



Reference: 21.321r01v04

10 March 2022

ACT Government
C/- Hill Thalys Architecture + Urban Projects Pty Ltd
Level 5, 68-72 Wentworth Avenue
SURRY HILLS NSW 2010

Attention: Mr Ian Wood-Bradley,

**Re: Whitlam Centre ACT
Traffic Engineering Consultant Services – Traffic Engineering Advice**

Dear Ian,

As you are aware, TRAFFIX has been commissioned to assess the traffic impacts associated with the proposed Whitlam Local Centre, an urban concept design for a new street-based mixed-use neighbourhood centre located in Molonglo Valley, within the Australian Capital Territory (ACT). The proposed concept is an amendment to the existing Stage 3 – Whitlam Estate development. Reference should be made to the *Whitlam Stage 3 – Traffic Impact Assessment* prepared separately by Calibre for more information on the Stage 3 Whitlam Estate development.

This Statement documents our preliminary findings in relation to proposed and amended intersection layouts in relation to the subject Whitlam Centre precinct. The Statement is based on the concept plan presented in **Attachment 1**, together with the future traffic volumes which were adopted from the Calibre Report for Stage 3.

► Site and Location

The study precinct is located approximately 10.0 kilometres west of Canberra CBD, 5.0 kilometres south of Belconnen Town centre and 8.0 kilometres northwest of Parliament House, Canberra. More specifically, the Whitlam estate is lies west of the John Gorton Drive, between William Hovell Drive and Molonglo River.

Reference should be made to the concept plans presented in **Attachment 1**. A Location Plan showing the Precinct is presented in **Figure 1**, with a Site Plan presented in **Figure 2**.

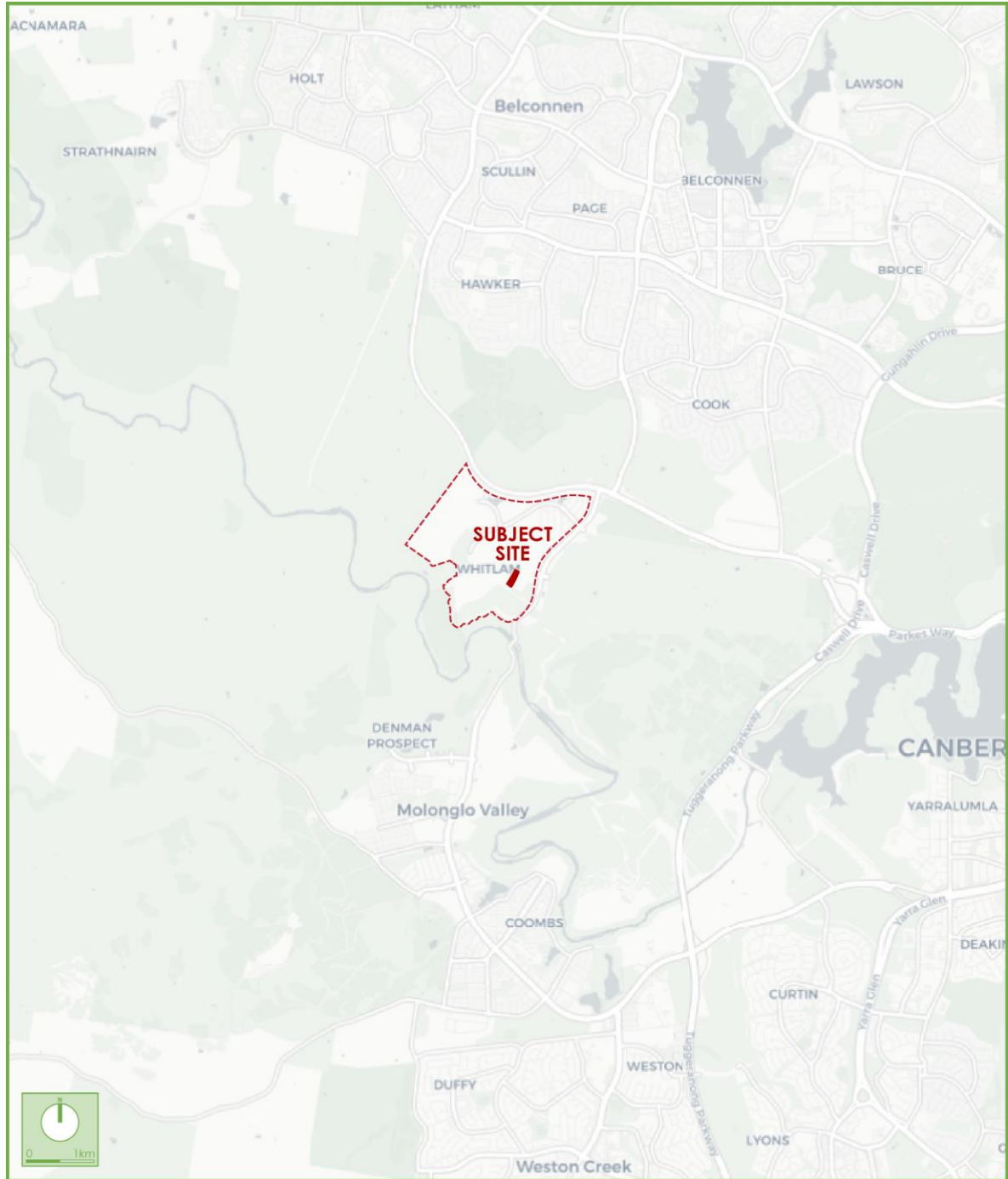


Figure 1: Location Plan

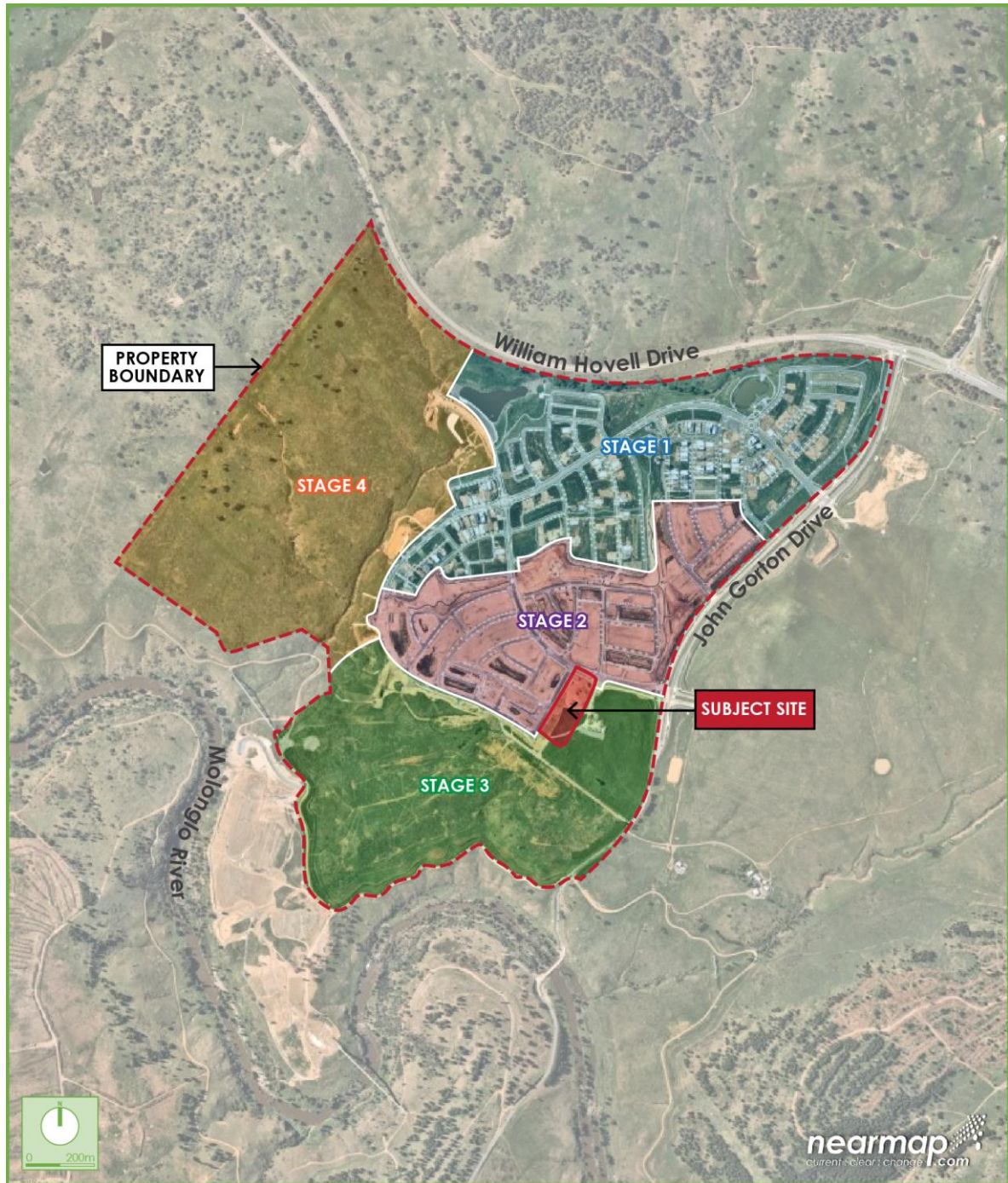


Figure 2: Precinct Stages and Site Plan



Existing Conditions

Road Hierarchy

The road hierarchy in the vicinity of the site is described below with the following roads of particular interest in relation to this assessment. Reference should be made to the Calibre Report prepared separately for a detailed description of the internal road hierarchy within the wider Whitlam Estate:

- John Gorton Drive: (Formerly Coppins Crossing Road) a sub-arterial road that generally traverses north-south between William Hovell Drive in the north and Cotter Road in the south. Within the vicinity of the site, John Gorton Drive is subject to a speed limit of 80km/h and accommodates two lanes of traffic in each direction within a divided carriageway. On-street parking is not permitted on either side of John Gorton Drive in the vicinity of the subject site area.
- Sculthorpe Avenue (Road 01): a future collector road within Whitlam Estate that will generally traverse east-west between John Gorton Drive in the east and the wider future Whitlam Estate internal road network in the west. Within the vicinity of the site, Road 03 is expected to be subject to a speed limit of 60km/h and will accommodate a single lane of traffic in each direction within a central median divided carriageway. On-street parking will not be permitted on either side of Road 01 in the vicinity of the subject site.
- Hazel Hawke Avenue (Road 03): a future collector road within Whitlam Estate that will generally traverse east-west between John Gorton Drive in the east and the wider future Whitlam Estate internal road network in the west. Within the vicinity of the site, Road 03 is expected to be subject to a speed limit of 60km/h and accommodates a single lane of traffic in each direction within a divided carriageway separated by a central median. On-street parking is will generally not be permitted on either side of Road 03 in the vicinity of the subject site.
- Alice Moyle Way (Road 53): a future local road that will generally traverse north-south between Road 03 in the north and Road 01 in the south. Within the vicinity of the site, Road 53 is expected to be subject to a speed limit of 40km/h High Pedestrian Activity Area (HPAA) and will accommodate a single lane of traffic in each direction within a divided carriageway separated by 90-degree parking spaces within a central median which will be accessible to vehicles travelling in each direction. Kerbside parallel parking is expected to be provided along both sides of Road 53 along the majority of its length.

It can be seen from **Figure 3** below that John Gorton Drive forms the main arterial road adjacent to the Precinct area providing a connection to the surrounding regional road network.

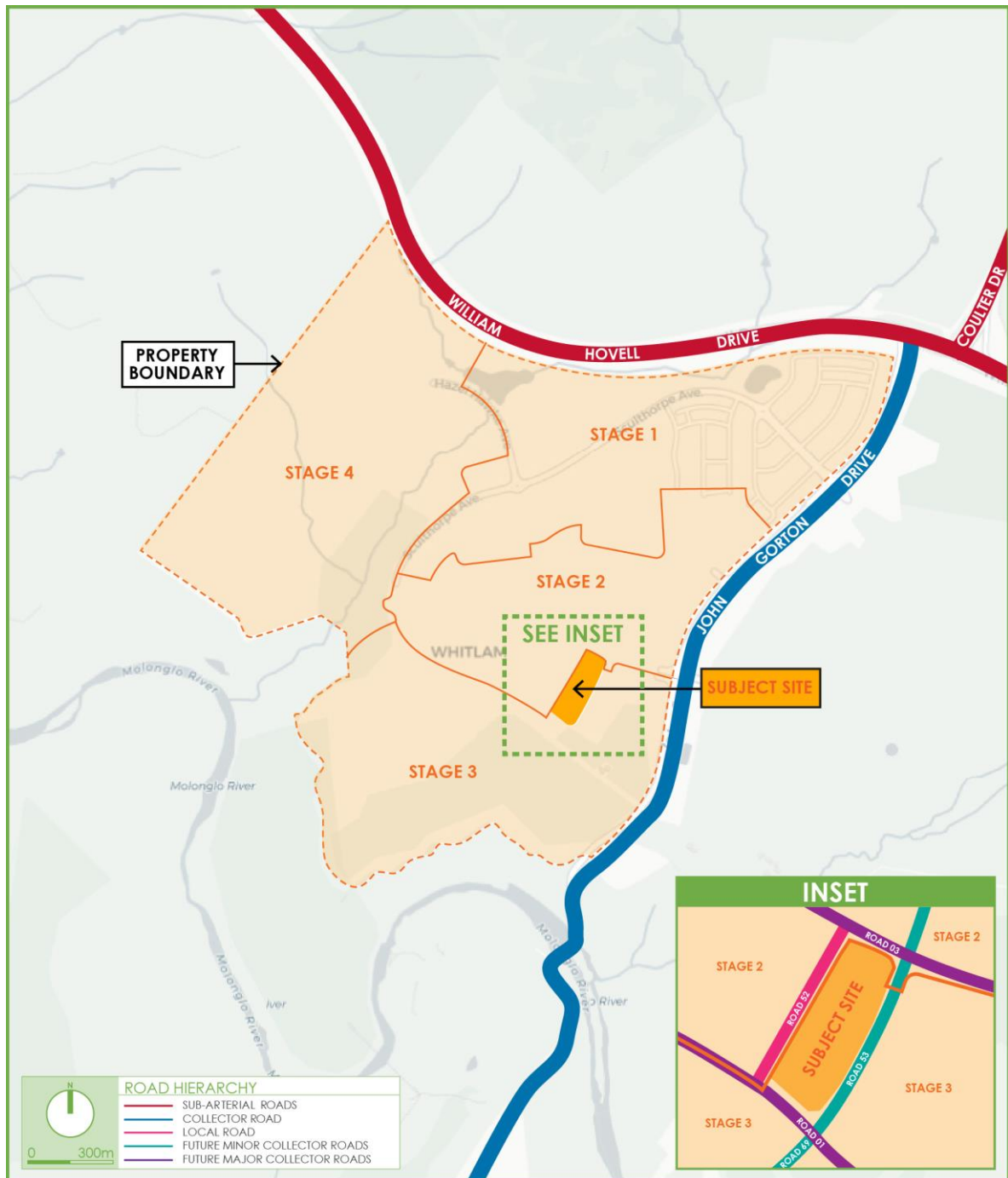


Figure 3: Road Hierarchy



► Proposed Works

This report addresses proposed changes to the Whitlam Local Centre and adjacent primary school / childcare centre which forms part of Stage 3 – Whitlam Estate Development, comprising the following:

- Whitlam Local Centre (located on the western side of Road 53) providing the following:
 - Residential development consisting of approximately 215 units
 - Ground floor retail development
 - Supermarket
 - Medical centre
 - Gym
 - Day-care
 - Basement car parking
- Changes to the proposed Childcare Centre / Primary School access roads comprising two (2) left in/ left out access driveways via Road 03 (northern access road) and Road 01 (southern access road) with a proposal to connect the two accesses via an internal roadway connecting with primary school staff and childcare parking and associated pick up / drop off facilities.
- Removal of the Local Centre basement carparking access driveway via Road 53 as proposed in the Calibre Report and relocation of this access via the proposed one-way northbound rear access laneway.
- Removal of the primary school access via Road 53 as proposed in the Calibre Report.
- Removal of the proposed childcare vehicular access via Road 53 (main street) immediately south of the intersection of Road 03 / Road 53 / Road 27.

Reference should be made to the proposed Concept Plans provided in **Attachment 1** showing the amended access arrangements to the childcare and primary school with respect to the surrounding road network.

► Intersection Layouts Based on Calibre Report

Reference should be made to the Calibre Report prepared separately showing the intersection layouts for all key intersections within Whitlam Estate. This report assesses the impacts of changes to the following intersections, which are also detailed in the Calibre Report:

► Childcare Centre Access / Road 03:

Intersection approaches are summarised as follows:

- Road 03 (East) – this approach provides a single lane permitting through and left turn movements
- Road 03 (West) – this approach provides two through lanes and one right turn bay of length 10.0 metres.
- Northern Access Road (South) – this approach will provide a single lane permitting left and right turn movements.

The currently proposed intersection arrangement outlined in the Calibre Report is shown in **Figure 4** below.

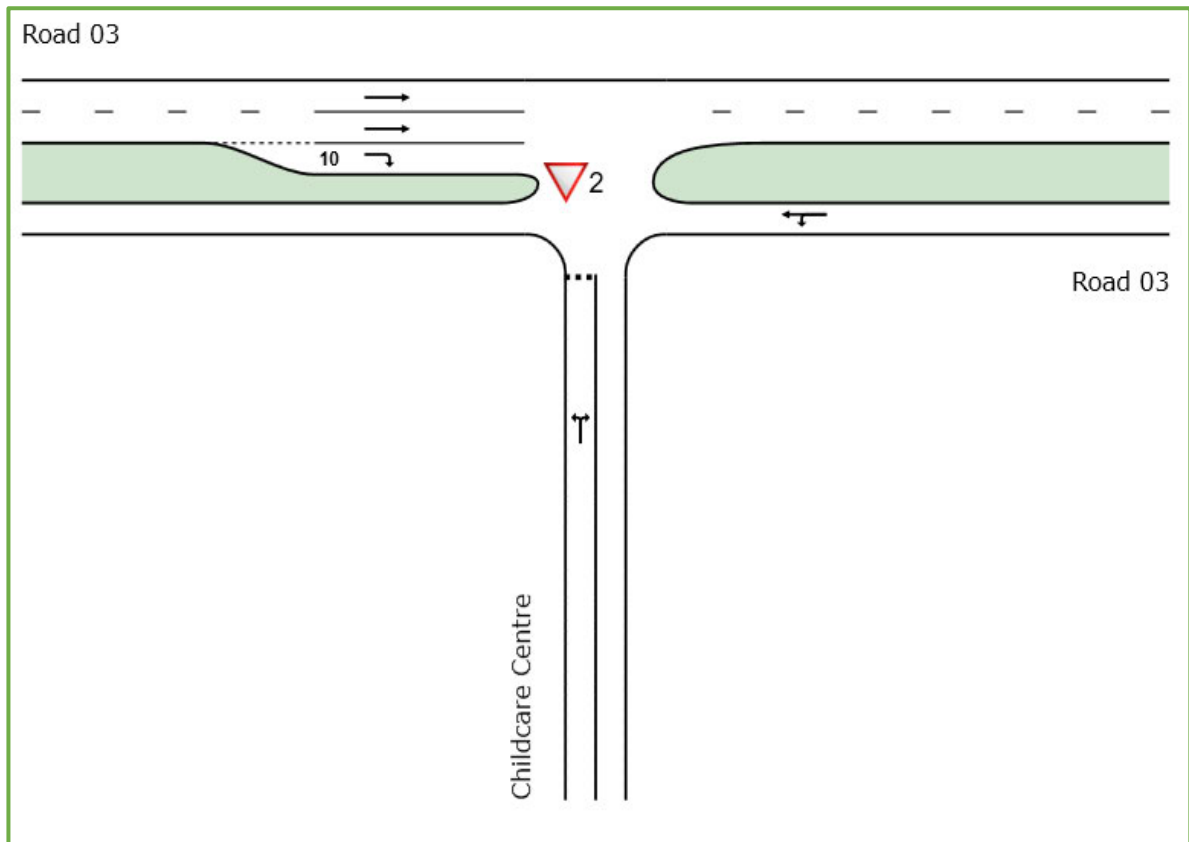


Figure 4: Proposed Childcare Centre Access / Road 03 Intersection Layout (Based on Calibre Report)

📍 **Primary School Access / Road 01**

Intersection approaches under the current proposal are summarised as follows:

- Road 01 (East) – this approach provides a single through lane and a single right turn bay of length 10.0 metres permitting through and right turn movements
- Road 01 (West) – this approach provides a single lane permitting through and left turn movements
- Northern Access Road (North) – this approach will provide a single lane permitting left and right turn movements.

The currently proposed intersection arrangement outlined in the Calibre Report is shown in **Figure 5** below.

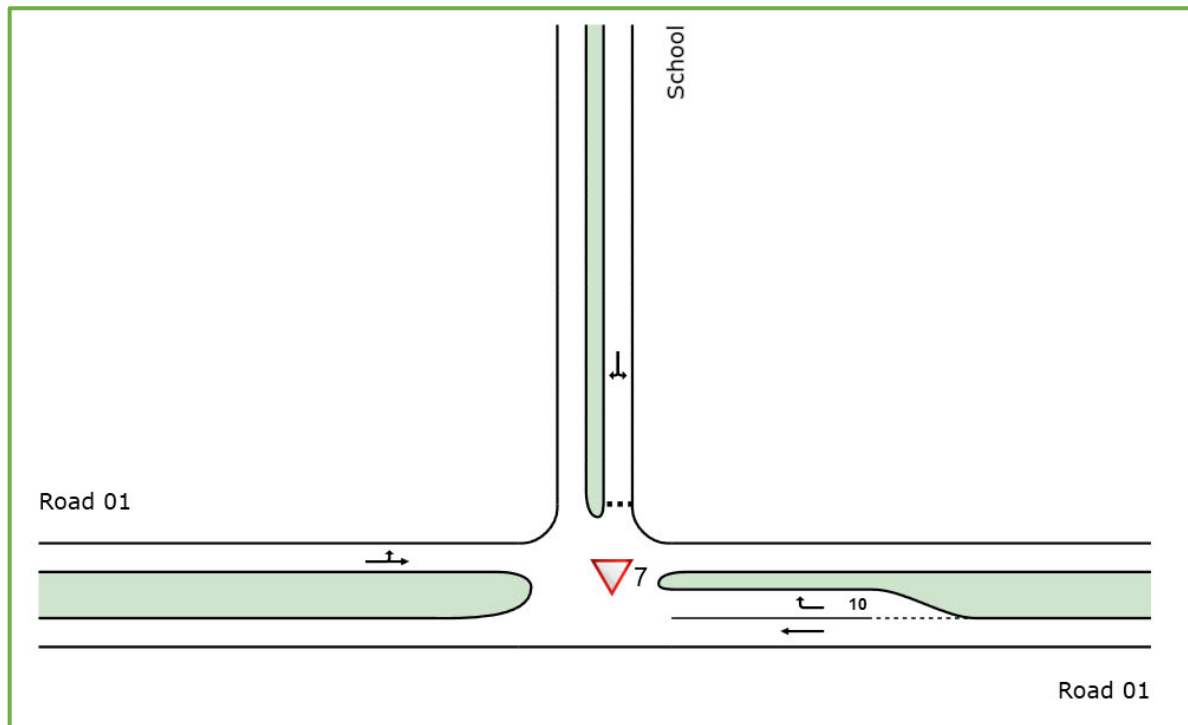


Figure 5: Proposed School Access / Road 03 Intersection Layout (Based on Calibre Report)

🔹 **Description of Proposed Changes to Future Intersections**

The amended proposal involves changes to the access arrangements in relation to the proposed childcare centre and primary school access. The currently proposed access arrangements detailed in the Calibre Report involve providing separate access driveways and carparks for these land uses via Road 03 and Road 01 respectively, as discussed above.

The following amended intersection layouts are proposed in relation to the primary school and childcare access arrangements. The childcare access road is now referred to as the Northern Access Road and the primary school access road is now referred to as the Southern Access Road.

- 🔹 Provision of a left in / left out access via Road 03 (Northern Access) as shown in **Figure 6** below:

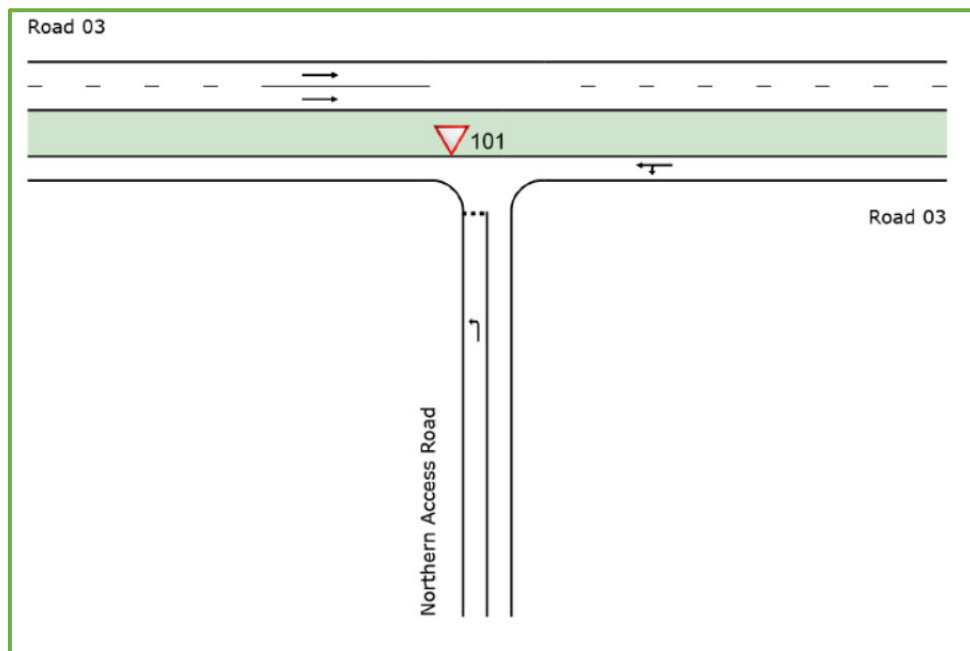


Figure 6: Amended Northern Access Road / Road 03 Intersection Layout

- Road 03 (East) – this approach will provide a single lane permitting through and left turn movements.
- Road 03 (West) – this approach will provide two (2) westbound lanes separated from the eastbound lanes by a central median.
- Northern Access Road (South) – this approach will provide a single lane permitting left turn movements only.

- Provision of a left in / left out access via Road 01 (Southern Access) as shown in **Figure 7** below:

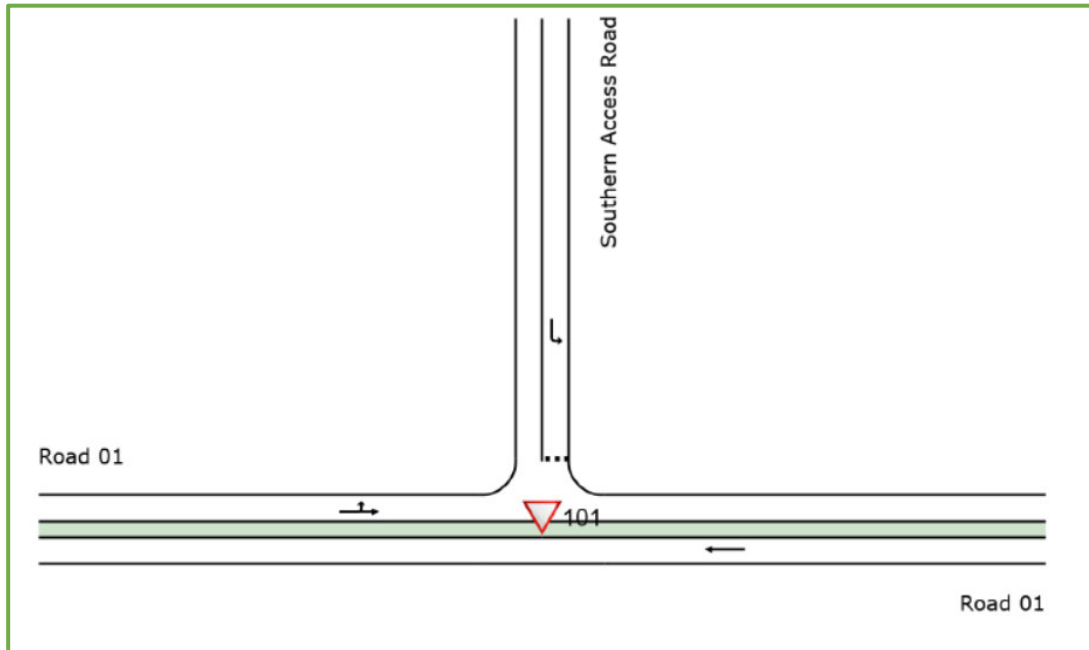


Figure 7: Amended Southern Access Road / Road 01 Intersection Layout

- Road 01 (West) – this approach will provide a single lane permitting through and left turn movements
- Road 01 (East) – this approach will provide a single eastbound lane separated from the westbound lane by a central median.
- Southern Access Road (north) – this approach will provide a single lane permitting left turn movements only.

Modelling Assumptions

The following assumptions were made in relation to SIDRA intersection modelling of the proposed layout scenario:

- The SIDRA intersection model assessed in the Calibre Report was used as a base case and adjusted to accommodate the revised proposed intersection arrangements discussed above.
- The traffic generation of the primary school and childcare centre underpinning the modelling was based on the primary school student numbers and childcare numbers and associated trip rates provided in the Calibre Report.
- It is acknowledged that based on the Calibre Report, 80 percent of school and childcare vehicle trips arrive to and depart from Whitlam Estate internally and 20 percent of vehicle trips arrive to and depart from Whitlam Estate, externally. However, for the purpose of this assessment it was assumed that 50 percent of vehicle trips arrive to and depart from the childcare centre / primary school within Whitlam Estate internally and 50 percent arrive and depart externally during the critical morning and afternoon peaks respectively, given that a significant portion of vehicle trips are attributed to parents dropping off or picking up their child during the morning and evening commute to and from work.



- It is assumed that 100% of vehicle trips to and from the primary school / childcare centre from within Whitlam Estate arrive via the Southern Access Road and depart via the Northern Access Road, due to the revised left in / left out access layouts.
- It is assumed that 100% of vehicle trips that arrive to and depart from the primary school / childcare centre from outside of Whitlam Estate arrive via the Northern Access Road and depart via the southern Access Road, given the revised left in / left out access layouts.
- Turning movement volumes provided within the Calibre Report at surrounding intersections have been adjusted to account for the following:
 - Revised school / childcare centre access arrangements via Road 01 and Road 03, respectively.
 - Removal of the Local Centre / Road 53 intersection providing access to the Local Centre carpark and relocation of this access to the rear laneway to the west, running parallel to Road 53 which will operate as a one-way northbound lane between Road 01 in the south and Road 03 in the north.
 - Closure of the proposed one-way ingress only access driveway to the primary school via Road 53.
- The additional 215 residential units proposed within the Local Centre were assumed to be medium density apartments for the purpose of this assessment. The ACT Estate Development Code (EDC) was used to determine the corresponding vehicle trip rate. The EDC specifies that multi-unit dwellings generate the following during the morning and afternoon peaks:
 - 0.6 peak hour vehicle trips per unit, assuming an 80:20 split between arrivals and departures during morning and evening peaks.
- It was assumed that all residential trips departed via Road 03 using the western road, west of the intersection of Road 03/53/27, and continued eastbound along Road 03 towards John Gorton Drive and returning westbound along the same route. The external trip distributions were adopted from the Calibre Report to distribute traffic along John Gorton Drive in each direction.

▶ Key intersections

The following key intersections were assessed during the critical morning and evening peaks as part of this assessment:

- John Gorton Drive / Bindubi Street / Road 03
- Northern Access Road / Road 03
- Road 03 / Road 27 / Road 53
- Road 01 / Road 53 Road 69
- Southern Access Road / Road 01



► Intersection Performance

Traffic turning count data at each of the above intersections was obtained from the Calibre Report prepared separately for existing turning movements and

These volumes were provided for the morning and afternoon network peak periods. The above data was analysed using SIDRA Intersection 9 to determine the performance characteristics under each of the above scenarios.

The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DoS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LoS) criteria. These performance measures can be interpreted using the following explanations:

- DoS** the DoS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DoS approaches 1, it is usual to attempt to keep DoS to less than 0.9. When DoS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DoS of 0.8 or less.
- AVD** the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).
- LoS** this is a comparative measure which provides an indication of the operating performance of an intersection as shown in Table 1.

Table 1: Intersection Performance Indicators (RMS)

Level of Service (LoS)	Average Delay per Vehicle (sec/veh)	Give Way and Stop Signs
A	Less than 14	Good Operation
B	15 to 28	Acceptable delays and space capacity
C	29 to 42	Satisfactory but accident study required
D	42 to 56	Near capacity and accident study required
E	57 to 70	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires other control mode or major treatment

► Future Intersection Performance for Amended Intersections

Traffic volumes contained within the Calibre Report were utilised to assess the traffic impacts of the amended intersections for the development scenario. For comparison, a summary of future intersection performance in accordance with intersection geometry outlined in the Calibre Report is provided in Table 2.



Reference should be made to the intersection layouts presented in **Attachment 2** and the SIDRA outputs provided in **Attachment 3**, which provide detailed results for individual lanes and approaches.

Table 2: Intersection Performance

Intersection	Control	Scenario	Period	Degree of Saturation	Average Delay (s)	Level of Service
John Gorton Drive / Road 03 / Bindubi Street	Signal	Current Layout	AM	0.882	37.8	C
			PM	0.839	33.6	C
		Proposed Layout	AM	0.914	37.1	C
			PM	0.916	36.8	C
Road 03 / Northern Access Road (Former Childcare Access)	Give Way	Current Layout	AM	0.0662	5.4	A
			PM	0.203	6.4	A
		Proposed Layout	AM	0.319	5.2	A
			PM	0.297	5.2	A
Road 03 / Road 27 / Road 53	Signal	Current Layout	AM	0.284	40.8	C
			PM	0.460	29.0	C
		Proposed Layout	AM	0.825	42.5	D
			PM	0.787	36.9	C
Road 01 / Road 53 / Road 69	Signal	Current Layout	AM	0.859	47.4	D
			PM	0.498	31.4	C
		Proposed Layout	AM	0.704	41.7	C
			PM	0.838	42.9	D
Road 01 / Southern Access Road	Give Way	Current Layout	AM	0.496	7.0	A
			PM	0.288	9.7	A
		Proposed Layout	AM	0.205	5.6	A
			PM	0.506	5.6	A

The intersection performance results shown in **Table 2** above are summarised below:

- The intersection of John Gorton Drive / Road 03 / Bindubi Street operates at a Level of Service C during both morning and evening peaks under both scenarios with no significant change in average delay (-0.7 seconds in the morning peak and +0.2 seconds in the evening peak).



- The intersection of Road 03 and the Northern Access Road (Former Childcare Access Road) operates at a Level of Service A during both morning and evening peaks under both scenarios with no significant change in average delay (-0.2 seconds in the morning peak and -1.2 seconds in the evening peak).
- The intersection of Road 03 / Road 27 / Road 53 operates at a Level of Service D during the morning and at a Level of Service C evening peak under the proposed scenario with a change in average delay of +1.7 seconds in the morning peak and + 7.9 seconds in the evening peak.
- The intersection of Road 01 / Road 53 / Road 69 operates at a Level of Service D in the morning peak and a level of service C in the evening peak under the proposed scenario. The intersection operates with a change in average delay of -5.7 seconds in the morning peak under the proposed scenario and a change in average delay of +11.5 seconds in the afternoon peak under the proposed scenario.
- The intersection of Road 01 / Southern Access Road (former School Access Road) operates at a Level of Service A during both morning and evening peaks under both scenarios with no significant change in average delay (-1.4 seconds in the morning peak and -4.1 seconds in the evening peak).

Discussion of Amended Intersection Layouts

The proposed layout is considered superior respect to the current layout Report for the following reasons:

Safety Considerations

- The proposed (left in / left out) intersection arrangements in relation to the intersections of Road 03 / Northern Access Roadway and Road 01 / Southern Access Roadway results in fewer points of conflict at both intersections, given that right turns will be banned to and from the school/childcare centre at both accesses given the proposed left in / left out intersection arrangements.
- The above modelling results do not account for non-typical peak demand flows where vehicles waiting to turn right from Road 01 into the subject site are required to queue, potentially blocking the intersection of Road 01 / John Gorton Drive. The amended left in / left out access arrangement removes any possibility of queuing occurring at this intersection and along the surrounding road network in general.
- It is envisaged that Road 53 would operate as a 40km/h High Pedestrian Activity Area (HPPA) with appropriate gateway treatments at the northern and southern intersections and Local Area Traffic Management treatments would be implemented in accordance with Austroads Guidelines. Implementation of a 40km/h HPPA along Road 53 will further improve safety of pedestrians and vulnerable road users within the town centre given the number of pedestrians expected within the precinct.

Operational & Efficiency Considerations

- The proposed arrangement distributes traffic generated by the primary school and childcare centre more evenly across the surrounding road network in comparison with the current arrangement which provides isolated vehicular access points to and from the primary school and childcare centres, respectively. The amended arrangement results in less congestion particularly at the southern access road during the critical afternoon peak. This is supported by the reduced average delay at the Southern Access Road during the critical afternoon peak (9.7 seconds



average delay under the current arrangement, in comparison with 5.6 seconds average under the amended arrangement).

- The provision of safe and efficient access points to the primary school and childcare centre by virtue of the left in / left out intersection layouts will encourage parents to utilise the internal pick up / drop off facilities and discourage use of Road 53 (local centre main street) as a pickup / drop off location, thereby reducing congestion along the local centre main street during school pick up and drop off times. Provision of Road 53 as a 40km/h HPAA will further discourage parents picking up and dropping off primary school students along this road and will encourage use of the designated internal drop off and pick up areas provided within the school.
- It can be seen from the SIDRA modelling results presented in **Attachment 2** that removal of the School Access Driveway and the Local Centre Carpark Driveway via Road 53 results in a significantly improved intersection performance in terms of reduced vehicle volumes and queuing impacts along this road (being the main street within the local centre) as summarised below:

- Road 03 / Road 27 / Road 53 Intersection (Road 53 southern approach, PM Peak):

Previous Layout:

- Demand flow: 88 vehicles / hour
- 95th percentile queue length: 17.5 metres (2.5 vehicles)

Proposed Layout:

- Demand flow: 9 vehicles / hour
- 95th percentile queue length: 1.3 metres (0.2 vehicles)

- Road 01 / Road 53 / Road 69 Intersection (Road 53 northern approach, PM Peak):

Previous Layout:

- Demand flow: 94 vehicles / hour
- 95th percentile queue length: 32.1 metres (4.5 vehicles)

Proposed Layout:

- Demand flow: 28 vehicles / hour
- 95th percentile queue length: 5.3 metres (0.7 vehicles)

It can be seen that under the proposed layout, the 95th percentile queue lengths along Road 53 on its southern approach to the intersection of Road 03/ Road 27 / Road 53 and on its northern approach to the intersection of Road 01 / Road 53 / Road 69 are significantly reduced during the evening peak. This is primarily due to the relocation of the Local Centre Carpark to the western side of the Local Centre.

Furthermore, removal of the proposed ingress only access driveway via Road 53 accessing the primary school will significantly reduce traffic volumes along Road 53. Reduction of through vehicle trips along Road 53 has the following desirable effects:



- Safety: Fewer vehicle movements reduces the chance of conflict between vehicles and pedestrians along Road 53. This is critical during school start and finish times when high pedestrian activity is expected, especially in relation to children.
- Efficiency in Design: Reduced vehicle queue lengths at the abovementioned intersections presents an opportunity to increase parking supply along Road 53 on approach to these intersections to the benefit of visitors to the Local Centre.

It is understood that Road 53 is intended to be a 'destination' street as opposed to a higher order road which is typically designed to facilitate efficient through movement of traffic in accordance with the Movement and Place Framework. Reduced through-traffic volumes along Road 53 and diversion of these trips to higher order roads along the surrounding road network will further encourage 'destination' trips only along Road 53 to the benefit of Local Centre visitors in terms of improved safety and efficiencies for the reasons discussed.

► Primary School / Childcare Centre Access & Internal Circulation Arrangements

The amended internal circulation arrangements are shown in the Concept Plans presented in **Attachment 1**. It is proposed to connect the northern vehicular access via Road 03 and the southern vehicular access via Road 01 with a two-way internal circulation road which provides access to a staff carpark and drop off / pick up area serving the primary school and the Childcare Centre situated in the north-western corner of the subject site. All internal access, circulation and parking areas are to be in accordance with AS2890. Reference should be made to the reduced plans presented in **Attachment 1** showing the proposed access and internal circulation arrangements.

► Primary School Staff Parking Requirements

At this stage the number of proposed staff members is unknown, however it is proposed that an indicative rate of one (1) staff car parking space per staff member would be required based on previous experience. However, it may be possible to review this requirement based on school requirements.

► Pick up / drop off requirements

Based on the primary school morning peak vehicle trip rate (945 trips per hour (482 in, 463 out) provided in the Calibre Report, there is a requirement for at least 20 drop off / pick up spaces based on the 98th percentile queue and a pick-up / drop off duration time of two (2) minutes per vehicle in accordance with the queuing analysis presented in **Attachment 4**. This is considered a conservative assessment based on the upper trip rate for the proposed primary school in order to remain consistent with the Calibre Report. It is envisaged that this requirement can be accommodated onsite.

► Conclusion

On the basis of the above, TRAFFIX considers the proposed amended concept design to be not only supportable, but in the public interest as the changes will improve the safety and operation in relation to the access and internal circulation arrangements of the proposed primary school and childcare centre and the operation of Road 53 (Main Street). The changes are therefore recommended for adoption on traffic planning grounds.



We trust the above is of assistance and request that you contact the undersigned should you have any queries or require any further information.

Yours faithfully,

Traffix



Justin Pindar
Traffic Engineer

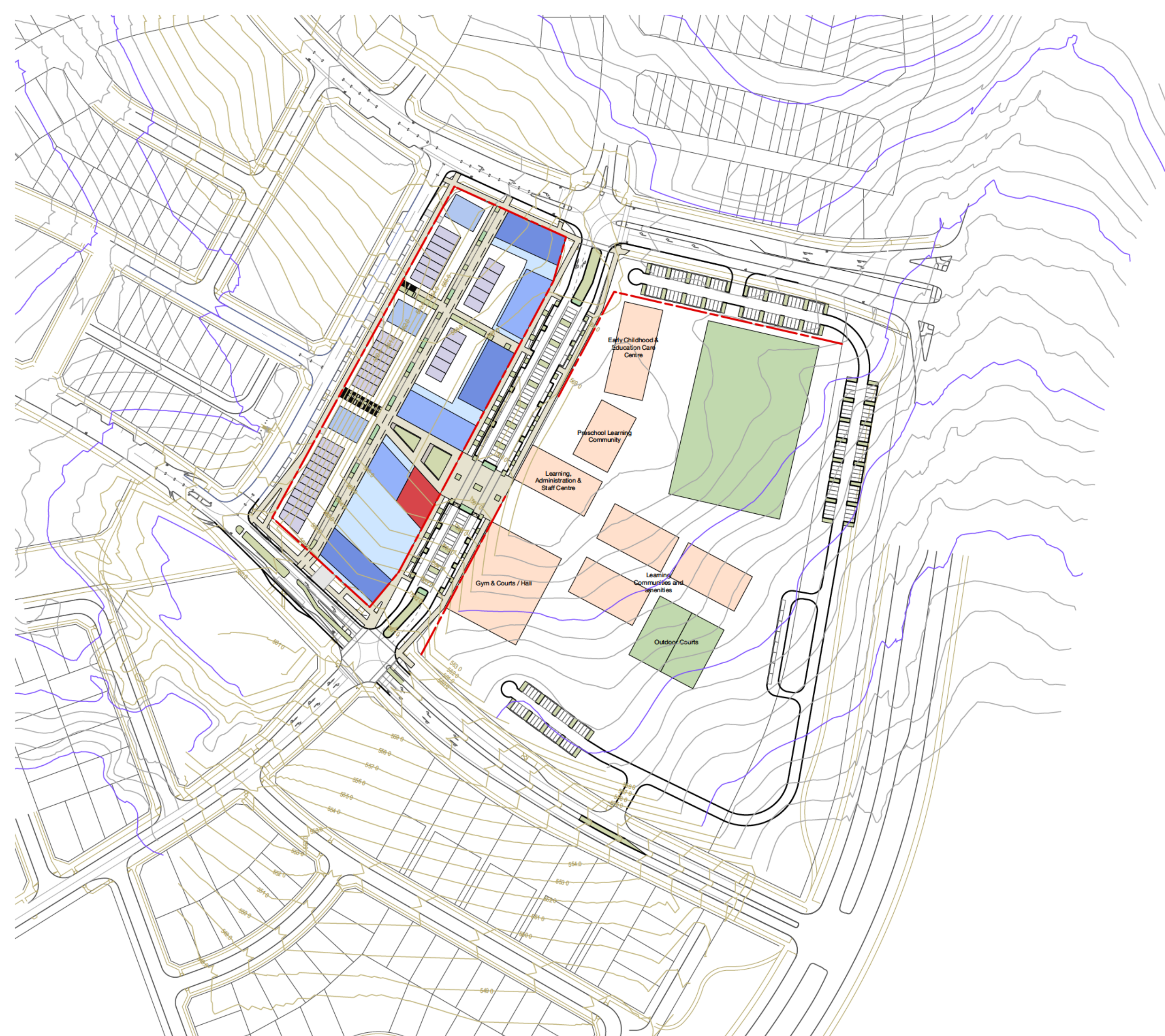
*Encl: Attachment 1 – Concept Plans
Attachment 2 – Intersection Layouts.
Attachment 3 – SIDRA Intersection Modelling Results
Attachment 4 – Proposed School Drop off Queuing Analysis (AM)*

ATTACHMENT 1

Concept Plan

Whitlam Local Centre
Concept Master Plan

22 February 2022



WHITLAM LOCAL CENTRE

1:1000 @ A3

Prepared by Hill Thalis A + UP
for ACT Suburban Land Agency

FOR INFORMATION

ATTACHMENT 2

Proposed Intersection Layouts

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: JP Edit Whitlam Stage 3 20200429

Template: Site Layout

Site: 1 [BSE-JGD-Rd03 - AM (Site Folder: General)]

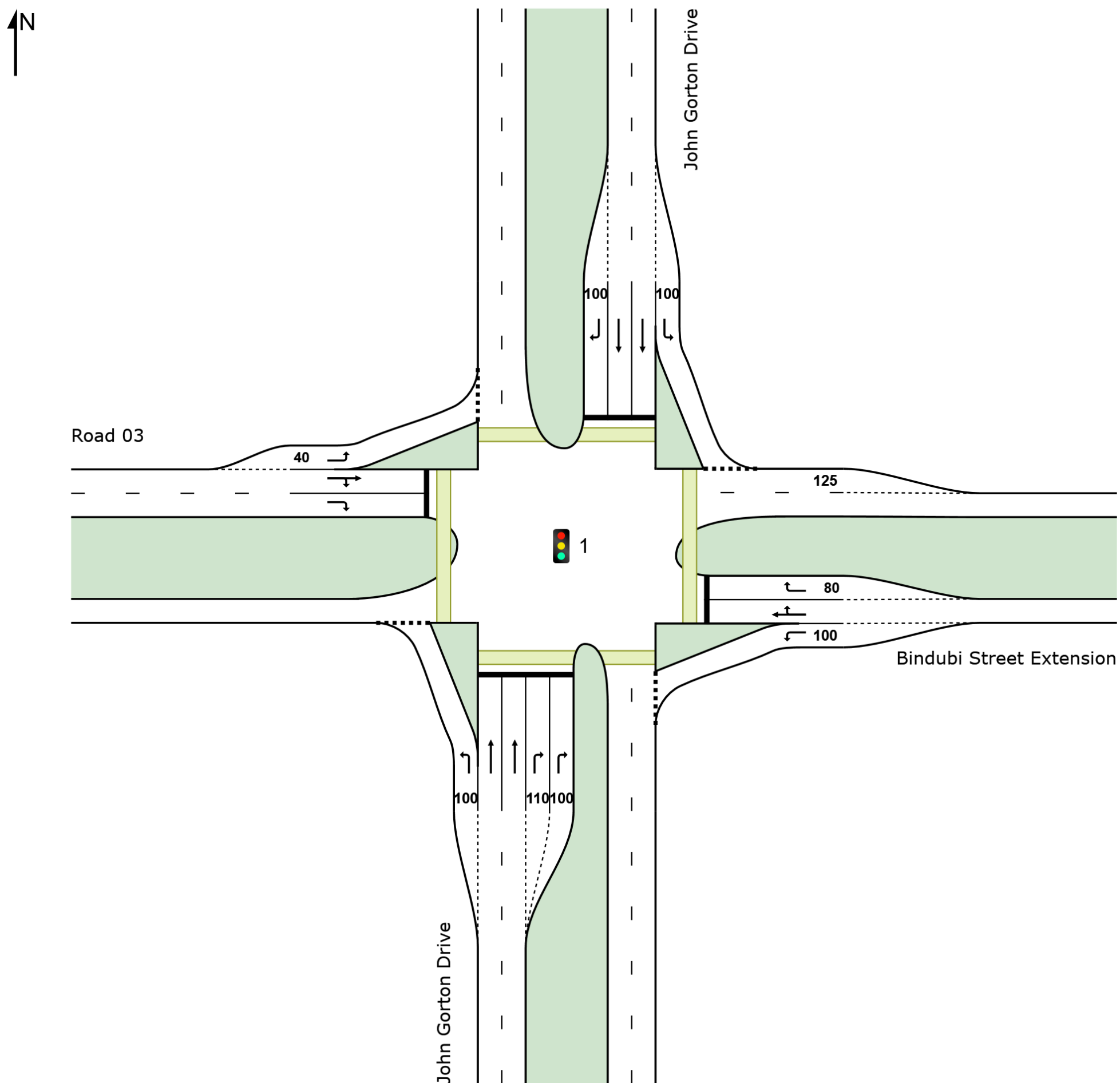
Network: 1 [Network AM (Network Folder: General)]

Bindubi Street Extension / John Gorton Drive / Road 03
Signalised Intersection
AM Peak Hour
Site Category: AM Peak
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: SDO / SA - Manual AM
Reference Phase: Phase A
Input Phase Sequence: A, D, E, F, F1
Output Phase Sequence: A, D, E, F, F1

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

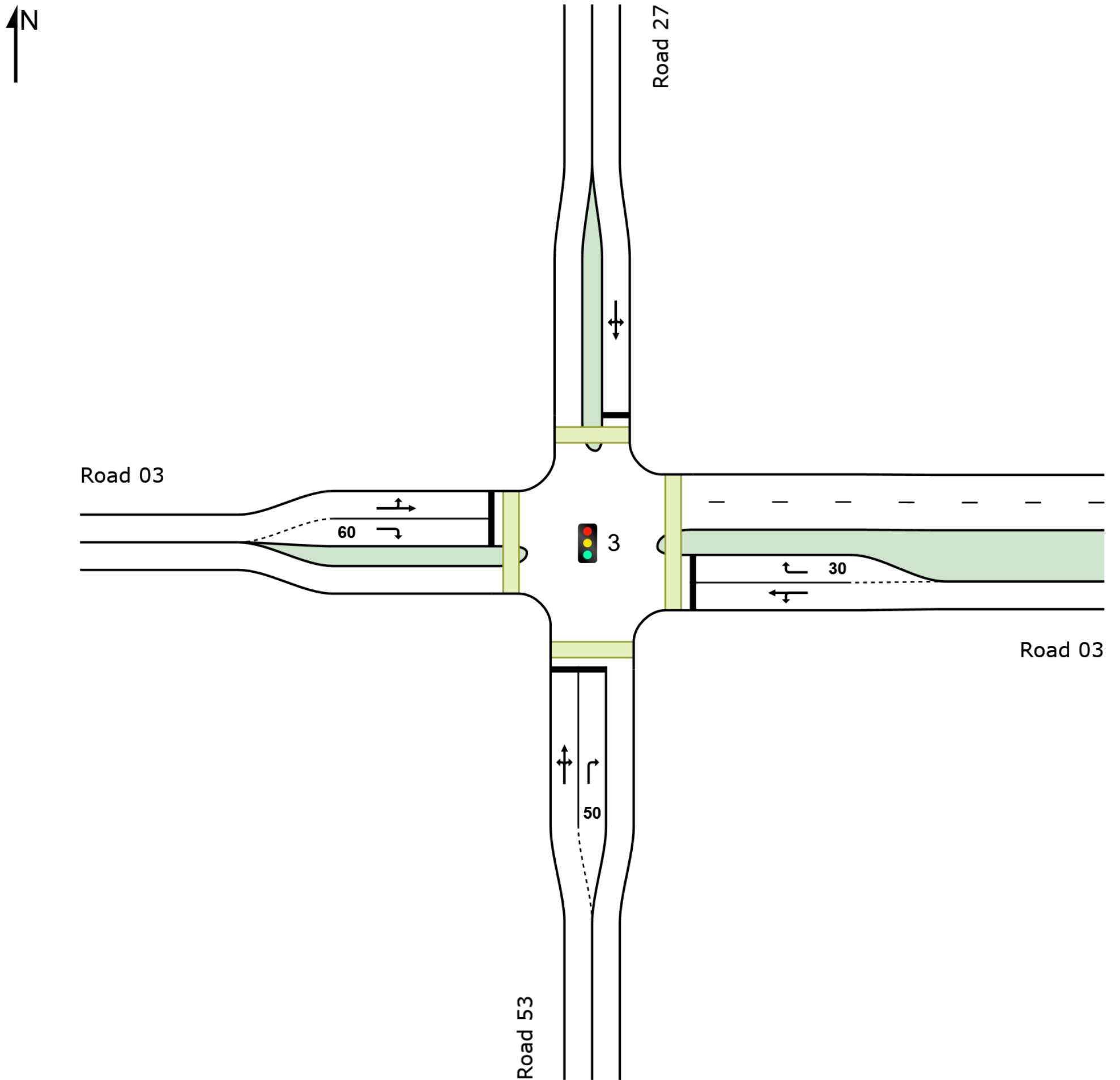


Road 03 / Road 27 / Road 53
Signalised Intersection
AM Peak Hour
Site Category: AM Peak
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SDO / SA - Manual AM (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, D, E, F, F1
Output Phase Sequence: A, D, E, F

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

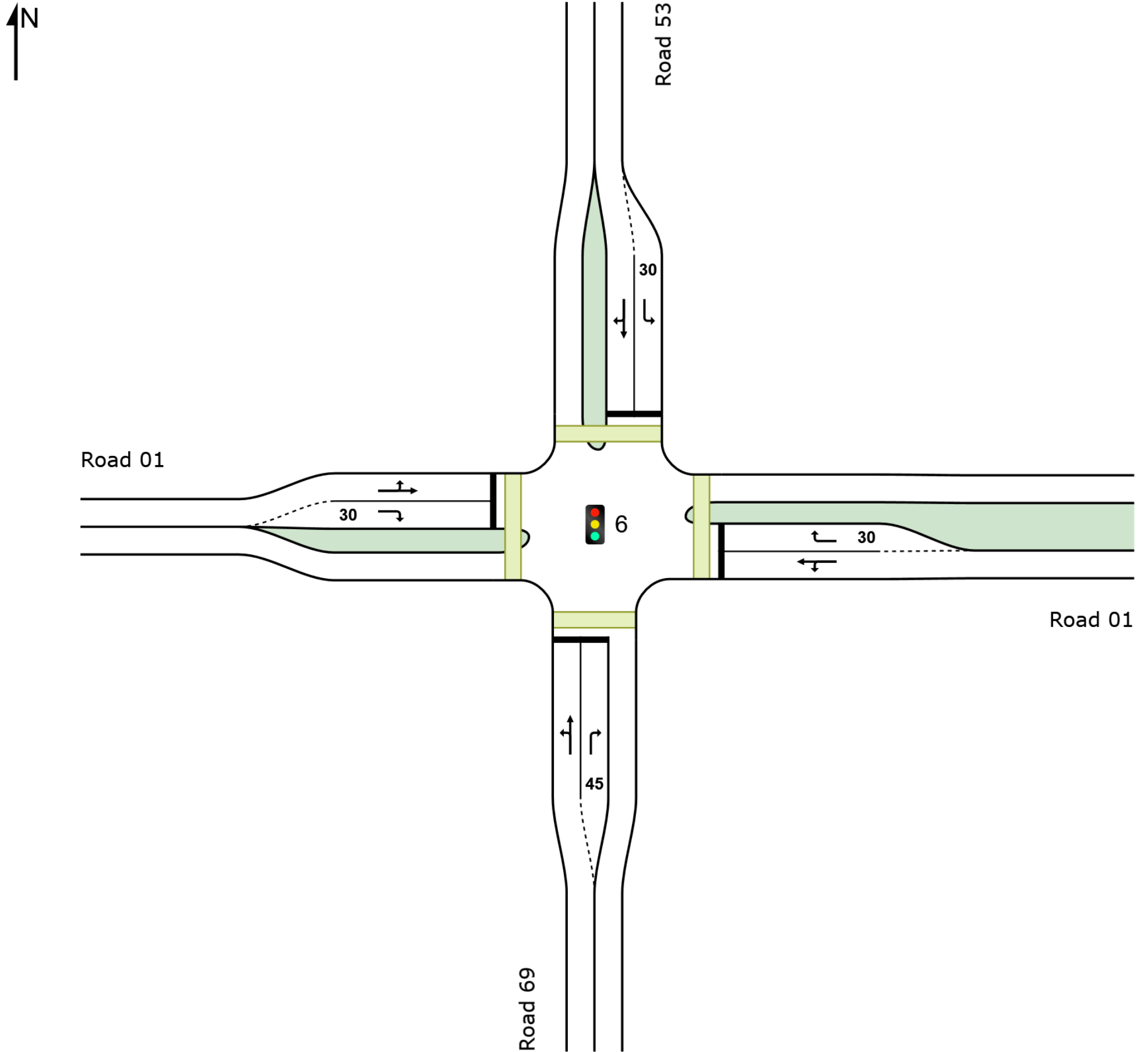


Road 01 / Road 53 / Road 69
Signalised Intersection
AM Peak Hour
Site Category: AM Peak
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: SDO / SA - Manual AM (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, D, E, F, F1
Output Phase Sequence: A, D, E, F

Site Layout

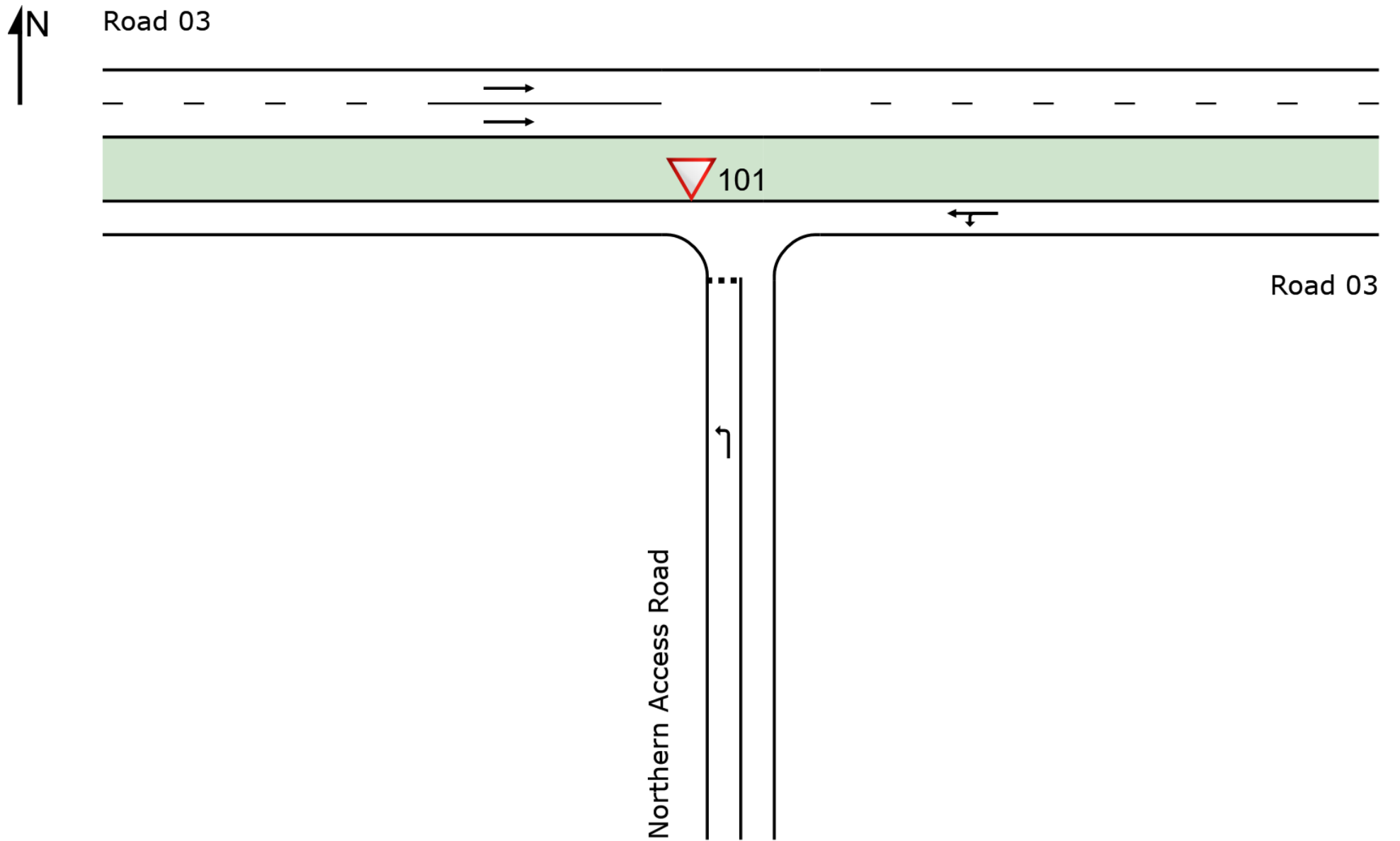
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



New Site
Site Category: (None)
Give-Way (Two-Way)

Site Layout

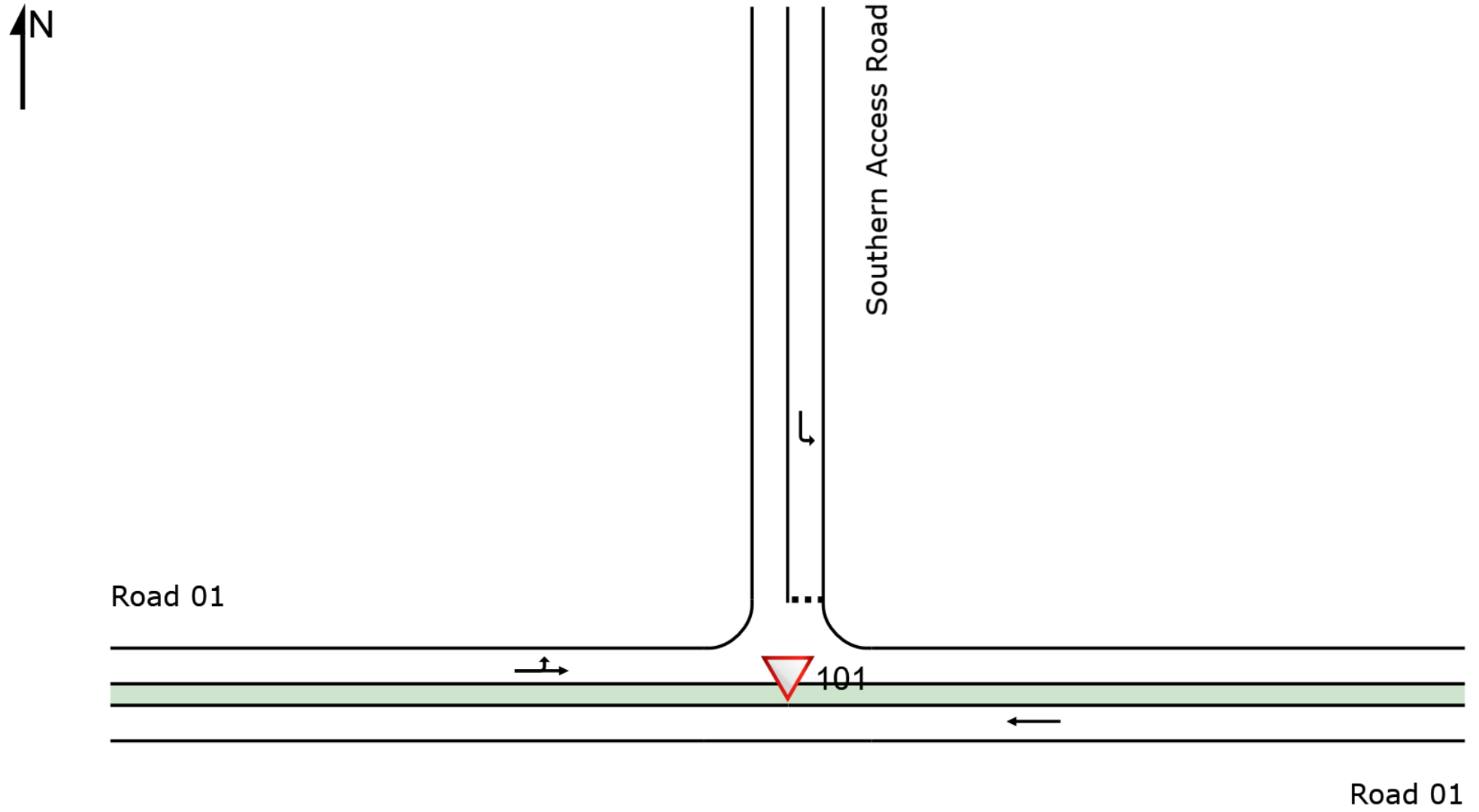
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



New Site
Site Category: (None)
Give-Way (Two-Way)

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



ATTACHMENT 3

SIDRA Intersection Modelling Results

MOVEMENT SUMMARY

Site: 1 [BSE-JGD-Rd03 - AM (Site Folder: General)]

Network: N101 [Network AM (Network Folder: General)]

Bindubi Street Extension / John Gorton Drive / Road 03

Signalised Intersection

AM Peak Hour

Site Category: AM Peak

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: John Gorton Drive														
1	L2	267	2.0	267	2.0	0.183	8.0	LOSA	1.2	8.7	0.25	0.65	0.25	48.6
2	T1	1239	5.0	1239	5.0	*0.895	43.0	LOS D	20.9	152.5	0.97	1.03	1.20	35.3
3	R2	541	2.0	541	2.0	0.914	67.2	LOS E	9.8	69.6	1.00	1.01	1.45	26.3
Approach		2047	3.8	2047	3.8	0.914	44.8	LOS D	20.9	152.5	0.88	0.97	1.14	32.7
East: Bindubi Street Extension														
4	L2	506	2.0	506	2.0	0.501	11.3	LOSA	5.9	42.1	0.52	0.73	0.52	49.6
5	T1	32	2.0	32	2.0	*0.914	61.9	LOS E	7.3	52.3	1.00	1.07	1.50	19.2
6	R2	376	2.0	376	2.0	0.914	67.6	LOS E	7.3	52.3	1.00	1.06	1.50	29.0
Approach		914	2.0	914	2.0	0.914	36.2	LOS C	7.3	52.3	0.74	0.88	0.96	36.5
North: John Gorton Drive														
7	L2	328	2.0	328	2.0	0.261	11.1	LOSA	2.8	20.0	0.39	0.69	0.39	54.0
8	T1	719	5.0	719	5.0	0.608	31.8	LOS C	9.2	67.1	0.91	0.78	0.91	40.5
9	R2	91	2.0	91	2.0	*0.612	57.9	LOS E	2.8	20.0	1.00	0.80	1.06	22.1
Approach		1138	3.9	1138	3.9	0.612	27.9	LOS B	9.2	67.1	0.76	0.76	0.77	42.4
West: Road 03														
10	L2	193	2.0	193	2.0	0.229	5.7	LOSA	0.1	0.9	0.03	0.55	0.03	54.3
11	T1	13	2.0	13	2.0	*0.218	49.4	LOS D	1.6	11.4	1.00	0.75	1.00	24.5
12	R2	93	2.0	93	2.0	0.218	53.8	LOS D	1.6	11.4	1.00	0.75	1.00	19.9
Approach		298	2.0	298	2.0	0.229	22.5	LOS B	1.6	11.4	0.37	0.62	0.37	36.7
All Vehicles		4397	3.3	4397	3.3	0.914	37.1	LOS C	20.9	152.5	0.79	0.87	0.95	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec	
					[Ped ped	Dist] m						
South: John Gorton Drive												
P11	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	71.2	35.0	0.49	
P12	Stage 2	53	44.3	LOS E	0.1	0.1	0.94	0.94	65.8	28.0	0.43	
East: Bindubi Street Extension												
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	78.7	44.7	0.57	
North: John Gorton Drive												
P31	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	68.5	31.5	0.46	
P32	Stage 2	53	44.3	LOS E	0.1	0.1	0.94	0.94	65.8	28.0	0.43	
West: Road 03												
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	78.5	44.5	0.57	
All Pedestrians		316	44.3	LOS E	0.1	0.1	0.94	0.94	71.4	35.3	0.49	

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: 3 [Rd03-Rd27-Rd53 - AM (Site Folder: General)]

Network: N101 [Network AM (Network Folder: General)]

Road 03 / Road 27 / Road 53

Signalised Intersection

AM Peak Hour

Site Category: AM Peak

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Road 53														
10	L2	2	2.0	2	2.0	0.019	38.7	LOS C	0.2	1.2	0.84	0.63	0.84	29.3
11	T1	1	2.0	1	2.0	0.019	35.3	LOS C	0.2	1.2	0.84	0.63	0.84	24.6
12	R2	11	2.0	11	2.0	0.019	38.2	LOS C	0.2	1.2	0.83	0.63	0.83	15.4
Approach		14	2.0	14	2.0	0.019	38.0	LOS C	0.2	1.2	0.83	0.63	0.83	19.2
East: Road 03														
1	L2	96	2.0	96	2.0	*0.825	50.1	LOS D	10.5	74.5	1.00	0.97	1.18	6.5
2	T1	239	2.0	239	2.0	0.825	44.9	LOS D	10.5	74.5	1.00	0.97	1.18	26.1
3	R2	44	2.0	44	2.0	*0.299	54.4	LOS D	1.3	9.4	0.98	0.74	0.98	17.2
Approach		379	2.0	379	2.0	0.825	47.3	LOS D	10.5	74.5	1.00	0.94	1.16	21.5
North: Road 27														
4	L2	29	2.0	29	2.0	0.104	39.1	LOS C	1.0	6.9	0.84	0.70	0.84	18.6
5	T1	11	2.0	11	2.0	*0.104	35.9	LOS C	1.0	6.9	0.84	0.70	0.84	18.6
6	R2	0	2.0	0	2.0	0.104	39.1	LOS C	1.0	6.9	0.84	0.70	0.84	31.6
Approach		40	2.0	40	2.0	0.104	38.3	LOS C	1.0	6.9	0.84	0.70	0.84	18.7
West: Road 03														
7	L2	0	2.0	0	2.0	0.553	41.9	LOS C	6.8	48.8	0.93	0.78	0.93	32.7
8	T1	258	2.0	258	2.0	0.553	36.3	LOS C	6.8	48.8	0.93	0.78	0.93	27.5
9	R2	1	2.0	1	2.0	0.007	51.8	LOS D	0.0	0.2	0.94	0.59	0.94	22.4
Approach		259	2.0	259	2.0	0.553	36.4	LOS C	6.8	48.8	0.93	0.78	0.93	27.5
All Vehicles		692	2.0	692	2.0	0.825	42.5	LOS D	10.5	74.5	0.96	0.86	1.05	23.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
					[Ped ped	Dist] m					
South: Road 53											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	73.5	38.0	0.52
East: Road 03											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	77.4	43.0	0.56
North: Road 27											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	71.2	35.0	0.49
West: Road 03											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	75.0	40.0	0.53
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	74.3	39.0	0.53

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: 6 [Rd01-Rd53-Rd69 - AM (Site Folder: General)]

Network: N101 [Network AM (Network Folder: General)]

Road 01 / Road 53 / Road 69

Signalised Intersection

AM Peak Hour

Site Category: AM Peak

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Road 69														
10	L2	0	2.0	0	2.0	0.007	36.1	LOS C	0.1	0.5	0.79	0.56	0.79	30.2
11	T1	3	2.0	3	2.0	0.007	32.7	LOS C	0.1	0.5	0.79	0.56	0.79	9.3
12	R2	109	2.0	109	2.0	*0.257	38.9	LOS C	2.7	19.3	0.86	0.76	0.86	8.1
Approach		113	2.0	113	2.0	0.257	38.7	LOS C	2.7	19.3	0.86	0.76	0.86	8.1
East: Road 01														
1	L2	4	2.0	4	2.0	0.046	37.3	LOS C	0.4	3.0	0.83	0.61	0.83	15.3
2	T1	14	2.0	14	2.0	0.046	33.9	LOS C	0.4	3.0	0.83	0.61	0.83	29.9
3	R2	1	2.0	1	2.0	*0.007	49.8	LOS D	0.0	0.2	0.94	0.58	0.94	8.3
Approach		19	2.0	19	2.0	0.046	35.6	LOS C	0.4	3.0	0.83	0.61	0.83	26.3
North: Road 53														
4	L2	1	2.0	1	2.0	0.003	38.2	LOS C	0.0	0.2	0.83	0.58	0.83	15.4
5	T1	2	2.0	2	2.0	*0.020	32.7	LOS C	0.2	1.4	0.81	0.62	0.81	19.7
6	R2	6	2.0	6	2.0	0.020	36.1	LOS C	0.2	1.4	0.81	0.62	0.81	30.2
Approach		9	2.0	9	2.0	0.020	35.6	LOS C	0.2	1.4	0.81	0.61	0.81	27.1
West: Road 01														
7	L2	9	2.0	9	2.0	0.704	46.6	LOS D	8.2	58.4	0.98	0.86	1.02	24.9
8	T1	276	2.0	276	2.0	*0.704	43.4	LOS D	8.2	58.4	0.98	0.86	1.02	24.9
9	R2	0	2.0	0	2.0	0.001	51.1	LOS D	0.0	0.0	0.93	0.52	0.93	24.3
Approach		285	2.0	285	2.0	0.704	43.5	LOS D	8.2	58.4	0.98	0.86	1.02	24.9
All Vehicles		427	2.0	427	2.0	0.704	41.7	LOS C	8.2	58.4	0.94	0.82	0.97	22.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
					[Ped ped	Dist] m					
South: Road 69											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	73.5	38.0	0.52
East: Road 01											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	76.6	42.0	0.55
North: Road 53											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	74.3	39.0	0.53
West: Road 01											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	78.1	44.0	0.56
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	75.6	40.8	0.54

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: 101 [Northern Access x Road 03 AM (Site Folder: General)]

Network: N101 [Network AM (Network Folder: General)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Northern Access Road														
1	L2	272	0.0	272	0.0	0.319	0.4	LOSA	0.4	2.5	0.22	0.09	0.22	19.8
Approach		272	0.0	272	0.0	0.319	0.4	LOSA	0.4	2.5	0.22	0.09	0.22	19.8
East: Road 03														
4	L2	282	0.0	282	0.0	0.251	5.2	LOSA	0.0	0.0	0.00	0.42	0.00	51.9
5	T1	107	0.0	107	0.0	0.251	0.0	LOSA	0.0	0.0	0.00	0.42	0.00	36.0
Approach		389	0.0	389	0.0	0.251	3.8	NA	0.0	0.0	0.00	0.42	0.00	50.6
West: Road 03														
11	T1	298	0.0	298	0.0	0.076	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach		298	0.0	298	0.0	0.076	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		959	0.0	959	0.0	0.319	1.6	NA	0.4	2.5	0.06	0.20	0.06	31.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Southern Access x Road 01 AM (Site Folder: General)]

Network: N101 [Network AM (Network Folder: General)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
East: Road 01														
5	T1	19	0.0	19	0.0	0.010	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach		19	0.0	19	0.0	0.010	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
North: Southern Access Road														
7	L2	273	0.0	273	0.0	0.180	0.4	LOSA	0.4	2.9	0.22	0.09	0.22	22.3
Approach		273	0.0	273	0.0	0.180	0.4	LOSA	0.4	2.9	0.22	0.09	0.22	22.3
West: Road 01														
10	L2	282	0.0	282	0.0	0.205	5.6	LOSA	0.0	0.0	0.00	0.43	0.00	52.1
11	T1	104	0.0	104	0.0	0.205	0.0	LOSA	0.0	0.0	0.00	0.43	0.00	47.7
Approach		386	0.0	386	0.0	0.205	4.1	NA	0.0	0.0	0.00	0.43	0.00	51.5
All Vehicles		678	0.0	678	0.0	0.205	2.5	NA	0.4	2.9	0.09	0.28	0.09	32.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [BSE-JGD-Rd03 - PM (Site Folder: General)]

Network: N101 [Network PM (Network Folder: General)]

Bindubi Street Extension / John Gorton Drive / Road 03

Signalised Intersection

PM Peak Hour

Site Category: PM Peak

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: John Gorton Drive														
1	L2	186	2.0	186	2.0	0.150	11.6	LOSA	1.9	13.7	0.37	0.68	0.37	42.6
2	T1	842	5.0	842	5.0	0.602	33.1	LOS C	12.2	89.2	0.87	0.76	0.87	39.9
3	R2	462	2.0	462	2.0	0.576	52.6	LOS D	7.5	53.4	0.95	0.82	0.95	30.1
Approach		1491	3.7	1491	3.7	0.602	36.5	LOS C	12.2	89.2	0.83	0.77	0.83	36.1
East: Bindubi Street Extension														
4	L2	608	2.0	608	2.0	0.625	14.6	LOS B	10.6	75.7	0.62	0.77	0.62	47.1
5	T1	19	2.0	19	2.0	*0.891	69.8	LOS E	6.8	48.4	1.00	1.01	1.40	17.7
6	R2	312	2.0	312	2.0	0.891	75.5	LOS F	6.8	48.4	1.00	1.00	1.40	27.3
Approach		939	2.0	939	2.0	0.891	35.9	LOS C	10.6	75.7	0.75	0.85	0.90	36.5
North: John Gorton Drive														
7	L2	329	2.0	329	2.0	0.250	10.1	LOSA	2.8	19.6	0.32	0.68	0.32	54.7
8	T1	935	5.0	935	5.0	*0.668	34.2	LOS C	14.0	102.3	0.90	0.79	0.90	39.3
9	R2	367	2.0	367	2.0	*0.916	73.2	LOS F	15.6	111.2	1.00	0.99	1.33	18.7
Approach		1632	3.7	1632	3.7	0.916	38.1	LOS C	15.6	111.2	0.80	0.81	0.88	36.2
West: Road 03														
10	L2	118	2.0	118	2.0	0.107	20.2	LOS B	2.8	20.1	0.82	0.76	0.82	39.8
11	T1	14	2.0	14	2.0	*0.151	61.3	LOS E	0.9	6.2	1.00	0.72	1.00	22.0
12	R2	34	2.0	34	2.0	0.151	66.0	LOS E	0.9	6.2	1.00	0.72	1.00	17.3
Approach		165	2.0	165	2.0	0.151	32.9	LOS C	2.8	20.1	0.87	0.75	0.87	31.2
All Vehicles		4226	3.3	4226	3.3	0.916	36.8	LOS C	15.6	111.2	0.81	0.80	0.87	36.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	Dist] m					
South: John Gorton Drive											
P11	Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95	81.2	35.0	0.43
P12	Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95	75.8	28.0	0.37
East: Bindubi Street Extension											
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	88.7	44.7	0.50
North: John Gorton Drive											
P31	Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95	78.5	31.5	0.40
P32	Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95	75.8	28.0	0.37
West: Road 03											
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	88.5	44.5	0.50
All Pedestrians		316	54.3	LOS E	0.2	0.2	0.95	0.95	81.4	35.3	0.43

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: 101 [Southern Access x Road 01 PM (Site Folder: General)]

Network: N101 [Network PM (Network Folder: General)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
East: Road 01														
5	T1	519	0.0	519	0.0	0.506	0.4	LOSA	0.0	0.0	0.00	0.00	0.00	59.2
Approach		519	0.0	519	0.0	0.506	0.4	NA	0.0	0.0	0.00	0.00	0.00	59.2
North: Southern Access Road														
7	L2	125	0.0	125	0.0	0.081	0.3	LOSA	0.2	1.1	0.18	0.06	0.18	22.3
Approach		125	0.0	125	0.0	0.081	0.3	LOSA	0.2	1.1	0.18	0.06	0.18	22.3
West: Road 01														
10	L2	120	0.0	120	0.0	0.107	5.6	LOSA	0.0	0.0	0.00	0.35	0.00	53.1
11	T1	82	0.0	82	0.0	0.107	0.0	LOSA	0.0	0.0	0.00	0.35	0.00	49.6
Approach		202	0.0	202	0.0	0.107	3.3	NA	0.0	0.0	0.00	0.35	0.00	52.3
All Vehicles		846	0.0	846	0.0	0.506	1.1	NA	0.2	1.1	0.03	0.09	0.03	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 3 [Rd03-Rd27-Rd53 - PM (Site Folder: General)]

Network: N101 [Network PM (Network Folder: General)]

Road 03 / Road 27 / Road 53

Signalised Intersection

PM Peak Hour

Site Category: PM Peak

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Road 53														
10	L2	1	2.0	1	2.0	0.020	48.2	LOS D	0.2	1.3	0.86	0.59	0.86	27.3
11	T1	5	2.0	5	2.0	0.020	44.7	LOS D	0.2	1.3	0.86	0.59	0.86	22.7
12	R2	3	2.0	3	2.0	0.010	48.0	LOS D	0.1	0.7	0.86	0.62	0.86	13.3
Approach		9	2.0	9	2.0	0.020	46.2	LOS D	0.2	1.3	0.86	0.60	0.86	20.7
East: Road 03														
1	L2	38	2.0	38	2.0	*0.787	41.4	LOS C	11.2	80.0	0.93	0.85	0.97	8.0
2	T1	480	2.0	480	2.0	0.787	36.2	LOS C	11.2	80.0	0.93	0.85	0.97	29.6
3	R2	60	2.0	60	2.0	*0.486	59.2	LOS E	2.0	14.6	0.93	0.74	0.93	16.2
Approach		578	2.0	578	2.0	0.787	39.0	LOS C	11.2	80.0	0.93	0.84	0.96	27.1
North: Road 27														
4	L2	8	2.0	8	2.0	0.036	48.7	LOS D	0.3	2.5	0.86	0.66	0.86	16.1
5	T1	3	2.0	3	2.0	*0.036	45.4	LOS D	0.3	2.5	0.86	0.66	0.86	16.1
6	R2	0	2.0	0	2.0	0.036	48.7	LOS D	0.3	2.5	0.86	0.66	0.86	28.6
Approach		12	2.0	12	2.0	0.036	47.8	LOS D	0.3	2.5	0.86	0.66	0.86	16.3
West: Road 03														
7	L2	0	2.0	0	2.0	0.211	32.6	LOS C	3.7	26.3	0.72	0.59	0.72	36.5
8	T1	154	2.0	154	2.0	0.211	27.1	LOS B	3.7	26.3	0.72	0.59	0.72	32.0
9	R2	4	2.0	4	2.0	0.034	63.6	LOS E	0.1	1.0	0.96	0.64	0.96	19.6
Approach		158	2.0	158	2.0	0.211	28.0	LOS B	3.7	26.3	0.72	0.59	0.72	31.4
All Vehicles		757	2.0	757	2.0	0.787	36.9	LOS C	11.2	80.0	0.89	0.78	0.91	27.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	Dist] m					
South: Road 53											
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	83.5	38.0	0.46
East: Road 03											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	87.3	43.0	0.49
North: Road 27											
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	81.2	35.0	0.43
West: Road 03											
P3	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	85.0	40.0	0.47
All Pedestrians		211	54.3	LOS E	0.2	0.2	0.95	0.95	84.3	39.0	0.46

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: 6 [Rd01-Rd53-Rd69 - PM (Site Folder: General)]

Network: N101 [Network PM (Network Folder: General)]

Road 01 / Road 53 / Road 69
 Signalised Intersection
 PM Peak Hour
 Site Category: PM Peak
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 115 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Road 69														
10	L2	0	2.0	0	2.0	0.025	44.0	LOS D	0.2	1.7	0.76	0.58	0.76	27.2
11	T1	9	2.0	9	2.0	0.025	40.7	LOS C	0.2	1.7	0.76	0.58	0.76	7.8
12	R2	56	2.0	56	2.0	*0.151	45.6	LOS D	1.6	11.3	0.86	0.73	0.86	7.1
Approach		65	2.0	65	2.0	0.151	44.9	LOS D	1.6	11.3	0.85	0.71	0.85	7.2
East: Road 01														
1	L2	137	2.0	137	2.0	*0.838	49.5	LOS D	17.8	126.4	0.99	0.95	1.10	13.8
2	T1	376	2.0	376	2.0	0.838	43.9	LOS D	17.8	126.4	0.99	0.95	1.10	27.6
3	R2	6	2.0	6	2.0	*0.049	61.1	LOS E	0.2	1.5	0.96	0.66	0.96	7.4
Approach		519	2.0	519	2.0	0.838	45.6	LOS D	17.8	126.4	0.99	0.95	1.10	24.5
North: Road 53														
4	L2	2	2.0	2	2.0	0.007	47.3	LOS D	0.1	0.4	0.85	0.61	0.85	14.4
5	T1	3	2.0	3	2.0	*0.074	41.1	LOS C	0.7	5.3	0.85	0.69	0.85	18.0
6	R2	23	2.0	23	2.0	0.074	45.7	LOS D	0.7	5.3	0.85	0.69	0.85	28.6
Approach		28	2.0	28	2.0	0.074	45.3	LOS D	0.7	5.3	0.85	0.69	0.85	26.9
West: Road 01														
7	L2	1	2.0	1	2.0	0.226	35.3	LOS C	3.6	25.5	0.76	0.71	0.76	29.4
8	T1	144	2.0	144	2.0	0.226	32.1	LOS C	3.6	25.5	0.76	0.71	0.76	29.4
9	R2	0	2.0	0	2.0	0.001	59.1	LOS E	0.0	0.0	0.94	0.52	0.94	22.3
Approach		145	2.0	145	2.0	0.226	32.2	LOS C	3.6	25.5	0.76	0.71	0.76	29.4
All Vehicles		758	2.0	758	2.0	0.838	42.9	LOS D	17.8	126.4	0.93	0.87	1.00	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
					[Ped ped	Dist] m					
South: Road 69											
P4	Full	53	51.8	LOS E	0.2	0.2	0.95	0.95	81.0	38.0	0.47
East: Road 01											
P1	Full	53	51.8	LOS E	0.2	0.2	0.95	0.95	84.1	42.0	0.50
North: Road 53											
P2	Full	53	51.8	LOS E	0.2	0.2	0.95	0.95	81.8	39.0	0.48
West: Road 01											
P3	Full	53	51.8	LOS E	0.2	0.2	0.95	0.95	85.6	44.0	0.51
All Pedestrians		211	51.8	LOS E	0.2	0.2	0.95	0.95	83.1	40.8	0.49

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: 101 [Northern Access x Road 03 PM (Site Folder: General)]

Network: N101 [Network PM (Network Folder: General)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Northern Access Road														
1	L2	125	0.0	125	0.0	0.225	1.8	LOSA	1.2	8.1	0.47	0.37	0.47	19.6
Approach		125	0.0	125	0.0	0.225	1.8	LOSA	1.2	8.1	0.47	0.37	0.47	19.6
East: Road 03														
4	L2	120	0.0	120	0.0	0.297	5.2	LOSA	4.2	29.3	0.00	0.13	0.00	55.5
5	T1	453	0.0	453	0.0	0.297	0.0	LOSA	4.2	29.3	0.00	0.13	0.00	49.9
Approach		573	0.0	573	0.0	0.297	1.1	NA	4.2	29.3	0.00	0.13	0.00	53.3
West: Road 03														
11	T1	165	0.0	165	0.0	0.042	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach		165	0.0	165	0.0	0.042	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		863	0.0	863	0.0	0.297	1.0	NA	4.2	29.3	0.07	0.14	0.07	33.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ATTACHMENT 4

School Drop off Queuing Analysis (AM)

Primary School - Queuing Calculations
AM Managed System for Cars

Vehicle Group Arrivals (veh/hr)	473
Pick up duration (sec)	120
Number of spaces	19
Total Average Time (sec)	6.315789

Queuing Theory Factors	
average arrival rate (r)	473.00000 *r=(veh/hr)
average service rate (s)	570.00000 *s=3600/(Total Average Time)
utilisation factor (p)	0.82982 *p=r/s
mean queue (E(m))	4.04646 *E(m)=(p/(1-p))-p

Probability of Vehicles in System (P(n))		*P(n)=(1-p)p^n
No. Vehicle Groups in System (n)	Probability (%)	
0	17.0%	17.0%
1	14.1%	31.1%
2	11.7%	42.9%
3	9.7%	52.6%
4	8.1%	60.7%
5	6.7%	67.3%
6	5.6%	72.9%
7	4.6%	77.5%
8	3.8%	81.3%
9	3.2%	84.5%
10	2.6%	87.2%
11	2.2%	89.3%
12	1.8%	91.2%
13	1.5%	92.7%
14	1.2%	93.9%
15	1.0%	94.9%
16	0.9%	95.8%
17	0.7%	96.5%
18	0.6%	97.1%
19	0.5%	97.6%
20	0.4%	98.0%
21	0.3%	98.3%
22	0.3%	98.6%
23	0.2%	98.9%
24	0.2%	99.1%
25	0.2%	99.2%
26	0.1%	99.4%
27	0.1%	99.5%
28	0.1%	99.6%

System 1	
473	60mins
473	

Total

Managed Queuing	
473	cars/30mins
473	cars/hr with 100% using queuing systems
473	cars/system/hr for analysis purposes
Max Queue	36 m
	Length in metres