	**0**	**76**

Job No.	: N2467
Client	: GTA
Suburb	: Telopea
Location	: 4. Kissing Point Rd / Sturt St
Day/Date	: Thu, 23rd June 2016
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



MATRIX Traffic and Transport Data

	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

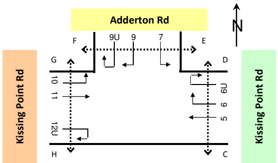
Approach	Kissing Point Rd											
Direction	Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	220	8	0	**228**	8	1	0	**9**	0	0	0	**0**
7:15 to 7:30	237	5	0	**242**	26	2	0	**28**	1	0	0	**1**
7:30 to 7:45	258	8	0	**266**	15	3	0	**18**	0	0	0	**0**
7:45 to 8:00	259	13	0	**272**	24	0	0	**24**	1	0	0	**1**
8:00 to 8:15	276	9	2	**287**	21	0	0	**21**	0	0	0	**0**
8:15 to 8:30	287	5	0	**292**	31	0	0	**31**	2	0	0	**2**
8:30 to 8:45	292	6	0	**298**	29	0	0	**29**	0	0	0	**0**
8:45 to 9:00	237	14	0	**251**	35	0	0	**35**	1	0	0	**1**
AM Totals	**2,066**	**68**	**2**	**2,136**	**189**	**6**	**0**	**195**	**5**	**0**	**0**	**5**
16:00 to 16:15	450	8	0	**458**	43	1	0	**44**	0	0	0	**0**
16:15 to 16:30	501	8	0	**509**	49	0	0	**49**	0	0	0	**0**
16:30 to 16:45	481	9	0	**490**	51	0	0	**51**	0	0	0	**0**
16:45 to 17:00	497	9	0	**506**	53	1	0	**54**	0	0	0	**0**
17:00 to 17:15	490	9	0	**499**	48	1	0	**49**	0	0	0	**0**
17:15 to 17:30	490	9	0	**499**	41	0	0	**41**	0	0	0	**0**
17:30 to 17:45	497	5	0	**502**	52	0	0	**52**	0	0	0	**0**
17:45 to 18:00	489	6	0	**495**	41	0	0	**41**	1	0	0	**1**
PM Totals	**3,895**	**63**	**0**	**3,958**	**378**	**3**	**0**	**381**	**1**	**0**	**0**	**1**

Approach	Sturt St											
Direction	Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 9U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	21	0	0	**21**	26	2	0	**28**	0	0	0	**0**
7:15 to 7:30	26	0	0	**26**	50	1	0	**51**	0	0	0	**0**
7:30 to 7:45	15	1	0	**16**	66	4	0	**70**	0	0	0	**0**
7:45 to 8:00	26	1	0	**27**	46	3	0	**49**	0	0	0	**0**
8:00 to 8:15	23	0	0	**23**	79	2	0	**81**	0	0	0	**0**
8:15 to 8:30	28	0	0	**28**	66	3	0	**69**	0	0	0	**0**
8:30 to 8:45	23	1	0	**24**	97	1	0	**98**	0	0	0	**0**
8:45 to 9:00	36	0	0	**36**	63	3	0	**66**	0	0	0	**0**
AM Totals	**198**	**3**	**0**	**201**	**493**	**19**	**0**	**512**	**0**	**0**	**0**	**0**
16:00 to 16:15	20	0	0	**20**	51	1	0	**52**	0	0	0	**0**
16:15 to 16:30	21	0	0	**21**	39	2	0	**41**	0	0	0	**0**
16:30 to 16:45	17	1	0	**18**	54	2	0	**56**	0	0	0	**0**
16:45 to 17:00	13	1	0	**14**	41	3	0	**44**	0	0	0	**0**
17:00 to 17:15	14	0	0	**14**	48	0	0	**48**	0	0	0	**0**
17:15 to 17:30	15	0	0	**15**	44	1	0	**45**	0	0	0	**0**
17:30 to 17:45	23	0	0	**23**	37	2	0	**39**	0	0	0	**0**
17:45 to 18:00	15	0	0	**15**	37	1	0	**38**	0	0	0	**0**
PM Totals	**138**	**2**	**0**	**140**	**351**	**12**	**0**	**363**	**0**	**0**	**0**	**0**

Approach	Kissing Point Rd											
Direction	Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	23	3	0	**26**	464	16	0	**480**	0	0	0	**0**
7:15 to 7:30	31	3	0	**34**	465	12	0	**477**	0	0	0	**0**
7:30 to 7:45	39	1	0	**40**	413	15	0	**428**	0	0	0	**0**
7:45 to 8:00	56	3	0	**59**	404	13	1	**418**	0	0	0	**0**
8:00 to 8:15	52	6	0	**58**	408	16	0	**424**	0	0	0	**0**
8:15 to 8:30	53	3	0	**56**	436	10	0	**446**	0	0	0	**0**
8:30 to 8:45	78	2	0	**80**	420	8	0	**428**	0	0	0	**0**
8:45 to 9:00	53	0	0	**53**	391	6	0	**397**	0	0	0	**0**
AM Totals	**385**	**21**	**0**	**406**	**3,401**	**96**	**1**	**3,498**	**0**	**0**	**0**	**0**
16:00 to 16:15	39	3	0	**42**	315	4	0	**319**	0	0	0	**0**
16:15 to 16:30	40	3	0	**43**	261	7	0	**268**	0	0	0	**0**
16:30 to 16:45	48	4	0	**52**	269	2	0	**271**	0	0	0	**0**
16:45 to 17:00	50	2	0	**52**	342	4	0	**346**	0	0	0	**0**
17:00 to 17:15	47	2	0	**49**	306	5	0	**311**	0	0	0	**0**
17:15 to 17:30	41	2	0	**43**	336	4	0	**340**	0	0	0	**0**
17:30 to 17:45	41	2	0	**43**	346	3	0	**349**	0	0	0	**0**
17:45 to 18:00	42	1	0	**43**	308	3	1	**312**	0	0	0	**0**
PM Totals	**348**	**19**	**0**	**367**	**2,483**	**32**	**1**	**2,516**	**0**	**0**	**0**	**0**

Approach	Crossing Pedestrians						
Time Period	C	D	E	F	G	H	Total
7:00 to 7:15	0	0	0	1	0	0	**1**
7:15 to 7:30	0	0	0	0	0	0	**0**
7:30 to 7:45	0	0	0	0	0	0	**0**
7:45 to 8:00	0	0	0	2	0	0	**2**
8:00 to 8:15	4	1	1	0	0	0	**6**
8:15 to 8:30	6	0	0	0	0	0	**6**
8:30 to 8:45	15	0	4	0	0	0	**19**
8:45 to 9:00	0	0	2	0	0	0	**2**
AM Totals	**25**	**1**	**7**	**3**	**0**	**0**	**36**
16:00 to 16:15	0	1	0	0	0	0	**1**
16:15 to 16:30	0	2	0	2	0	0	**4**
16:30 to 16:45	0	0	0	0	0	0	**0**
16:45 to 17:00	0	0	0	0	0	0	**0**
17:00 to 17:15	0	0	0	0	0	0	**0**
17:15 to 17:30	0	2	0	0	0	0	**2**
17:30 to 17:45	0	0	0	0	0	0	**0**
17:45 to 18:00	0	0	0	0	0	0	**0**
PM Totals	**0**	**5**	**0**	**2**	**0**	**0**	**7**

Job No.	: N2467
Client	: GTA
Suburb	: Telopea
Location	: 5. Kissing Point Rd / Adderton Rd
Day/Date	: Thu, 23rd June 2016
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



MATRIX Traffic and Transport Data

	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

Approach	Kissing Point Rd											
Direction	Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	233	7	0	**240**	27	2	0	**29**	0	0	0	**0**
7:15 to 7:30	252	6	0	**258**	23	0	0	**23**	0	0	0	**0**
7:30 to 7:45	315	11	0	**326**	30	0	0	**30**	0	0	0	**0**
7:45 to 8:00	281	16	0	**297**	29	0	0	**29**	0	0	0	**0**
8:00 to 8:15	343	11	2	**356**	27	0	0	**27**	0	0	0	**0**
8:15 to 8:30	297	5	0	**302**	54	1	0	**55**	0	0	0	**0**
8:30 to 8:45	351	10	0	**361**	41	0	0	**41**	0	0	0	**0**
8:45 to 9:00	264	13	0	**277**	29	3	0	**32**	0	0	0	**0**
AM Totals	**2,336**	**79**	**2**	**2,417**	**260**	**6**	**0**	**266**	**0**	**0**	**0**	**0**
16:00 to 16:15	469	10	0	**479**	43	1	0	**44**	0	0	0	**0**
16:15 to 16:30	491	8	0	**499**	54	0	0	**54**	0	0	0	**0**
16:30 to 16:45	490	9	0	**499**	50	0	0	**50**	0	0	0	**0**
16:45 to 17:00	488	10	0	**498**	60	0	0	**60**	0	0	0	**0**
17:00 to 17:15	481	8	0	**489**	75	1	0	**76**	0	0	0	**0**
17:15 to 17:30	453	8	0	**461**	92	1	0	**93**	0	0	0	**0**
17:30 to 17:45	417	8	0	**425**	66	0	0	**66**	1	0	0	**1**
17:45 to 18:00	418	9	0	**427**	82	0	0	**82**	0	0	0	**0**
PM Totals	**3,707**	**70**	**0**	**3,777**	**522**	**3**	**0**	**525**	**1**	**0**	**0**	**1**

Approach	Adderton Rd											
Direction	Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 9U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	65	1	0	**66**	82	1	0	**83**	0	0	0	**0**
7:15 to 7:30	72	4	0	**76**	109	2	0	**111**	0	0	0	**0**
7:30 to 7:45	52	1	0	**53**	87	1	0	**88**	0	0	0	**0**
7:45 to 8:00	58	0	0	**58**	137	1	0	**138**	0	0	0	**0**
8:00 to 8:15	62	2	0	**64**	110	1	0	**111**	0	0	0	**0**
8:15 to 8:30	71	0	0	**71**	171	1	0	**172**	0	0	0	**0**
8:30 to 8:45	57	1	0	**58**	124	5	1	**130**	0	0	0	**0**
8:45 to 9:00	81	1	0	**82**	141	0	0	**141**	0	0	0	**0**
AM Totals	**518**	**10**	**0**	**528**	**961**	**12**	**1**	**974**	**0**	**0**	**0**	**0**
16:00 to 16:15	51	1	0	**52**	63	0	0	**63**	0	0	0	**0**
16:15 to 16:30	42	1	0	**43**	60	2	0	**62**	0	0	0	**0**
16:30 to 16:45	37	2	0	**39**	58	1	0	**59**	0	0	0	**0**
16:45 to 17:00	39	0	0	**39**	42	0	0	**42**	0	0	0	**0**
17:00 to 17:15	34	0	0	**34**	63	1	0	**64**	0	0	0	**0**
17:15 to 17:30	39	0	0	**39**	53	1	0	**54**	0	0	0	**0**
17:30 to 17:45	38	0	0	**38**	82	3	0	**85**	0	0	0	**0**
17:45 to 18:00	54	0	0	**54**	43	0	0	**43**	0	0	0	**0**
PM Totals	**334**	**4**	**0**	**338**	**464**	**8**	**0**	**472**	**0**	**0**	**0**	**0**

Approach	Kissing Point Rd												Crossing Pedestrians						
Direction	Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12U (U Turn)										
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	C	D	E	F	G	H	Total
7:00 to 7:15	44	3	0	**47**	465	18	0	**483**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:15 to 7:30	46	3	0	**49**	393	9	0	**402**	0	0	0	**0**	1	1	0	1	0	0	**3**
7:30 to 7:45	65	2	0	**67**	449	18	0	**467**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:45 to 8:00	61	2	0	**63**	385	13	0	**398**	0	0	0	**0**	1	1	1	1	0	0	**4**
8:00 to 8:15	62	1	0	**63**	453	22	0	**475**	0	0	0	**0**	0	0	0	1	0	0	**1**
8:15 to 8:30	82	4	0	**86**	391	12	0	**403**	0	0	0	**0**	0	0	0	2	0	0	**2**
8:30 to 8:45	62	1	0	**63**	448	13	0	**461**	0	0	0	**0**	0	0	0	0	0	0	**0**
8:45 to 9:00	81	4	0	**85**	333	4	0	**337**	0	0	0	**0**	1	0	1	2	0	0	**4**
AM Totals	**503**	**20**	**0**	**523**	**3,317**	**109**	**0**	**3,426**	**0**	**0**	**0**	**0**	**3**	**2**	**2**	**7**	**0**	**0**	**14**
16:00 to 16:15	112	0	0	**112**	284	5	0	**289**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:15 to 16:30	113	3	0	**116**	265	9	0	**274**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:30 to 16:45	122	1	0	**123**	301	2	0	**303**	0	0	0	**0**	0	0	1	1	0	0	**2**
16:45 to 17:00	103	2	0	**105**	338	6	0	**344**	0	0	0	**0**	0	0	0	0	0	0	**0**
17:00 to 17:15	139	1	0	**140**	326	7	0	**333**	0	0	0	**0**	0	0	0	0	0	0	**0**
17:15 to 17:30	111	0	0	**111**	318	7	0	**325**	0	0	0	**0**	0	0	1	0	0	0	**1**
17:30 to 17:45	130	1	0	**131**	370	6	0	**376**	0	0	0	**0**	1	0	0	1	0	0	**2**
17:45 to 18:00	123	2	0	**125**	296	5	0	**301**	0	0	0	**0**	0	1	1	1	0	0	**3**
PM Totals	**953**	**10**	**0**	**963**	**2,498**	**47**	**0**	**2,545**	**0**	**0**	**0**	**0**	**1**	**1**	**3**	**3**	**0**	**0**	**8**

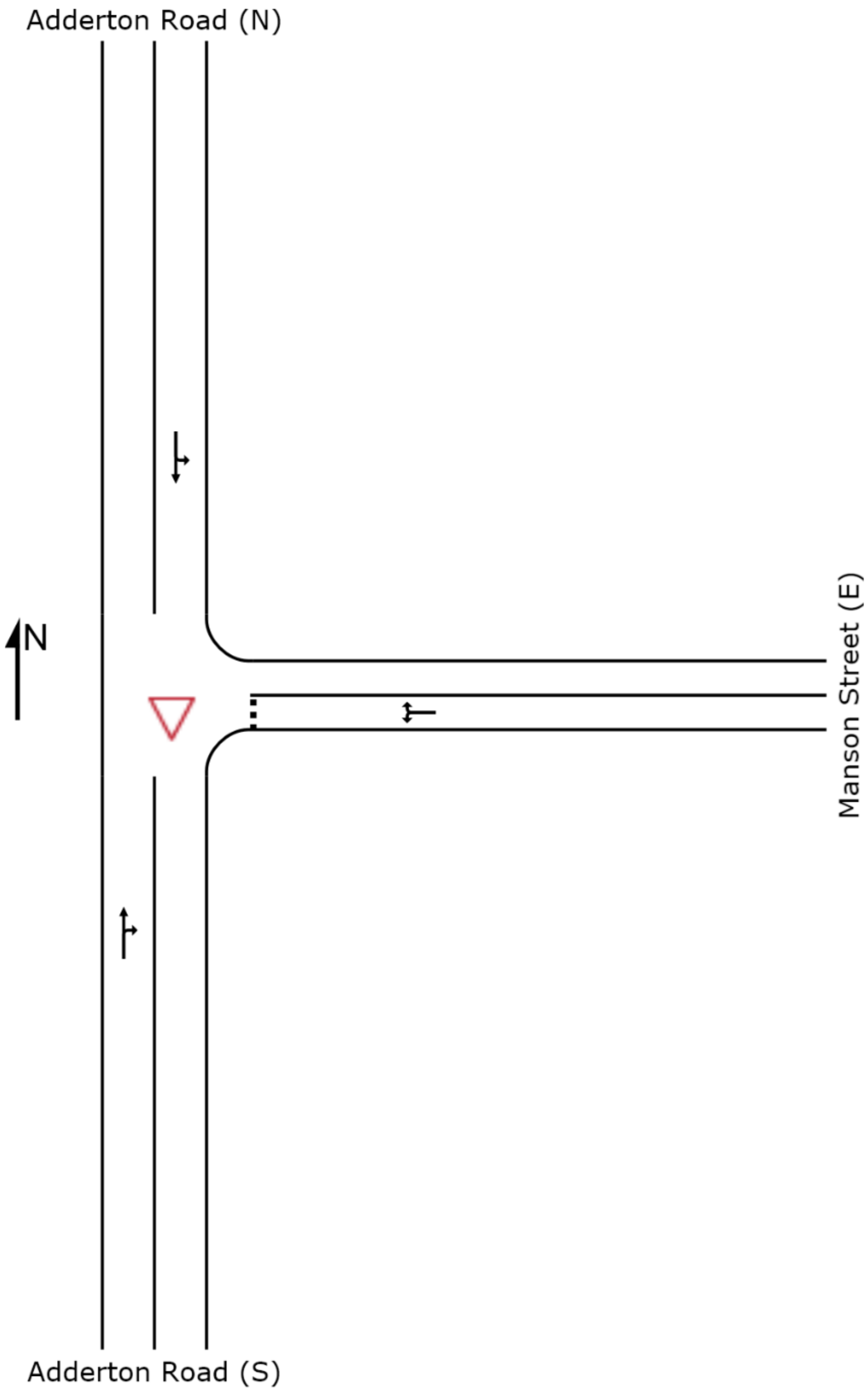
Appendix B

SIDRA Intersection Results (Internal Intersections)

SITE LAYOUT

▽ Site: Adderton Road/ Manson Street - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)



SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: GTA CONSULTANTS | Created: Thursday, 5 May 2016 10:00:51 AM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-Existing.sip6

MOVEMENT SUMMARY

▽ Site: Adderton Road/ Manson Street - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	411	0.3	0.451	7.6	LOS A	4.4	31.1	0.68	0.20	44.2
3	R2	108	3.9	0.451	17.1	LOS B	4.4	31.1	0.68	0.20	42.6
Approach		519	1.0	0.451	9.6	NA	4.4	31.1	0.68	0.20	43.9
East: Manson Street (E)											
4	L2	64	1.6	0.361	11.1	LOS A	1.3	9.3	0.81	0.98	38.6
6	R2	48	4.3	0.361	26.2	LOS B	1.3	9.3	0.81	0.98	38.5
Approach		113	2.8	0.361	17.6	LOS B	1.3	9.3	0.81	0.98	38.6
North: Adderton Road (N)											
7	L2	245	0.9	0.490	4.6	LOS A	0.0	0.0	0.00	0.13	48.5
8	T1	773	1.8	0.490	0.1	LOS A	0.0	0.0	0.00	0.13	49.2
Approach		1018	1.6	0.490	1.2	NA	0.0	0.0	0.00	0.13	49.0
All Vehicles		1649	1.5	0.490	5.0	NA	4.4	31.1	0.27	0.21	46.5

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - PM (Ex)

16S9023000
Telopea Urban Renewal - Existing PM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

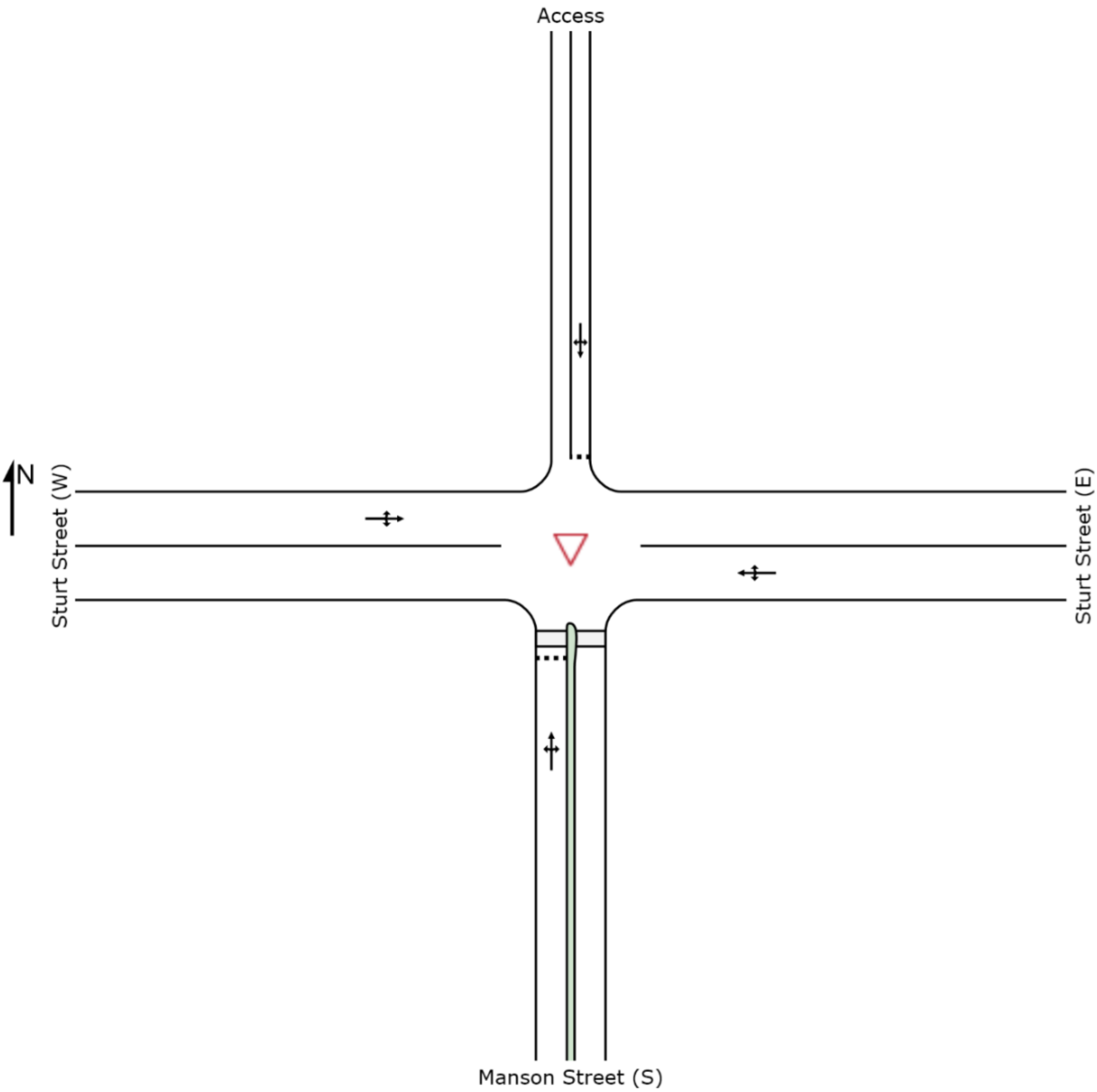
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	832	0.3	0.421	0.2	LOS A	0.6	4.0	0.07	0.02	49.7
3	R2	35	0.0	0.421	7.0	LOS A	0.6	4.0	0.07	0.02	48.8
Approach		866	0.2	0.421	0.5	NA	0.6	4.0	0.07	0.02	49.6
East: Manson Street (E)											
4	L2	33	0.0	0.402	8.0	LOS A	1.5	10.6	0.75	0.93	39.0
6	R2	102	0.0	0.402	19.7	LOS C	1.5	10.6	0.75	0.93	38.8
Approach		135	0.0	0.402	16.9	LOS C	1.5	10.6	0.75	0.93	38.9
North: Adderton Road (N)											
7	L2	46	0.0	0.185	4.6	LOS A	0.0	0.0	0.00	0.07	49.0
8	T1	341	0.9	0.185	0.0	LOS A	0.0	0.0	0.00	0.07	49.6
Approach		387	0.8	0.185	0.6	NA	0.0	0.0	0.00	0.07	49.5
All Vehicles		1388	0.4	0.421	2.1	NA	1.5	10.6	0.11	0.12	48.5

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	35	3.0	0.386	3.5	LOS A	1.8	13.0	0.24	0.48	38.3
2	T1	3	0.0	0.386	3.2	LOS A	1.8	13.0	0.24	0.48	38.6
3	R2	357	1.8	0.386	4.3	LOS A	1.8	13.0	0.24	0.48	38.4
Approach		395	1.9	0.386	4.2	LOS A	1.8	13.0	0.24	0.48	38.4
East: Sturt Street (E)											
4	L2	84	3.8	0.055	5.6	LOS A	0.0	0.1	0.00	0.46	54.2
5	T1	22	23.8	0.055	0.0	LOS A	0.0	0.1	0.00	0.46	55.8
6	R2	1	0.0	0.055	5.6	LOS A	0.0	0.1	0.00	0.46	54.4
Approach		107	7.8	0.055	4.4	NA	0.0	0.1	0.00	0.46	54.5
North: Access											
7	L2	3	0.0	0.004	5.6	LOS A	0.0	0.1	0.09	0.54	53.5
8	T1	1	0.0	0.004	5.3	LOS A	0.0	0.1	0.09	0.54	54.0
9	R2	1	0.0	0.004	6.0	LOS A	0.0	0.1	0.09	0.54	53.5
Approach		5	0.0	0.004	5.6	LOS A	0.0	0.1	0.09	0.54	53.6
West: Sturt Street (W)											
10	L2	2	0.0	0.028	5.8	LOS A	0.1	0.9	0.18	0.26	55.1
11	T1	26	20.0	0.028	0.2	LOS A	0.1	0.9	0.18	0.26	56.5
12	R2	22	0.0	0.028	5.9	LOS A	0.1	0.9	0.18	0.26	55.3
Approach		51	10.4	0.028	2.9	NA	0.1	0.9	0.18	0.26	55.9
All Vehicles		558	3.8	0.386	4.1	NA	1.8	13.0	0.19	0.45	42.1

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - PM (Ex)

16S9023000
Telopea Urban Renewal - Existing PM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

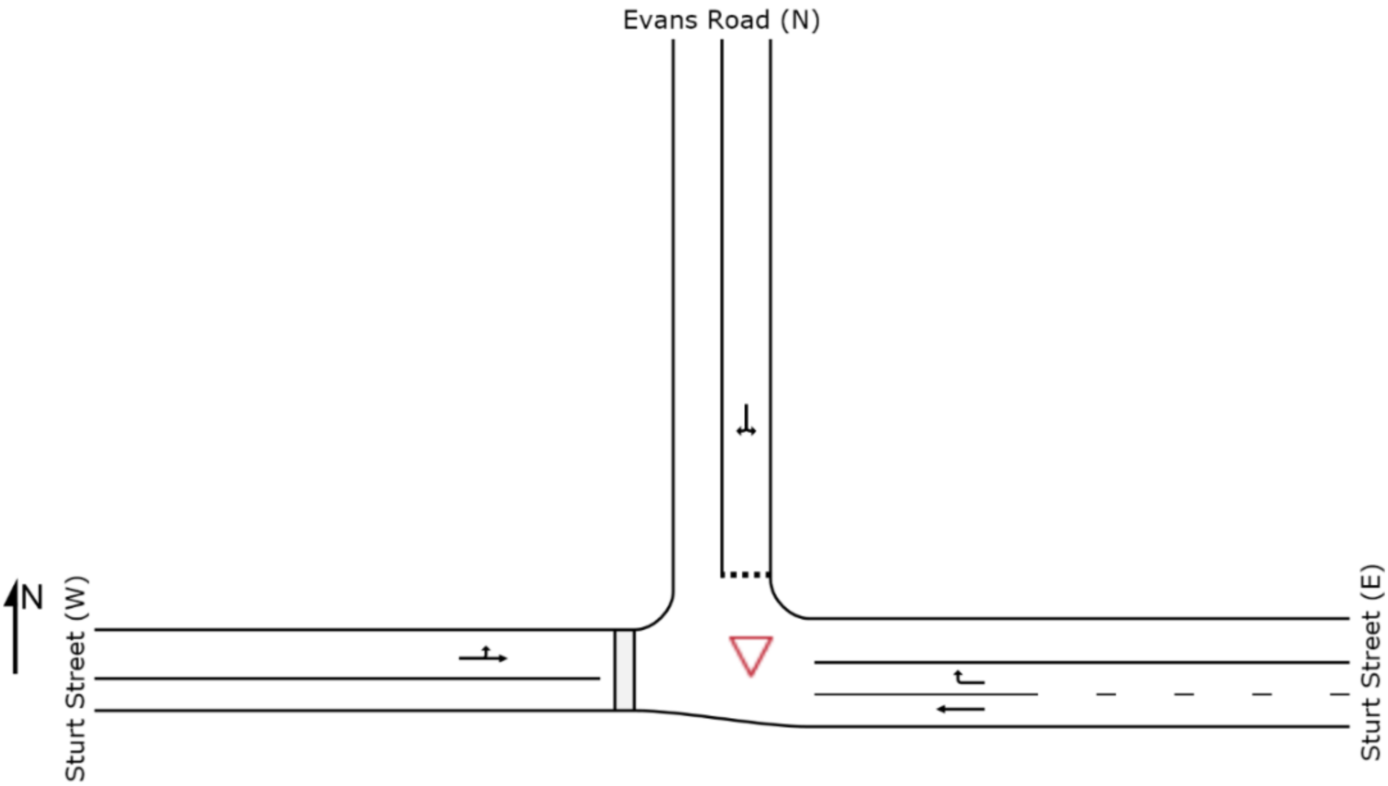
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	24	0.0	0.070	4.7	LOS A	0.2	1.7	0.15	0.51	46.3
2	T1	1	0.0	0.070	4.3	LOS A	0.2	1.7	0.15	0.51	46.6
3	R2	52	0.0	0.070	5.3	LOS A	0.2	1.7	0.15	0.51	46.4
Approach		77	0.0	0.070	5.1	LOS A	0.2	1.7	0.15	0.51	46.4
East: Sturt Street (E)											
4	L2	125	0.0	0.082	5.5	LOS A	0.0	0.2	0.01	0.45	54.5
5	T1	36	14.7	0.082	0.0	LOS A	0.0	0.2	0.01	0.45	55.9
6	R2	3	0.0	0.082	5.6	LOS A	0.0	0.2	0.01	0.45	54.5
Approach		164	3.2	0.082	4.3	NA	0.0	0.2	0.01	0.45	54.8
North: Access											
7	L2	6	0.0	0.009	5.6	LOS A	0.0	0.2	0.08	0.54	53.5
8	T1	3	0.0	0.009	5.5	LOS A	0.0	0.2	0.08	0.54	54.0
9	R2	2	0.0	0.009	6.0	LOS A	0.0	0.2	0.08	0.54	53.6
Approach		12	0.0	0.009	5.7	LOS A	0.0	0.2	0.08	0.54	53.7
West: Sturt Street (W)											
10	L2	1	0.0	0.022	6.0	LOS A	0.1	0.6	0.19	0.21	55.5
11	T1	24	21.7	0.022	0.3	LOS A	0.1	0.6	0.19	0.21	57.0
12	R2	14	0.0	0.022	6.0	LOS A	0.1	0.6	0.19	0.21	55.7
Approach		39	13.5	0.022	2.4	NA	0.1	0.6	0.19	0.21	56.5
All Vehicles		292	3.6	0.082	4.3	NA	0.2	1.7	0.07	0.44	52.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Sturt Street/ Evans Road - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: Sturt Street/ Evans Road - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	99	9.6	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
6	R2	394	1.3	0.313	5.1	LOS A	1.6	11.4	0.51	0.63	37.8
Approach		493	3.0	0.313	4.1	NA	1.6	11.4	0.40	0.50	38.2
North: Evans Road (N)											
7	L2	377	3.1	0.403	3.9	LOS A	2.0	14.6	0.26	0.49	38.0
9	R2	69	1.5	0.403	12.5	LOS B	2.0	14.6	0.26	0.49	37.9
Approach		446	2.8	0.403	5.2	LOS A	2.0	14.6	0.26	0.49	38.0
West: Sturt Street (W)											
10	L2	262	0.8	0.179	3.4	LOS A	0.0	0.0	0.00	0.34	39.0
11	T1	97	8.7	0.179	0.0	LOS A	0.0	0.0	0.00	0.34	38.9
Approach		359	2.9	0.179	2.5	NA	0.0	0.0	0.00	0.34	39.0
All Vehicles		1298	2.9	0.403	4.0	NA	2.0	14.6	0.24	0.45	38.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Evans Road - PM (Ex)

16S9023000
Telopea Urban Renewal - Existing PM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

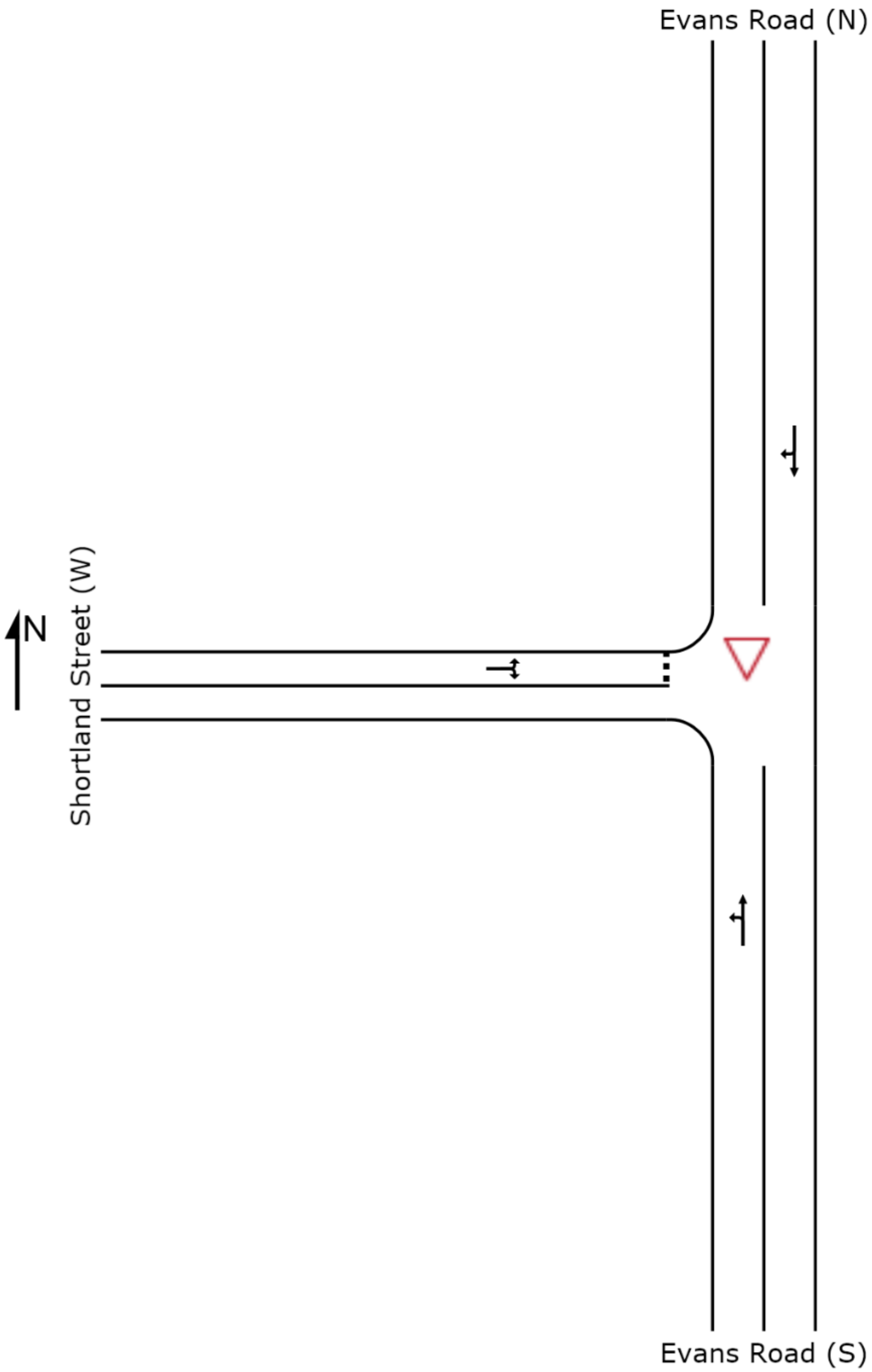
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	165	4.5	0.087	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	193	1.1	0.115	4.8	LOS A	0.6	3.9	0.19	0.50	46.1
Approach		358	2.6	0.115	2.6	NA	0.6	3.9	0.10	0.27	47.8
North: Evans Road (N)											
7	L2	175	1.8	0.205	4.7	LOS A	0.9	6.4	0.14	0.53	46.0
9	R2	67	0.0	0.205	7.8	LOS A	0.9	6.4	0.14	0.53	45.9
Approach		242	1.3	0.205	5.6	LOS A	0.9	6.4	0.14	0.53	46.0
West: Sturt Street (W)											
10	L2	27	0.0	0.038	4.6	LOS A	0.0	0.0	0.00	0.20	48.3
11	T1	47	13.3	0.038	0.0	LOS A	0.0	0.0	0.00	0.20	48.8
Approach		75	8.5	0.038	1.7	NA	0.0	0.0	0.00	0.20	48.6
All Vehicles		675	2.8	0.205	3.6	NA	0.9	6.4	0.10	0.35	47.2

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Evans Road/ Shortland Street - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)



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Organisation: GTA CONSULTANTS | Created: Thursday, 5 May 2016 10:03:08 AM
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MOVEMENT SUMMARY

▽ Site: Evans Road/ Shortland Street - AM (Ex)

16S9023000
Telopea Urban Renewal - Existing AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	18	11.8	0.304	4.7	LOS A	0.0	0.0	0.00	0.02	49.2
2	T1	623	0.7	0.304	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		641	1.0	0.304	0.2	NA	0.0	0.0	0.00	0.02	49.9
North: Evans Road (N)											
8	T1	329	2.2	0.195	0.8	LOS A	0.5	3.6	0.15	0.04	49.1
9	R2	25	25.0	0.195	9.6	LOS A	0.5	3.6	0.15	0.04	48.0
Approach		355	3.9	0.195	1.4	NA	0.5	3.6	0.15	0.04	49.0
West: Shortland Street (W)											
10	L2	71	13.4	0.270	8.7	LOS A	1.0	7.8	0.67	0.88	42.9
12	R2	68	7.7	0.270	13.5	LOS B	1.0	7.8	0.67	0.88	42.9
Approach		139	10.6	0.270	11.0	LOS B	1.0	7.8	0.67	0.88	42.9
All Vehicles		1135	3.1	0.304	1.9	NA	1.0	7.8	0.13	0.13	48.6

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Evans Road/ Shortland Street - PM (Ex)

16S9023000
Telopea Urban Renewal - Existing PM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	28	0.0	0.088	4.6	LOS A	0.0	0.0	0.00	0.08	49.0
2	T1	157	0.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.08	49.5
Approach		185	0.0	0.088	0.7	NA	0.0	0.0	0.00	0.08	49.4
North: Evans Road (N)											
8	T1	154	2.1	0.092	0.2	LOS A	0.2	1.4	0.10	0.06	49.4
9	R2	21	30.0	0.092	5.7	LOS A	0.2	1.4	0.10	0.06	48.2
Approach		175	5.4	0.092	0.8	NA	0.2	1.4	0.10	0.06	49.3
West: Shortland Street (W)											
10	L2	63	13.3	0.135	5.3	LOS A	0.5	3.7	0.31	0.58	45.7
12	R2	82	0.0	0.135	6.1	LOS A	0.5	3.7	0.31	0.58	45.7
Approach		145	5.8	0.135	5.7	LOS A	0.5	3.7	0.31	0.58	45.7
All Vehicles		505	3.5	0.135	2.2	NA	0.5	3.7	0.12	0.22	48.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	416	0.3	0.619	11.3	LOS A	8.0	56.5	1.00	0.38	42.1
3	R2	189	2.2	0.619	18.9	LOS B	8.0	56.5	1.00	0.38	40.4
Approach		605	0.9	0.619	13.7	NA	8.0	56.5	1.00	0.38	41.6
East: Manson Street (E)											
4	L2	400	0.3	0.997	56.0	LOS D	20.6	145.3	0.94	2.74	25.4
6	R2	72	2.9	0.997	79.7	LOS F	20.6	145.3	0.94	2.74	25.3
Approach		472	0.7	0.997	59.6	LOS E	20.6	145.3	0.94	2.74	25.4
North: Adderton Road (N)											
7	L2	252	0.8	0.483	4.6	LOS A	0.0	0.0	0.00	0.14	48.4
8	T1	751	1.8	0.483	0.1	LOS A	0.0	0.0	0.00	0.14	49.1
Approach		1002	1.6	0.483	1.2	NA	0.0	0.0	0.00	0.14	49.0
All Vehicles		2079	1.2	0.997	18.1	NA	20.6	145.3	0.50	0.80	39.3

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - PM (PD)

16S9023000
Telopea Urban Renewal - Post-Development PM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

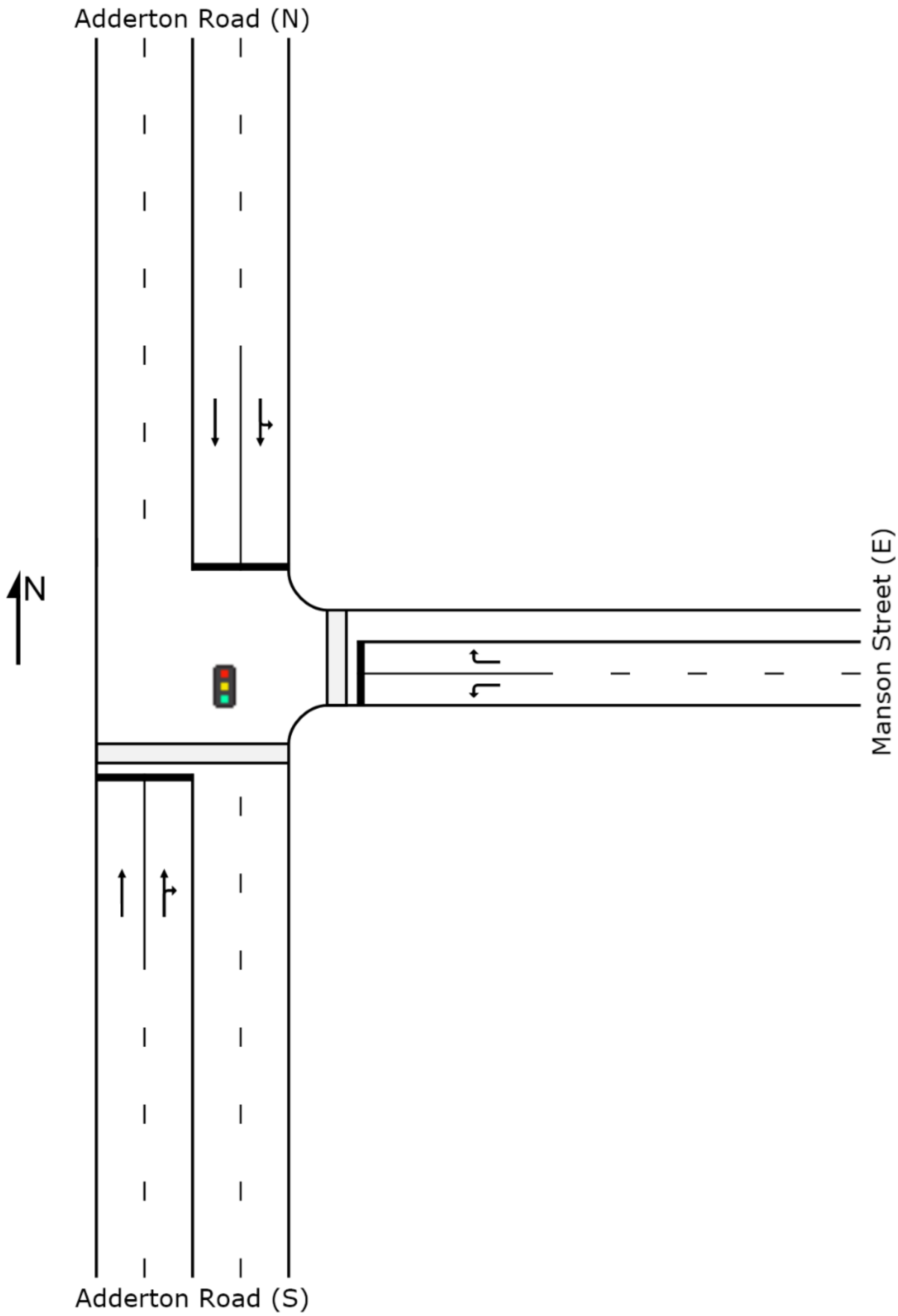
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	885	0.2	0.743	4.0	LOS A	11.6	81.3	0.63	0.30	46.2
3	R2	372	0.0	0.743	10.8	LOS B	11.6	81.3	0.63	0.30	44.9
Approach		1257	0.2	0.743	6.0	NA	11.6	81.3	0.63	0.30	45.8
East: Manson Street (E)											
4	L2	117	0.0	1.299	309.7	LOS F	39.6	277.1	1.00	4.42	7.7
6	R2	108	0.0	1.299	373.3	LOS F	39.6	277.1	1.00	4.42	7.7
Approach		225	0.0	1.299	340.3	LOS F	39.6	277.1	1.00	4.42	7.7
North: Adderton Road (N)											
7	L2	69	0.0	0.209	4.6	LOS A	0.0	0.0	0.00	0.09	48.8
8	T1	368	0.9	0.209	0.0	LOS A	0.0	0.0	0.00	0.09	49.5
Approach		438	0.7	0.209	0.7	NA	0.0	0.0	0.00	0.09	49.4
All Vehicles		1920	0.3	1.299	44.0	NA	39.6	277.1	0.53	0.74	30.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Adderton Road/ Manson Street - PM (PD-signals)

16S9023000
Telopea Urban Renewal - Post-Development PM
Signal Conversion
Signals - Fixed Time Isolated



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Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\1600610-Telopea Urban Renewal-PD (Option 1 Layout)(mit2).sip6

MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - AM (PD-signals)

16S9023000
Telopea Urban Renewal - Post-Development AM
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	416	0.3	0.392	10.1	LOS A	7.6	53.3	0.66	0.57	43.9
3	R2	189	2.2	0.754	30.1	LOS C	6.1	43.4	0.94	0.98	33.7
Approach		605	0.9	0.754	16.3	LOS B	7.6	53.3	0.75	0.70	40.5
East: Manson Street (E)											
4	L2	400	0.3	0.719	26.8	LOS B	11.3	79.2	0.95	0.88	34.7
6	R2	72	2.9	0.131	21.3	LOS B	1.6	11.2	0.76	0.71	37.1
Approach		472	0.7	0.719	26.0	LOS B	11.3	79.2	0.92	0.86	35.0
North: Adderton Road (N)											
7	L2	252	0.8	0.483	15.3	LOS B	9.6	68.2	0.71	0.70	40.9
8	T1	751	1.8	0.483	10.7	LOS A	9.8	69.9	0.71	0.64	43.2
Approach		1002	1.6	0.483	11.9	LOS A	9.8	69.9	0.71	0.66	42.7
All Vehicles		2079	1.2	0.754	16.4	LOS B	11.3	79.2	0.77	0.71	40.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	11.4	LOS B	0.1	0.1	0.62	0.62
All Pedestrians		105	17.9	LOS B			0.76	0.76

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.

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MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - PM (PD-signals)

16S9023000
Telopea Urban Renewal - Post-Development PM
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	885	0.2	0.633	7.3	LOS A	15.2	106.9	0.66	0.61	45.4
3	R2	372	0.0	0.633	12.6	LOS B	7.7	54.2	0.68	0.75	41.7
Approach		1257	0.2	0.633	8.8	LOS A	15.2	106.9	0.67	0.65	44.3
East: Manson Street (E)											
4	L2	117	0.0	0.377	29.8	LOS C	3.2	22.4	0.93	0.77	33.6
6	R2	108	0.0	0.350	29.6	LOS C	3.0	20.7	0.93	0.76	33.8
Approach		225	0.0	0.377	29.7	LOS C	3.2	22.4	0.93	0.77	33.7
North: Adderton Road (N)											
7	L2	69	0.0	0.165	9.4	LOS A	2.6	18.2	0.43	0.46	44.9
8	T1	368	0.9	0.165	4.8	LOS A	2.6	18.5	0.43	0.40	46.6
Approach		438	0.7	0.165	5.5	LOS A	2.6	18.5	0.43	0.41	46.3
All Vehicles		1920	0.3	0.633	10.5	LOS B	15.2	106.9	0.64	0.61	43.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	7.0	LOS A	0.0	0.0	0.48	0.48
All Pedestrians		105	15.7	LOS B			0.69	0.69

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.

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MOVEMENT SUMMARY

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	41	2.6	1.186	181.4	LOS F	76.3	539.9	1.00	5.04	13.0
2	T1	53	0.0	1.186	182.4	LOS F	76.3	539.9	1.00	5.04	13.0
3	R2	527	1.2	1.186	192.1	LOS F	76.3	539.9	1.00	5.04	13.0
Approach		621	1.2	1.186	190.6	LOS F	76.3	539.9	1.00	5.04	13.0
East: Sturt Street (E)											
4	L2	198	1.6	0.161	5.6	LOS A	0.5	3.4	0.06	0.46	54.0
5	T1	52	10.2	0.161	0.1	LOS A	0.5	3.4	0.06	0.46	55.5
6	R2	63	0.0	0.161	5.7	LOS A	0.5	3.4	0.06	0.46	54.2
Approach		313	2.7	0.161	4.7	NA	0.5	3.4	0.06	0.46	54.3
North: Access											
7	L2	258	0.0	0.378	5.7	LOS A	1.9	13.2	0.11	0.55	53.0
8	T1	198	0.0	0.378	7.2	LOS A	1.9	13.2	0.11	0.55	53.5
9	R2	1	0.0	0.378	7.5	LOS A	1.9	13.2	0.11	0.55	53.1
Approach		457	0.0	0.378	6.3	LOS A	1.9	13.2	0.11	0.55	53.2
West: Sturt Street (W)											
10	L2	2	0.0	0.032	6.3	LOS A	0.1	1.0	0.29	0.27	54.8
11	T1	28	18.5	0.032	0.5	LOS A	0.1	1.0	0.29	0.27	56.2
12	R2	23	0.0	0.032	6.4	LOS A	0.1	1.0	0.29	0.27	55.0
Approach		54	9.8	0.032	3.3	NA	0.1	1.0	0.29	0.27	55.6
All Vehicles		1444	1.5	1.186	85.1	NA	76.3	539.9	0.49	2.45	22.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Manson Street/ Community Centre Access - PM (PD)

16S9023000
Telopea Urban Renewal - Post-Development PM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

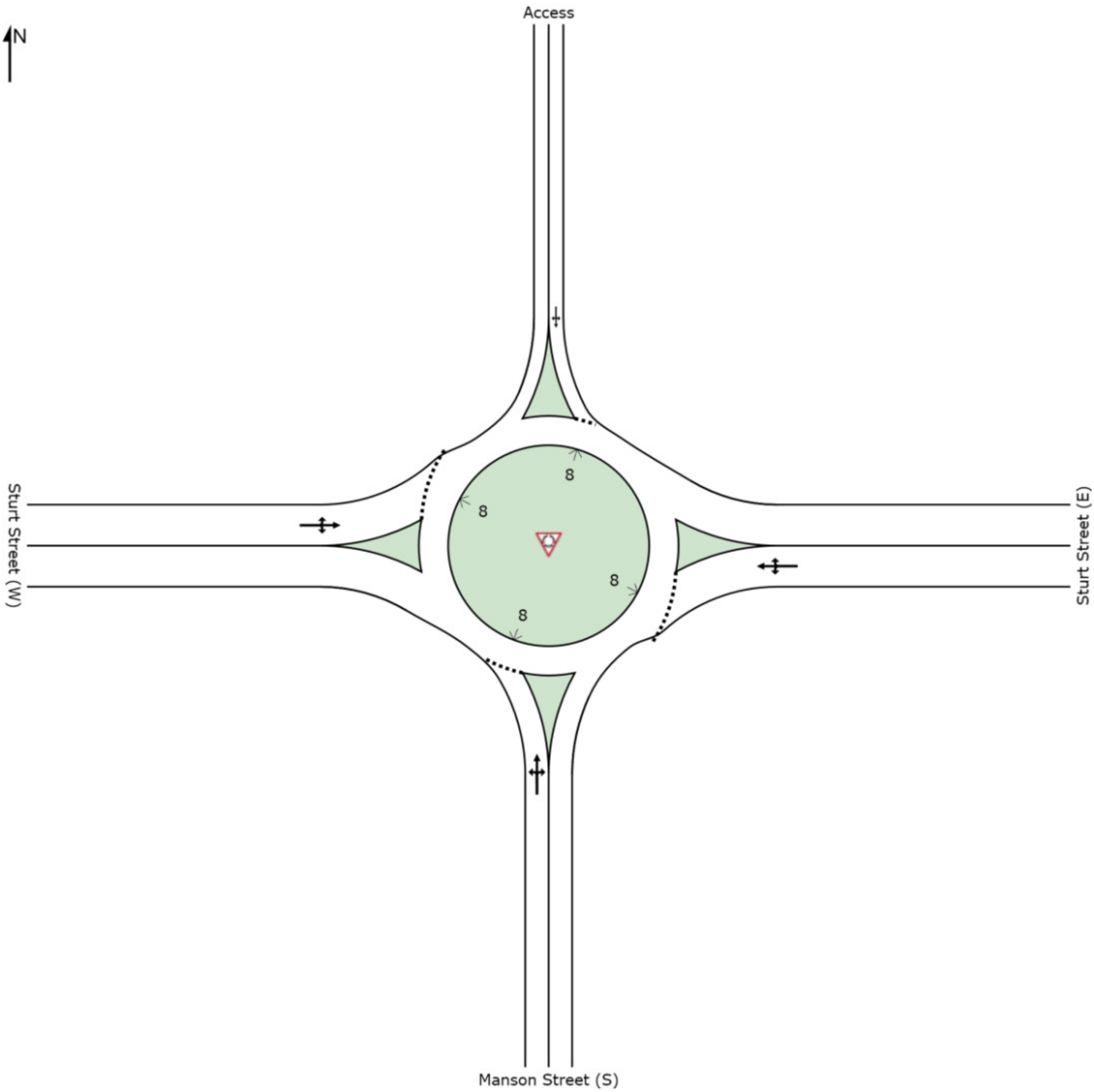
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	25	0.0	0.600	7.1	LOS A	4.1	28.8	0.56	0.91	42.8
2	T1	198	0.0	0.600	10.2	LOS B	4.1	28.8	0.56	0.91	43.1
3	R2	166	0.0	0.600	13.8	LOS B	4.1	28.8	0.56	0.91	43.0
Approach		389	0.0	0.600	11.6	LOS B	4.1	28.8	0.56	0.91	43.0
East: Sturt Street (E)											
4	L2	291	0.0	0.325	5.7	LOS A	1.8	12.8	0.16	0.46	53.5
5	T1	61	8.6	0.325	0.2	LOS A	1.8	12.8	0.16	0.46	54.9
6	R2	258	0.0	0.325	5.8	LOS A	1.8	12.8	0.16	0.46	53.6
Approach		609	0.9	0.325	5.2	NA	1.8	12.8	0.16	0.46	53.7
North: Access											
7	L2	69	0.0	0.130	5.7	LOS A	0.5	3.4	0.15	0.56	52.4
8	T1	49	0.0	0.130	9.2	LOS A	0.5	3.4	0.15	0.56	52.8
9	R2	2	0.0	0.130	9.9	LOS A	0.5	3.4	0.15	0.56	52.4
Approach		121	0.0	0.130	7.2	LOS A	0.5	3.4	0.15	0.56	52.6
West: Sturt Street (W)											
10	L2	1	0.0	0.043	6.7	LOS A	0.2	1.1	0.25	0.17	55.9
11	T1	55	9.6	0.043	0.5	LOS A	0.2	1.1	0.25	0.17	57.4
12	R2	20	0.0	0.043	6.8	LOS A	0.2	1.1	0.25	0.17	56.1
Approach		76	6.9	0.043	2.3	NA	0.2	1.1	0.25	0.17	57.0
All Vehicles		1196	0.9	0.600	7.3	NA	4.1	28.8	0.30	0.60	49.7

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Sturt Street/ Manson Street/ Community Centre Access - AM (PD-roundabout)

16S9023000
Telopea Urban Renewal - Post-Development AM
Roundabout Conversion
Roundabout



MOVEMENT SUMMARY

Site: Sturt Street/ Manson Street/ Community Centre Access - AM (PD-roundabout)

16S9023000
Telopea Urban Renewal - Post-Development AM
Roundabout Conversion
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	41	2.6	0.506	4.1	LOS A	4.1	29.2	0.45	0.58	37.3
2	T1	53	0.0	0.506	3.5	LOS A	4.1	29.2	0.45	0.58	37.7
3	R2	527	1.2	0.506	6.3	LOS A	4.1	29.2	0.45	0.58	37.6
Approach		621	1.2	0.506	5.9	LOS A	4.1	29.2	0.45	0.58	37.6
East: Sturt Street (E)											
4	L2	198	1.6	0.289	6.2	LOS A	1.3	9.6	0.37	0.64	51.7
5	T1	52	10.2	0.289	5.6	LOS A	1.3	9.6	0.37	0.64	52.4
6	R2	63	0.0	0.289	8.3	LOS A	1.3	9.6	0.37	0.64	52.4
Approach		313	2.7	0.289	6.6	LOS A	1.3	9.6	0.37	0.64	52.0
North: Access											
7	L2	258	0.0	0.733	22.3	LOS C	10.1	70.8	1.00	1.22	42.9
8	T1	198	0.0	0.733	22.3	LOS C	10.1	70.8	1.00	1.22	43.3
9	R2	1	0.0	0.733	25.2	LOS C	10.1	70.8	1.00	1.22	43.0
Approach		457	0.0	0.733	22.3	LOS C	10.1	70.8	1.00	1.22	43.1
West: Sturt Street (W)											
10	L2	2	0.0	0.067	7.7	LOS A	0.3	2.1	0.52	0.71	50.9
11	T1	28	18.5	0.067	7.4	LOS A	0.3	2.1	0.52	0.71	51.2
12	R2	23	0.0	0.067	9.8	LOS A	0.3	2.1	0.52	0.71	51.4
Approach		54	9.8	0.067	8.4	LOS A	0.3	2.1	0.52	0.71	51.3
All Vehicles		1444	1.5	0.733	11.3	LOS B	10.1	70.8	0.61	0.80	42.2

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Manson Street/ Community Centre Access - PM (PD-Roundabout)

16S9023000
Telopea Urban Renewal - Post-Development PM
Roundabout Conversion
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	25	0.0	0.414	6.6	LOS A	2.7	18.7	0.60	0.70	44.6
2	T1	198	0.0	0.414	6.3	LOS A	2.7	18.7	0.60	0.70	45.2
3	R2	166	0.0	0.414	9.2	LOS A	2.7	18.7	0.60	0.70	45.0
Approach		389	0.0	0.414	7.5	LOS A	2.7	18.7	0.60	0.70	45.1
East: Sturt Street (E)											
4	L2	291	0.0	0.444	5.7	LOS A	2.2	15.2	0.20	0.60	51.9
5	T1	61	8.6	0.444	5.1	LOS A	2.2	15.2	0.20	0.60	52.6
6	R2	258	0.0	0.444	7.9	LOS A	2.2	15.2	0.20	0.60	52.5
Approach		609	0.9	0.444	6.6	LOS A	2.2	15.2	0.20	0.60	52.2
North: Access											
7	L2	69	0.0	0.133	7.0	LOS A	0.9	6.2	0.55	0.61	52.1
8	T1	49	0.0	0.133	7.0	LOS A	0.9	6.2	0.55	0.61	52.8
9	R2	2	0.0	0.133	9.9	LOS A	0.9	6.2	0.55	0.61	52.4
Approach		121	0.0	0.133	7.1	LOS A	0.9	6.2	0.55	0.61	52.4
West: Sturt Street (W)											
10	L2	1	0.0	0.090	7.6	LOS A	0.4	2.7	0.50	0.70	51.3
11	T1	55	9.6	0.090	7.1	LOS A	0.4	2.7	0.50	0.70	52.0
12	R2	20	0.0	0.090	9.7	LOS A	0.4	2.7	0.50	0.70	51.9
Approach		76	6.9	0.090	7.8	LOS A	0.4	2.7	0.50	0.70	51.9
All Vehicles		1196	0.9	0.444	7.0	LOS A	2.7	18.7	0.38	0.64	49.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: Sturt Street/ Evans Road - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	1	0.0	0.733	45.2	LOS E	3.0	21.3	0.97	1.14	24.5
2	T1	38	0.0	0.733	78.2	LOS F	3.0	21.3	0.97	1.14	24.5
3	R2	28	0.0	0.733	99.8	LOS F	3.0	21.3	0.97	1.14	24.5
Approach		67	0.0	0.733	86.8	LOS F	3.0	21.3	0.97	1.14	24.5
East: Sturt Street (E)											
4	L2	12	0.0	0.107	3.6	LOS A	0.0	0.0	0.00	0.06	41.1
5	T1	191	5.0	0.107	0.2	LOS A	0.0	0.0	0.00	0.06	41.5
6	R2	438	1.2	0.647	13.0	LOS B	4.7	33.5	0.82	1.22	35.1
Approach		640	2.3	0.647	9.0	NA	4.7	33.5	0.56	0.86	36.9
North: Evans Road (N)											
7	L2	552	2.1	1.937	858.8	LOS F	238.5	1693.8	1.00	13.69	3.8
8	T1	15	0.0	1.937	901.2	LOS F	238.5	1693.8	1.00	13.69	3.8
9	R2	177	0.6	1.937	922.5	LOS F	238.5	1693.8	1.00	13.69	3.8
Approach		743	1.7	1.937	874.8	LOS F	238.5	1693.8	1.00	13.69	3.8
West: Sturt Street (W)											
10	L2	416	0.5	0.393	3.4	LOS A	0.0	0.1	0.00	0.24	39.4
11	T1	389	2.2	0.393	0.0	LOS A	0.0	0.1	0.00	0.24	39.2
12	R2	1	0.0	0.393	4.6	LOS A	0.0	0.1	0.00	0.24	45.6
Approach		806	1.3	0.393	1.8	NA	0.0	0.1	0.00	0.24	39.3
All Vehicles		2257	1.7	1.937	293.8	NA	238.5	1693.8	0.52	4.87	9.5

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Sturt Street/ Evans Road - PM (PD)

16S9023000
Telopea Urban Renewal - Post-Development PM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	1	0.0	0.133	7.3	LOS A	0.4	3.0	0.85	0.92	42.2
2	T1	14	0.0	0.133	19.5	LOS C	0.4	3.0	0.85	0.92	42.4
3	R2	11	0.0	0.133	31.4	LOS D	0.4	3.0	0.85	0.92	42.3
Approach		25	0.0	0.133	24.0	LOS C	0.4	3.0	0.85	0.92	42.4
East: Sturt Street (E)											
4	L2	29	0.0	0.263	4.6	LOS A	0.0	0.0	0.00	0.04	49.8
5	T1	477	1.5	0.263	0.1	LOS A	0.0	0.0	0.00	0.04	51.0
6	R2	367	0.6	0.266	5.7	LOS A	1.4	9.6	0.43	0.60	45.6
Approach		874	1.1	0.266	2.6	NA	1.4	9.6	0.18	0.28	48.5
North: Evans Road (N)											
7	L2	219	1.4	1.396	378.6	LOS F	100.0	703.7	1.00	5.00	7.8
8	T1	39	0.0	1.396	406.3	LOS F	100.0	703.7	1.00	5.00	7.9
9	R2	221	0.0	1.396	414.6	LOS F	100.0	703.7	1.00	5.00	7.8
Approach		479	0.7	1.396	397.5	LOS F	100.0	703.7	1.00	5.00	7.8
West: Sturt Street (W)											
10	L2	135	0.0	0.137	4.6	LOS A	0.0	0.1	0.01	0.26	48.0
11	T1	143	4.4	0.137	0.0	LOS A	0.0	0.1	0.01	0.26	48.5
12	R2	1	0.0	0.137	6.9	LOS A	0.0	0.1	0.01	0.26	51.2
Approach		279	2.3	0.137	2.3	NA	0.0	0.1	0.01	0.26	48.3
All Vehicles		1657	1.1	1.396	117.0	NA	100.0	703.7	0.40	1.65	19.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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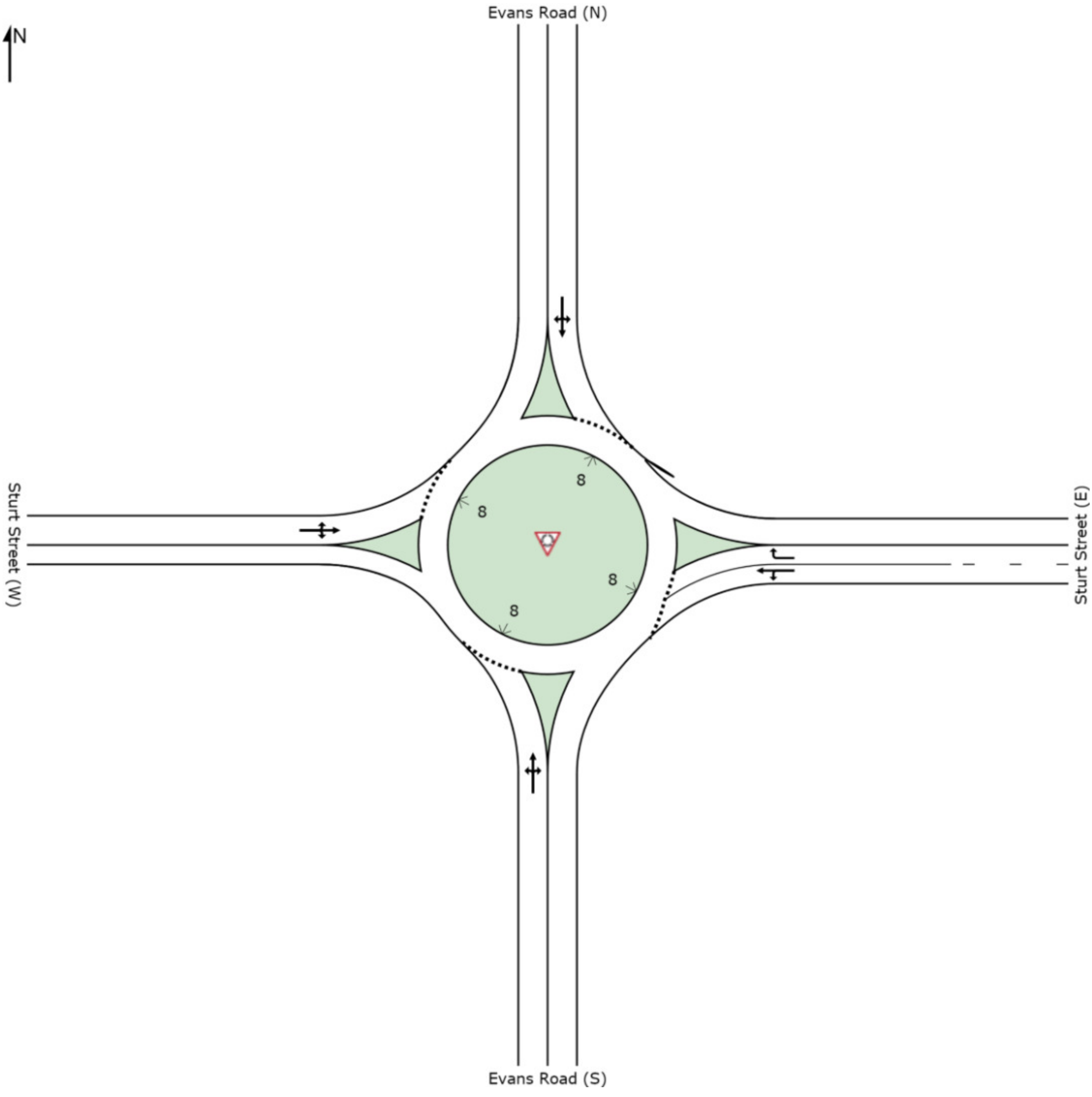
SITE LAYOUT

Site: Sturt Street/ Evans Road - AM (PD-Roundabout)

16S9023000
Telopea Urban Renewal - Post-Development AM
Roundabout Conversion
Roundabout



MOVEMENT SUMMARY

Site: Sturt Street/ Evans Road - AM (PD-Roundabout)

16S9023000
Telopea Urban Renewal - Post-Development AM
Roundabout Conversion
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	1	0.0	0.101	9.6	LOS A	0.5	3.7	0.68	0.78	49.7
2	T1	38	0.0	0.101	9.2	LOS A	0.5	3.7	0.68	0.78	50.4
3	R2	28	0.0	0.101	12.1	LOS B	0.5	3.7	0.68	0.78	50.1
Approach		67	0.0	0.101	10.4	LOS B	0.5	3.7	0.68	0.78	50.3
East: Sturt Street (E)											
4	L2	12	0.0	0.229	5.4	LOS A	1.6	11.6	0.54	0.53	44.2
5	T1	191	5.0	0.229	4.5	LOS A	1.6	11.6	0.54	0.53	38.7
6	R2	438	1.2	0.369	6.7	LOS A	3.1	22.1	0.57	0.62	37.3
Approach		640	2.3	0.369	6.0	LOS A	3.1	22.1	0.56	0.59	37.8
North: Evans Road (N)											
7	L2	552	2.1	0.848	12.9	LOS B	13.3	94.4	1.00	1.15	34.9
8	T1	15	0.0	0.848	12.1	LOS B	13.3	94.4	1.00	1.15	40.4
9	R2	177	0.6	0.848	15.0	LOS B	13.3	94.4	1.00	1.15	35.3
Approach		743	1.7	0.848	13.4	LOS B	13.3	94.4	1.00	1.15	35.1
West: Sturt Street (W)											
10	L2	416	0.5	0.940	24.5	LOS C	22.5	159.2	1.00	1.68	31.5
11	T1	389	2.2	0.940	23.8	LOS C	22.5	159.2	1.00	1.68	31.8
12	R2	1	0.0	0.940	26.6	LOS C	22.5	159.2	1.00	1.68	35.8
Approach		806	1.3	0.940	24.2	LOS C	22.5	159.2	1.00	1.68	31.7
All Vehicles		2257	1.7	0.940	15.1	LOS B	22.5	159.2	0.87	1.17	34.8

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Evans Road - PM (PD-roundabout)

16S9023000
Telopea Urban Renewal - Post-Development PM
Roundabout Conversion
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	1	0.0	0.051	12.8	LOS B	0.3	2.1	0.80	0.79	47.7
2	T1	14	0.0	0.051	12.4	LOS B	0.3	2.1	0.80	0.79	48.3
3	R2	11	0.0	0.051	15.3	LOS B	0.3	2.1	0.80	0.79	48.0
Approach		25	0.0	0.051	13.6	LOS B	0.3	2.1	0.80	0.79	48.2
East: Sturt Street (E)											
4	L2	29	0.0	0.444	6.6	LOS A	3.5	25.1	0.62	0.62	48.3
5	T1	477	1.5	0.444	5.8	LOS A	3.5	25.1	0.62	0.62	46.0
6	R2	367	0.6	0.370	8.9	LOS A	2.7	18.8	0.60	0.70	44.3
Approach		874	1.1	0.444	7.1	LOS A	3.5	25.1	0.61	0.65	45.3
North: Evans Road (N)											
7	L2	219	1.4	0.407	5.2	LOS A	2.5	17.3	0.39	0.61	45.3
8	T1	39	0.0	0.407	4.6	LOS A	2.5	17.3	0.39	0.61	49.1
9	R2	221	0.0	0.407	7.5	LOS A	2.5	17.3	0.39	0.61	45.8
Approach		479	0.7	0.407	6.2	LOS A	2.5	17.3	0.39	0.61	45.8
West: Sturt Street (W)											
10	L2	135	0.0	0.307	6.2	LOS A	1.7	11.8	0.55	0.67	45.3
11	T1	143	4.4	0.307	5.8	LOS A	1.7	11.8	0.55	0.67	45.9
12	R2	1	0.0	0.307	8.6	LOS A	1.7	11.8	0.55	0.67	48.7
Approach		279	2.3	0.307	6.0	LOS A	1.7	11.8	0.55	0.67	45.6
All Vehicles		1657	1.1	0.444	6.8	LOS A	3.5	25.1	0.54	0.64	45.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	51	4.2	0.400	4.6	LOS A	0.0	0.0	0.00	0.03	49.2
2	T1	791	0.5	0.400	0.1	LOS A	0.0	0.0	0.00	0.03	49.8
Approach		841	0.8	0.400	0.3	NA	0.0	0.0	0.00	0.03	49.7
North: Evans Road (N)											
8	T1	40	18.4	0.144	5.4	LOS A	0.7	5.6	0.69	0.57	44.7
9	R2	73	8.7	0.144	10.4	LOS B	0.7	5.6	0.69	0.57	44.0
Approach		113	12.1	0.144	8.6	NA	0.7	5.6	0.69	0.57	44.2
West: Shortland Street (W)											
10	L2	187	5.1	0.784	18.0	LOS C	5.8	42.2	0.89	1.38	39.0
12	R2	201	2.6	0.784	21.3	LOS C	5.8	42.2	0.89	1.38	38.9
Approach		388	3.8	0.784	19.7	LOS C	5.8	42.2	0.89	1.38	39.0
All Vehicles		1342	2.6	0.784	6.6	NA	5.8	42.2	0.32	0.47	45.6

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - PM (PD)

16S9023000
Telopea Urban Renewal - Post-Development PM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

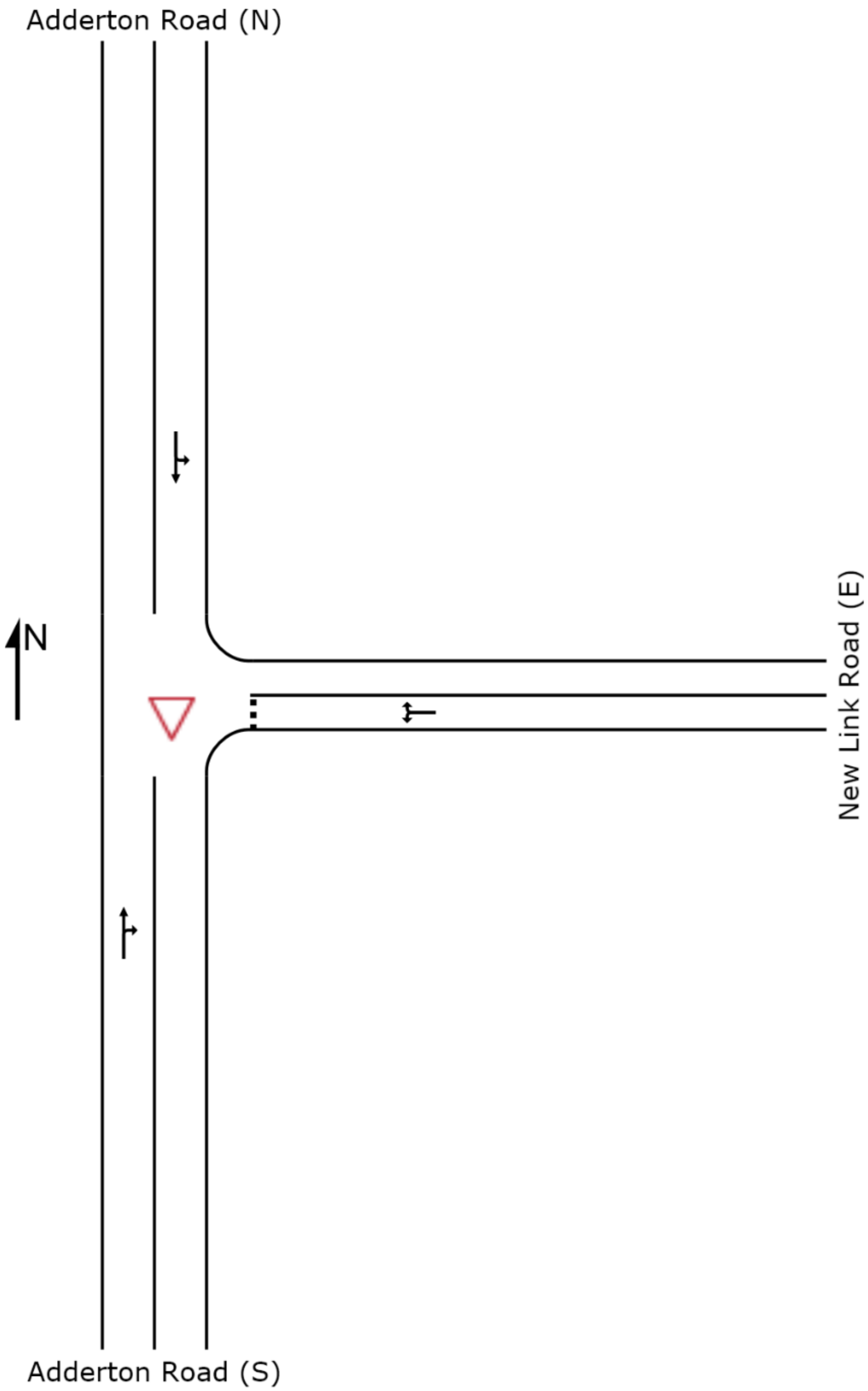
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	161	0.0	0.191	4.6	LOS A	0.0	0.0	0.00	0.22	48.3
2	T1	236	0.0	0.191	0.0	LOS A	0.0	0.0	0.00	0.22	48.7
Approach		397	0.0	0.191	1.9	NA	0.0	0.0	0.00	0.22	48.5
North: Evans Road (N)											
8	T1	344	0.9	0.280	1.0	LOS A	1.3	9.5	0.34	0.18	48.2
9	R2	134	4.7	0.280	6.6	LOS A	1.3	9.5	0.34	0.18	47.5
Approach		478	2.0	0.280	2.6	NA	1.3	9.5	0.34	0.18	48.0
West: Shortland Street (W)											
10	L2	115	7.3	0.294	5.8	LOS A	1.2	8.8	0.44	0.69	44.6
12	R2	115	0.0	0.294	10.1	LOS B	1.2	8.8	0.44	0.69	44.5
Approach		229	3.7	0.294	8.0	LOS A	1.2	8.8	0.44	0.69	44.6
All Vehicles		1104	1.6	0.294	3.4	NA	1.3	9.5	0.24	0.30	47.5

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Adderton Road/ New Link Road - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Adderton Road/ New Link Road
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: Adderton Road/ New Link Road - AM (PD)

16S9023000
Telopea Urban Renewal - Post-Development AM
Adderton Road/ New Link Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	451	2.3	0.250	0.8	LOS A	0.6	4.0	0.13	0.03	58.7
3	R2	22	0.0	0.250	12.1	LOS B	0.6	4.0	0.13	0.03	54.0
Approach		473	2.2	0.250	1.3	NA	0.6	4.0	0.13	0.03	58.6
East: New Link Road (E)											
4	L2	5	0.0	0.181	10.4	LOS B	0.5	3.8	0.83	0.93	38.9
6	R2	42	0.0	0.181	19.2	LOS C	0.5	3.8	0.83	0.93	38.7
Approach		47	0.0	0.181	18.2	LOS C	0.5	3.8	0.83	0.93	38.7
North: Adderton Road (N)											
7	L2	28	0.0	0.403	5.6	LOS A	0.0	0.0	0.00	0.02	31.6
8	T1	814	2.3	0.403	0.1	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		842	2.3	0.403	0.2	NA	0.0	0.0	0.00	0.02	58.6
All Vehicles		1362	2.2	0.403	1.2	NA	0.6	4.0	0.07	0.06	58.0

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Adderton Road/ New Link Road - PM (PD)

16S9023000
Telopea Urban Renewal - Post-Development PM
Adderton Road/ New Link Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

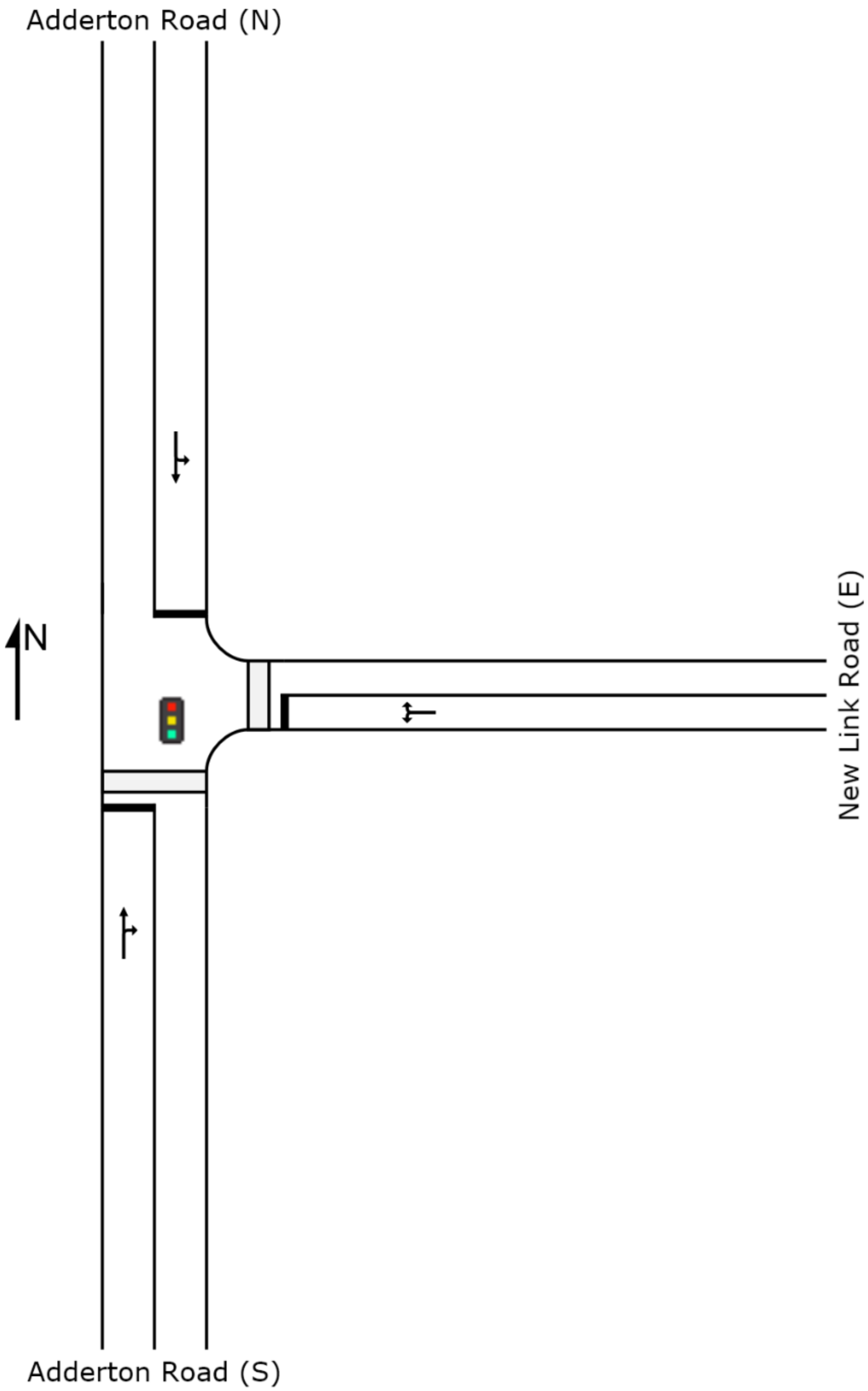
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	856	2.5	0.432	0.1	LOS A	0.4	3.2	0.05	0.02	59.6
3	R2	27	0.0	0.432	7.8	LOS A	0.4	3.2	0.05	0.02	55.2
Approach		883	2.4	0.432	0.4	NA	0.4	3.2	0.05	0.02	59.5
East: New Link Road (E)											
4	L2	27	0.0	0.127	6.7	LOS A	0.4	2.8	0.57	0.74	43.5
6	R2	27	0.0	0.127	17.8	LOS C	0.4	2.8	0.57	0.74	43.3
Approach		55	0.0	0.127	12.3	LOS B	0.4	2.8	0.57	0.74	43.4
North: Adderton Road (N)											
7	L2	23	0.0	0.173	5.6	LOS A	0.0	0.0	0.00	0.04	31.6
8	T1	337	2.5	0.173	0.0	LOS A	0.0	0.0	0.00	0.04	59.6
Approach		360	2.3	0.173	0.4	NA	0.0	0.0	0.00	0.04	57.6
All Vehicles		1298	2.3	0.432	0.9	NA	0.4	3.2	0.06	0.06	58.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Adderton Road/ New Link Road - AM (PD-signals)

16s9023000
Telopea Urban Renewal - Post-Development AM
Signal Conversion
Signals - Fixed Time Isolated



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Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-New Link Roads.sip6

MOVEMENT SUMMARY

Site: Adderton Road/ New Link Road - AM (PD-signals)

16s9023000
Telopea Urban Renewal - Post-Development AM
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	451	2.3	0.374	4.8	LOS A	6.1	43.8	0.48	0.43	55.4
3	R2	22	0.0	0.374	10.3	LOS B	6.1	43.8	0.48	0.43	49.4
Approach		473	2.2	0.374	5.0	LOS A	6.1	43.8	0.48	0.43	55.2
East: New Link Road (E)											
4	L2	5	0.0	0.255	34.4	LOS C	1.4	9.6	0.96	0.73	30.3
6	R2	42	0.0	0.255	34.4	LOS C	1.4	9.6	0.96	0.73	30.2
Approach		47	0.0	0.255	34.4	LOS C	1.4	9.6	0.96	0.73	30.2
North: Adderton Road (N)											
7	L2	28	0.0	0.576	10.4	LOS B	12.4	88.2	0.54	0.50	29.6
8	T1	814	2.3	0.576	4.9	LOS A	12.4	88.2	0.54	0.50	55.4
Approach		842	2.3	0.576	5.0	LOS A	12.4	88.2	0.54	0.50	54.4
All Vehicles		1362	2.2	0.576	6.1	LOS A	12.4	88.2	0.53	0.49	53.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	4.4	LOS A	0.0	0.0	0.38	0.38
All Pedestrians		105	14.4	LOS B			0.64	0.64

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.

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Organisation: GTA CONSULTANTS | Processed: Friday, 24 June 2016 2:50:23 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-New Link Roads.sip6

MOVEMENT SUMMARY

Site: Adderton Road/ New Link Road - PM (PD-signals)

16S9023000
Telopea Urban Renewal
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	856	2.5	0.627	5.2	LOS A	13.8	98.7	0.58	0.54	55.1
3	R2	27	0.0	0.627	10.7	LOS B	13.8	98.7	0.58	0.54	49.1
Approach		883	2.4	0.627	5.3	LOS A	13.8	98.7	0.58	0.54	55.0
East: New Link Road (E)											
4	L2	27	0.0	0.295	34.6	LOS C	1.6	11.2	0.96	0.74	30.2
6	R2	27	0.0	0.295	34.5	LOS C	1.6	11.2	0.96	0.74	30.1
Approach		55	0.0	0.295	34.6	LOS C	1.6	11.2	0.96	0.74	30.2
North: Adderton Road (N)											
7	L2	23	0.0	0.247	9.0	LOS A	3.8	27.1	0.39	0.36	30.1
8	T1	337	2.5	0.247	3.5	LOS A	3.8	27.1	0.39	0.36	56.4
Approach		360	2.3	0.247	3.8	LOS A	3.8	27.1	0.39	0.36	54.5
All Vehicles		1298	2.3	0.627	6.2	LOS A	13.8	98.7	0.54	0.49	53.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	4.4	LOS A	0.0	0.0	0.38	0.38
All Pedestrians		105	14.4	LOS B			0.64	0.64

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.

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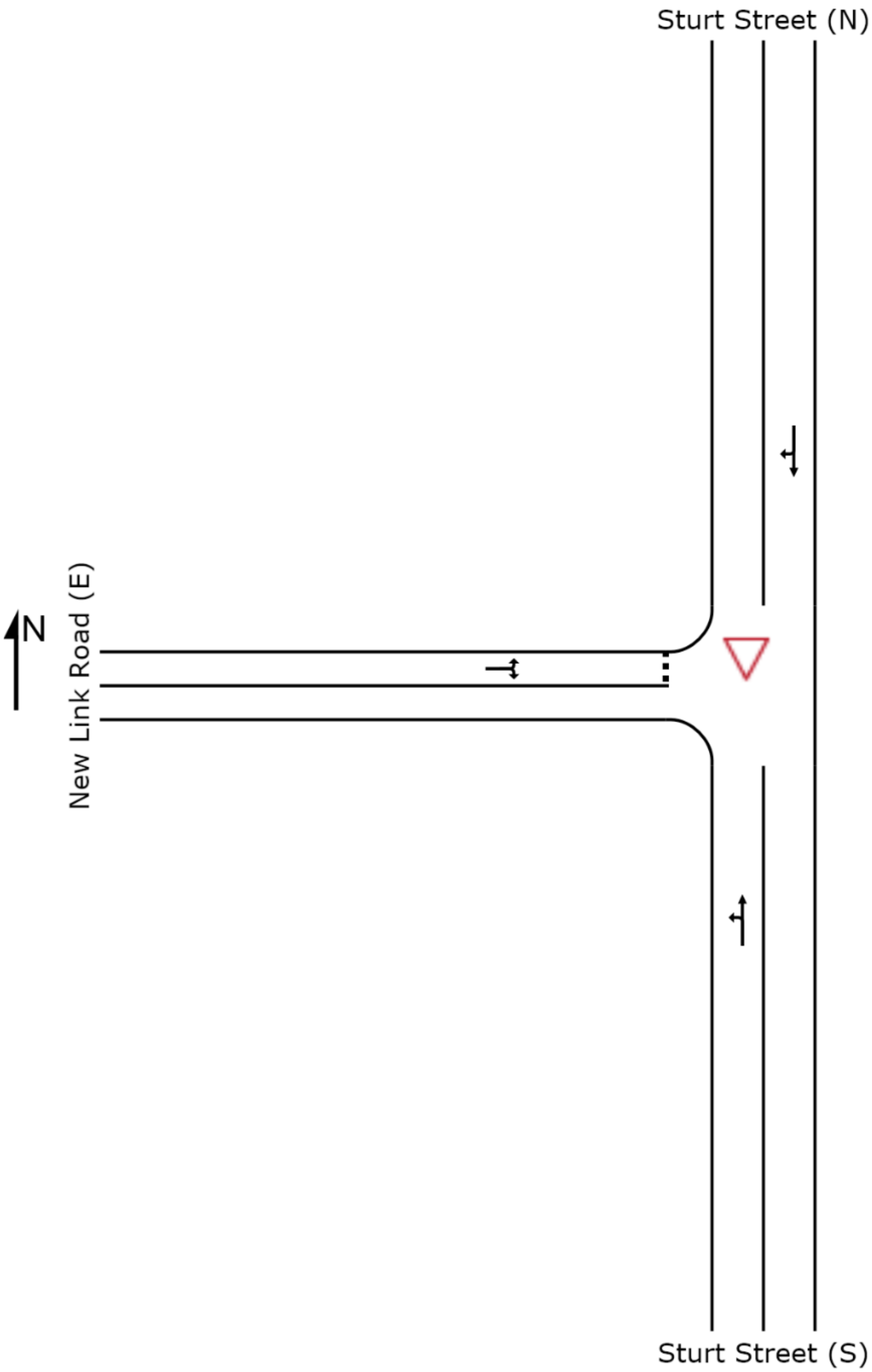
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-New Link Roads.sip6

SITE LAYOUT

▽ Site: Sturt Street/ New Link Road - AM (PD)

16S9023000
Telopea Urban Renewal
Sturt Street/ New Link Road
Giveway / Yield (Two-Way)



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Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-New Link Roads.sip6

MOVEMENT SUMMARY

▽ Site: Sturt Street/ New Link Road - AM (PD)

16S9023000
Telopea Urban Renewal
Sturt Street/ New Link Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Sturt Street (S)											
1	L2	40	0.0	0.047	5.5	LOS A	0.0	0.0	0.00	0.24	56.3
2	T1	57	0.0	0.047	0.0	LOS A	0.0	0.0	0.00	0.24	57.8
Approach		97	0.0	0.047	2.3	NA	0.0	0.0	0.00	0.24	57.2
North: Sturt Street (N)											
8	T1	51	0.0	0.028	0.0	LOS A	0.0	0.3	0.05	0.07	59.2
9	R2	6	0.0	0.028	5.8	LOS A	0.0	0.3	0.05	0.07	57.3
Approach		57	0.0	0.028	0.7	NA	0.0	0.3	0.05	0.07	59.0
West: New Link Road (E)											
10	L2	2	0.0	0.043	5.7	LOS A	0.1	1.0	0.20	0.56	53.0
12	R2	48	0.0	0.043	6.0	LOS A	0.1	1.0	0.20	0.56	52.8
Approach		51	0.0	0.043	5.9	LOS A	0.1	1.0	0.20	0.56	52.8
All Vehicles		204	0.0	0.047	2.7	NA	0.1	1.0	0.06	0.27	56.5

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ New Link Road - PM (PD)

16S9023000
Telopea Urban Renewal
Sturt Street/ New Link Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Sturt Street (S)											
1	L2	55	0.0	0.056	5.5	LOS A	0.0	0.0	0.00	0.28	56.0
2	T1	62	0.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.28	57.5
Approach		117	0.0	0.056	2.6	NA	0.0	0.0	0.00	0.28	56.8
North: Sturt Street (N)											
8	T1	38	0.0	0.019	0.0	LOS A	0.0	0.0	0.01	0.02	59.8
9	R2	1	0.0	0.019	5.8	LOS A	0.0	0.0	0.01	0.02	57.9
Approach		39	0.0	0.019	0.2	NA	0.0	0.0	0.01	0.02	59.7
West: New Link Road (E)											
10	L2	1	0.0	0.044	5.7	LOS A	0.1	1.0	0.20	0.56	53.0
12	R2	51	0.0	0.044	5.9	LOS A	0.1	1.0	0.20	0.56	52.8
Approach		52	0.0	0.044	5.9	LOS A	0.1	1.0	0.20	0.56	52.8
All Vehicles		207	0.0	0.056	3.0	NA	0.1	1.0	0.05	0.30	56.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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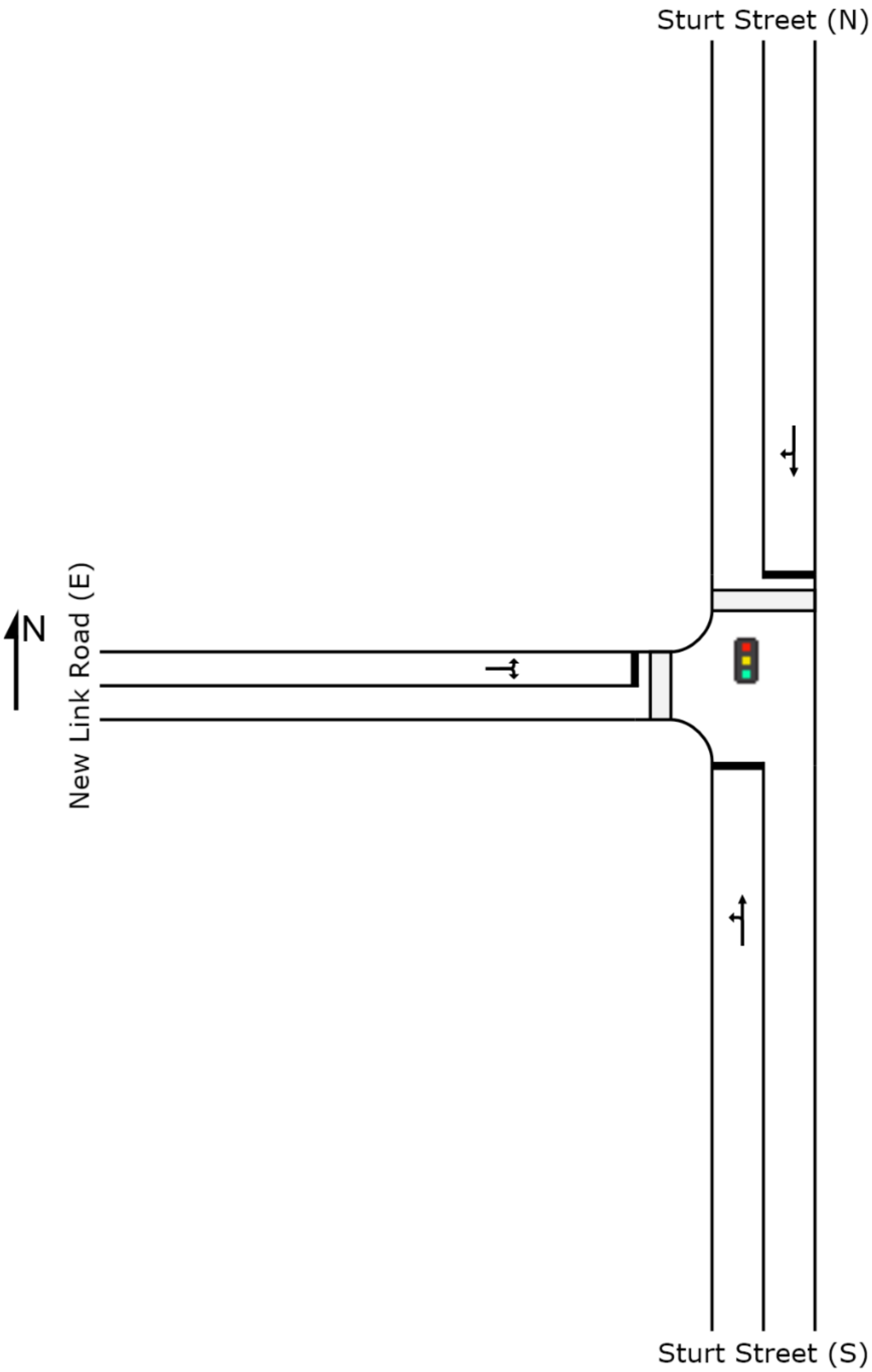
SITE LAYOUT

Site: Sturt Street/ New Link Road - AM (PD-signals)

16s9023000
Telopea Urban Renewal
Signal Conversion
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Friday, 24 June 2016 2:57:02 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\160309-Telopea Urban Renewal-New Link Roads.sip6

MOVEMENT SUMMARY

Site: Sturt Street/ New Link Road - AM (PD-signals)

16s9023000
Telopea Urban Renewal
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Sturt Street (S)											
1	L2	40	0.0	0.093	14.0	LOS B	1.5	10.4	0.55	0.55	49.8
2	T1	57	0.0	0.093	8.4	LOS A	1.5	10.4	0.55	0.55	51.0
Approach		97	0.0	0.093	10.7	LOS B	1.5	10.4	0.55	0.55	50.5
North: Sturt Street (N)											
8	T1	51	0.0	0.058	8.3	LOS A	0.9	6.0	0.54	0.45	52.3
9	R2	6	0.0	0.058	13.8	LOS B	0.9	6.0	0.54	0.45	50.9
Approach		57	0.0	0.058	8.9	LOS A	0.9	6.0	0.54	0.45	52.2
West: New Link Road (E)											
10	L2	2	0.0	0.091	22.0	LOS C	1.1	7.6	0.75	0.72	43.2
12	R2	48	0.0	0.091	22.0	LOS C	1.1	7.6	0.75	0.72	43.0
Approach		51	0.0	0.091	22.0	LOS C	1.1	7.6	0.75	0.72	43.0
All Vehicles		204	0.0	0.093	13.0	LOS B	1.5	10.4	0.60	0.56	48.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	20.1	LOS C	0.1	0.1	0.82	0.82
P4	West Full Crossing	53	10.2	LOS B	0.1	0.1	0.58	0.58
All Pedestrians		105	15.1	LOS B			0.70	0.70

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: Sturt Street/ New Link Road - PM (PD-signals)

16S9023000
Telopea Urban Renewal
Signal Conversion
Signals - Fixed Time Isolated   Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Sturt Street (S)											
1	L2	55	0.0	0.106	12.9	LOS B	1.7	11.8	0.52	0.55	50.3
2	T1	62	0.0	0.106	7.4	LOS A	1.7	11.8	0.52	0.55	51.5
Approach		117	0.0	0.106	10.0	LOS B	1.7	11.8	0.52	0.55	50.9
North: Sturt Street (N)											
8	T1	38	0.0	0.035	7.1	LOS A	0.5	3.7	0.50	0.38	53.6
9	R2	1	0.0	0.035	12.6	LOS B	0.5	3.7	0.50	0.38	52.1
Approach		39	0.0	0.035	7.2	LOS A	0.5	3.7	0.50	0.38	53.6
West: New Link Road (E)											
10	L2	1	0.0	0.104	23.8	LOS C	1.2	8.1	0.79	0.72	42.3
12	R2	51	0.0	0.104	23.7	LOS C	1.2	8.1	0.79	0.72	42.2
Approach		52	0.0	0.104	23.7	LOS C	1.2	8.1	0.79	0.72	42.2
All Vehicles		207	0.0	0.106	12.9	LOS B	1.7	11.8	0.58	0.56	48.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	21.7	LOS C	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	9.1	LOS A	0.0	0.0	0.55	0.55
All Pedestrians		105	15.4	LOS B			0.70	0.70

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.

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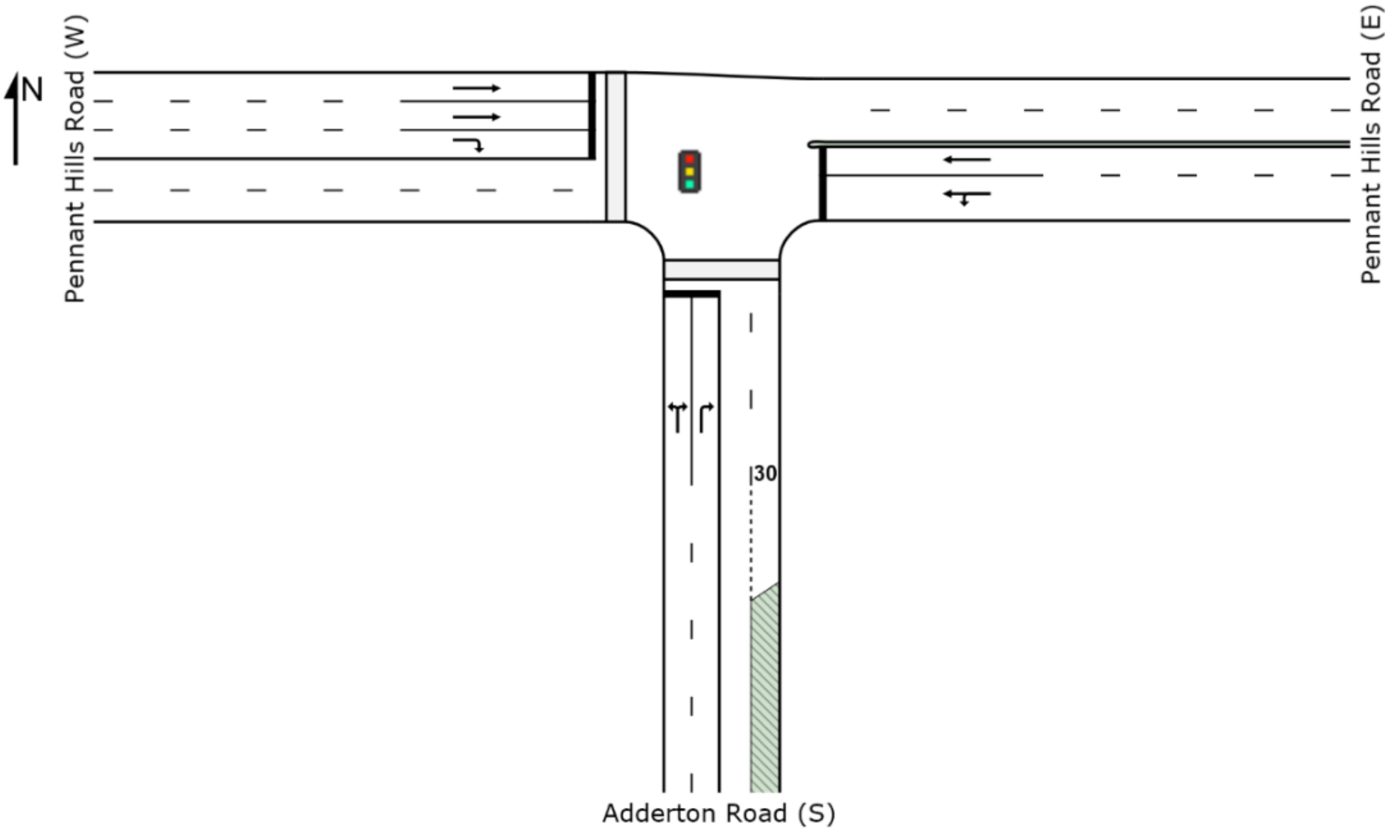
Appendix C

SIDRA Intersection Results (External Intersections)

SITE LAYOUT

Site: Pennant Hills Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 2:59:30 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Existing\160309-Telopea Urban Renewal-External-Existing - (745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	20	15.8	0.773	67.7	LOS E	12.0	86.0	1.00	0.89	26.6
3	R2	345	1.2	0.773	67.9	LOS E	12.0	86.0	1.00	0.89	26.7
Approach		365	2.0	0.773	67.9	LOS E	12.0	86.0	1.00	0.89	26.7
East: Pennant Hills Road (E)											
4	L2	465	0.7	0.773	20.9	LOS B	42.3	303.6	0.72	0.75	42.7
5	T1	1512	4.9	0.773	15.8	LOS B	42.3	303.6	0.74	0.72	47.0
Approach		1977	3.9	0.773	17.0	LOS B	42.3	303.6	0.74	0.73	45.9
West: Pennant Hills Road (W)											
11	T1	1129	4.5	0.390	4.9	LOS A	11.2	81.2	0.35	0.31	55.6
12	R2	87	1.2	0.696	74.1	LOS F	5.8	41.2	1.00	0.82	25.8
Approach		1217	4.2	0.696	9.8	LOS A	11.2	81.2	0.39	0.35	51.3
All Vehicles		3559	3.8	0.773	19.8	LOS B	42.3	303.6	0.65	0.61	44.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	5	10.8	LOS B	0.0	0.0	0.41	0.41
P4	West Full Crossing	22	59.2	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		27	49.9	LOS E			0.85	0.85

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

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Adderton Road - PM

16S9023000
Telopea Urban Renewal - Existing PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	20	0.0	0.708	55.0	LOS D	17.1	119.8	0.98	0.85	29.5
3	R2	555	0.2	0.708	55.3	LOS D	17.1	119.8	0.98	0.85	29.5
Approach		575	0.2	0.708	55.3	LOS D	17.1	119.8	0.98	0.85	29.5
East: Pennant Hills Road (E)											
4	L2	262	0.4	0.728	25.0	LOS B	37.6	271.6	0.76	0.74	41.1
5	T1	1407	5.1	0.728	19.8	LOS B	37.6	271.6	0.77	0.73	44.9
Approach		1669	4.4	0.728	20.6	LOS B	37.6	271.6	0.77	0.73	44.2
West: Pennant Hills Road (W)											
11	T1	1445	3.5	0.562	11.1	LOS A	23.0	165.9	0.56	0.51	50.8
12	R2	55	1.9	0.658	77.2	LOS F	3.7	26.5	1.00	0.79	25.2
Approach		1500	3.4	0.658	13.5	LOS A	23.0	165.9	0.57	0.52	49.0
All Vehicles		3744	3.3	0.728	23.1	LOS B	37.6	271.6	0.72	0.66	42.6

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	13	14.8	LOS B	0.0	0.0	0.48	0.48
P4	West Full Crossing	9	49.1	LOS E	0.0	0.0	0.87	0.87
All Pedestrians		22	29.5	LOS C			0.65	0.65

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.

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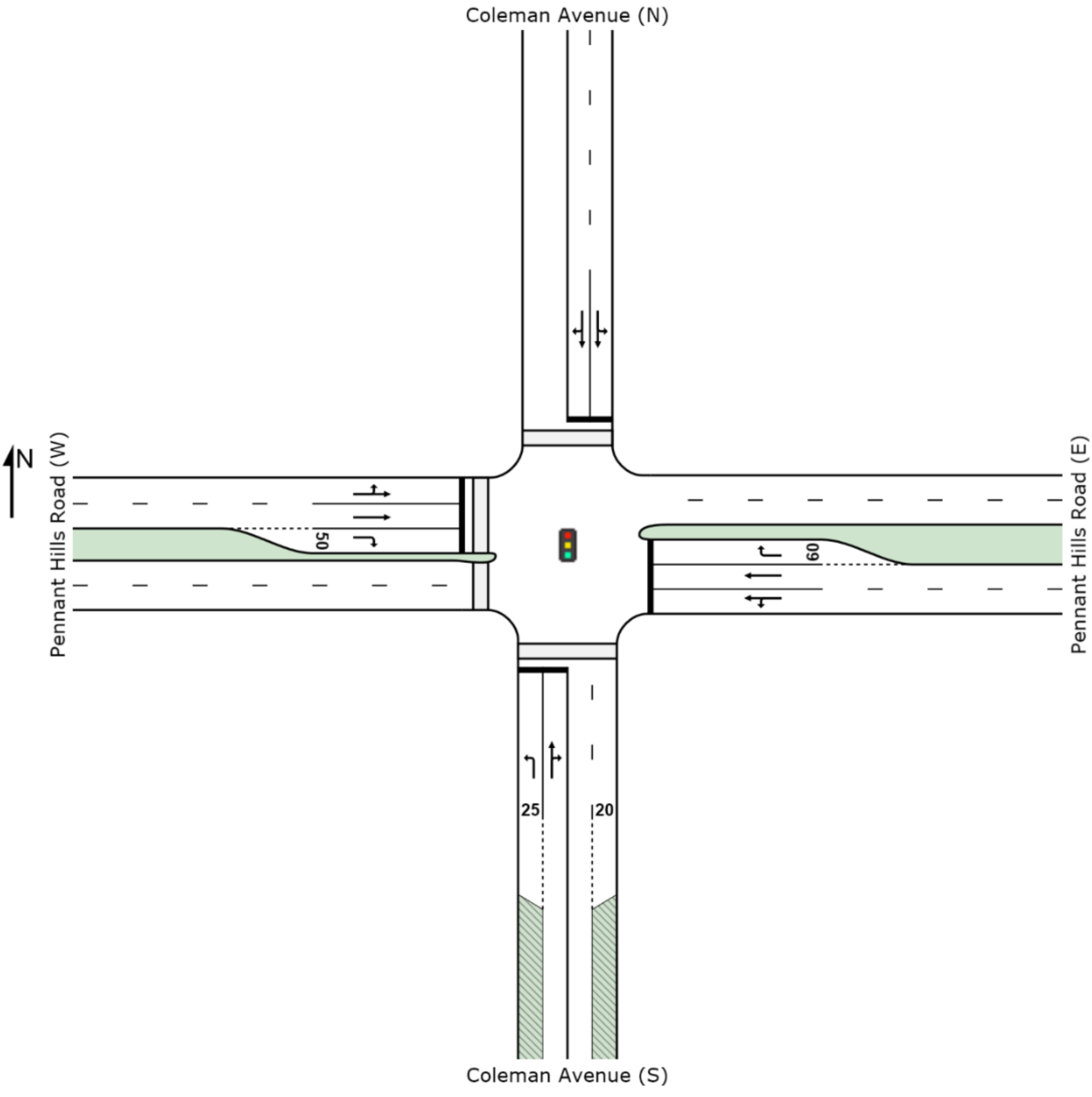
SITE LAYOUT

Site: Pennant Hills Road/ Coleman Avenue - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Pennant Hills Road/ Coleman Avenue - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	53	6.0	0.154	51.8	LOS D	2.8	20.5	0.87	0.73	30.2
2	T1	21	0.0	0.618	54.2	LOS D	8.7	61.5	0.97	0.81	27.9
3	R2	125	0.8	0.618	58.7	LOS E	8.7	61.5	0.97	0.81	28.9
Approach		199	2.1	0.618	56.4	LOS D	8.7	61.5	0.94	0.79	29.1
East: Pennant Hills Road (E)											
4	L2	34	9.4	0.639	15.9	LOS B	28.1	204.7	0.57	0.54	46.7
5	T1	1545	4.6	0.639	9.6	LOS A	28.1	204.7	0.54	0.50	51.8
6	R2	42	0.0	0.275	24.1	LOS B	1.5	10.7	0.57	0.72	40.0
Approach		1621	4.6	0.639	10.1	LOS A	28.1	204.7	0.54	0.51	51.2
North: Coleman Avenue (N)											
7	L2	19	0.0	0.054	50.5	LOS D	1.0	6.8	0.85	0.69	30.7
8	T1	43	0.0	0.224	49.0	LOS D	3.7	26.1	0.89	0.72	29.6
9	R2	25	0.0	0.224	53.6	LOS D	3.7	26.1	0.89	0.72	30.8
Approach		87	0.0	0.224	50.7	LOS D	3.7	26.1	0.88	0.71	30.1
West: Pennant Hills Road (W)											
10	L2	3	0.0	0.543	14.6	LOS B	21.1	157.0	0.51	0.47	47.6
11	T1	1439	7.6	0.543	9.0	LOS A	21.1	157.0	0.50	0.46	52.3
12	R2	1	100.0	0.018	27.0	LOS B	0.0	0.5	0.54	0.64	38.7
Approach		1443	7.7	0.543	9.1	LOS A	21.1	157.0	0.50	0.46	52.2
All Vehicles		3351	5.7	0.639	13.5	LOS A	28.1	204.7	0.56	0.51	48.6

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	8.5	LOS A	0.0	0.0	0.36	0.36
P3	North Full Crossing	5	8.1	LOS A	0.0	0.0	0.35	0.35
P4	West Full Crossing	61	54.6	LOS E	0.2	0.2	0.92	0.92
All Pedestrians		77	45.1	LOS E			0.80	0.80

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: Pennant Hills Road/ Coleman Avenue - PM

16S9023000
Telopea Urban Renewal - Existing PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	60	1.8	0.236	59.1	LOS E	3.4	24.5	0.93	0.75	28.6
2	T1	23	0.0	0.617	62.7	LOS E	6.4	45.5	1.00	0.81	26.3
3	R2	78	1.4	0.617	67.3	LOS E	6.4	45.5	1.00	0.81	27.2
Approach		161	1.3	0.617	63.6	LOS E	6.4	45.5	0.97	0.79	27.5
East: Pennant Hills Road (E)											
4	L2	86	2.4	0.662	13.0	LOS A	28.1	203.2	0.51	0.51	48.3
5	T1	1656	4.0	0.662	6.8	LOS A	28.1	203.2	0.47	0.45	53.8
6	R2	46	0.0	0.329	19.9	LOS B	1.5	10.8	0.52	0.71	41.8
Approach		1788	3.8	0.662	7.5	LOS A	28.1	203.2	0.47	0.46	53.1
North: Coleman Avenue (N)											
7	L2	21	0.0	0.103	57.7	LOS E	1.5	10.4	0.91	0.70	29.1
8	T1	57	3.7	0.456	58.5	LOS E	5.3	38.0	0.97	0.77	27.4
9	R2	36	0.0	0.456	63.5	LOS E	5.3	38.0	0.97	0.77	28.3
Approach		114	1.9	0.456	59.9	LOS E	5.3	38.0	0.96	0.76	28.0
West: Pennant Hills Road (W)											
10	L2	1	0.0	0.544	11.8	LOS A	19.9	142.7	0.43	0.40	49.5
11	T1	1597	3.0	0.544	6.2	LOS A	19.9	142.7	0.43	0.40	54.4
12	R2	1	100.0	0.020	23.1	LOS B	0.0	0.5	0.49	0.63	40.3
Approach		1599	3.1	0.544	6.2	LOS A	19.9	142.7	0.43	0.40	54.4
All Vehicles		3662	3.3	0.662	11.0	LOS A	28.1	203.2	0.49	0.46	50.2

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

Movement Performance - Pedestrians

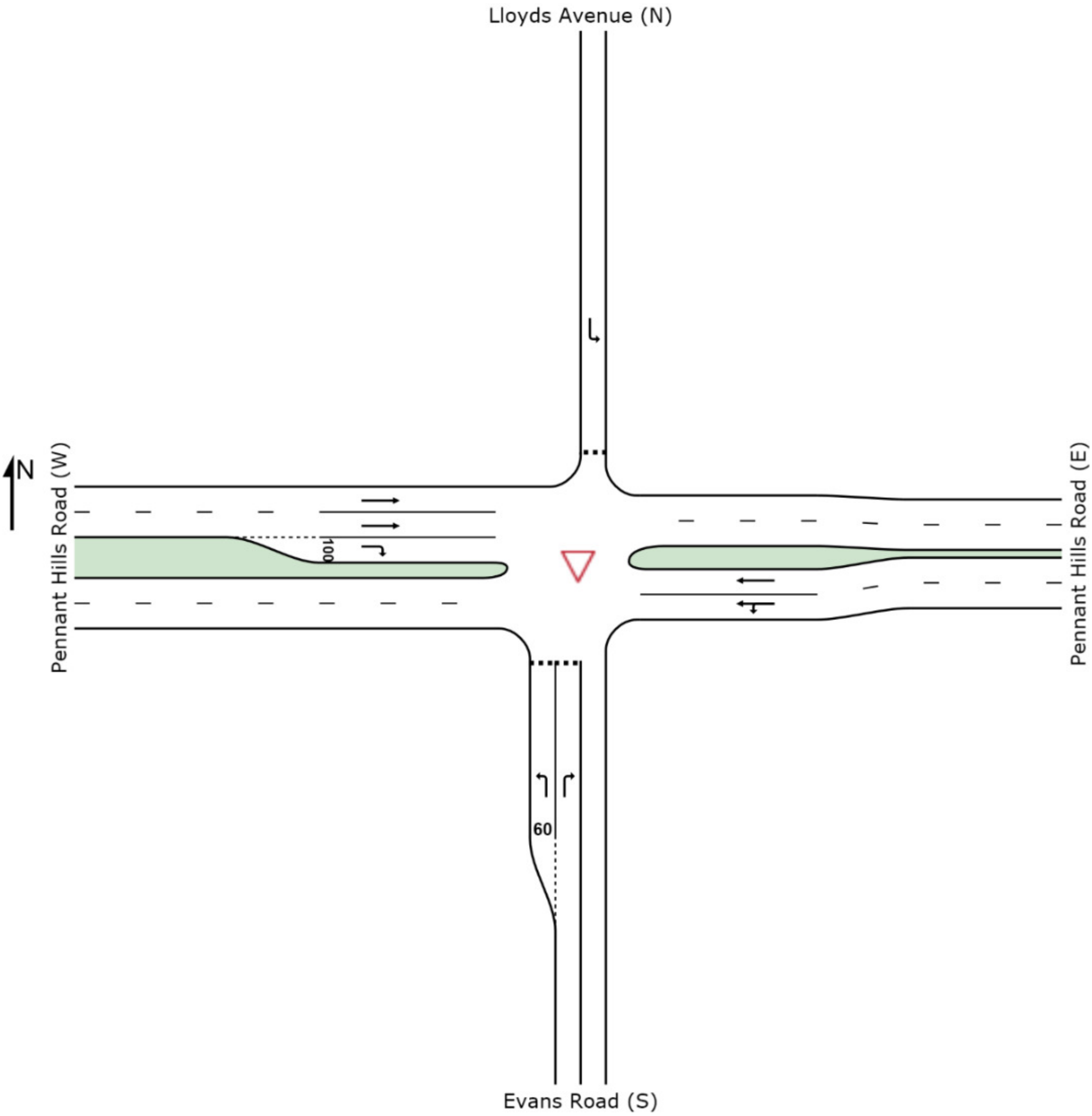
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	33	6.2	LOS A	0.0	0.0	0.31	0.31
P3	North Full Crossing	5	5.9	LOS A	0.0	0.0	0.30	0.30
P4	West Full Crossing	60	59.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		98	38.7	LOS D			0.70	0.70

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

SITE LAYOUT

▽ Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	197	1.1	0.256	7.9	LOS A	1.1	7.6	0.55	0.76	47.6
3	R2	96	3.3	0.912	66.4	LOS E	3.1	22.5	0.99	1.28	26.9
Approach		293	1.8	0.912	27.0	LOS B	3.1	22.5	0.70	0.93	38.1
East: Pennant Hills Road (E)											
4	L2	326	1.3	0.457	5.6	LOS A	0.0	0.0	0.00	0.23	56.2
5	T1	1389	5.0	0.457	0.1	LOS A	0.0	0.0	0.00	0.09	59.1
Approach		1716	4.3	0.457	1.1	NA	0.0	0.0	0.00	0.11	58.5
North: Lloyds Avenue (N)											
7	L2	108	2.9	0.172	8.9	LOS A	0.6	4.6	0.58	0.80	47.0
Approach		108	2.9	0.172	8.9	LOS A	0.6	4.6	0.58	0.80	47.0
West: Pennant Hills Road (W)											
11	T1	1277	8.2	0.345	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	252	2.1	0.872	41.9	LOS C	5.5	39.5	0.98	1.39	33.3
Approach		1528	7.2	0.872	6.9	NA	5.5	39.5	0.16	0.23	53.0
All Vehicles		3645	5.3	0.912	5.9	NA	5.5	39.5	0.14	0.25	53.5

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - PM

16S9023000
Telopea Urban Renewal - Existing PM
4:45PM-5:45PM
Giveway / Yield (Two-Way)

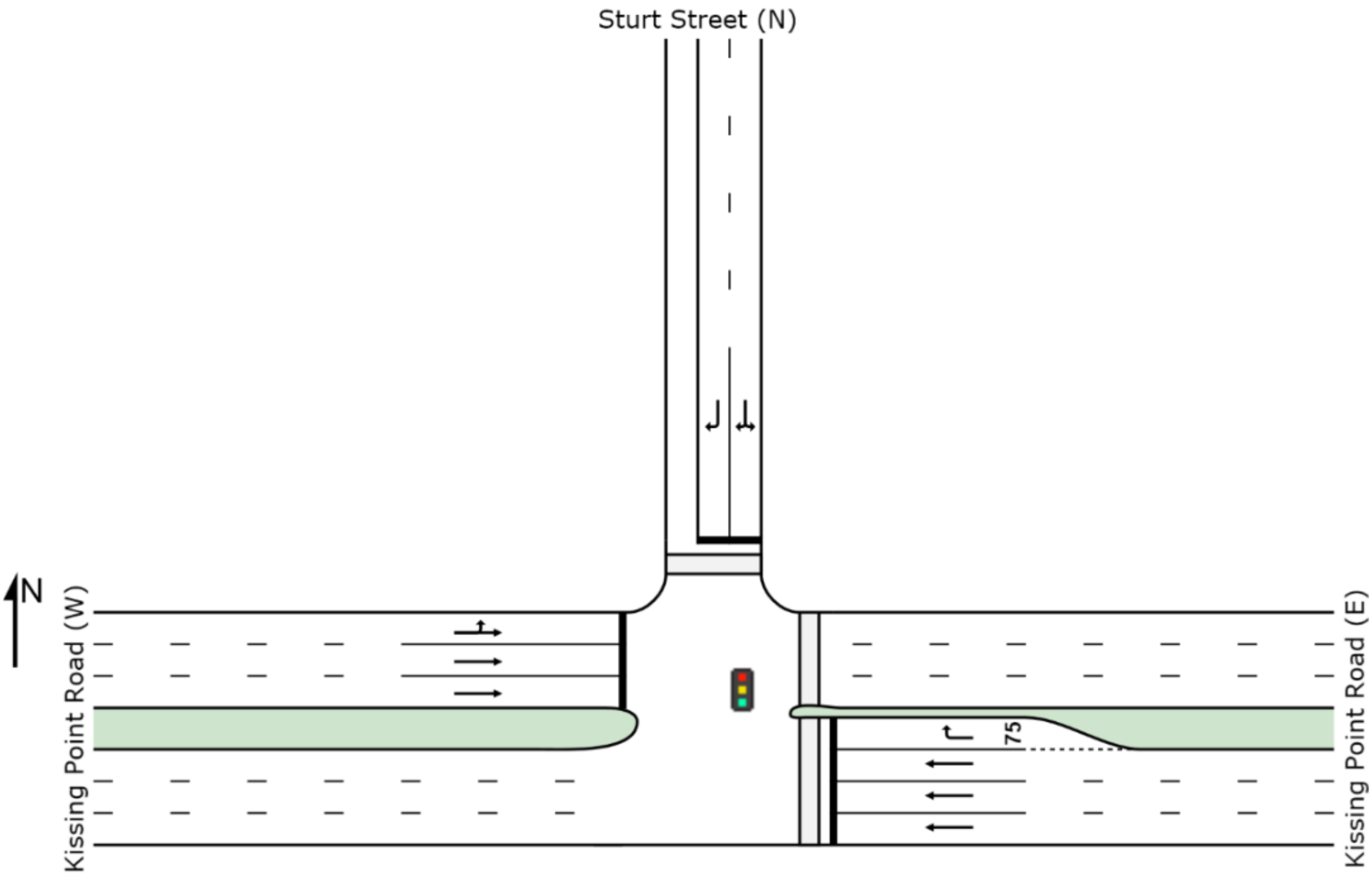
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	359	0.6	0.491	10.3	LOS A	3.2	22.6	0.66	0.97	46.2
3	R2	91	1.2	0.862	57.5	LOS E	2.7	18.8	0.99	1.20	28.8
Approach		449	0.7	0.862	19.8	LOS B	3.2	22.6	0.72	1.01	41.2
East: Pennant Hills Road (E)											
4	L2	267	1.6	0.447	5.6	LOS A	0.0	0.0	0.00	0.19	56.5
5	T1	1415	4.7	0.447	0.1	LOS A	0.0	0.0	0.00	0.08	59.2
Approach		1682	4.2	0.447	1.0	NA	0.0	0.0	0.00	0.09	58.7
North: Lloyds Avenue (N)											
7	L2	53	0.0	0.098	9.8	LOS A	0.3	2.4	0.62	0.82	46.5
Approach		53	0.0	0.098	9.8	LOS A	0.3	2.4	0.62	0.82	46.5
West: Pennant Hills Road (W)											
11	T1	1543	3.2	0.404	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	131	0.0	0.412	19.9	LOS B	1.4	10.1	0.89	1.01	41.8
Approach		1674	3.0	0.412	1.6	NA	1.4	10.1	0.07	0.08	57.9
All Vehicles		3858	3.2	0.862	3.6	NA	3.2	22.6	0.12	0.20	55.4

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Kissing Point Road/ Sturt Street - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Kissing Point Road/ Sturt Street - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1207	2.9	0.297	6.8	LOS A	8.5	60.9	0.40	0.35	61.9
6	R2	111	0.0	0.581	40.4	LOS C	6.5	45.7	1.00	0.88	35.4
Approach		1318	2.6	0.581	9.6	LOS A	8.5	60.9	0.45	0.40	58.3
North: Sturt Street (N)											
7	L2	107	2.0	0.578	51.2	LOS D	11.7	83.5	0.95	0.82	31.2
9	R2	313	3.0	0.578	52.3	LOS D	11.7	83.5	0.96	0.82	30.8
Approach		420	2.8	0.578	52.0	LOS D	11.7	83.5	0.96	0.82	30.9
West: Kissing Point Road (W)											
10	L2	266	5.5	0.598	21.4	LOS B	23.4	169.2	0.65	0.68	45.3
11	T1	1805	2.7	0.598	15.2	LOS B	24.7	176.9	0.66	0.62	53.7
Approach		2072	3.1	0.598	16.0	LOS B	24.7	176.9	0.66	0.63	52.5
All Vehicles		3809	2.9	0.598	17.8	LOS B	24.7	176.9	0.62	0.57	50.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	27	54.2	LOS E	0.1	0.1	0.95	0.95
P3	North Full Crossing	7	12.2	LOS B	0.0	0.0	0.45	0.45
All Pedestrians		35	45.3	LOS E			0.84	0.84

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

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Organisation: GTA CONSULTANTS | Processed: Monday, 4 July 2016 2:26:43 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Existing\160309-Telopea Urban Renewal-External-Existing - (745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Kissing Point Road/ Sturt Street - PM

16S9023000
Telopea Urban Renewal - Existing PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	2112	1.6	0.476	5.4	LOS A	14.8	104.9	0.40	0.36	63.4
6	R2	206	1.0	0.498	34.1	LOS C	10.6	74.6	0.93	0.91	37.7
Approach		2318	1.5	0.498	8.0	LOS A	14.8	104.9	0.45	0.41	59.8
North: Sturt Street (N)											
7	L2	69	1.5	0.493	55.4	LOS D	7.4	53.0	0.96	0.80	30.1
9	R2	185	3.4	0.493	57.1	LOS E	7.4	53.0	0.97	0.79	29.6
Approach		255	2.9	0.493	56.6	LOS E	7.4	53.0	0.97	0.79	29.8
West: Kissing Point Road (W)											
10	L2	197	4.3	0.495	22.8	LOS B	18.1	129.0	0.64	0.66	44.6
11	T1	1417	1.2	0.495	16.5	LOS B	18.8	133.1	0.65	0.60	52.7
Approach		1614	1.6	0.495	17.3	LOS B	18.8	133.1	0.65	0.61	51.6
All Vehicles		4186	1.6	0.498	14.5	LOS B	18.8	133.1	0.55	0.51	53.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	14.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		11	34.3	LOS D			0.72	0.72

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

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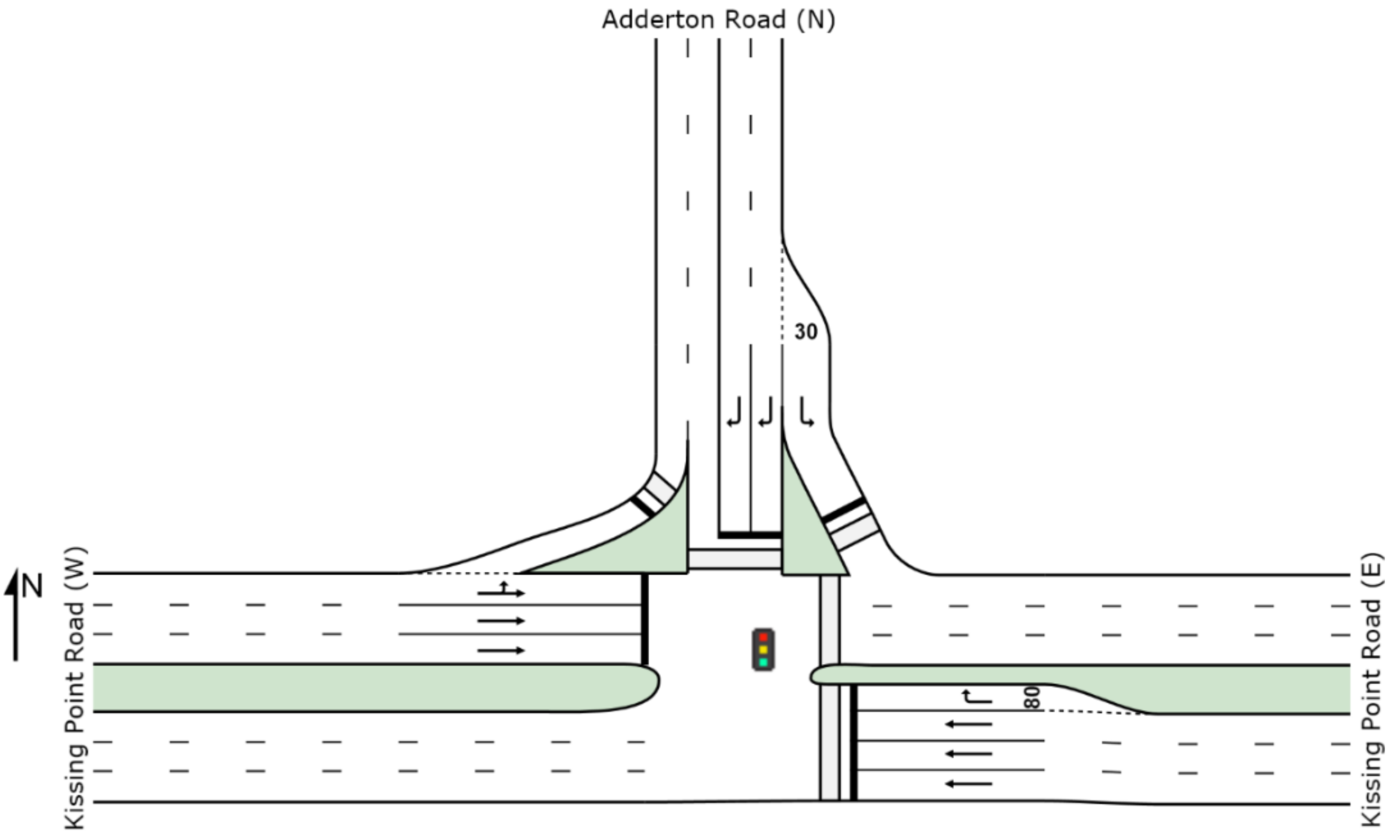
SITE LAYOUT

Site: Kissing Point Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 3:12:27 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Existing\160309-Telopea Urban Renewal-External-Existing - (745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Kissing Point Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Existing AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1383	3.2	0.374	10.2	LOS A	12.3	88.4	0.50	0.44	51.4
6	R2	160	0.7	0.764	65.8	LOS E	9.8	68.8	1.00	0.88	27.6
Approach		1543	2.9	0.764	16.0	LOS B	12.3	88.4	0.55	0.49	47.2
North: Adderton Road (N)											
7	L2	264	1.2	0.427	29.5	LOS C	10.3	72.5	0.72	0.75	37.6
9	R2	579	1.5	0.747	50.3	LOS D	19.1	135.6	0.95	0.86	30.8
Approach		843	1.4	0.747	43.8	LOS D	19.1	135.6	0.88	0.83	32.6
West: Kissing Point Road (W)											
10	L2	289	2.9	0.770	30.5	LOS C	32.6	234.2	0.88	0.83	39.4
11	T1	1828	3.5	0.770	26.7	LOS B	33.6	242.3	0.89	0.81	41.6
Approach		2118	3.4	0.770	27.2	LOS B	33.6	242.3	0.89	0.82	41.3
All Vehicles		4504	2.9	0.770	26.5	LOS B	33.6	242.3	0.77	0.71	41.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	49.5	LOS E	0.0	0.0	0.91	0.91
P3	North Full Crossing	5	21.6	LOS C	0.0	0.0	0.60	0.60
P3S	North Slip/Bypass Lane Crossing	5	17.1	LOS B	0.0	0.0	0.53	0.53
P4S	West Slip/Bypass Lane Crossing	5	17.1	LOS B	0.0	0.0	0.53	0.53
All Pedestrians		21	26.3	LOS C			0.64	0.64

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: Kissing Point Road/ Adderton Road - PM

16S9023000
Telopea Urban Renewal - Existing PM
4:45PM-5:45PM
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1972	1.8	0.434	4.2	LOS A	12.0	85.2	0.34	0.31	56.2
6	R2	311	0.7	0.692	50.1	LOS D	16.7	117.4	0.97	0.85	31.3
Approach		2282	1.7	0.692	10.4	LOS A	16.7	117.4	0.43	0.39	50.7
North: Adderton Road (N)											
7	L2	158	0.0	0.191	28.6	LOS C	5.8	40.9	0.68	0.72	37.9
9	R2	258	2.0	0.650	62.6	LOS E	7.6	54.1	1.00	0.82	27.9
Approach		416	1.3	0.650	49.7	LOS D	7.6	54.1	0.88	0.78	31.0
West: Kissing Point Road (W)											
10	L2	536	5.1	0.677	21.6	LOS B	24.7	179.0	0.77	0.79	42.5
11	T1	1427	0.3	0.677	23.8	LOS B	28.3	198.8	0.82	0.75	43.0
Approach		1963	1.6	0.677	23.2	LOS B	28.3	198.8	0.80	0.76	42.8
All Vehicles		4661	1.6	0.692	19.3	LOS B	28.3	198.8	0.63	0.58	44.7

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

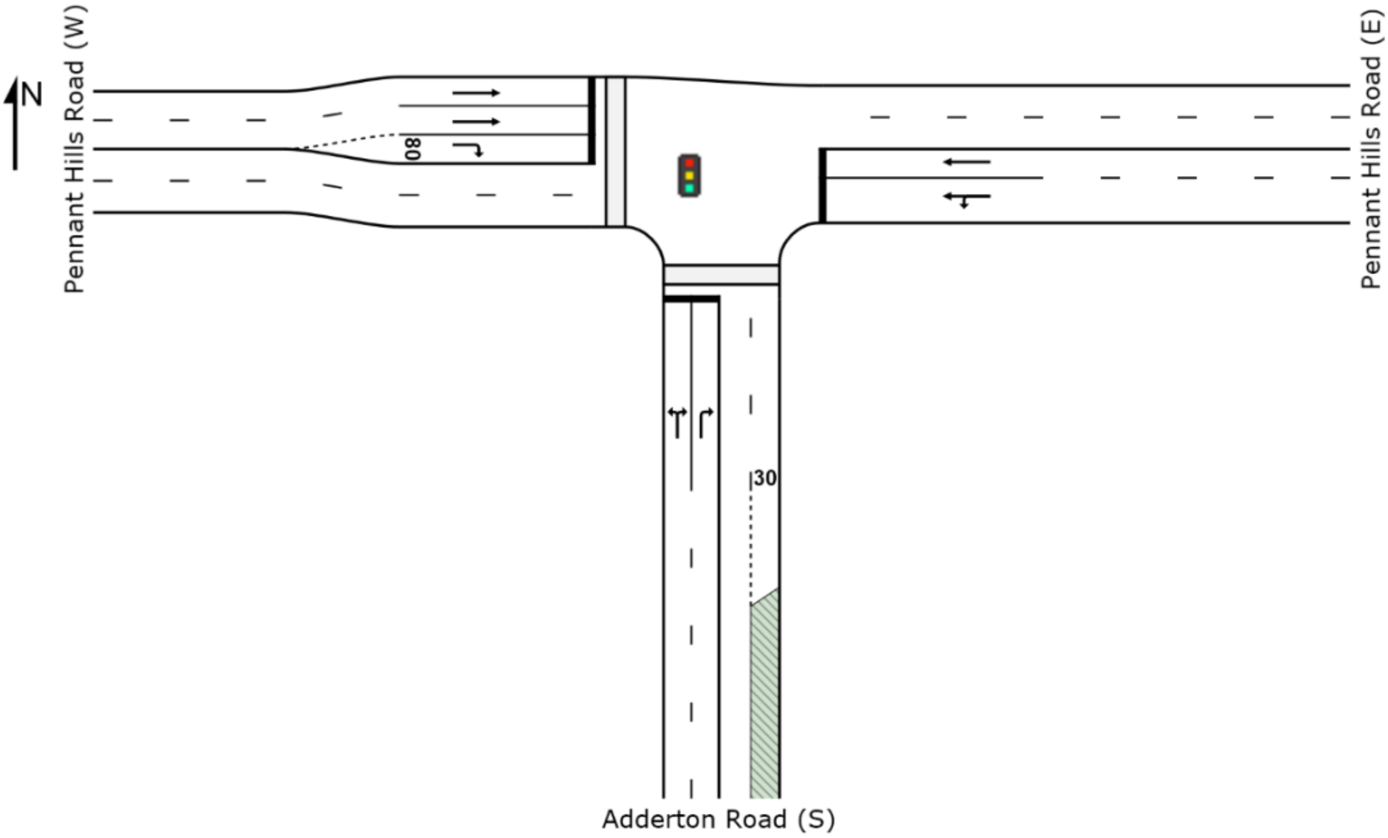
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	21.0	LOS C	0.0	0.0	0.59	0.59
P3S	North Slip/Bypass Lane Crossing	5	16.5	LOS B	0.0	0.0	0.53	0.53
P4S	West Slip/Bypass Lane Crossing	5	16.5	LOS B	0.0	0.0	0.53	0.53
All Pedestrians		21	27.1	LOS C			0.65	0.65

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

SITE LAYOUT

Site: Pennant Hills Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 1:40:02 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Post Development w Existing Layout\160309-Telopea Urban Renewal-External-PD-(745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	238	1.3	0.981	98.8	LOS F	32.4	228.8	1.00	1.11	21.8
3	R2	463	0.9	0.981	99.6	LOS F	32.4	228.8	1.00	1.11	21.7
Approach		701	1.1	0.981	99.3	LOS F	32.4	228.8	1.00	1.11	21.7
East: Pennant Hills Road (E)											
4	L2	488	0.6	0.990	74.1	LOS F	96.7	692.7	1.00	1.14	26.4
5	T1	1726	4.3	0.990	71.0	LOS F	96.7	692.7	1.00	1.18	27.5
Approach		2215	3.5	0.990	71.7	LOS F	96.7	692.7	1.00	1.17	27.3
West: Pennant Hills Road (W)											
11	T1	1129	4.5	0.419	7.5	LOS A	13.9	101.0	0.43	0.39	53.4
12	R2	180	0.6	0.989	106.6	LOS F	15.3	107.8	1.00	1.08	21.0
Approach		1309	3.9	0.989	21.1	LOS B	15.3	107.8	0.51	0.48	44.0
All Vehicles		4225	3.2	0.990	60.6	LOS E	96.7	692.7	0.85	0.95	29.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	5	15.8	LOS B	0.0	0.0	0.49	0.49
P4	West Full Crossing	22	53.6	LOS E	0.1	0.1	0.91	0.91
All Pedestrians		27	46.3	LOS E			0.83	0.83

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

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Adderton Road - PM

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	105	0.0	1.094	174.9	LOS F	41.9	293.3	1.00	1.33	15.0
3	R2	611	0.2	1.094	174.9	LOS F	41.9	293.3	1.00	1.33	15.0
Approach		716	0.1	1.094	174.9	LOS F	41.9	293.3	1.00	1.33	15.0
East: Pennant Hills Road (E)											
4	L2	354	0.3	1.108	175.2	LOS F	114.6	824.0	1.00	1.53	15.3
5	T1	1461	4.9	1.108	169.7	LOS F	114.6	824.0	1.00	1.61	15.8
Approach		1815	4.0	1.108	170.8	LOS F	114.6	824.0	1.00	1.59	15.7
West: Pennant Hills Road (W)											
11	T1	1445	3.5	0.527	8.1	LOS A	19.6	141.4	0.48	0.44	53.0
12	R2	424	0.2	1.108	199.6	LOS F	51.5	361.4	1.00	1.29	13.7
Approach		1869	2.8	1.108	51.5	LOS D	51.5	361.4	0.59	0.63	32.1
All Vehicles		4400	2.8	1.108	120.8	LOS F	114.6	824.0	0.83	1.14	19.8

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

Movement Performance - Pedestrians

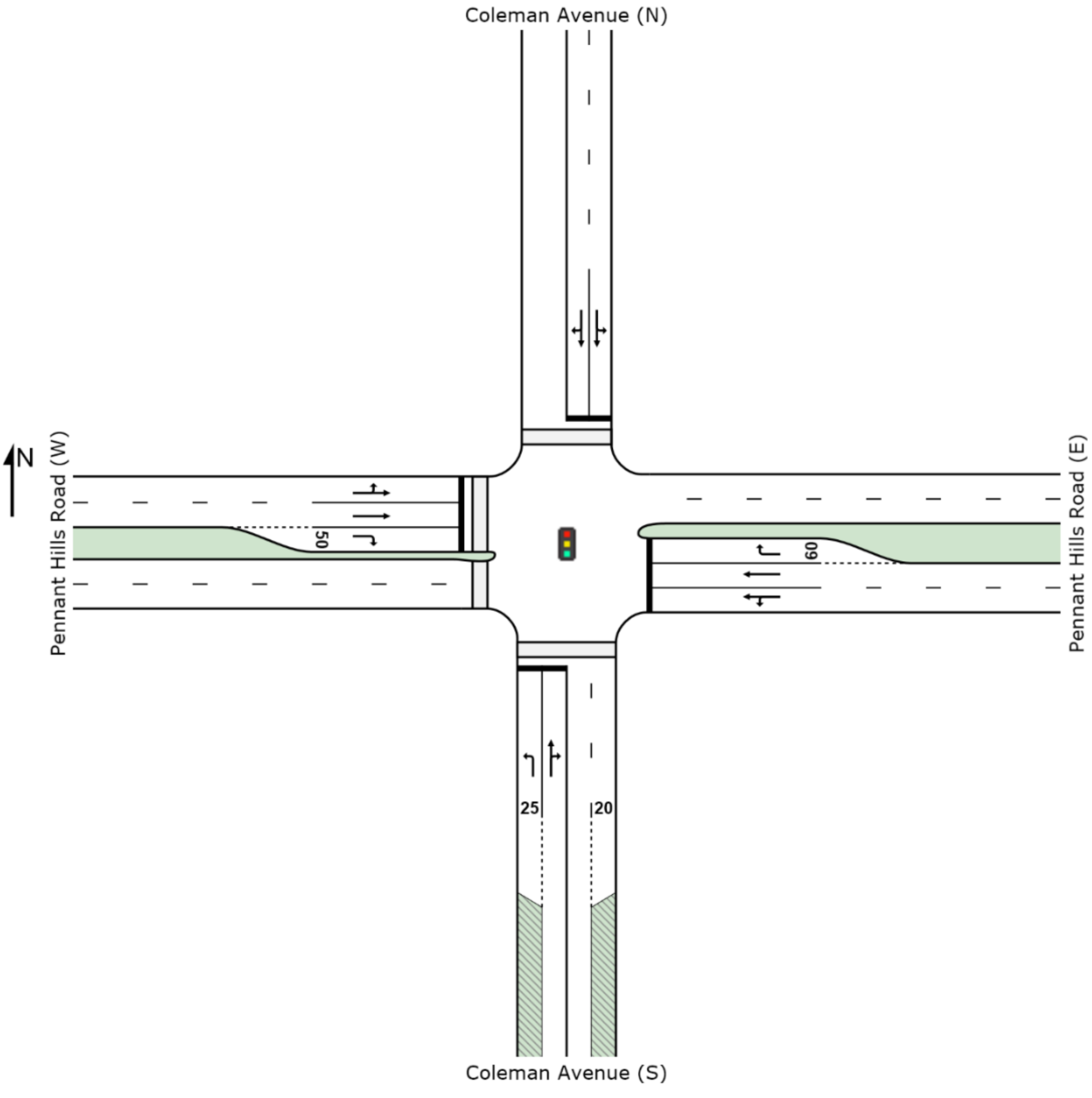
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	13	27.2	LOS C	0.0	0.0	0.65	0.65
P4	West Full Crossing	9	54.5	LOS E	0.0	0.0	0.92	0.92
All Pedestrians		22	38.9	LOS D			0.76	0.76

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

SITE LAYOUT

Site: Pennant Hills Road/ Coleman Avenue - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Pennant Hills Road/ Coleman Avenue - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	211	1.5	0.591	43.1	LOS D	10.5	74.6	0.84	0.78	32.6
2	T1	21	0.0	0.784	53.6	LOS D	11.6	81.5	0.93	0.90	28.0
3	R2	167	0.6	0.784	58.2	LOS E	11.6	81.5	0.93	0.90	29.0
Approach		399	1.1	0.784	50.0	LOS D	11.6	81.5	0.88	0.84	30.7
East: Pennant Hills Road (E)											
4	L2	76	4.2	0.765	25.4	LOS B	40.1	291.5	0.80	0.75	41.6
5	T1	1545	4.6	0.765	18.6	LOS B	40.1	291.5	0.75	0.70	45.8
6	R2	42	0.0	0.245	49.0	LOS D	2.3	16.2	0.88	0.77	31.4
Approach		1663	4.5	0.765	19.7	LOS B	40.1	291.5	0.76	0.70	45.1
North: Coleman Avenue (N)											
7	L2	19	0.0	0.039	34.3	LOS C	1.0	7.1	0.69	0.64	35.8
8	T1	43	0.0	0.172	40.8	LOS C	3.2	22.2	0.81	0.68	31.6
9	R2	25	0.0	0.172	47.0	LOS D	3.2	22.2	0.83	0.69	32.5
Approach		87	0.0	0.172	41.2	LOS C	3.2	22.2	0.79	0.67	32.7
West: Pennant Hills Road (W)											
10	L2	3	0.0	0.785	32.8	LOS C	38.8	288.3	0.88	0.81	38.5
11	T1	1506	7.3	0.785	27.2	LOS B	38.8	288.3	0.88	0.80	41.5
12	R2	1	100.0	0.021	57.7	LOS E	0.1	0.8	0.85	0.64	29.2
Approach		1511	7.3	0.785	27.2	LOS B	38.8	288.3	0.88	0.80	41.5
All Vehicles		3660	5.2	0.785	26.6	LOS B	40.1	291.5	0.82	0.76	41.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	14.3	LOS B	0.0	0.0	0.47	0.47
P3	North Full Crossing	5	19.9	LOS B	0.0	0.0	0.55	0.55
P4	West Full Crossing	61	42.5	LOS E	0.2	0.2	0.81	0.81
All Pedestrians		77	37.1	LOS D			0.75	0.75

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: Pennant Hills Road/ Coleman Avenue - PM

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	100	1.1	0.294	54.2	LOS D	5.5	38.9	0.91	0.77	29.7
2	T1	23	0.0	0.768	62.2	LOS E	9.3	65.5	1.00	0.90	26.3
3	R2	120	0.9	0.768	66.8	LOS E	9.3	65.5	1.00	0.90	27.2
Approach		243	0.9	0.768	61.2	LOS E	9.3	65.5	0.96	0.85	28.1
East: Pennant Hills Road (E)											
4	L2	255	0.8	0.784	17.7	LOS B	42.5	305.6	0.70	0.70	45.1
5	T1	1656	4.0	0.784	10.7	LOS A	42.5	305.6	0.62	0.60	50.5
6	R2	46	0.0	0.242	32.7	LOS C	2.1	14.5	0.73	0.75	36.5
Approach		1957	3.5	0.784	12.2	LOS A	42.5	305.6	0.63	0.61	49.3
North: Coleman Avenue (N)											
7	L2	21	0.0	0.076	47.3	LOS D	1.5	10.6	0.82	0.68	31.9
8	T1	57	3.7	0.333	51.4	LOS D	4.8	34.2	0.91	0.74	28.9
9	R2	36	0.0	0.333	57.6	LOS E	4.8	34.2	0.93	0.75	29.7
Approach		114	1.9	0.333	52.6	LOS D	4.8	34.2	0.90	0.73	29.7
West: Pennant Hills Road (W)											
10	L2	1	0.0	0.670	21.7	LOS B	32.4	232.9	0.69	0.64	43.6
11	T1	1614	3.0	0.670	16.1	LOS B	32.4	232.9	0.69	0.64	47.5
12	R2	1	100.0	0.021	47.2	LOS D	0.1	0.7	0.75	0.65	31.9
Approach		1616	3.1	0.670	16.1	LOS B	32.4	232.9	0.69	0.64	47.4
All Vehicles		3929	3.1	0.784	18.0	LOS B	42.5	305.6	0.68	0.64	45.6

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

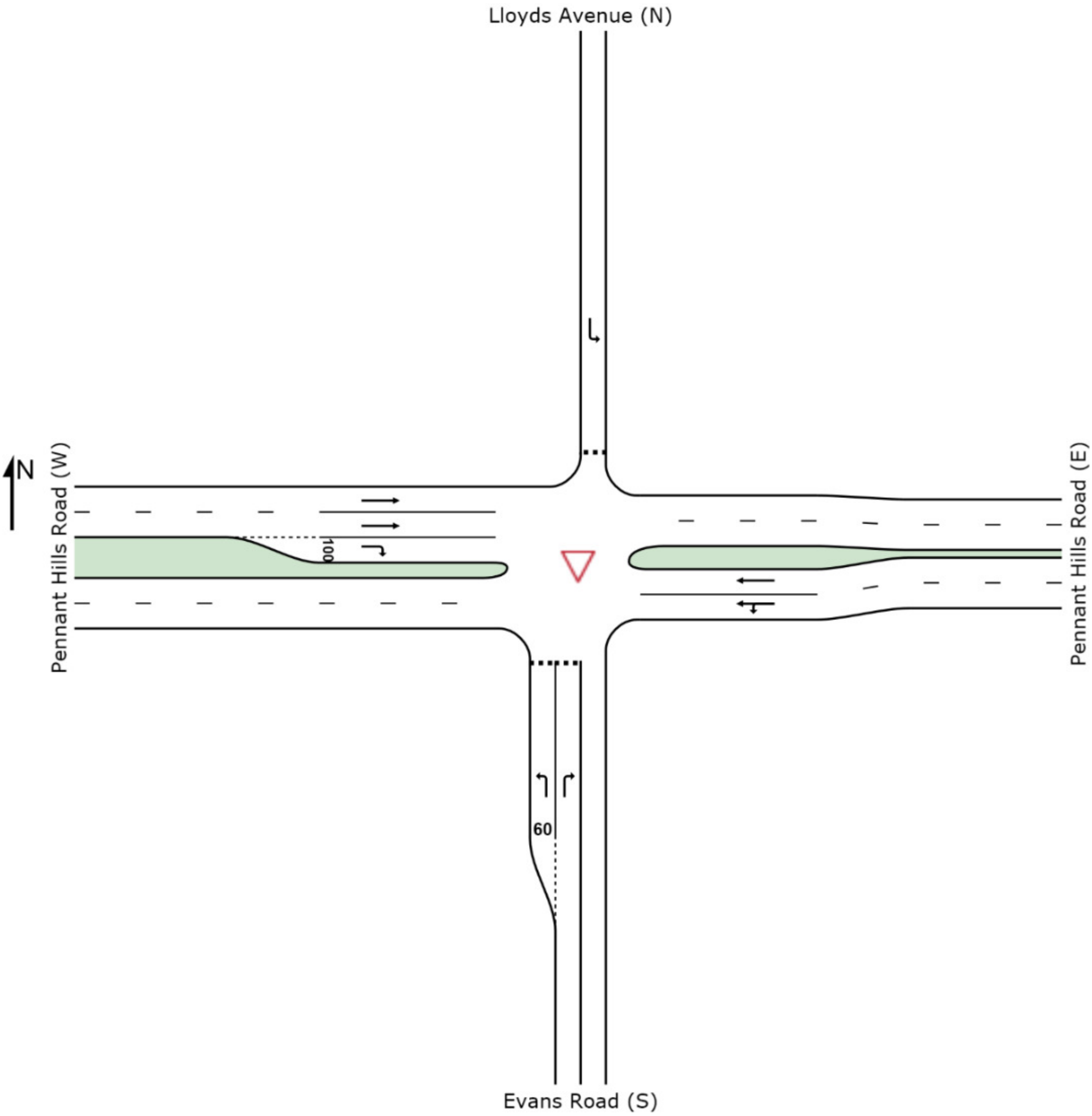
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	33	8.1	LOS A	0.0	0.0	0.35	0.35
P3	North Full Crossing	5	12.5	LOS B	0.0	0.0	0.44	0.44
P4	West Full Crossing	60	55.5	LOS E	0.2	0.2	0.93	0.93
All Pedestrians		98	37.4	LOS D			0.71	0.71

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

SITE LAYOUT

▽ Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Giveway / Yield (Two-Way)



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 1:51:30 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Post Development w Existing Layout\160309-Telopea Urban Renewal-External-PD-(745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	197	1.1	0.250	7.7	LOS A	1.0	7.4	0.54	0.74	47.8
3	R2	148	2.1	1.414	415.5	LOS F	30.6	218.0	1.00	3.50	7.5
Approach		345	1.5	1.414	183.0	LOS F	30.6	218.0	0.74	1.93	14.5
East: Pennant Hills Road (E)											
4	L2	364	1.2	0.467	5.6	LOS A	0.0	0.0	0.00	0.25	56.1
5	T1	1389	5.0	0.467	0.1	LOS A	0.0	0.0	0.00	0.09	59.0
Approach		1754	4.2	0.467	1.2	NA	0.0	0.0	0.00	0.12	58.4
North: Lloyds Avenue (N)											
7	L2	108	2.9	0.198	10.1	LOS A	0.7	5.2	0.64	0.83	46.3
Approach		108	2.9	0.198	10.1	LOS A	0.7	5.2	0.64	0.83	46.3
West: Pennant Hills Road (W)											
11	T1	1465	7.2	0.393	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	252	2.1	0.934	57.3	LOS E	7.5	53.4	0.99	1.58	29.2
Approach		1717	6.4	0.934	8.4	NA	7.5	53.4	0.14	0.23	51.9
All Vehicles		3924	4.9	1.414	20.6	NA	30.6	218.0	0.15	0.35	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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - PM

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	359	0.6	0.466	9.6	LOS A	3.0	21.1	0.63	0.94	46.6
3	R2	135	0.8	1.283	304.3	LOS F	22.0	155.0	1.00	2.92	9.8
Approach		494	0.6	1.283	90.0	LOS F	22.0	155.0	0.73	1.48	23.0
East: Pennant Hills Road (E)											
4	L2	346	1.2	0.468	5.6	LOS A	0.0	0.0	0.00	0.23	56.2
5	T1	1415	4.7	0.468	0.1	LOS A	0.0	0.0	0.00	0.09	59.0
Approach		1761	4.0	0.468	1.2	NA	0.0	0.0	0.00	0.12	58.5
North: Lloyds Avenue (N)											
7	L2	53	0.0	0.101	10.2	LOS A	0.4	2.5	0.64	0.83	46.3
Approach		53	0.0	0.101	10.2	LOS A	0.4	2.5	0.64	0.83	46.3
West: Pennant Hills Road (W)											
11	T1	1591	3.1	0.416	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	131	0.0	0.474	23.4	LOS B	1.7	11.7	0.91	1.03	40.1
Approach		1721	2.9	0.474	1.8	NA	1.7	11.7	0.07	0.08	57.7
All Vehicles		4028	3.1	1.283	12.5	NA	22.0	155.0	0.13	0.28	48.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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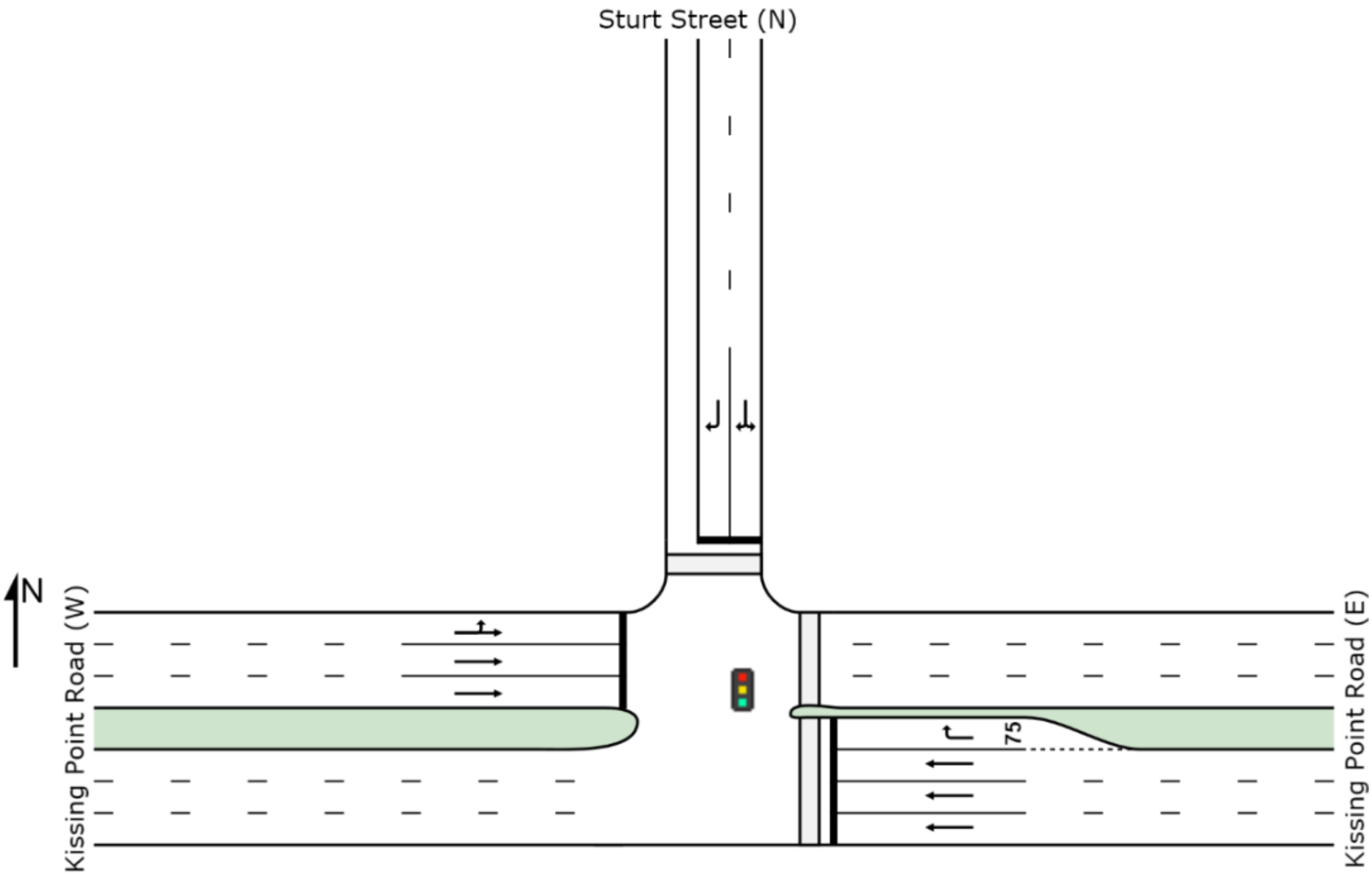
SITE LAYOUT

Site: Kissing Point Road/ Sturt Street - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: Kissing Point Road/ Sturt Street - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1207	2.9	0.346	12.3	LOS A	11.5	82.2	0.53	0.47	56.6
6	R2	226	0.0	0.834	71.5	LOS F	14.1	98.9	1.00	1.07	27.2
Approach		1434	2.4	0.834	21.6	LOS B	14.1	98.9	0.61	0.56	48.4
North: Sturt Street (N)											
7	L2	472	0.4	0.881	53.7	LOS D	36.3	255.7	1.00	0.97	30.6
9	R2	577	1.6	0.881	58.1	LOS E	36.3	255.7	1.00	0.97	29.5
Approach		1048	1.1	0.881	56.1	LOS D	36.3	255.7	1.00	0.97	30.0
West: Kissing Point Road (W)											
10	L2	333	4.4	0.875	45.6	LOS D	42.4	305.5	0.95	0.94	34.7
11	T1	1911	2.6	0.875	39.6	LOS C	44.6	319.0	0.97	0.97	39.5
Approach		2243	2.9	0.875	40.4	LOS C	44.6	319.0	0.97	0.96	38.7
All Vehicles		4725	2.3	0.881	38.2	LOS C	44.6	319.0	0.87	0.84	38.6

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	27	45.1	LOS E	0.1	0.1	0.87	0.87
P3	North Full Crossing	7	22.2	LOS C	0.0	0.0	0.61	0.61
All Pedestrians		35	40.3	LOS E			0.81	0.81

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: Kissing Point Road/ Sturt Street - PM

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	2112	1.6	0.456	4.0	LOS A	12.7	89.8	0.34	0.31	65.0
6	R2	597	0.4	0.825	48.4	LOS D	29.3	205.6	0.97	1.05	32.9
Approach		2708	1.3	0.825	13.8	LOS A	29.3	205.6	0.48	0.48	53.5
North: Sturt Street (N)											
7	L2	302	0.3	0.959	78.9	LOS F	20.3	142.2	0.64	1.01	25.3
9	R2	141	4.5	0.784	67.2	LOS E	8.8	63.8	1.00	0.90	27.3
Approach		443	1.7	0.959	75.2	LOS F	20.3	142.2	0.76	0.97	25.9
West: Kissing Point Road (W)											
10	L2	461	1.8	0.831	44.2	LOS D	33.7	239.4	0.95	0.91	34.5
11	T1	1443	1.2	0.831	38.2	LOS C	35.7	252.5	0.97	0.92	40.2
Approach		1904	1.3	0.831	39.7	LOS C	35.7	252.5	0.96	0.91	38.6
All Vehicles		5056	1.4	0.959	28.9	LOS C	35.7	252.5	0.69	0.68	43.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	26.0	LOS C	0.0	0.0	0.66	0.66
All Pedestrians		11	40.1	LOS E			0.80	0.80

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.

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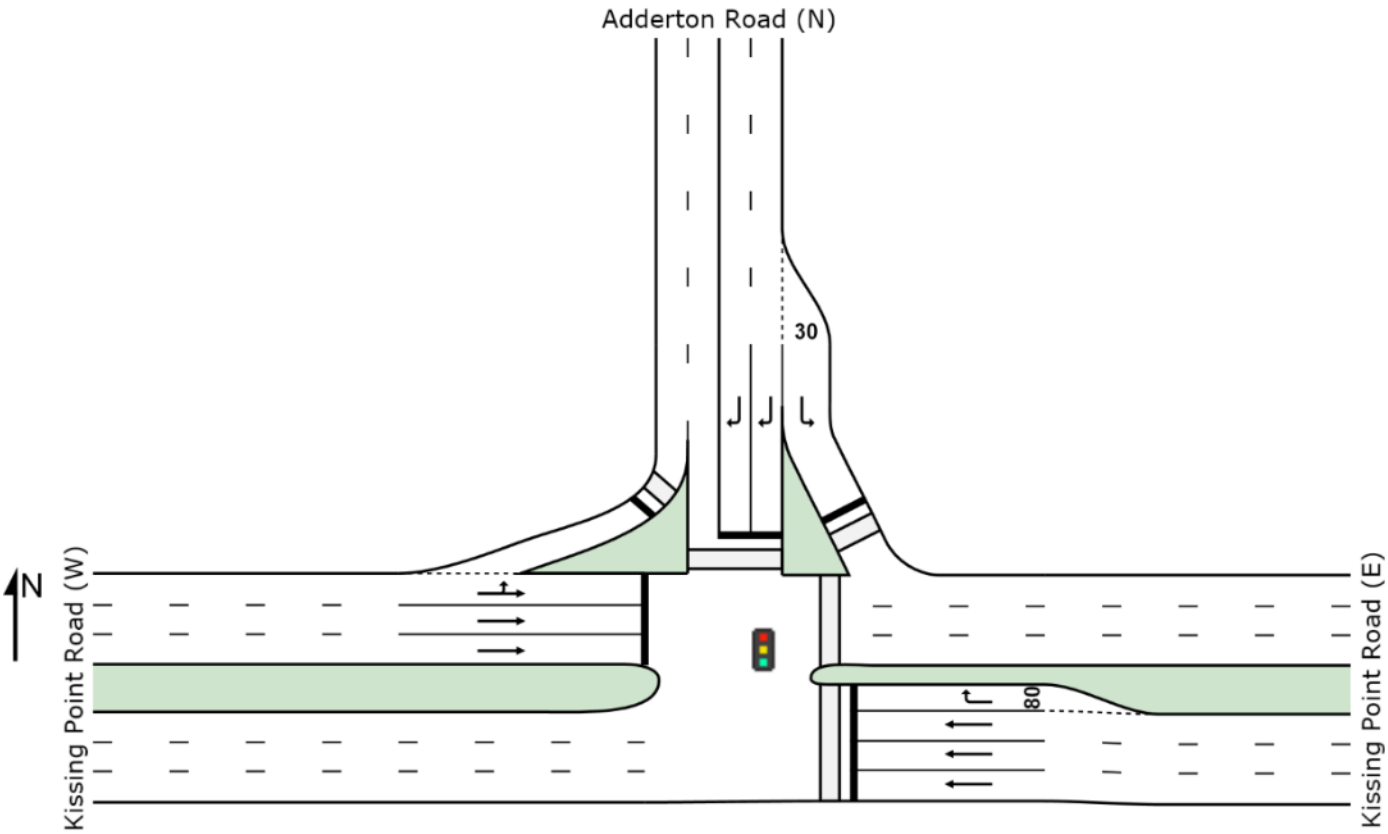
SITE LAYOUT

Site: Kissing Point Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: Kissing Point Road/ Adderton Road - AM

16S9023000
Telopea Urban Renewal - Post-Development AM
7:45AM-8:45AM
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1647	2.7	0.475	13.7	LOS A	17.5	125.1	0.59	0.53	49.1
6	R2	160	0.7	0.823	69.3	LOS E	10.1	71.4	1.00	0.92	26.9
Approach		1807	2.5	0.823	18.6	LOS B	17.5	125.1	0.63	0.57	45.7
North: Adderton Road (N)											
7	L2	323	1.0	0.530	27.5	LOS B	12.2	86.3	0.70	0.75	38.4
9	R2	755	1.1	0.858	55.6	LOS D	28.5	201.3	0.96	0.94	29.5
Approach		1078	1.1	0.858	47.1	LOS D	28.5	201.3	0.88	0.89	31.7
West: Kissing Point Road (W)											
10	L2	358	2.4	0.852	38.7	LOS C	39.6	284.3	0.96	0.93	36.1
11	T1	1828	3.5	0.852	35.8	LOS C	40.7	293.5	0.96	0.93	37.7
Approach		2186	3.3	0.852	36.3	LOS C	40.7	293.5	0.96	0.93	37.4
All Vehicles		5072	2.5	0.858	32.3	LOS C	40.7	293.5	0.83	0.79	38.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	45.1	LOS E	0.0	0.0	0.87	0.87
P3	North Full Crossing	5	24.1	LOS C	0.0	0.0	0.63	0.63
P3S	North Slip/Bypass Lane Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
P4S	West Slip/Bypass Lane Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
All Pedestrians		21	26.9	LOS C			0.66	0.66

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.

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MOVEMENT SUMMARY

Site: Kissing Point Road/ Adderton Road - PM

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	2038	1.8	0.458	5.0	LOS A	13.6	96.8	0.38	0.35	55.5
6	R2	311	0.7	0.831	61.2	LOS E	19.1	134.7	1.00	0.93	28.6
Approach		2348	1.6	0.831	12.4	LOS A	19.1	134.7	0.46	0.42	49.4
North: Adderton Road (N)											
7	L2	173	0.0	0.223	31.0	LOS C	6.7	47.1	0.71	0.73	37.0
9	R2	333	1.6	0.802	65.2	LOS E	11.4	81.0	1.00	0.91	27.3
Approach		505	1.0	0.802	53.5	LOS D	11.4	81.0	0.90	0.85	30.0
West: Kissing Point Road (W)											
10	L2	738	3.7	0.631	22.5	LOS B	37.9	272.6	0.89	0.86	42.0
11	T1	1427	0.3	0.631	21.5	LOS B	37.9	272.6	0.79	0.72	44.2
Approach		2165	1.5	0.631	21.8	LOS B	37.9	272.6	0.82	0.77	43.4
All Vehicles		5019	1.5	0.831	20.6	LOS B	37.9	272.6	0.66	0.61	43.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
P3S	North Slip/Bypass Lane Crossing	5	15.0	LOS B	0.0	0.0	0.50	0.50
P4S	West Slip/Bypass Lane Crossing	5	15.0	LOS B	0.0	0.0	0.50	0.50
All Pedestrians		21	25.9	LOS C			0.63	0.63

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

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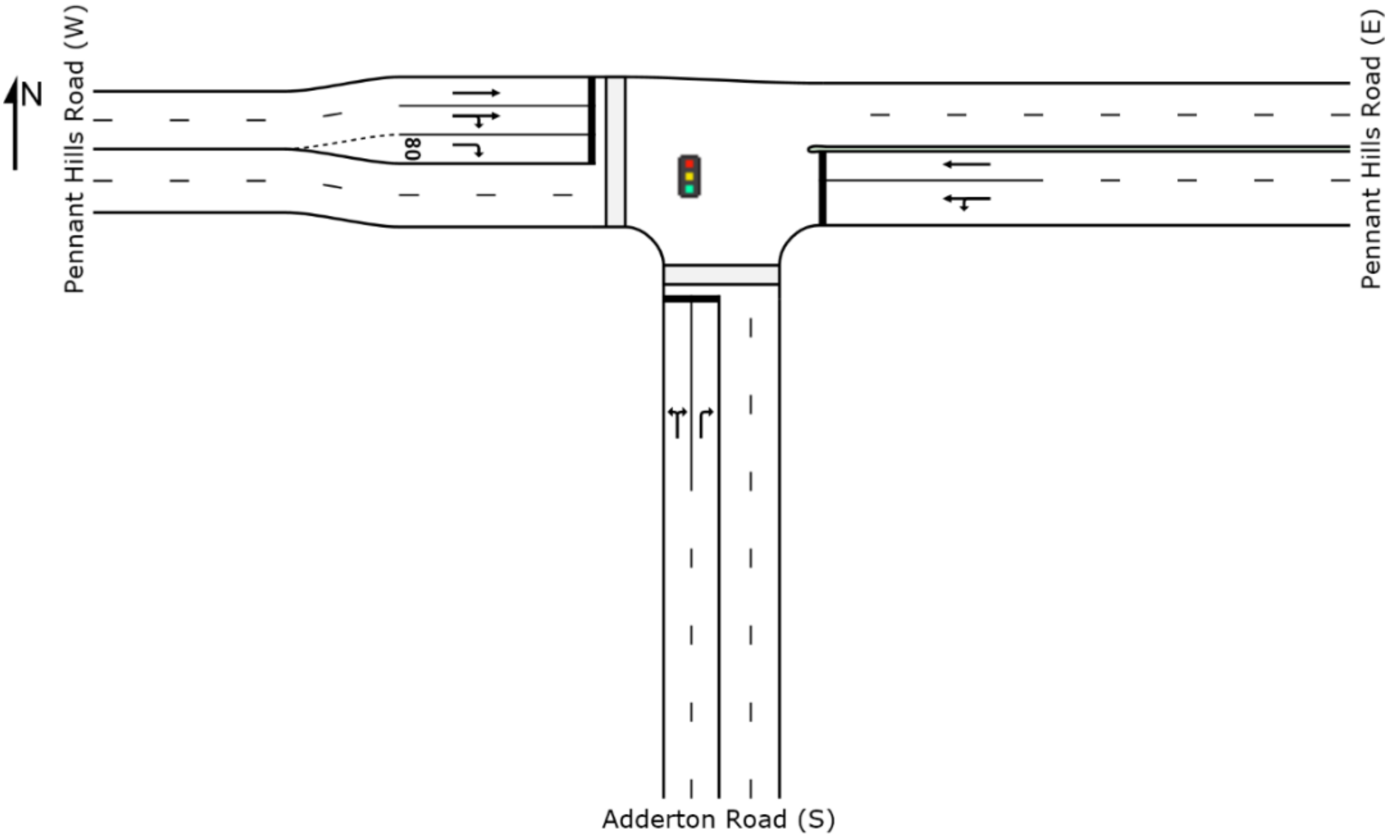
SITE LAYOUT

Site: Pennant Hills Road/ Adderton Road - AM(signal optimisation and extra west RT lane)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: Pennant Hills Road/ Adderton Road - AM(signal optimisation and extra west RT lane)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	238	1.3	0.911	73.9	LOS F	27.5	194.2	1.00	1.00	25.6
3	R2	463	0.9	0.911	75.3	LOS F	27.5	194.2	1.00	1.00	25.4
Approach		701	1.1	0.911	74.9	LOS F	27.5	194.2	1.00	1.00	25.4
East: Pennant Hills Road (E)											
4	L2	488	0.6	0.951	51.8	LOS D	81.5	583.9	0.97	1.03	31.4
5	T1	1726	4.3	0.951	48.5	LOS D	81.5	583.9	0.99	1.07	33.1
Approach		2215	3.5	0.951	49.2	LOS D	81.5	583.9	0.98	1.06	32.7
West: Pennant Hills Road (W)											
11	T1	1129	4.5	0.845	15.3	LOS B	50.5	366.9	0.80	0.75	47.9
12	R2	180	0.6	0.845	79.9	LOS F	7.0	49.3	1.00	0.92	24.8
Approach		1309	3.9	0.845	24.2	LOS B	50.5	366.9	0.83	0.78	42.5
All Vehicles		4225	3.2	0.951	45.7	LOS D	81.5	583.9	0.94	0.96	33.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	5	14.3	LOS B	0.0	0.0	0.47	0.47
P4	West Full Crossing	22	51.8	LOS E	0.1	0.1	0.89	0.89
All Pedestrians		27	44.6	LOS E			0.81	0.81

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: Pennant Hills Road/ Adderton Road - PM(signal optimisation and extra west RT lane)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
1	L2	105	0.0	0.935	80.6	LOS F	28.1	196.6	1.00	1.03	24.5
3	R2	611	0.2	0.935	80.8	LOS F	28.1	196.6	1.00	1.03	24.4
Approach		716	0.1	0.935	80.8	LOS F	28.1	196.6	1.00	1.03	24.4
East: Pennant Hills Road (E)											
4	L2	354	0.3	0.967	69.8	LOS E	74.6	536.4	1.00	1.10	27.3
5	T1	1461	4.9	0.967	66.3	LOS E	74.6	536.4	1.00	1.13	28.5
Approach		1815	4.0	0.967	66.9	LOS E	74.6	536.4	1.00	1.13	28.3
West: Pennant Hills Road (W)											
11	T1	1445	3.5	0.949	44.7	LOS D	87.9	634.0	0.98	1.06	34.5
12	R2	424	0.2	0.949	88.1	LOS F	26.1	186.1	1.00	1.06	23.6
Approach		1869	2.8	0.949	54.5	LOS D	87.9	634.0	0.99	1.06	31.2
All Vehicles		4400	2.8	0.967	63.9	LOS E	87.9	634.0	0.99	1.08	28.7

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	13	22.2	LOS C	0.0	0.0	0.58	0.58
P4	West Full Crossing	9	50.9	LOS E	0.0	0.0	0.88	0.88
All Pedestrians		22	34.5	LOS D			0.71	0.71

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.

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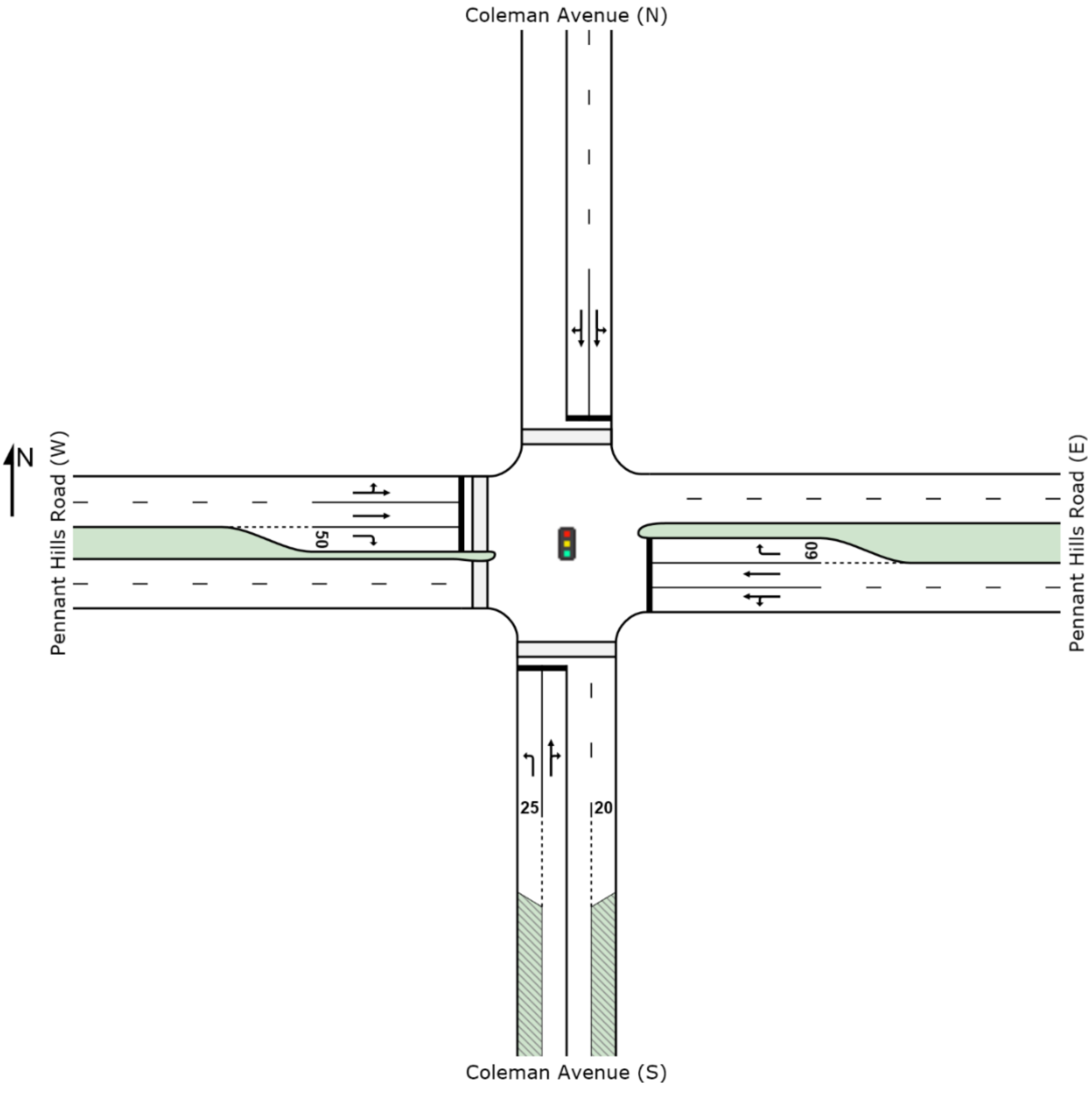
SITE LAYOUT

Site: Pennant Hills Road/ Coleman Avenue - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 2:14:07 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Mitigating Measures rev2
\160309-Telopea Urban Renewal-External-Mit-(745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Pennant Hills Road/ Coleman Avenue - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	211	1.5	0.585	43.1	LOS D	10.5	74.6	0.84	0.78	32.6
2	T1	21	0.0	0.798	55.2	LOS D	11.7	82.6	0.94	0.91	27.7
3	R2	167	0.6	0.798	59.8	LOS E	11.7	82.6	0.94	0.91	28.6
Approach		399	1.1	0.798	50.8	LOS D	11.7	82.6	0.89	0.84	30.6
East: Pennant Hills Road (E)											
4	L2	76	4.2	0.788	25.9	LOS B	42.3	307.9	0.82	0.77	41.3
5	T1	1545	4.6	0.788	18.8	LOS B	42.3	307.9	0.76	0.70	45.7
6	R2	42	0.0	0.381	42.8	LOS D	2.2	15.2	0.79	0.77	33.2
Approach		1663	4.5	0.788	19.7	LOS B	42.3	307.9	0.76	0.71	45.1
North: Coleman Avenue (N)											
7	L2	19	0.0	0.040	38.7	LOS C	1.0	6.8	0.74	0.66	34.2
8	T1	43	0.0	0.177	41.9	LOS C	3.3	23.1	0.83	0.69	31.3
9	R2	25	0.0	0.177	47.0	LOS D	3.3	23.1	0.83	0.69	32.5
Approach		87	0.0	0.177	42.7	LOS D	3.3	23.1	0.81	0.68	32.3
West: Pennant Hills Road (W)											
10	L2	3	0.0	0.667	23.3	LOS B	31.3	233.0	0.72	0.66	42.8
11	T1	1506	7.3	0.667	17.7	LOS B	31.3	233.0	0.71	0.65	46.5
12	R2	1	100.0	0.020	48.7	LOS D	0.1	0.7	0.77	0.64	31.5
Approach		1511	7.3	0.667	17.8	LOS B	31.3	233.0	0.71	0.65	46.5
All Vehicles		3660	5.2	0.798	22.8	LOS B	42.3	307.9	0.76	0.70	43.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	14.3	LOS B	0.0	0.0	0.47	0.47
P3	North Full Crossing	5	13.8	LOS B	0.0	0.0	0.46	0.46
P4	West Full Crossing	61	42.5	LOS E	0.2	0.2	0.81	0.81
All Pedestrians		77	36.7	LOS D			0.74	0.74

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: Pennant Hills Road/ Coleman Avenue - PM(signal optimisation)

16S9023000
Telopea Urban Renewal - Post-Development PM
4:45PM-5:45PM
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Coleman Avenue (S)											
1	L2	100	1.1	0.294	54.2	LOS D	5.5	38.9	0.91	0.77	29.7
2	T1	23	0.0	0.775	62.6	LOS E	9.3	65.8	1.00	0.91	26.2
3	R2	120	0.9	0.775	67.2	LOS E	9.3	65.8	1.00	0.91	27.1
Approach		243	0.9	0.775	61.4	LOS E	9.3	65.8	0.96	0.85	28.0
East: Pennant Hills Road (E)											
4	L2	255	0.8	0.800	18.0	LOS B	44.6	320.8	0.72	0.72	44.9
5	T1	1656	4.0	0.800	10.9	LOS A	44.6	320.8	0.62	0.60	50.5
6	R2	46	0.0	0.365	26.7	LOS B	1.9	13.0	0.62	0.74	38.8
Approach		1957	3.5	0.800	12.2	LOS A	44.6	320.8	0.64	0.62	49.3
North: Coleman Avenue (N)											
7	L2	21	0.0	0.078	51.7	LOS D	1.4	9.8	0.86	0.69	30.6
8	T1	57	3.7	0.344	52.6	LOS D	5.0	35.8	0.92	0.75	28.7
9	R2	36	0.0	0.344	57.7	LOS E	5.0	35.8	0.93	0.75	29.7
Approach		114	1.9	0.344	54.0	LOS D	5.0	35.8	0.91	0.74	29.3
West: Pennant Hills Road (W)											
10	L2	1	0.0	0.585	14.6	LOS B	24.3	174.6	0.52	0.48	47.6
11	T1	1614	3.0	0.585	9.0	LOS A	24.3	174.6	0.52	0.48	52.3
12	R2	1	100.0	0.021	39.2	LOS C	0.0	0.6	0.68	0.65	34.3
Approach		1616	3.1	0.585	9.1	LOS A	24.3	174.6	0.52	0.48	52.2
All Vehicles		3929	3.1	0.800	15.1	LOS B	44.6	320.8	0.62	0.58	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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

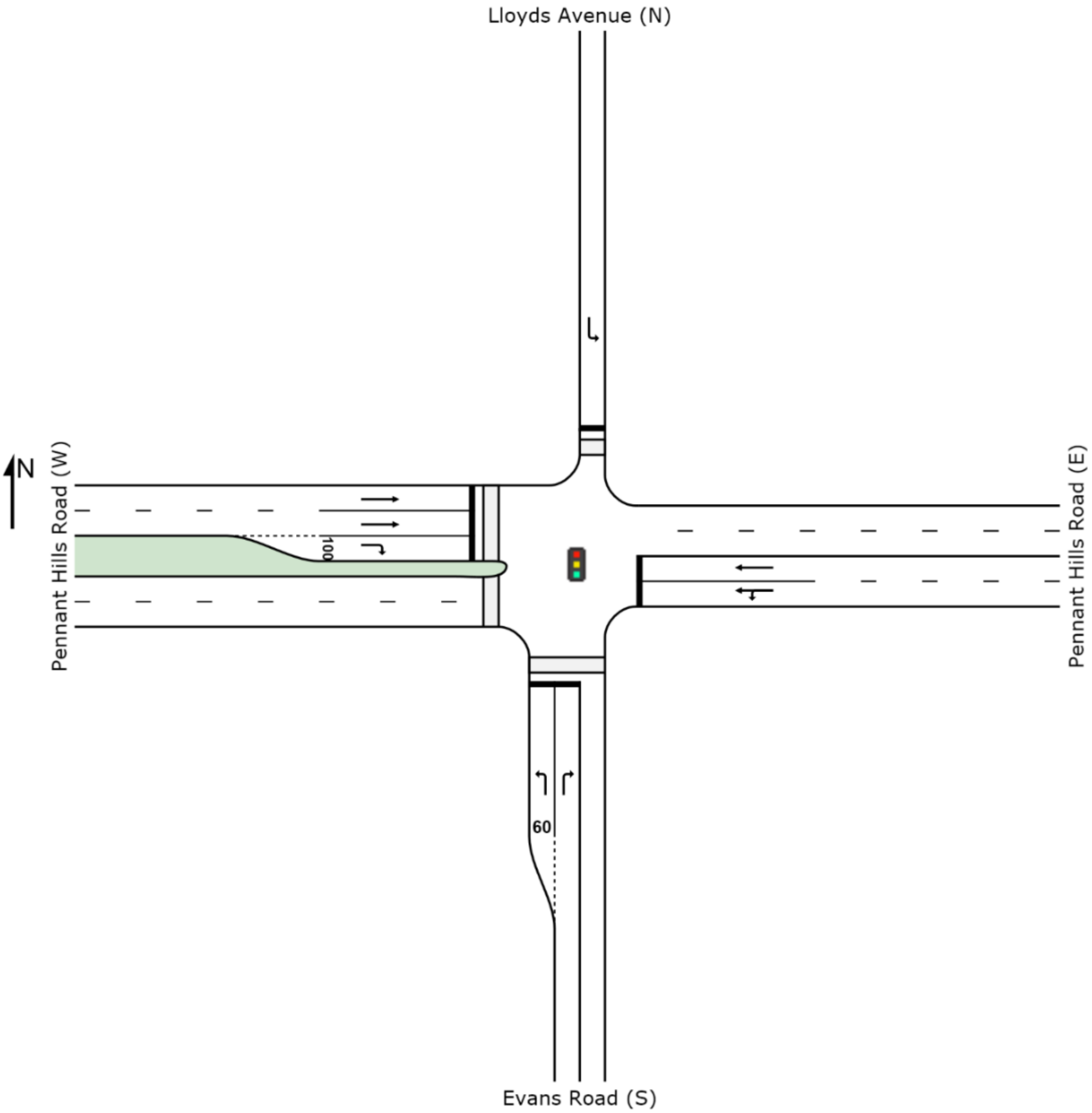
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	33	8.1	LOS A	0.0	0.0	0.35	0.35
P3	North Full Crossing	5	7.8	LOS A	0.0	0.0	0.35	0.35
P4	West Full Crossing	60	55.5	LOS E	0.2	0.2	0.93	0.93
All Pedestrians		98	37.2	LOS D			0.70	0.70

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

SITE LAYOUT

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM(signal construction)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Pennant Hills Road/ Evans Road/ Lloyds Avenue - AM(signal construction)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated   Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	197	1.1	0.375	44.6	LOS D	10.0	70.5	0.85	0.79	32.2
3	R2	148	2.1	0.620	63.7	LOS E	9.2	65.3	1.00	0.81	27.5
Approach		345	1.5	0.620	52.8	LOS D	10.0	70.5	0.91	0.80	30.0
East: Pennant Hills Road (E)											
4	L2	364	1.2	0.743	22.6	LOS B	37.7	271.4	0.75	0.76	42.0
5	T1	1389	5.0	0.743	17.8	LOS B	38.2	278.9	0.76	0.72	45.9
Approach		1754	4.2	0.743	18.8	LOS B	38.2	278.9	0.76	0.73	45.0
North: Lloyds Avenue (N)											
7	L2	108	2.9	0.553	65.9	LOS E	6.8	48.4	0.99	0.79	27.1
Approach		108	2.9	0.553	65.9	LOS E	6.8	48.4	0.99	0.79	27.1
West: Pennant Hills Road (W)											
11	T1	1465	7.2	0.631	16.1	LOS B	28.3	210.5	0.67	0.62	47.5
12	R2	252	2.1	0.771	44.3	LOS D	12.9	92.1	1.00	0.98	32.7
Approach		1717	6.4	0.771	20.2	LOS B	28.3	210.5	0.72	0.67	44.5
All Vehicles		3924	4.9	0.771	23.7	LOS B	38.2	278.9	0.76	0.71	42.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	12.1	LOS B	0.1	0.1	0.43	0.43
P3	North Full Crossing	53	10.0	LOS B	0.1	0.1	0.39	0.39
P4	West Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		158	27.1	LOS C			0.59	0.59

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: Pennant Hills Road/ Evans Road/ Lloyds Avenue - PM(signal construction)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works PM
4:45PM-5:45PM
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	359	0.6	0.787	52.2	LOS D	21.2	149.3	0.95	0.88	30.2
3	R2	135	0.8	0.474	59.6	LOS E	7.9	56.0	0.96	0.80	28.4
Approach		494	0.6	0.787	54.2	LOS D	21.2	149.3	0.95	0.86	29.7
East: Pennant Hills Road (E)											
4	L2	346	1.2	0.745	22.7	LOS B	37.9	272.9	0.75	0.75	42.0
5	T1	1415	4.7	0.745	17.8	LOS B	38.5	280.3	0.76	0.73	45.9
Approach		1761	4.0	0.745	18.8	LOS B	38.5	280.3	0.76	0.73	45.1
North: Lloyds Avenue (N)											
7	L2	53	0.0	0.335	67.2	LOS E	3.3	22.9	0.98	0.75	26.9
Approach		53	0.0	0.335	67.2	LOS E	3.3	22.9	0.98	0.75	26.9
West: Pennant Hills Road (W)											
11	T1	1591	3.1	0.668	16.7	LOS B	31.9	229.6	0.70	0.65	47.1
12	R2	131	0.0	0.515	28.2	LOS B	5.7	40.0	0.94	0.83	38.1
Approach		1721	2.9	0.668	17.6	LOS B	31.9	229.6	0.72	0.66	46.2
All Vehicles		4028	3.1	0.787	23.2	LOS B	38.5	280.3	0.77	0.72	42.5

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

Movement Performance - Pedestrians

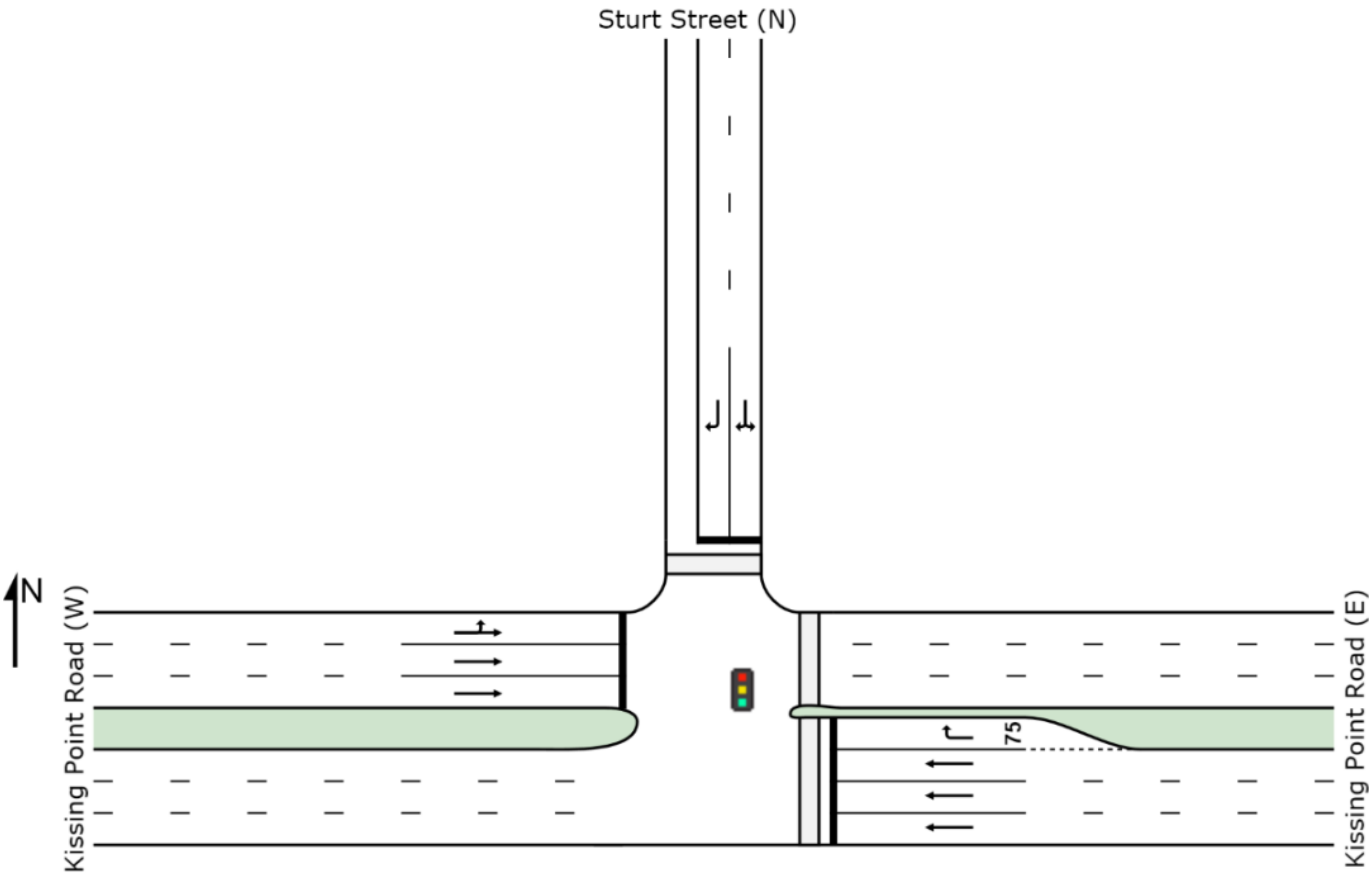
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	12.1	LOS B	0.1	0.1	0.43	0.43
P3	North Full Crossing	53	10.0	LOS B	0.1	0.1	0.39	0.39
P4	West Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		158	27.1	LOS C			0.59	0.59

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

SITE LAYOUT

Site: Kissing Point Road/ Sturt Street - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



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Organisation: GTA CONSULTANTS | Created: Thursday, 21 July 2016 2:57:02 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Mitigating Measures rev2 \160309-Telopea Urban Renewal-External-Mit-(745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Kissing Point Road/ Sturt Street - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1207	2.9	0.400	18.2	LOS B	13.9	100.0	0.65	0.57	51.9
6	R2	226	0.0	0.292	27.8	LOS B	8.8	61.3	0.71	0.86	40.4
Approach		1434	2.4	0.400	19.7	LOS B	13.9	100.0	0.66	0.61	49.7
North: Sturt Street (N)											
7	L2	472	0.4	0.759	40.0	LOS C	27.0	189.9	0.94	0.87	34.6
9	R2	577	1.6	0.759	40.1	LOS C	27.0	189.9	0.94	0.87	34.5
Approach		1048	1.1	0.759	40.1	LOS C	27.0	190.4	0.94	0.87	34.6
West: Kissing Point Road (W)											
10	L2	333	4.4	0.750	30.2	LOS C	33.2	239.5	0.85	0.82	40.6
11	T1	1911	2.6	0.750	23.7	LOS B	34.2	244.7	0.85	0.78	47.7
Approach		2243	2.9	0.750	24.7	LOS B	34.2	244.7	0.85	0.79	46.5
All Vehicles		4725	2.3	0.759	26.6	LOS B	34.2	244.7	0.81	0.75	44.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	27	36.9	LOS D	0.1	0.1	0.78	0.78
P3	North Full Crossing	7	17.1	LOS B	0.0	0.0	0.53	0.53
All Pedestrians		35	32.7	LOS D			0.73	0.73

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

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Organisation: GTA CONSULTANTS | Processed: Thursday, 21 July 2016 2:23:14 PM
Project: P:\16S9000-9099\16S9023000 Telopea Urban Renewal Master Planning Project\Modelling\SIDRA\External Intersections\Mitigating Measures rev2 \160309-Telopea Urban Renewal-External-Mit-(745-845_445-545).sip6

MOVEMENT SUMMARY

Site: Kissing Point Road/ Sturt Street - PM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	2112	1.6	0.673	21.1	LOS B	29.3	208.0	0.78	0.71	49.9
6	R2	597	0.4	0.781	39.0	LOS C	25.0	175.5	0.93	1.04	35.9
Approach		2708	1.3	0.781	25.0	LOS B	29.3	208.0	0.81	0.78	45.9
North: Sturt Street (N)											
7	L2	302	0.3	0.455	36.2	LOS C	13.5	94.7	0.82	0.80	35.9
9	R2	141	4.5	0.219	33.2	LOS C	5.7	41.4	0.74	0.74	36.6
Approach		443	1.7	0.455	35.2	LOS C	13.5	94.7	0.79	0.78	36.1
West: Kissing Point Road (W)											
10	L2	461	1.8	0.614	26.4	LOS B	24.5	173.9	0.74	0.79	41.5
11	T1	1443	1.2	0.614	20.0	LOS B	25.5	180.2	0.74	0.68	50.2
Approach		1904	1.3	0.614	21.6	LOS B	25.5	180.2	0.74	0.71	47.8
All Vehicles		5056	1.4	0.781	24.6	LOS B	29.3	208.0	0.78	0.75	45.5

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

Movement Performance - Pedestrians

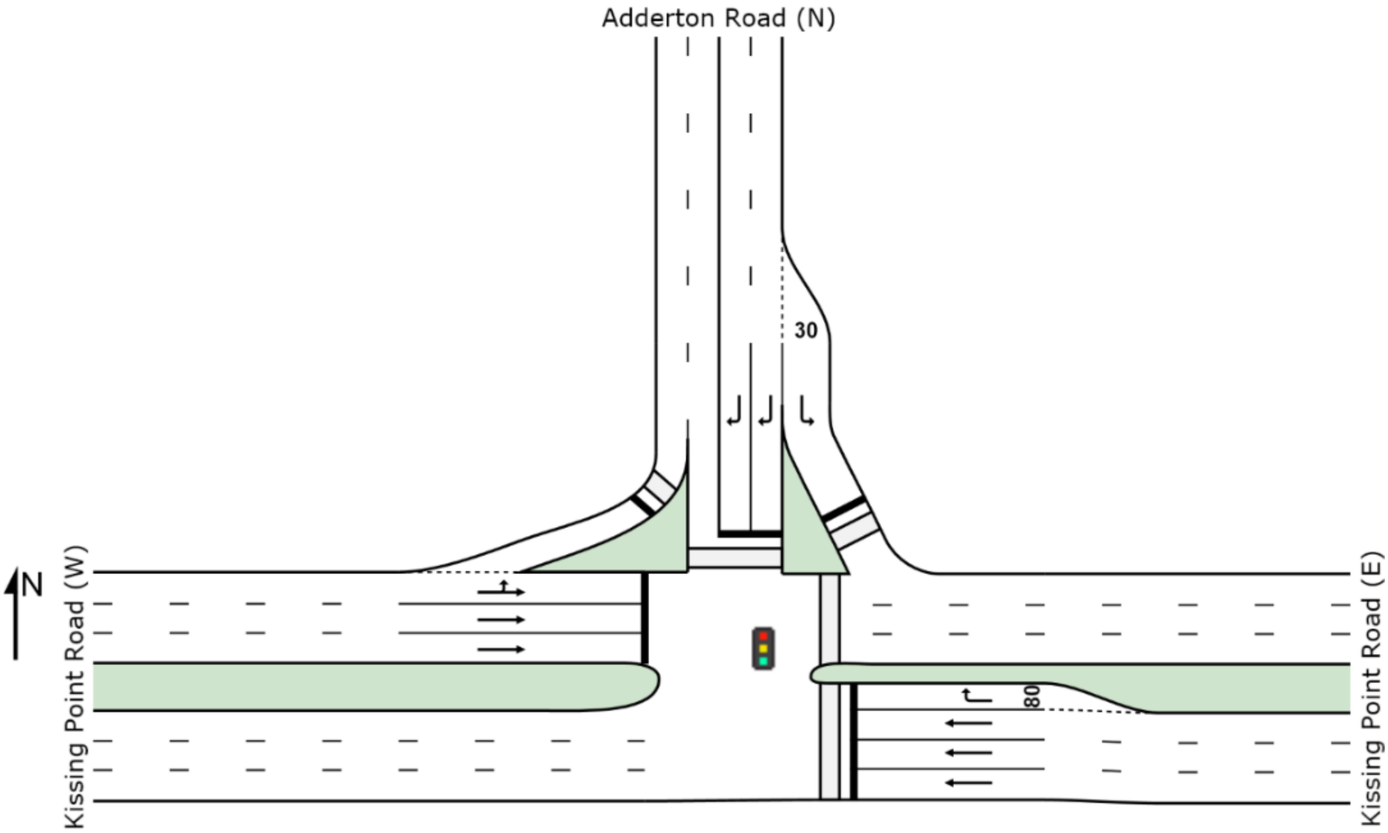
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	38.4	LOS D	0.0	0.0	0.80	0.80
P3	North Full Crossing	5	16.0	LOS B	0.0	0.0	0.52	0.52
All Pedestrians		11	27.2	LOS C			0.66	0.66

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

SITE LAYOUT

Site: Kissing Point Road/ Adderton Road - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Kissing Point Road/ Adderton Road - AM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works AM
7:45AM-8:45AM
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	1647	2.7	0.475	13.7	LOS A	17.5	125.1	0.59	0.53	49.1
6	R2	160	0.7	0.823	69.3	LOS E	10.1	71.4	1.00	0.92	26.9
Approach		1807	2.5	0.823	18.6	LOS B	17.5	125.1	0.63	0.57	45.7
North: Adderton Road (N)											
7	L2	323	1.0	0.530	27.5	LOS B	12.2	86.3	0.70	0.75	38.4
9	R2	755	1.1	0.858	55.6	LOS D	28.5	201.3	0.96	0.94	29.5
Approach		1078	1.1	0.858	47.1	LOS D	28.5	201.3	0.88	0.89	31.7
West: Kissing Point Road (W)											
10	L2	358	2.4	0.852	38.7	LOS C	39.6	284.3	0.96	0.93	36.1
11	T1	1828	3.5	0.852	35.8	LOS C	40.7	293.5	0.96	0.93	37.7
Approach		2186	3.3	0.852	36.3	LOS C	40.7	293.5	0.96	0.93	37.4
All Vehicles		5072	2.5	0.858	32.3	LOS C	40.7	293.5	0.83	0.79	38.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	45.1	LOS E	0.0	0.0	0.87	0.87
P3	North Full Crossing	5	24.1	LOS C	0.0	0.0	0.63	0.63
P3S	North Slip/Bypass Lane Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
P4S	West Slip/Bypass Lane Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
All Pedestrians		21	26.9	LOS C			0.66	0.66

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: Kissing Point Road/ Adderton Road - PM(signal optimisation)

16S9023000
Telopea Urban Renewal - Mitigating and Intersection Works PM
4:45PM-5:45PM
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Kissing Point Road (E)											
5	T1	2038	1.8	0.458	5.0	LOS A	13.6	96.8	0.38	0.35	55.5
6	R2	311	0.7	0.831	61.2	LOS E	19.1	134.7	1.00	0.93	28.6
Approach		2348	1.6	0.831	12.4	LOS A	19.1	134.7	0.46	0.42	49.4
North: Adderton Road (N)											
7	L2	173	0.0	0.223	31.0	LOS C	6.7	47.1	0.71	0.73	37.0
9	R2	333	1.6	0.802	65.2	LOS E	11.4	81.0	1.00	0.91	27.3
Approach		505	1.0	0.802	53.5	LOS D	11.4	81.0	0.90	0.85	30.0
West: Kissing Point Road (W)											
10	L2	738	3.7	0.631	22.5	LOS B	37.9	272.6	0.89	0.86	42.0
11	T1	1427	0.3	0.631	21.5	LOS B	37.9	272.6	0.79	0.72	44.2
Approach		2165	1.5	0.631	21.8	LOS B	37.9	272.6	0.82	0.77	43.4
All Vehicles		5019	1.5	0.831	20.6	LOS B	37.9	272.6	0.66	0.61	43.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	19.3	LOS B	0.0	0.0	0.57	0.57
P3S	North Slip/Bypass Lane Crossing	5	15.0	LOS B	0.0	0.0	0.50	0.50
P4S	West Slip/Bypass Lane Crossing	5	15.0	LOS B	0.0	0.0	0.50	0.50
All Pedestrians		21	25.9	LOS C			0.63	0.63

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

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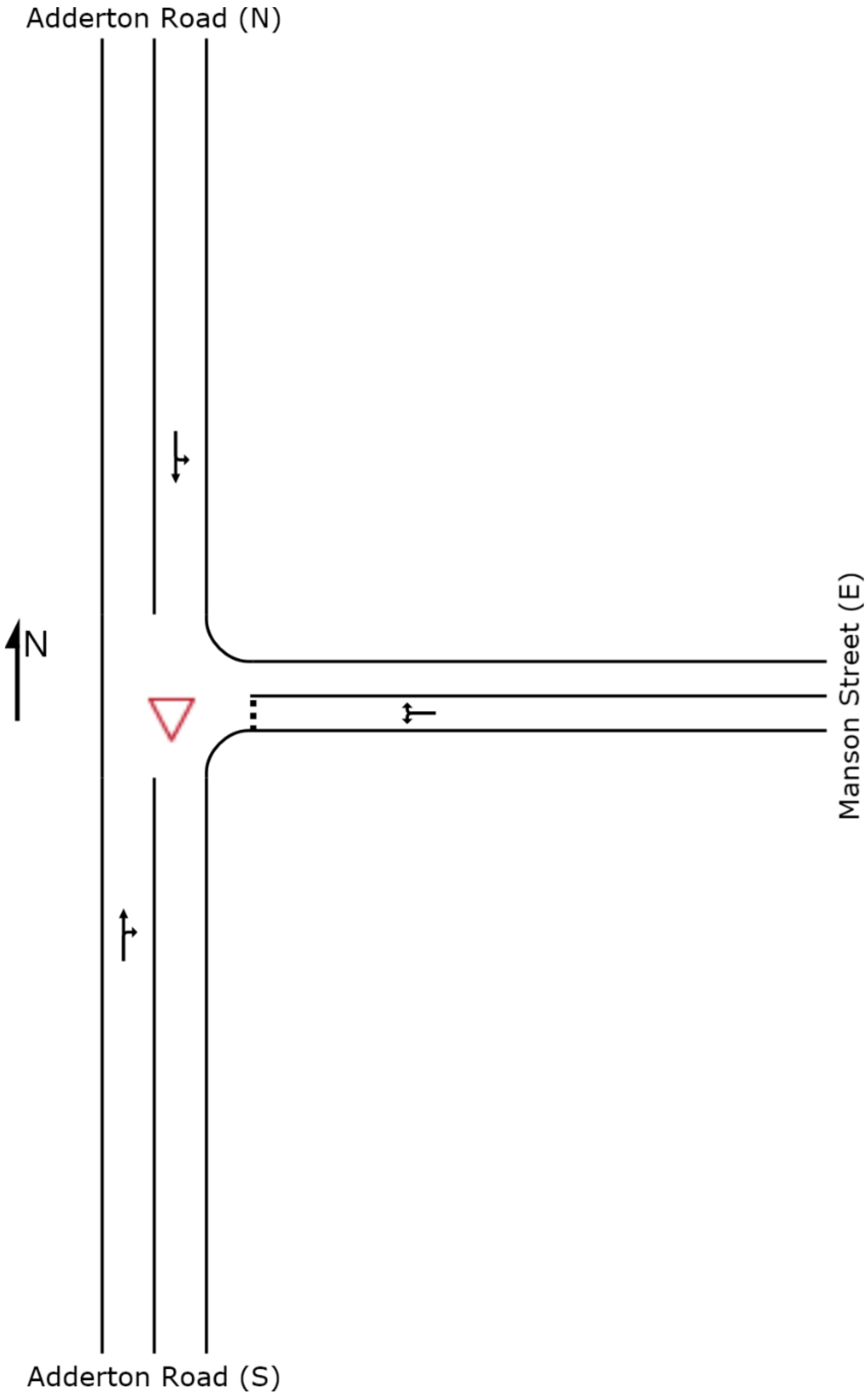
SITE LAYOUT

▽ Site: Adderton Road/ Manson Street - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	411	0.3	0.495	8.9	LOS A	5.2	36.4	0.74	0.23	43.5
3	R2	125	3.4	0.495	17.9	LOS B	5.2	36.4	0.74	0.23	41.9
Approach		536	1.0	0.495	11.0	NA	5.2	36.4	0.74	0.23	43.1
East: Manson Street (E)											
4	L2	118	0.9	0.541	13.5	LOS A	2.4	16.8	0.84	1.08	37.7
6	R2	65	3.2	0.541	30.3	LOS C	2.4	16.8	0.84	1.08	37.6
Approach		183	1.7	0.541	19.5	LOS B	2.4	16.8	0.84	1.08	37.7
North: Adderton Road (N)											
7	L2	255	0.8	0.495	4.6	LOS A	0.0	0.0	0.00	0.13	48.4
8	T1	773	1.8	0.495	0.1	LOS A	0.0	0.0	0.00	0.13	49.1
Approach		1027	1.5	0.495	1.2	NA	0.0	0.0	0.00	0.13	49.0
All Vehicles		1746	1.4	0.541	6.1	NA	5.2	36.4	0.32	0.26	45.8

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Adderton Road/ Manson Street - PM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 PM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

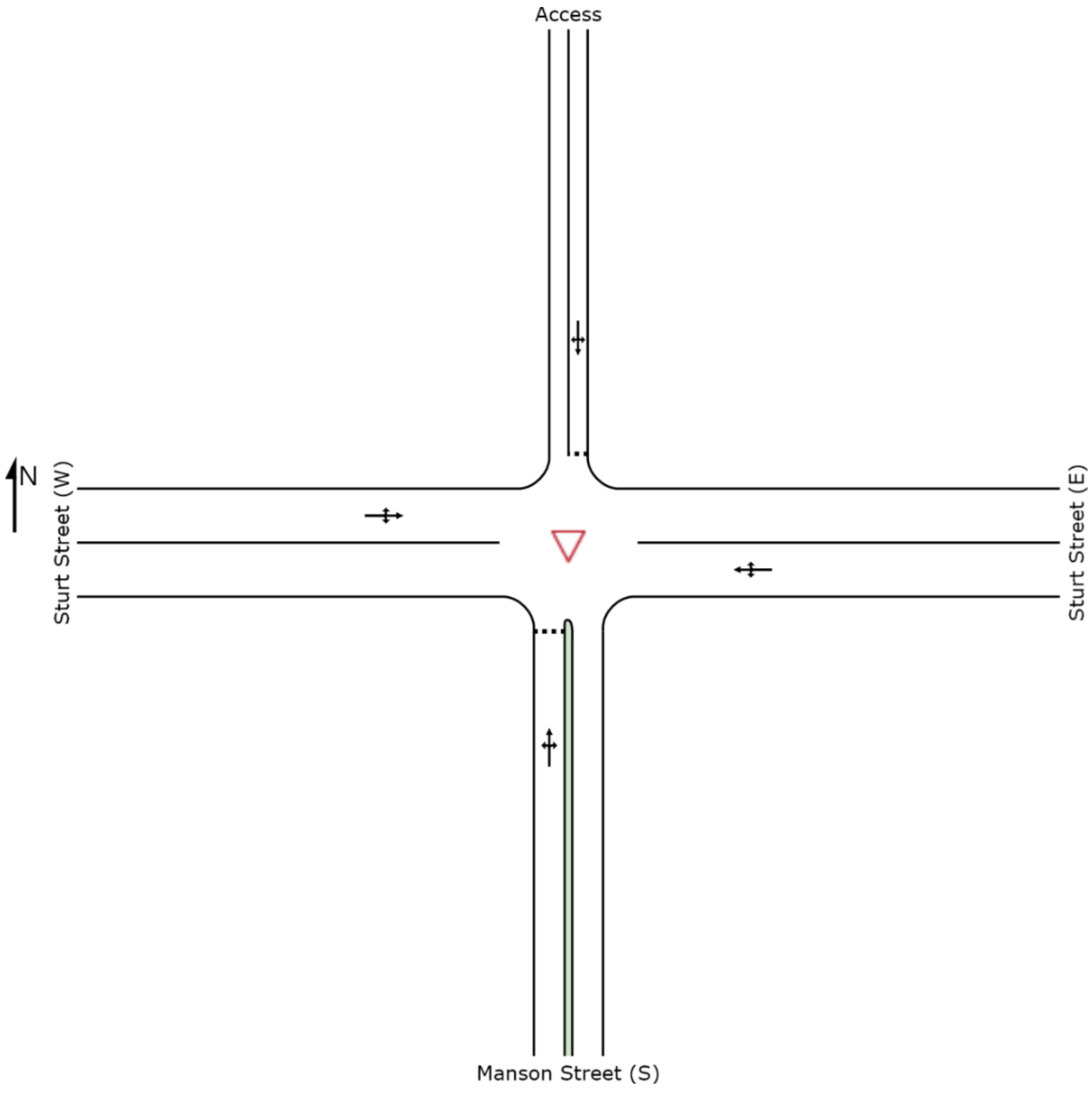
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	832	0.3	0.469	0.6	LOS A	1.7	11.8	0.17	0.06	49.1
3	R2	88	0.0	0.469	7.7	LOS A	1.7	11.8	0.17	0.06	48.2
Approach		920	0.2	0.469	1.3	NA	1.7	11.8	0.17	0.06	49.0
East: Manson Street (E)											
4	L2	49	0.0	0.517	9.9	LOS A	2.1	14.9	0.77	0.99	37.5
6	R2	112	0.0	0.517	24.4	LOS C	2.1	14.9	0.77	0.99	37.4
Approach		161	0.0	0.517	20.0	LOS C	2.1	14.9	0.77	0.99	37.4
North: Adderton Road (N)											
7	L2	87	0.0	0.205	4.6	LOS A	0.0	0.0	0.00	0.11	48.7
8	T1	341	0.9	0.205	0.0	LOS A	0.0	0.0	0.00	0.11	49.3
Approach		428	0.7	0.205	0.9	NA	0.0	0.0	0.00	0.11	49.2
All Vehicles		1509	0.3	0.517	3.2	NA	2.1	14.9	0.19	0.17	47.7

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: Sturt Street/ Manson Street/ Community Centre Access - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	35	3.0	0.423	3.6	LOS A	2.1	14.6	0.30	0.51	38.2
2	T1	7	0.0	0.423	3.6	LOS A	2.1	14.6	0.30	0.51	38.5
3	R2	373	1.7	0.423	4.6	LOS A	2.1	14.6	0.30	0.51	38.3
Approach		415	1.8	0.423	4.5	LOS A	2.1	14.6	0.30	0.51	38.3
East: Sturt Street (E)											
4	L2	85	3.7	0.060	5.6	LOS A	0.0	0.1	0.01	0.43	54.5
5	T1	31	17.2	0.060	0.0	LOS A	0.0	0.1	0.01	0.43	56.1
6	R2	1	0.0	0.060	5.8	LOS A	0.0	0.1	0.01	0.43	54.7
Approach		117	7.2	0.060	4.1	NA	0.0	0.1	0.01	0.43	54.9
North: Access											
7	L2	9	0.0	0.012	5.7	LOS A	0.0	0.3	0.14	0.53	53.4
8	T1	5	0.0	0.012	5.5	LOS A	0.0	0.3	0.14	0.53	53.9
9	R2	1	0.0	0.012	6.3	LOS A	0.0	0.3	0.14	0.53	53.5
Approach		16	0.0	0.012	5.7	LOS A	0.0	0.3	0.14	0.53	53.6
West: Sturt Street (W)											
10	L2	31	0.0	0.054	5.7	LOS A	0.2	1.2	0.13	0.27	55.2
11	T1	51	10.4	0.054	0.1	LOS A	0.2	1.2	0.13	0.27	56.7
12	R2	22	0.0	0.054	5.9	LOS A	0.2	1.2	0.13	0.27	55.5
Approach		103	5.1	0.054	3.0	NA	0.2	1.2	0.13	0.27	56.0
All Vehicles		651	3.2	0.423	4.2	NA	2.1	14.6	0.21	0.46	43.1

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 PM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

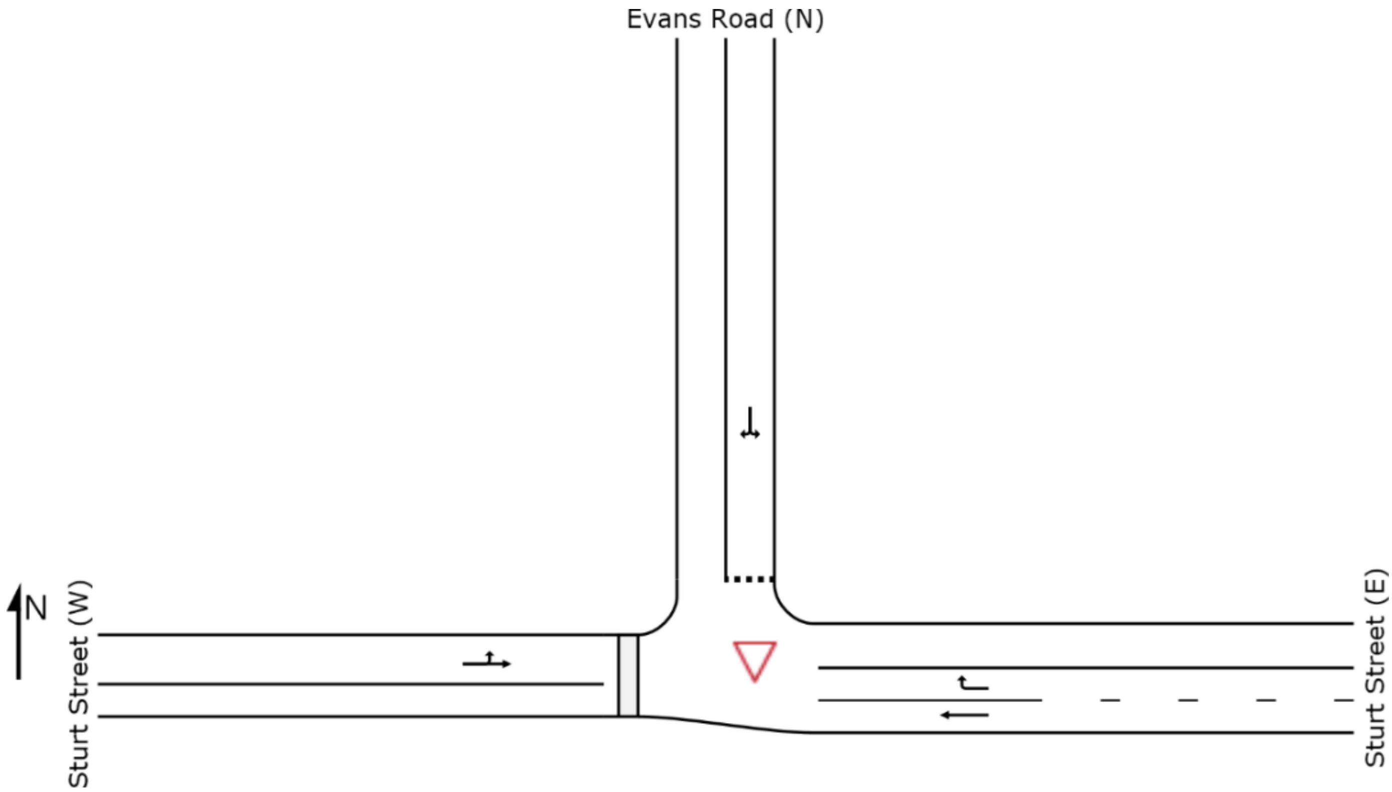
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	24	0.0	0.078	4.7	LOS A	0.3	1.9	0.20	0.52	46.2
2	T1	5	0.0	0.078	4.5	LOS A	0.3	1.9	0.20	0.52	46.5
3	R2	53	0.0	0.078	5.6	LOS A	0.3	1.9	0.20	0.52	46.3
Approach		82	0.0	0.078	5.3	LOS A	0.3	1.9	0.20	0.52	46.3
East: Sturt Street (E)											
4	L2	141	0.0	0.105	5.6	LOS A	0.1	0.6	0.02	0.41	54.8
5	T1	60	8.8	0.105	0.0	LOS A	0.1	0.6	0.02	0.41	56.2
6	R2	9	0.0	0.105	5.7	LOS A	0.1	0.6	0.02	0.41	54.8
Approach		211	2.5	0.105	4.0	NA	0.1	0.6	0.02	0.41	55.2
North: Access											
7	L2	6	0.0	0.018	5.6	LOS A	0.1	0.4	0.13	0.54	53.4
8	T1	7	0.0	0.018	5.8	LOS A	0.1	0.4	0.13	0.54	53.9
9	R2	6	0.0	0.018	6.2	LOS A	0.1	0.4	0.13	0.54	53.4
Approach		20	0.0	0.018	5.9	LOS A	0.1	0.4	0.13	0.54	53.6
West: Sturt Street (W)											
10	L2	1	0.0	0.026	6.1	LOS A	0.1	0.7	0.19	0.18	55.9
11	T1	33	16.1	0.026	0.3	LOS A	0.1	0.7	0.19	0.18	57.4
12	R2	14	0.0	0.026	6.2	LOS A	0.1	0.7	0.19	0.18	56.1
Approach		47	11.1	0.026	2.1	NA	0.1	0.7	0.19	0.18	57.0
All Vehicles		360	2.9	0.105	4.1	NA	0.3	1.9	0.09	0.41	53.0

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Sturt Street/ Evans Road - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

▽ Site: Sturt Street/ Evans Road - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	122	7.8	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
6	R2	402	1.3	0.338	5.6	LOS A	1.9	13.2	0.54	0.69	37.8
Approach		524	2.8	0.338	4.3	NA	1.9	13.2	0.42	0.53	38.3
North: Evans Road (N)											
7	L2	388	3.0	0.442	4.5	LOS A	2.8	20.1	0.35	0.55	37.6
9	R2	71	1.5	0.442	14.7	LOS B	2.8	20.1	0.35	0.55	37.6
Approach		459	2.8	0.442	6.1	LOS A	2.8	20.1	0.35	0.55	37.6
West: Sturt Street (W)											
10	L2	267	0.8	0.202	3.4	LOS A	0.0	0.0	0.00	0.30	39.2
11	T1	141	6.0	0.202	0.0	LOS A	0.0	0.0	0.00	0.30	39.0
Approach		408	2.6	0.202	2.3	NA	0.0	0.0	0.00	0.30	39.1
All Vehicles		1392	2.7	0.442	4.3	NA	2.8	20.1	0.27	0.47	38.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Evans Road - PM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 PM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

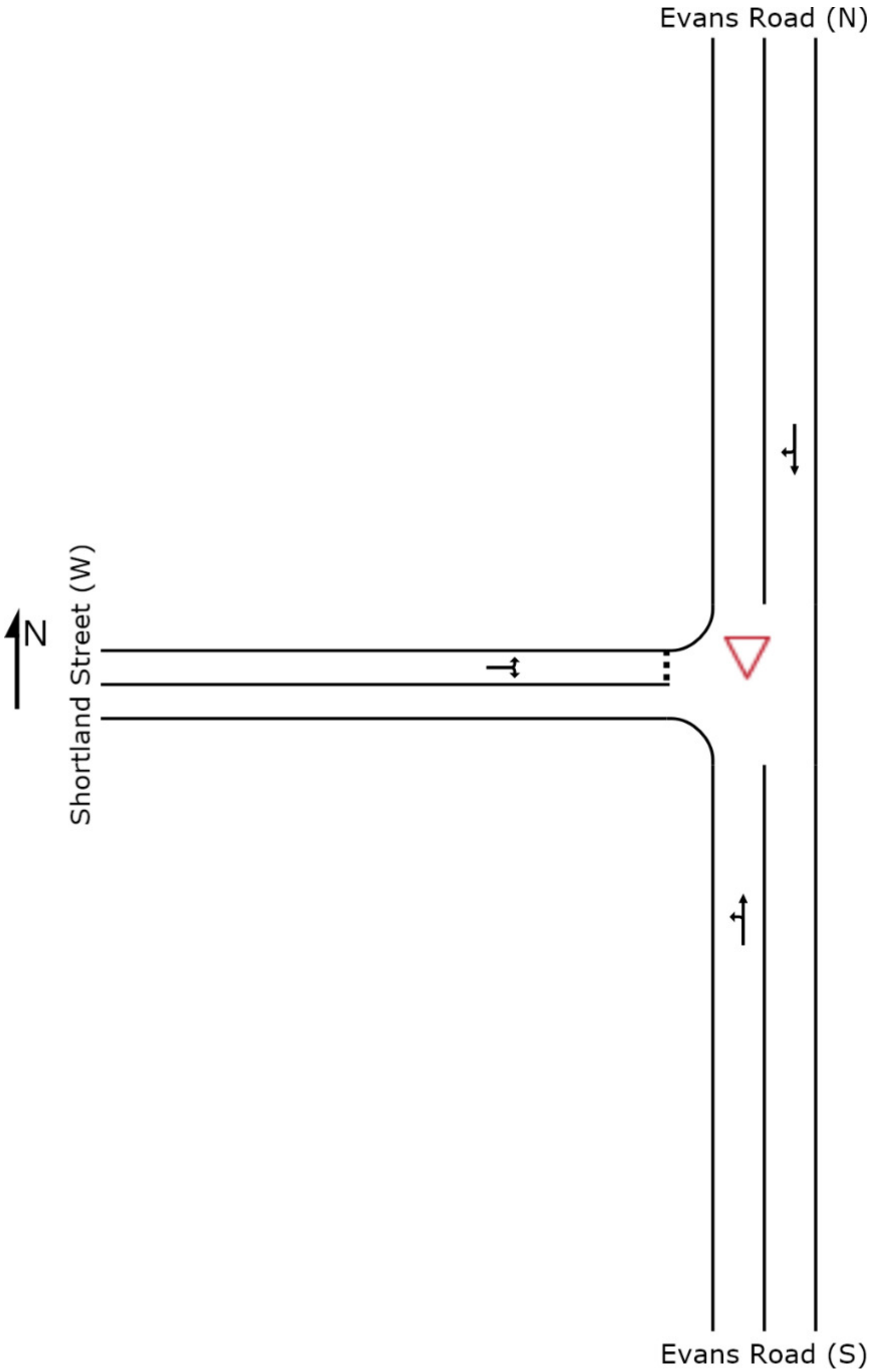
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	209	3.5	0.110	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	204	1.0	0.125	4.9	LOS A	0.6	4.3	0.22	0.51	46.0
Approach		414	2.3	0.125	2.4	NA	0.6	4.3	0.11	0.25	48.0
North: Evans Road (N)											
7	L2	183	1.7	0.230	4.8	LOS A	1.0	7.2	0.19	0.54	45.8
9	R2	73	0.0	0.230	8.7	LOS A	1.0	7.2	0.19	0.54	45.7
Approach		256	1.2	0.230	5.9	LOS A	1.0	7.2	0.19	0.54	45.8
West: Sturt Street (W)											
10	L2	28	0.0	0.049	4.6	LOS A	0.0	0.0	0.00	0.16	48.6
11	T1	71	9.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.16	49.1
Approach		99	6.4	0.049	1.3	NA	0.0	0.0	0.00	0.16	48.9
All Vehicles		768	2.5	0.230	3.5	NA	1.0	7.2	0.12	0.33	47.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Evans Road/ Shortland Street - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - AM 0-5 Years

16S9023000
Telopea Urban Renewal - 0-5 AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	18	11.8	0.314	4.7	LOS A	0.0	0.0	0.00	0.01	49.2
2	T1	643	0.7	0.314	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		661	1.0	0.314	0.2	NA	0.0	0.0	0.00	0.01	49.9
North: Evans Road (N)											
8	T1	345	2.1	0.204	0.8	LOS A	0.5	3.8	0.15	0.04	49.1
9	R2	25	25.0	0.204	9.9	LOS A	0.5	3.8	0.15	0.04	48.0
Approach		371	3.7	0.204	1.5	NA	0.5	3.8	0.15	0.04	49.0
West: Shortland Street (W)											
10	L2	71	13.4	0.283	9.0	LOS A	1.1	8.2	0.69	0.90	42.7
12	R2	68	7.7	0.283	14.2	LOS B	1.1	8.2	0.69	0.90	42.6
Approach		139	10.6	0.283	11.6	LOS B	1.1	8.2	0.69	0.90	42.6
All Vehicles		1171	3.0	0.314	1.9	NA	1.1	8.2	0.13	0.13	48.6

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - PM (Ex)

16S9023000
Telopea Urban Renewal - 0-5 PM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

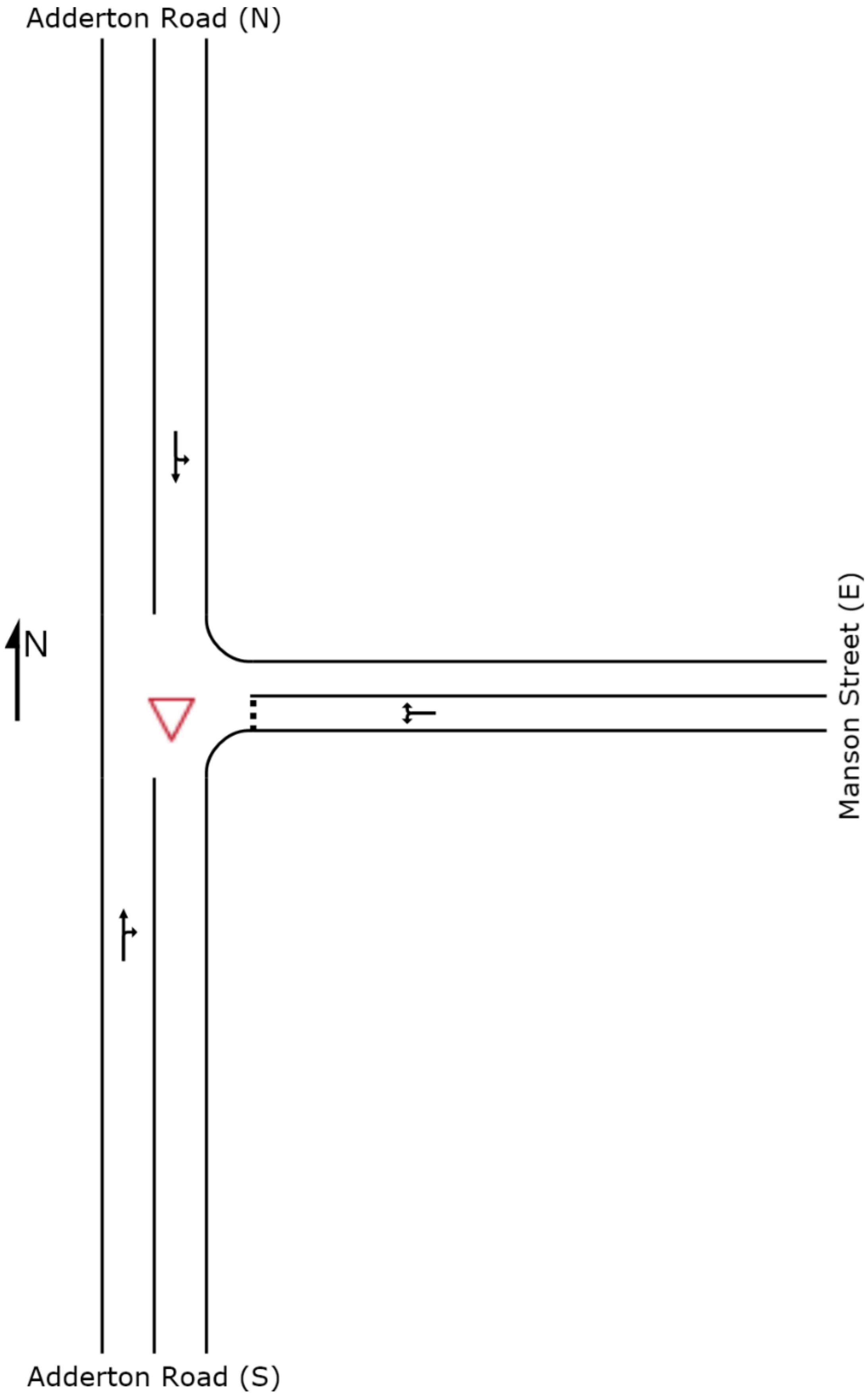
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	28	0.0	0.095	4.6	LOS A	0.0	0.0	0.00	0.08	49.1
2	T1	173	0.0	0.095	0.0	LOS A	0.0	0.0	0.00	0.08	49.6
Approach		201	0.0	0.095	0.7	NA	0.0	0.0	0.00	0.08	49.5
North: Evans Road (N)											
8	T1	174	1.8	0.102	0.2	LOS A	0.2	1.4	0.09	0.06	49.5
9	R2	21	30.0	0.102	5.7	LOS A	0.2	1.4	0.09	0.06	48.3
Approach		195	4.9	0.102	0.8	NA	0.2	1.4	0.09	0.06	49.4
West: Shortland Street (W)											
10	L2	63	13.3	0.139	5.3	LOS A	0.5	3.8	0.32	0.59	45.7
12	R2	82	0.0	0.139	6.2	LOS A	0.5	3.8	0.32	0.59	45.7
Approach		145	5.8	0.139	5.9	LOS A	0.5	3.8	0.32	0.59	45.7
All Vehicles		541	3.3	0.139	2.1	NA	0.5	3.8	0.12	0.21	48.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Adderton Road/ Manson Street - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)



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Project: P:\16S1600-1699\16S1627000 LaHCR Ad Hoc Traffic and Transport Advice\Modelling\Post Development\160309-Telopea Urban Renewal-Internal - 0-15 Years.sip6

MOVEMENT SUMMARY

▽ Site: Adderton Road/ Manson Street - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	443	0.2	0.496	8.4	LOS A	5.2	36.5	0.71	0.21	43.7
3	R2	119	3.5	0.496	18.0	LOS B	5.2	36.5	0.71	0.21	42.2
Approach		562	0.9	0.496	10.4	NA	5.2	36.5	0.71	0.21	43.4
East: Manson Street (E)											
4	L2	129	0.8	0.685	17.7	LOS B	3.5	24.5	0.88	1.21	35.4
6	R2	85	2.5	0.685	35.8	LOS C	3.5	24.5	0.88	1.21	35.3
Approach		215	1.5	0.685	24.9	LOS B	3.5	24.5	0.88	1.21	35.4
North: Adderton Road (N)											
7	L2	255	0.8	0.495	4.6	LOS A	0.0	0.0	0.00	0.13	48.4
8	T1	773	1.8	0.495	0.1	LOS A	0.0	0.0	0.00	0.13	49.1
Approach		1027	1.5	0.495	1.2	NA	0.0	0.0	0.00	0.13	49.0
All Vehicles		1804	1.3	0.685	6.9	NA	5.2	36.5	0.33	0.28	45.3

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Adderton Road/ Manson Street - PM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years PM
Adderton Road/ Manson Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

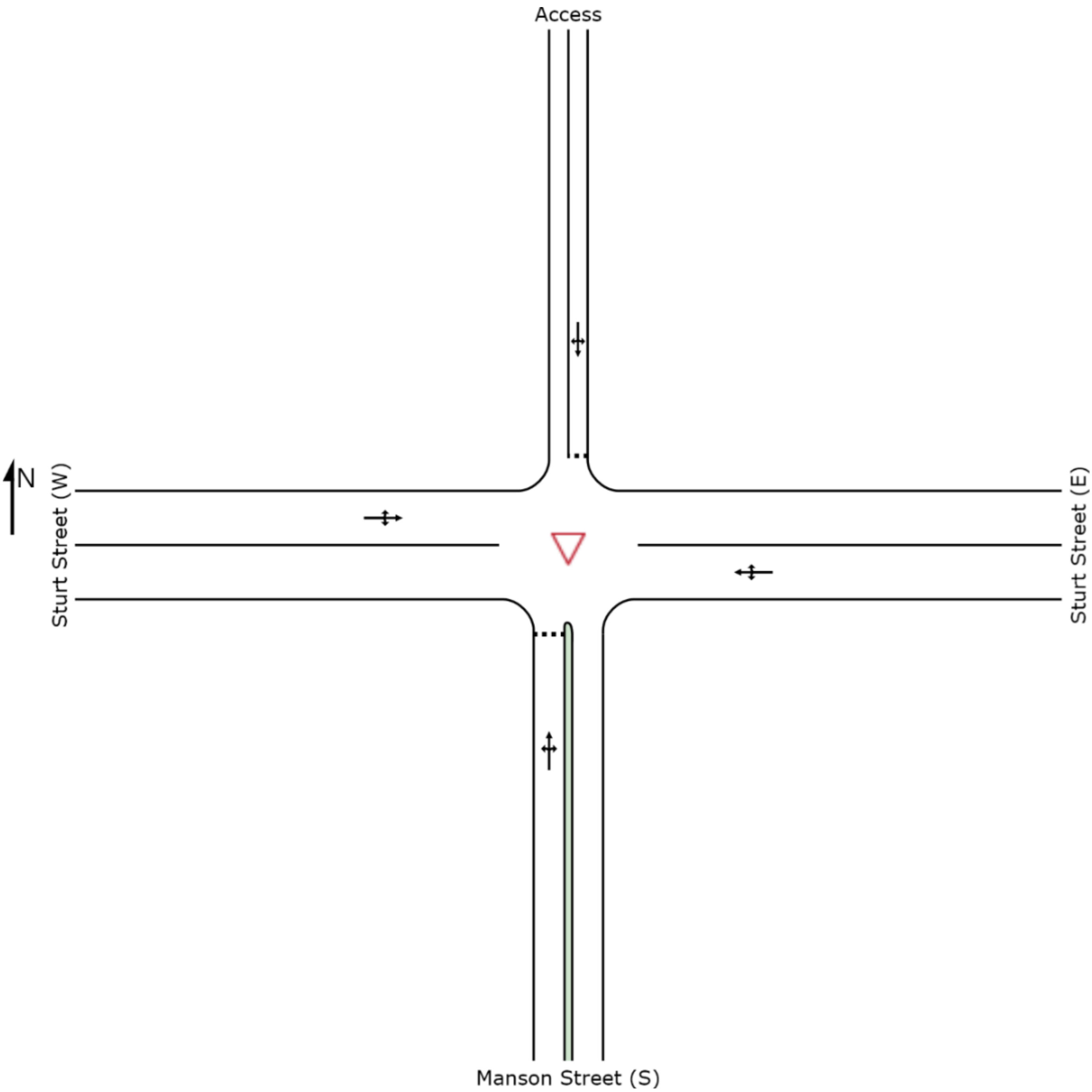
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Adderton Road (S)											
2	T1	863	0.2	0.483	0.7	LOS A	1.7	12.0	0.17	0.06	49.1
3	R2	83	0.0	0.483	8.1	LOS A	1.7	12.0	0.17	0.06	48.2
Approach		946	0.2	0.483	1.3	NA	1.7	12.0	0.17	0.06	49.0
East: Manson Street (E)											
4	L2	43	0.0	0.574	12.0	LOS B	2.4	16.7	0.82	1.05	35.8
6	R2	112	0.0	0.574	28.5	LOS D	2.4	16.7	0.82	1.05	35.7
Approach		155	0.0	0.574	23.9	LOS C	2.4	16.7	0.82	1.05	35.7
North: Adderton Road (N)											
7	L2	83	0.0	0.221	4.6	LOS A	0.0	0.0	0.00	0.10	48.8
8	T1	380	0.8	0.221	0.0	LOS A	0.0	0.0	0.00	0.10	49.4
Approach		463	0.7	0.221	0.8	NA	0.0	0.0	0.00	0.10	49.3
All Vehicles		1564	0.3	0.574	3.4	NA	2.4	16.7	0.18	0.17	47.6

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Sturt Street/ Manson Street/ Community Centre Access - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: Sturt Street/ Manson Street/ Community Centre Access - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	35	3.0	0.534	4.8	LOS A	3.9	27.4	0.47	0.75	37.2
2	T1	3	0.0	0.534	5.3	LOS A	3.9	27.4	0.47	0.75	37.5
3	R2	405	1.6	0.534	7.3	LOS A	3.9	27.4	0.47	0.75	37.4
Approach		443	1.7	0.534	7.1	LOS A	3.9	27.4	0.47	0.75	37.3
East: Sturt Street (E)											
4	L2	95	3.3	0.087	5.6	LOS A	0.1	0.7	0.04	0.35	55.0
5	T1	65	8.1	0.087	0.1	LOS A	0.1	0.7	0.04	0.35	56.6
6	R2	11	0.0	0.087	5.9	LOS A	0.1	0.7	0.04	0.35	55.2
Approach		171	4.9	0.087	3.5	NA	0.1	0.7	0.04	0.35	55.6
North: Access											
7	L2	42	0.0	0.110	5.9	LOS A	0.4	2.9	0.26	0.57	52.9
8	T1	29	0.0	0.110	6.1	LOS A	0.4	2.9	0.26	0.57	53.4
9	R2	46	0.0	0.110	6.9	LOS A	0.4	2.9	0.26	0.57	53.0
Approach		118	0.0	0.110	6.3	LOS A	0.4	2.9	0.26	0.57	53.1
West: Sturt Street (W)											
10	L2	2	0.0	0.066	6.0	LOS A	0.2	1.1	0.11	0.11	56.9
11	T1	104	5.1	0.066	0.1	LOS A	0.2	1.1	0.11	0.11	58.5
12	R2	22	0.0	0.066	6.1	LOS A	0.2	1.1	0.11	0.11	57.1
Approach		128	4.1	0.066	1.3	NA	0.2	1.1	0.11	0.11	58.2
All Vehicles		860	2.4	0.534	5.4	NA	3.9	27.4	0.31	0.55	44.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Manson Street/ Community Centre Access - PM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years PM
Sturt Street/ Manson Street/ Access
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

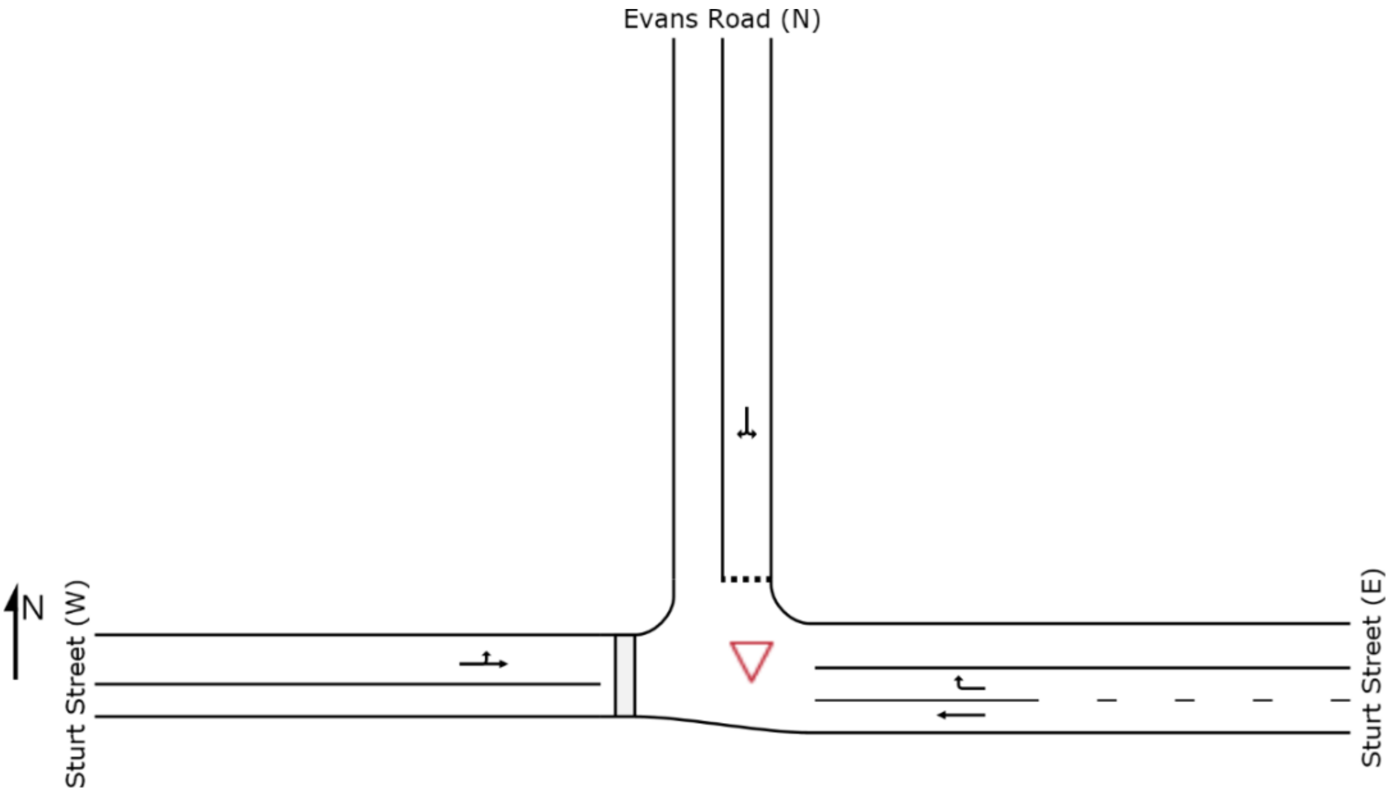
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Manson Street (S)											
1	L2	24	0.0	0.137	5.1	LOS A	0.5	3.5	0.39	0.62	45.6
2	T1	29	0.0	0.137	5.9	LOS A	0.5	3.5	0.39	0.62	46.0
3	R2	62	0.0	0.137	7.1	LOS A	0.5	3.5	0.39	0.62	45.8
Approach		116	0.0	0.137	6.4	LOS A	0.5	3.5	0.39	0.62	45.8
East: Sturt Street (E)											
4	L2	125	0.0	0.168	5.7	LOS A	0.4	2.9	0.11	0.27	55.4
5	T1	164	3.2	0.168	0.2	LOS A	0.4	2.9	0.11	0.27	56.9
6	R2	42	0.0	0.168	6.1	LOS A	0.4	2.9	0.11	0.27	55.5
Approach		332	1.6	0.168	3.0	NA	0.4	2.9	0.11	0.27	56.2
North: Access											
7	L2	16	0.0	0.017	5.8	LOS A	0.1	0.4	0.20	0.54	53.1
8	T1	3	0.0	0.017	6.9	LOS A	0.1	0.4	0.20	0.54	53.6
9	R2	2	0.0	0.017	7.7	LOS A	0.1	0.4	0.20	0.54	53.1
Approach		21	0.0	0.017	6.2	LOS A	0.1	0.4	0.20	0.54	53.2
West: Sturt Street (W)											
10	L2	46	0.0	0.084	5.8	LOS A	0.1	1.1	0.11	0.20	56.1
11	T1	105	5.0	0.084	0.2	LOS A	0.1	1.1	0.11	0.20	57.6
12	R2	14	0.0	0.084	6.6	LOS A	0.1	1.1	0.11	0.20	56.3
Approach		165	3.2	0.084	2.3	NA	0.1	1.1	0.11	0.20	57.1
All Vehicles		634	1.7	0.168	3.5	NA	0.5	3.5	0.16	0.32	54.0

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: Sturt Street/ Evans Road - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

▽ Site: Sturt Street/ Evans Road - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	177	5.4	0.094	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
6	R2	394	1.3	0.380	6.7	LOS A	2.3	16.1	0.61	0.83	37.3
Approach		571	2.6	0.380	4.6	NA	2.3	16.1	0.42	0.57	38.1
North: Evans Road (N)											
7	L2	354	3.3	0.565	7.0	LOS A	4.9	34.8	0.51	0.81	36.2
9	R2	101	1.0	0.565	20.2	LOS C	4.9	34.8	0.51	0.81	36.1
Approach		455	2.8	0.565	9.9	LOS A	4.9	34.8	0.51	0.81	36.2
West: Sturt Street (W)											
10	L2	295	0.7	0.256	3.4	LOS A	0.0	0.0	0.00	0.26	39.3
11	T1	226	3.7	0.256	0.0	LOS A	0.0	0.0	0.00	0.26	39.1
Approach		521	2.0	0.256	2.0	NA	0.0	0.0	0.00	0.26	39.2
All Vehicles		1546	2.5	0.565	5.3	NA	4.9	34.8	0.31	0.54	37.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sturt Street/ Evans Road - PM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years PM
Sturt Street/ Evans Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

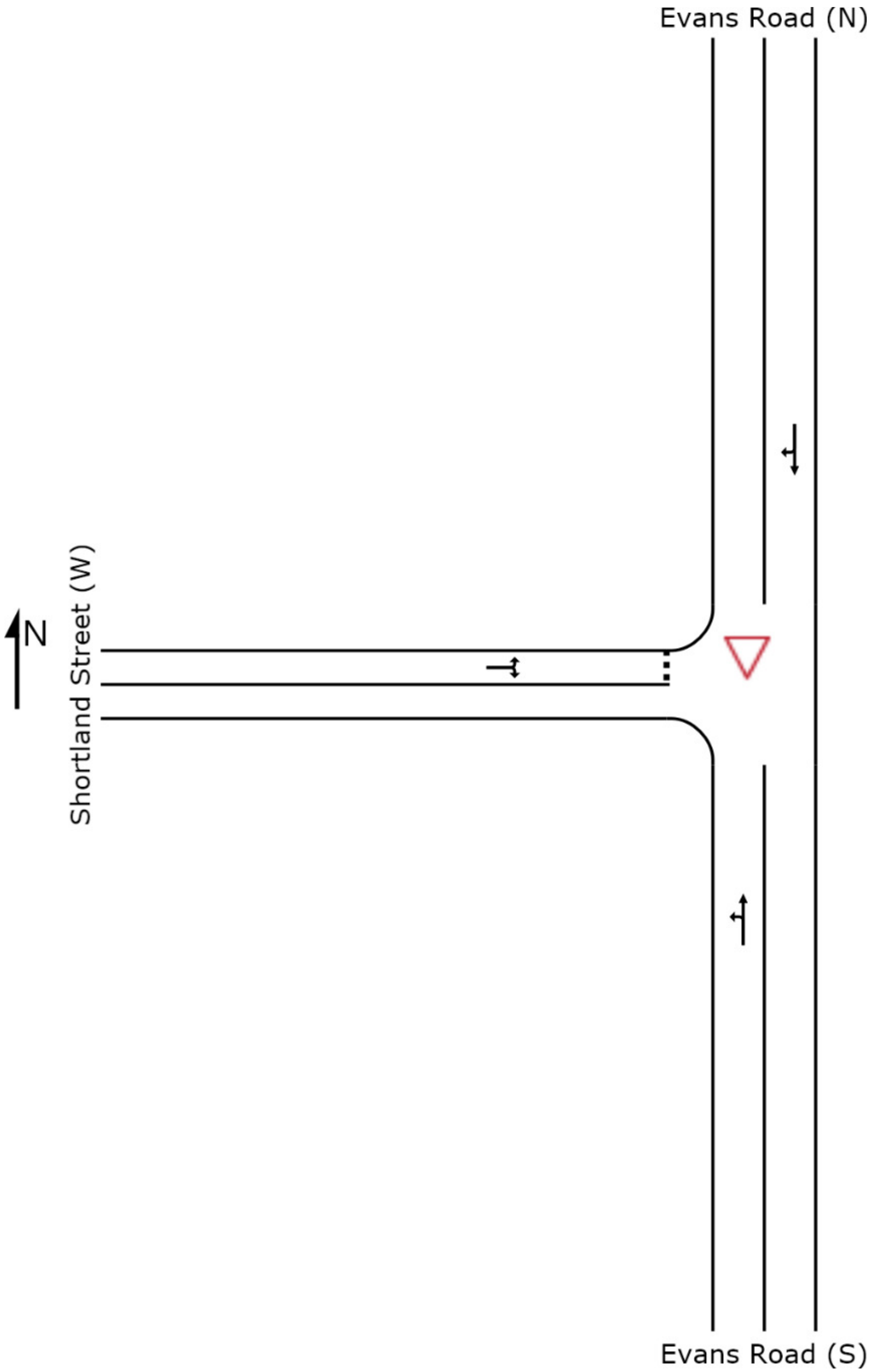
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Sturt Street (E)											
5	T1	320	2.3	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	169	1.2	0.114	5.3	LOS A	0.5	3.8	0.32	0.54	45.8
Approach		489	1.9	0.167	1.8	NA	0.5	3.8	0.11	0.19	48.4
North: Evans Road (N)											
7	L2	175	1.8	0.356	5.4	LOS A	1.8	13.0	0.36	0.63	44.7
9	R2	125	0.0	0.356	11.4	LOS B	1.8	13.0	0.36	0.63	44.6
Approach		300	1.1	0.356	7.9	LOS A	1.8	13.0	0.36	0.63	44.7
West: Sturt Street (W)											
10	L2	65	0.0	0.096	4.6	LOS A	0.0	0.0	0.00	0.18	48.5
11	T1	132	4.8	0.096	0.0	LOS A	0.0	0.0	0.00	0.18	48.9
Approach		197	3.2	0.096	1.5	NA	0.0	0.0	0.00	0.18	48.8
All Vehicles		986	1.9	0.356	3.6	NA	1.8	13.0	0.17	0.32	47.3

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: Evans Road/ Shortland Street - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - AM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years AM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	18	11.8	0.305	4.7	LOS A	0.0	0.0	0.00	0.02	49.2
2	T1	624	0.7	0.305	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		642	1.0	0.305	0.2	NA	0.0	0.0	0.00	0.02	49.9
North: Evans Road (N)											
8	T1	334	2.2	0.205	0.9	LOS A	0.6	4.4	0.18	0.05	48.9
9	R2	33	19.4	0.205	9.3	LOS A	0.6	4.4	0.18	0.05	47.9
Approach		366	3.7	0.205	1.7	NA	0.6	4.4	0.18	0.05	48.8
West: Shortland Street (W)											
10	L2	97	9.8	0.304	8.8	LOS A	1.2	9.2	0.67	0.89	43.0
12	R2	68	7.7	0.304	14.0	LOS B	1.2	9.2	0.67	0.89	42.9
Approach		165	8.9	0.304	10.9	LOS B	1.2	9.2	0.67	0.89	43.0
All Vehicles		1174	3.0	0.305	2.1	NA	1.2	9.2	0.15	0.15	48.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Evans Road/ Shortland Street - PM 0-15 Years

16S9023000
Telopea Urban Renewal - 0-15 Years PM
Evans Road/ Shortland Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Evans Road (S)											
1	L2	28	0.0	0.093	4.6	LOS A	0.0	0.0	0.00	0.08	49.1
2	T1	167	0.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.08	49.5
Approach		196	0.0	0.093	0.7	NA	0.0	0.0	0.00	0.08	49.5
North: Evans Road (N)											
8	T1	180	1.8	0.122	0.3	LOS A	0.4	2.7	0.16	0.11	49.0
9	R2	47	13.3	0.122	5.5	LOS A	0.4	2.7	0.16	0.11	48.1
Approach		227	4.2	0.122	1.3	NA	0.4	2.7	0.16	0.11	48.8
West: Shortland Street (W)											
10	L2	71	11.9	0.146	5.3	LOS A	0.5	4.0	0.32	0.59	45.7
12	R2	82	0.0	0.146	6.4	LOS A	0.5	4.0	0.32	0.59	45.7
Approach		153	5.5	0.146	5.9	LOS A	0.5	4.0	0.32	0.59	45.7
All Vehicles		576	3.1	0.146	2.3	NA	0.5	4.0	0.15	0.23	48.1

Level of Service (LOS) Method: Delay (HCM 2000).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D

Traffic Generation

Telopea Urban Renewal

Traffic Generation Calculation - 2036 Yields (provided 3 June 2016)

Block ID	New dwellings (2036)	Existing dwellings to remain	Total dwellings (2036)	Existing dwellings	New total dwellings (2036)	New LD dwelling	New MD dwellings	New HD dwellings	RMS Guide 2002 Rates			Net Traffic Generation Resulting from Development
									LD	MD	HD	
1	27	0	27	27	0	0			0.85			0
2	78	49	127	25	102	102			0.85			87
3	302	6	308	25	283			283			0.29	82
4	200	21	221	38	183			183			0.29	53
5	300	1	301	18	283			283			0.29	82
6	124	5	129	70	59			59			0.29	17
7	454	90	544	71	473		95	378		0.65	0.29	171
9	368	0	368	25	343			343			0.29	99
11	68	1	69	46	23	23			0.85			20
13	317	0	317	84	233		117	117		0.65	0.29	110
14	349	0	349	20	329			329			0.29	95
15	500	3	503	91	412		41	371		0.65	0.29	134
16	61	0	61	47	14	14			0.85			12
17	290	7	297	39	258			258			0.29	75
18	36	21	57	28	29	29			0.85			25
19	562	158	720	89	631			631			0.29	183
20	127	2	129	58	71	71			0.85			60
Core (8,10,12)	1,527	0	1,527	278	1,249			1,249			0.29	362
Total	**5,690**	**364**	**6,054**	**1,079**	**4,975**							**1667**

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