TRAFFIC IMPACT ASSESSMENT
FOR
283-293 LOGAN RESERVE ROAD, LOGAN RESERVE

ITE CONSULTING
TRAFFIC AND TRANSPORT ENGINEERS

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ITE CONSULTING REPORT
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Signed **Date**

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1.0 INTRODUCTION AND APPROACH

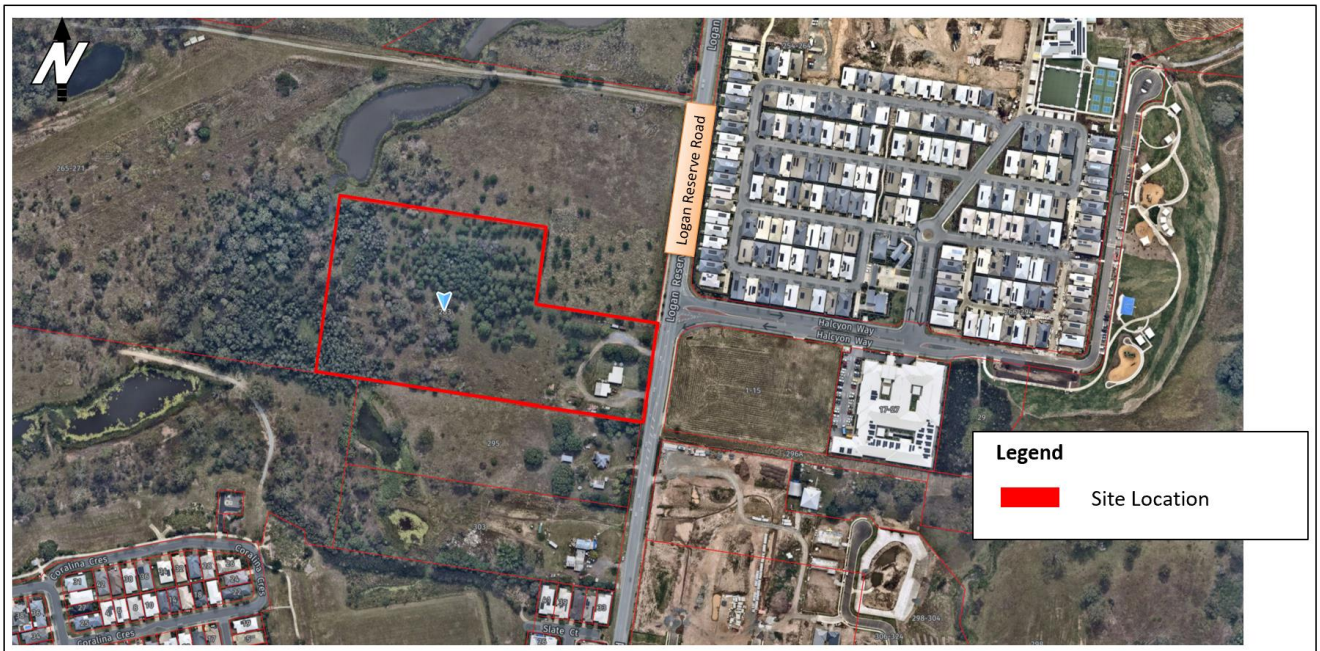
1.1 Project Overview

A traffic impact assessment has been undertaken as part of this letter based on preliminary conceptual development plans for 283-293 Logan Reserve Road, Logan Reserve. The proposed development is understood to include a Queensland Nepalese Cultural Centre. The proposed development would comprise of 518.7m^2 of GFA. The proposed development would consist of a staged approach consisting of:

- Stage 1: Temple, stupa, possibly a small amenities block and storage area. At Stage 1 it is anticipated that some of the open space area will be used for occasional events/functions in a temporary marquee setup.
- Stage 2: New community hall and other remaining structures/facilities.

The site locality is provided in Figure 1.1.

Figure 1.1: Site Locality



ITE CONSULTING Project:	Client:	Figure Name:	Figure Number:
283-293 Logan Reserve Road	Nepalese Association	Site Locality	1

Source: Nearmap (2023)

The proposed development is located adjacent to Logan Reserve Road which is considered to be the frontage road of the proposed development. Vehicular access to the site is proposed to be provided from Logan Reserve Road which is the lowest order road to which the site has frontage. This will be facilitated by means of a new access RS-051 IPWEAQ standard 6m wide driveway with left turn deceleration lane which will only

provide left-in-left-out traffic movements. The proposed access will located approximately 75m south of the Halcyon Way / Logan Reserve Road intersection.

1.2 Proposed Application

The proposed application is for a material change of use consisting of:

Table 1.1 Proposed Development Extents

Parameter	Extent
Place of Worship GFA:	518.7
Carparks:	81 car spaces + SRV Bay

There is no phasing expected for this development. The following legislative summary items applicable to the proposed TIS are indicated in Table 1.2.

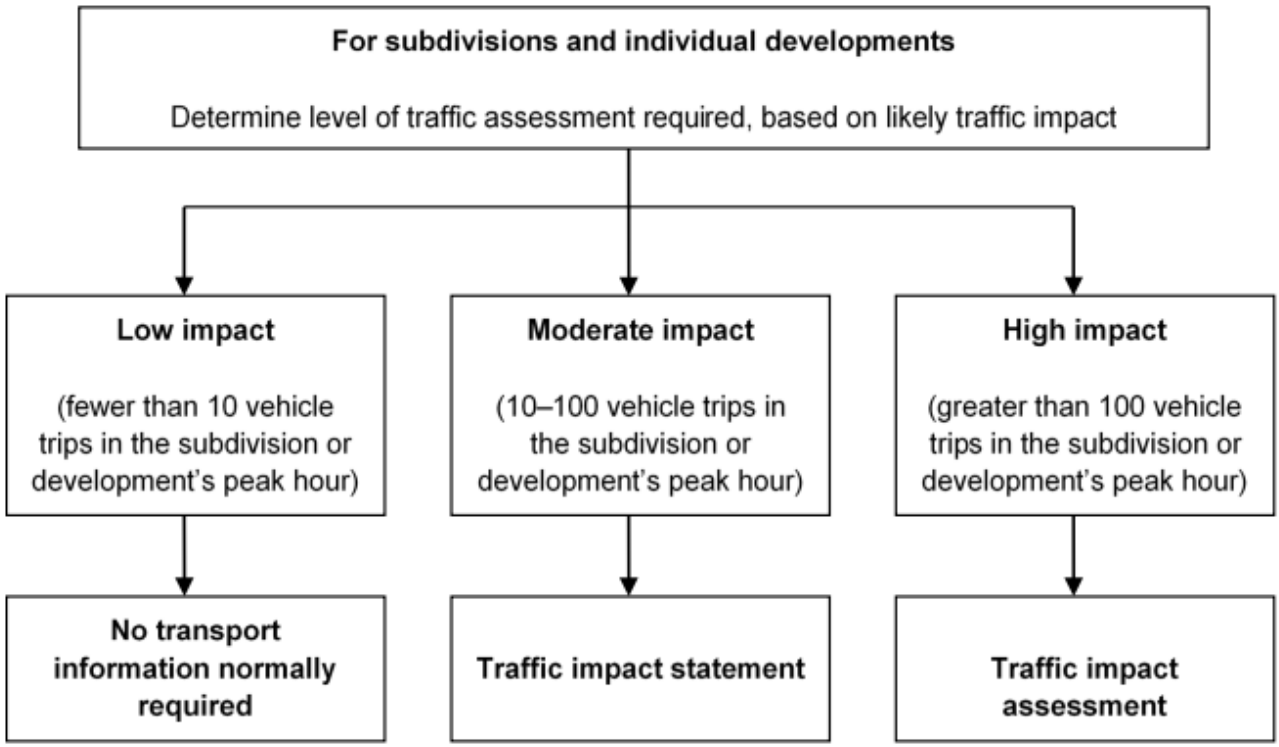
Table 1.2 Legislative Summary

Legislative Summary	
Local Government Authority	Logan City Council
Local Planning Framework	Logan City Council Planning Scheme, 2015
Planning Scheme Zone/s	Emerging Community
Applicable Overlays	N.A
Applicable Planning Scheme Schedule	Servicing, Access and Parking Code

1.3 Scope and Context of Report

This report assesses the impact which the proposed development would have on the external road network and provides recommendations regarding site access and internal layout requirements from a traffic engineering perspective. Based on the provisions contained in the *Austroads Guide to Traffic Management Part 12: Intigrated Transport Assessments for Developments* a Traffic Impact Statement would be required, based on the expected generated traffic. Figure 4.1 illustrates the level of assessment hierarchy.

Figure 1.2: Level of Impact Assessment



Source: Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Parking supply required to cater for development demand
- Parking layout to provide efficient and safe internal maneuvering
- Site servicing requirements
- a brief description of the development in terms of proposed land use and trips generated;
- a brief description of the existing operational conditions of the road network in the immediate vicinity of the development;
- analysis of the operation of the accesses to the development;
- analysis of the operation of the first intersection, as a minimum, on either side of the accesses;
- Access configuration to provide efficient and safe maneuvering between the site and the public road network
- Suitability of access and internal facilities to provide for pedestrian and cyclist operation

1.4 Reference Guides

The following documents have been evaluated in order to formulate the traffic advice within this assessment:

- AS/NZS 2890.1 – 2004 Parking facilities Part 1: Off-street car parking
- AS/NZS 2890.2 – 2018 Off-street commercial vehicle facilities
- TMR Guide for Treatment Options to Improve Safety of Pedestrians, Bicycle Riders and other Users at Driveways, 2021
- TMR Guide to Traffic Impact Assessment Manual, December 2018
- Road Planning and Design Manual, Chapter 13
- Plans of the proposed development, with a copy of relevant drawings provided in **Appendix A** to this report
- Logan City Council Planning Scheme of 2015

2.0 EXISTING CONDITIONS

2.1 On-Site Uses

The proposed development site currently vacant and will be developed as part of this application.

2.2 Land Uses

The surrounding area is largely fully developed, consisting primarily of low-medium and medium-density residential properties.

2.3 Site Surrounding Road Network

Descriptive details regarding the road network surrounding the proposed site is provided in Table 2.1. The table provides information regarding existing geometrical conditions of the road network and associated road links.

Table 2.1 Immediate Site Surrounding Road Network

Road Name	Road Class	Number of Lanes per Direction	Carriageway Single / Dual	Authority	Posted Speed (km/h)
Logan Reserve Road	Urban Arterial	1	S	Council	60
Halcyon Way	Local Street	1	S	Council	50

Halcyon Way meets Logan Reserve Road at a priority-controlled T-intersection 75m north of the site.

3.0 TRAFFIC OPERATIONS

3.1 Development Layout

The proposed development would consist of a multiple residential development of 244 units. Layout drawings are provided in Appendix A for the purposes of this DA.

3.2 Development Staging

TMR's GTIA outlines the impact assessment year by impact type. The assessment year for impacts on intersection delay is the year of opening of each stage, including the final stage. Furthermore, the GTIA requires a 10-year design horizon be adopted from the opening of the final stage when assessing the impact of access and frontage works. This proposed development is expected to be completed in one stage of construction. Therefore, the following development staging has been adopted:

- Traffic Counts: 2023
- Development Application: 2024
- Construction and Opening: 2025
- Operation plus 10 years: 2035 (Access Only)

3.3 Assessment Scenarios

The following assessment scenarios have been adopted:

- Opening year (2025) pre-development
- Opening year (2025) post-development
- Future year (2035) pre-development (access to the road network)
- Future year (2035) post-development (access to the road network)

3.4 Background Traffic Growth

The scenarios modelled reflect the development staging with detailed analyses undertaken on the existing conditions, opening year (2025) and future year (2035). Based on traffic surveys undertaken in February of 2024, a relevant traffic growth rate was derived from previous traffic data collected along Logan Reserve Road. Based on historic traffic volume data on Logan Reserve Road (adopted from the 22 January 2016 TTM Traffic Report for 303-309 Logan Reserve Road, the anticipated traffic growth rate is approximately 3%.

3.5 Traffic Generation

The peak hour traffic generation associated with the proposed uses has been based on trip generation rates, from the Queensland Open Portal Data as per anticipated use of Place of Worship. The peak hour trip generation rates envisaged is provided in Table 3.1. The data assumes a directional split of 100% inbound and 100% outbound during the peak hours for conservancy.

Table 3.1 Peak Hour Trip Generation

Trip Generation (Queensland Open Portal Data)		
	Weekend	Weekday
Max Trip Rate AM	0.092	0.055
Max Trip Rate PM	0.068	0.080
Proposed GFA (sqm)	518.7	

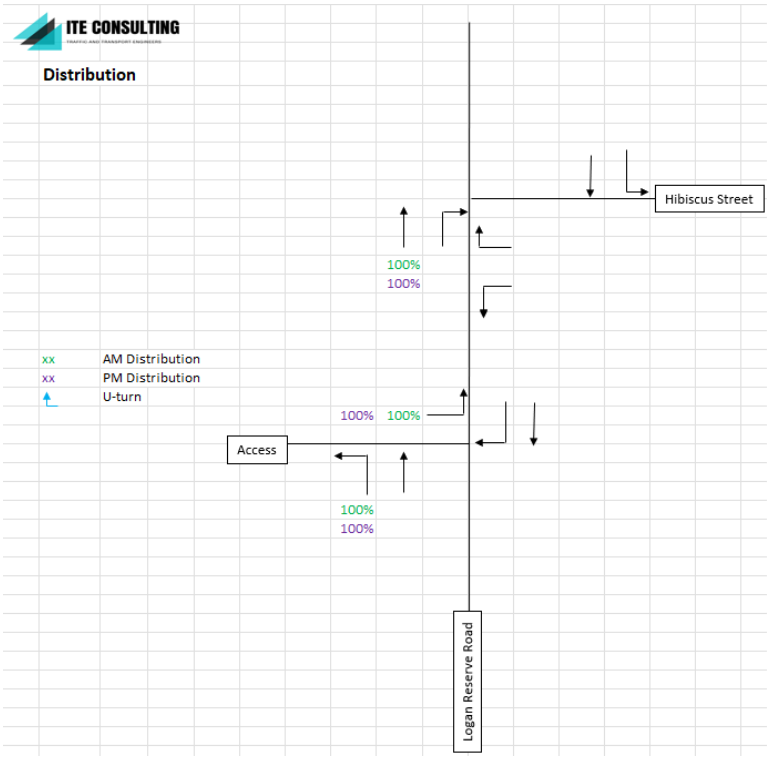
AM Trip Generation	48	29
PM Trip Generation	35	43

As indicated in Table 4.1, it is anticipated that 48 (rounded) vehicles would enter and exit the site during the AM peak hour. During the PM peak hour, 43 (rounded) vehicles would enter and exit the site. The highest peak hour trip rate is anticipated to be a weekend AM peak and weekday PM peak. As such a weekend AM peak and weekday PM peak were considered for intersection modelling purposes.

3.6 Directional Distribution and Assignment

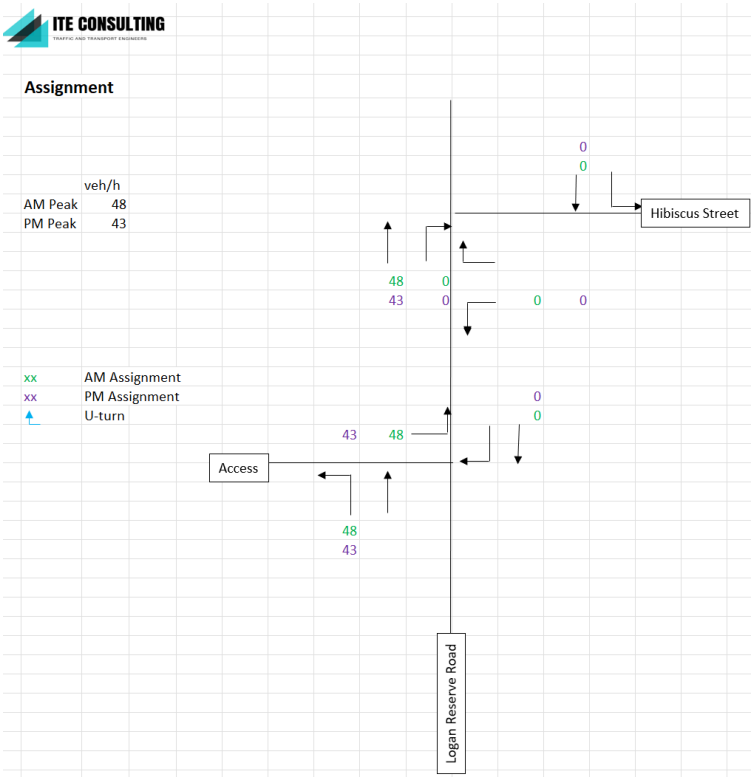
The distribution of development related traffic on the existing road network has been estimated based on the directional split inherent in the traffic surveys. The resulting distributions are shown in Figures 3.1 for the weekend morning and weekday evening peak hours, respectively.

Figure 3.1: Distributon



The anticipated traffic assignment of the AM and PM peak hour development traffic are illustrated in Figure 3.2.

Figure 3.2: Traffic Assignemnt



3.7 Background Volumes

A traffic survey was undertaken on Saturday 03/02/2024 from 09:00am – 12:00pm and Thursday 08/02/2024 06:00am – 09:00am and 15:00pm – 17:30pm. Traffic surveys were undertaken at the following key intersection:

- Logan Reserve Road / Halcyon Way

The peak turn movement background traffic is provided in Appendix A. A series of SIDRA analyses were conducted to quantify the existing traffic operations at the above intersection. The analyses were based on the traffic count data presented in Appendix A with:

- Peak Hour Factors (PHF) of 0.95
- the observed proportion of heavy vehicles (%HV) for each movement
- SIDRA default values for other parameters

The results are presented in terms of the degree of saturation (DOS), cycle length, 95th percentile vehicle queues and critical movement at each intersection. The degree of saturation for a movement is defined as the ratio of traffic demand to the capacity of the movement. The critical movement relates to the approach or movement with the highest degree of saturation.

3.8 Access Operations

A comprehensive analysis was carried out to determine the adequacy of the proposed access location. This relates to:

- Sight Distance;
- Turn warrant requirements;
- Queue storage.

3.8.1 Design Parameters

The following parameters were used for the access analyses:

- Design speed of 70km/h (operating +10 km/h) along Logan Reserve Road;
- Turn warrant requirements in line with AGRD Part 4A;
- Access spacing requirements in line with AGRD Part 4A. Particularly maintaining a 75m centre line to centre line offset from the Logan Reserve Road / Halcyon Way intersection to the proposed access as per simultaneous entry spacing from Table E 6 of AGRD Part 4A;
- Maintaining good sight line conditions in line with AGRD Part 3 and AGRD Part 4 requirements;
- Determining appropriate turn lane requirements in line with Extended Design Domain (EDD) criteria based on turn lane warrant outcomes.

3.8.2 Minimum Gap Sight Distance

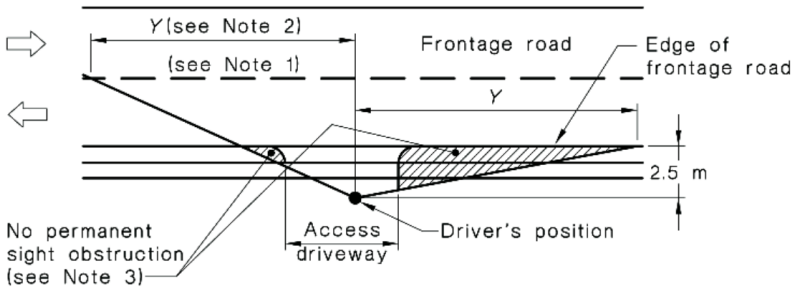
The MGSD was calculated based on the observation angle to approaching traffic and critical gap acceptance values adopted by drivers undertaking typical manoeuvres at the intersections. The MGSD was determined through performance outcomes as defined in AS2890.1:2004 and the Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections (Austroads, 2010) as the minimum distance in meters required for the driver of a vehicle entering the major flow to see a vehicle in the conflicting streams, in order to safely commence the desired manoeuvre.

AS2890.1:2004 MGSD Requirements

The desirable sight distance as per Figure 3.2 of AS2890.1 for an access driveway with a frontage road speed (speed of 70km/h) should be 97m desirable and 85m minimum. The concept of vehicle sight distance envelope which should be required is illustrated in Figure 3.1 below.

Figure 3.1: AS2890.1:2004 Access Sight Distance (MGSD)

Figure 3.2 — Sight distance requirements at access driveways



Frontage road speed (Note 4) km/h	Distance (*Y*) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70
80	111	105	95
90	125	130	Use values from 2nd and 3rd columns
100	139	160	
110	153	190	

The detailed MGSD sight distance analysis results, indicates that both the desirable and minimum MGSD would be complied with along both directions of travel (as measured in line of travel path).

AGRD Part 4A MGSD Requirements

Figure 3.2 and Figure 3.3 illustrate the MGSD for left turning and right turning traffic respectively as the distance labelled 'D'.

Figure 3.2 Sight distance requirements and angles for traffic turning left

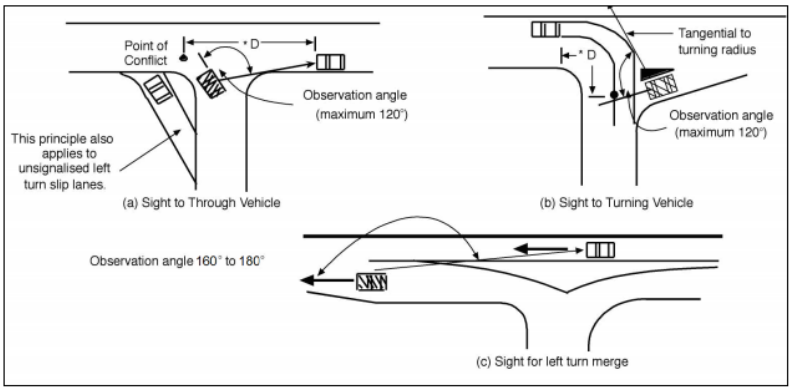
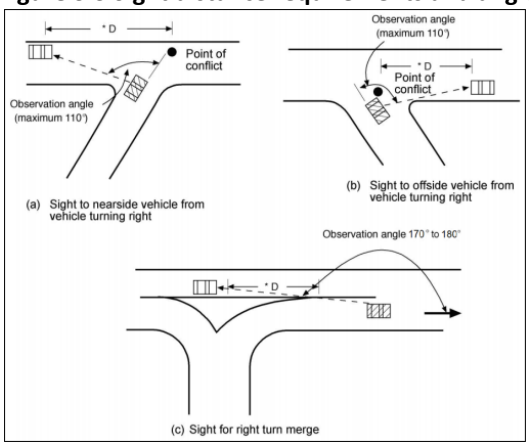


Figure 3.3 Sight distance requirements and angles for traffic turning right



The MGSD varies depending on vehicle approach speeds and critical gap acceptance times, as shown in Figure 3.4.

Figure 3.4 Minimum gap sight distances ('D' in metres) for various speeds

Critical gap acceptance time (ta) (secs)	85th percentile speed of approaching vehicle (km/h)										
	10	20	30	40	50	60	70	80	90	100	110
4	11	22	33	44	55	67	78	89	100	111	122
5	14	28	42	55	69	83	97	111	125	139	153
6	17	33	50	67	83	100	117	133	150	167	183
7	19	39	58	78	97	117	136	155	175	194	214
8	22	44	67	89	111	133	155	178	200	222	244
9	25	50	75	100	125	150	175	200	225	250	275
10	28	56	83	111	139	167	194	222	250	278	305

Based on the evaluation the following MGSD is required for the access as per AGRD Part 4A:

- Left turn movement from minor road (Access) = 97m
- Right turn movement from minor road (Access) = 97m
- Right turn from Stubbins Street = 78m

The MGSD analysis results are provided in Table 3.1.

Table 3.1 MGSD Results

Movement	MGSD Required	Sight Distance Achieved (Y/N)
AS2890.1:2004 Minimum	83m	Y Sight distance to the north is achieved for 83m Sight distance to the south is achieved for 83m
AS2890.1:2004 Desirable	65m	Y Sight distance to the north is achieved for 65m Sight distance to the south is achieved for 65m
AGRD Part 4A Left turn from access	97m	Y Sight distance to the south is achieved for 65m
AGRD Part 4A Right turn from access	97m	Y Sight distance to the north is achieved for 65m

It was found that sufficient MGSD sight distance would be available to meet the minimum requirements of AS2890.1:2004 for both directions of travel at the proposed access.

3.8.3 Turn Lane Warrant (Configuration)

Vehicular access to the site is proposed to be provided from Logan Reserve Road which is the lowest order road to which the site has frontage. This will be facilitated by means of a new access RS-051 IPWEAQ standard 6m wide driveway. A single primary access point is proposed which considered wide enough to accommodate the required vehicle turn paths of an SRV and waste collection vehicle. Swept paths are provided in **Annexure C**. A turn lane warrant assessment was carried out based on the expected overlapping peaks of a weekend AM peak and weekday PM peak. The analysis is based on a design year of 2035. The results are provided in Figure 3.5.

Figure 3.5 Turn Warrant Analysis (Year 2035)

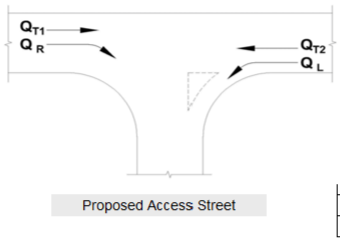
Intersection: **Logan Reserve Road / Proposed Access** (Major Road / Minor Road)
Year / Peak: **2035 AM & PM** Scenario: **Post Development**

Assessment based on Austroads Guide to Traffic Management Part 6. This warrant assessment applies only to turning movements from the major road only.

	AM Peak	PM Peak
Q_{T1} =	900	1,872
Q_R =	0	0

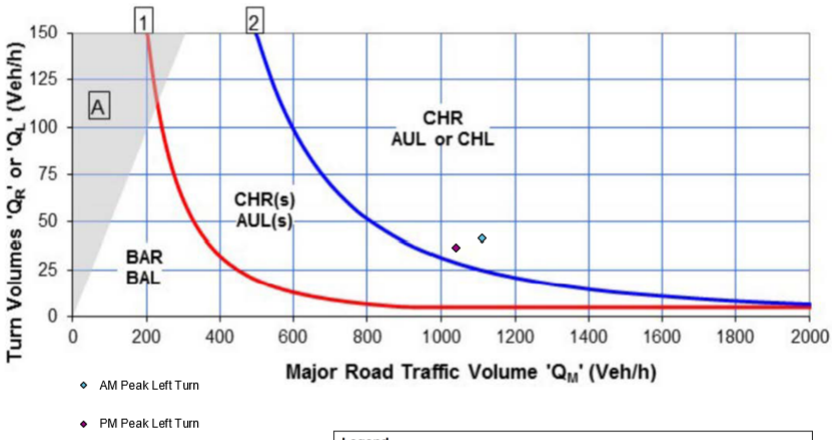
Splitter Island? No

Design speed (km/h) 70



	AM Peak	PM Peak
Q_{T2} =	1,175	1,099
Q_L =	48	43

Graph	Q_M	Q_R/Q_L
AM Peak		
Right	2,123	0
Left	1,175	48
PM Peak		
Right	3,014	0
Left	1,099	43



Recommended treatments:

Right Turn	-
Left Turn	AUL(s)

Legend

BAR	Basic Right Turn	BAL	Basic Left Turn
CHR(S)	Channelised Right Turn (short)	AUL(S)	Auxiliary Left Turn (short)
CHR	Channelised Right Turn	AUL	Auxiliary Left Turn
		CHL	Channelised Left Turn

Comments:

Prepared by: Herman Joubert RPEQ
Reviewed by: Herman Joubert RPEQ
Date: 05/06/2024

The turn warrant analyses indicated that an AUL would be required. In order to balance design outcomes and access / intersection spacing requirements the turn lane configuration as per EDD criteria was adopted. This includes a deceleration taper of 15m and total deceleration length of 25m as per Table A 17 of AGRD Part 4A. The proposed access was found to operate as a left-in-left out configuration due to the existing road geometry and line marking of Logan Reserve Road. The driveway was conceptually designed as a 6m wide IPWEAQ RS-051 driveway in line with IPWEAG standards and able to accommodate service vehicle swept paths as well as two-way flow of AS2890.1:2004 passenger vehicles.

3.8.4 Queueing

Queuing space is to be provided in accordance with Table 9.4.7.3.3 of the Servicing, Access and Parking Code. For the purpose of calculating queue length each car length is 6.0m and the queue distance is measured from the boundary of the premises to the first available parking space. AS2890.1 recommends that sufficient on-site queuing be provided to allow a free influx of traffic which will not adversely affect traffic or pedestrian flows on the frontage road. It must be noted that these queue distance requirements are based on high turnover parking areas such as shopping centres and cannot be standardised for the proposed medium to long term parking of the proposed development. The 95th percentile queue at the development access is considered to be an adequate measure of the minimum queuing space required at the site access. To calculate the amount of queuing space required, we must estimate the probability ty of a number of vehicles in a queue (n) exceeding a specified number of vehicles (N) at any instant. This is calculated using the following formula:

$Pr\ (n>N) = \rho^{N+1} \leq \alpha$

Where:

- ρ is the queue utilisation factor
- α is the probability of a queue of N vehicles being exceeded

Rearranging this formula enables the calculation of the design queue length in terms of the number of vehicles as follows:

$$N = \frac{\log(\alpha)}{\log(\rho) - 1}$$

The minimum design queue would be calculated as N vehicles. The utilisation factor, ρ, is the ratio of the mean arrival rate (r) and the mean service rate(s), ie:

$$\rho = \frac{r}{s}$$

The mean arrival rate (veh/hr) varies for each situation. It is calculated using the peak hour trip generation for the facility. This is expressed in vehicles per hour. The mean service rate (veh/hr) is determined by the time required to clear the one-way section and associated clearance which can be achieved within an hour.

The queuing formula is used to calculate the queue length given a specified probability (α). Generally, the 95th percentile queue is considered an adequate measure of an acceptable queue at access driveways. This infers that there is a 5% probability that the queue length will be exceeded (ie α=0.05). Australian Standards, AS2890.1, outlines the requirement to provide a 98th percentile queue for situations where mechanical parking installations such as car stackers are used (ie α=0.02). The 95th percentile queue results are provided in Table 3.2.

Table 3.2 Queueing Analysis

Queue Length Analyses (M/M/1 Queue): Access PM Peak Hour			
Variable Inputs			
Unit of time	hour		
Arrival rate	48	vehicles per hour	
Service rate	360	vehicles per hour	
Number of gates	1	gates	
Queue distance per vehicle	6	metres	
Outputs			
Direct outputs from inputs			
Mean time between arrivals	0.021	hour	
Mean time per service	0.0	hour	
Traffic intensity	0.13		
Summary measures			
Average utilisation rate of gate	13.3%		
Average number of vehicles waiting in line (Lq)	0.02051	vehicles	
Average number of vehicles in system (L)	0.15385	vehicles	
Average time waiting in line (Wq)	0.00043	hour	
Average Delay E(w)	1.53846	seconds	
Probability of no vehicles in system (P0)	0.86667	(this is the probability of empty system)	
Probability of 'x' vehicles in queue (%)	11.6	1	
Probability that at least one server is idle	-1055.6%	(this is also the "percentage who don't wait in queue")	
Number of gates required	1		
Average Delay (Time in Queue (hour))	0.003		
Average Queue (vehicles)	0.2		
Mean Queue (per lane) - vehicles			0.154
Percentile Back of Queue (per lane)	85%	Formula (vehicles)	0.00
		Rounded up (vehicles)	0
		Distance (metres)	0
	95%	Formula (vehicles)	0.49
		Rounded up (vehicles)	1
		Distance (metres)	6
	99%	Formula (vehicles)	1.29
		Rounded up (vehicles)	2.00
		Distance (metres)	12
Mean Delay (veh) seconds			11.54
Q Prob.	1	More than 1 veh.	1.8%
Queue Theory	**Mean Queue**	0.15	
$p^{(N+1)} = (1\text{-}\%)$	$n_q = p/(1-p)$	0.05	
$N+1 = \log_p(1\text{-}\%)$		0.01	
$N = \log_p(1\text{-}\%)-1$	**Mean Waiting Time (Delay)**		
	$W_m = n_q/q_a$		

where:		
p = Utilisation Ratio		
% = Percentile Queue		
N = No. of Vehicles		
n_q = Mean Queue (incl. vehicle being serviced)		
q_a = Approach Volume		
W_m = Mean Delay (incl. vehicle being serviced)		

Allowance is made for in the design to accommodate for up to 21m of queue storage plus an additional 25m with the left turn lane. However, the proposed 95th percentile queueing would be for only 1 vehicle (6m) and thus the proposed internal queue storage of 21m is considered sufficient.

4.0 TRAFFIC IMPACT ASSESSMENT

4.1 Intersection Analysis Criteria

The intersection assessment approach consisted of the approach of analysis as contained in the GTIA (Guide to Traffic Impact Assessment, TMR December 2018) manual. An increase in vehicles through an intersection as a result of the development will likely increase traffic delays. Increases in delays have an economic and social impact on the community through increased travel times, driver impatience (leading to possible crashes) and the associated economic cost of these delays to private and commercial / heavy vehicle trips according to the GTIA. The following input types were required as a basis to evaluate existing intersection performance:

- Existing intersection geometry and lane configuration data;
- Vehicle movement data;
- Peak hour traffic movement data.

The assessment of delay impacts was consistent with the following process:

- Determine the development's design peak periods for assessment and the impact assessment year(s)
- Identify all of the intersections in the impact assessment area
- Analyse every intersection in the impact assessment area for the base case for the design peak periods in the opening year(s), by means of a recognised analytical methodology (SIDRA) to determine intersection delays.
- An analysis of every intersection in the impact assessment area for the 'with development case' for the design peak periods in the impact assessment year(s).
- The total vehicle-minutes across each intersection and across all design peak periods assessed for the 'base case' and the 'with development case' were added together. The development impact was then reflected as:

$$\mathrm{ID} = \sum_{i=1}^{n} \mathrm{WD} + \sum_{i=1}^{n} \mathrm{BC}$$

where:

ID is the aggregate intersection-delay impact on vehicle-minutes.

WD is 'with development' intersection vehicle-minutes for design peak periods. This is calculated by multiplying the 'with development' average delay by movement to the base case volume on each movement, thus not counting the impact as delays to development traffic, only to pre-existing traffic that is affected by these additional delays.

BC is base case intersection vehicle-minutes for design peak periods

n is the number of intersections in the impact assessment area

i is each intersection within the impact assessment area.

- Possible intersection upgrades (if required) for the 'with development' case for intersections within the impact assessment area will be identified. The upgrades and or mitigations may also be short term operational management strategies due to the short term nature of construction traffic.
- Intersections, including any proposed upgrades, across the design peak periods in the impact assessment year were analysed to demonstrate that the aggregate intersection-delay impact 'with development' is equal to or less than the aggregate intersection-delay impact in the base case.
- Where development traffic adds less than 5% of delay to base traffic in aggregate, no mitigation to treat the intersection delay is required.

The impact assessment year is the year at which the impacts of the development are assessed. The impact assessment year varies by impact type because the effects of development can be quite different on infrastructure than they are on other users. The impact years which are to be assessed were adopted from GTIA (Guide to Traffic Impact Assessment Manual, December 2018) and summarised in Table 4.1.

Table 4.1: Impact Assessment Years

Impact Type	Impact assessment years
Intersection Delay	Year of opening of each stage including the final stage (Assumed to be end of year 2025)
Access and frontage	Year of opening of each stage including the final stage and 10 years after the year of opening of the final stage for access intersections (includes both new and amended accesses). Assumed to be year 2035.

4.2 Impact Assessment Area

TMR's Guide to Traffic Impact Assessment (2018) (GTIA) defines the impact assessment area for intersection delay and road safety as all intersections where development traffic exceeds more than 5% of the base traffic for any movement in the year of opening (ie 2026). The 2025 development generated traffic for weekend morning and weekday evening peak hours is only expected to exceed 5% of the base traffic at the Logan Reserve Road / Halcyon Way intersection. Therefore, this intersection has been assessed further in terms of intersection delay and road safety.

4.3 Future Planned Upgrades

The LCC LGIP mapping indicates that Logan Reserve Road to which the site has access is not planned for future intersection or road link upgrades. As such the proposed development is not considered to impact the future long-term planning of the road network.

4.4 Intersection Analysis

4.4.1 5% Comparison

According to the GTIA, an intersection delay assessment would be required where long-term development traffic exceeds 5% of the base traffic for any movement in the design peak periods in the year of opening of each stage. As such a 5% traffic comparison was undertaken to determine the net effective increase of development traffic to opening year traffic and whether a delay assessment would be required at the respective intersection. The 5% comparison results are provided in Table 4.2.

Table 4.2: 5% Comparison Analysis

Logan Reserve Road / Halcyon Way					
Year of Operation	**Peak**	**Movement**	**Background Volume (veh/h)**	**Development volume (veh/h)**	**5% Comparison Results**
Opening Year 2025 Volumes with Development	AM	North (LT)	16		0.00%
		North (TH)	366	48	13.11%
		North (RT)			
		East (LT)	10		0.00%
		East (TH)			
		East (RT)	34		0.00%
		South (LT)			
		South (TH)	583	48	8.23%
		South (RT)	14		0.00%
		West (LT)			
		West (TH)			
		West (RT)			
	PM	North (LT)	22		0.00%
		North (TH)	917	43	4.69%
		North (RT)			
		East (LT)	10		0.00%
		East (TH)			
		East (RT)	14		0.00%
		South (LT)			
		South (TH)	553	43	7.78%
		South (RT)	5		0.00%
		West (LT)			
		West (TH)			
		West (RT)			

Table 4.2 indicates that some movements would exceed the 5% increase in traffic volume and as such SIDRA modelling was undertaken for these two intersections to determine the aggregate increase in vehicle delay.

4.4.2 SIDRA Delay Assessment

The level of service and delay results for each movement based on the "without development" and "with development" scenario is provided in Table 4.3.

Table 4.3: SIDRA Delay Analysis Opening Year 2025 Weekend AM Peak

Year 2025 AM Peak Analysis							
		Without Development (Base Case)			With Development		
		Volume (veh/h)	Delays	LOS	Volume (veh/h)	Delays	LOS
Logan Reserve Road / Halcyon Way	North (LT)	17	5.6	A	17	5.6	A
	North (TH)	385	0.1	A	385	0.1	A
	North (RT)	0			0		
	East (LT)	11	7.5	A	11	7.4	A
	East (TH)	0			0		
	East (RT)	36	20.4	B	36	20.8	B
	South (LT)	0			0		
	South (TH)	614	0.1	A	673	0.1	A
	South (RT)	15	7.3	A	15	7.3	A
	West (LT)	0			0		
	West (TH)	0			0		
	West (RT)	0			0		

Table 4.4: SIDRA Delay Analysis Opening Year 2025 Weekday PM Peak

Year 2025 PM Peak Analysis							
		Without Development (Base Case)			With Development		
		Volume (veh/h)	Delays	LOS	Volume (veh/h)	Delays	LOS
Logan Reserve Road / Halcyon Way	North (LT)	23	5.6	A	23	5.6	A
	North (TH)	965	0.2	A	965	0.2	A
	North (RT)						
	East (LT)	11	15	B	11	15.4	B
	East (TH)						
	East (RT)	15	41.4	C	15	45.1	D
	South (LT)						
	South (TH)	582	0.1	A	634	0.1	A
	South (RT)	5	13.5	A	5	13.5	A
	West (LT)						
	West (TH)						
	West (RT)						

The intersection operates at LOS A as an overall intersection performance during both AM and PM peaks for the "without" and "with" development traffic scenarios. The worst-movement is considered the right tun out of Halcyon Way during both Saturday AM and weekday PM peak hours. The impact on aggregate delay is provided in Table 4.5 for the AM peak of the opening year and Table 4.6 for the PM of the opening year.

Table 4.5: Opening Year 2025 Weekend AM Peak Aggregate Delay Analysis

Year 2025 AM Peak Analysis				
		Aggregate Delay		
		BC	WD	
Logan Reserve Road / Halcyon Way		veh-mins	veh-mins	Change in Delay
	North (LT)	95	95	
	North (TH)	39	39	
	North (RT)	0	0	
	East (LT)	83	81	
	East (TH)	0	0	
	East (RT)	734	749	
	South (LT)	0	0	
	South (TH)	61	61	
	South (RT)	110	110	
	West (LT)	0	0	
	West (TH)	0	0	
	West (RT)	0	0	
Total Aggregate		1122	1135	
Percentage Change in Delay		1122	1135	1.2%

Table 4.6: Opening Year 2025 Weekday PM Peak Aggregate Delay Analysis

Year 2025 PM Peak Analysis				
		Aggregate Delay		
		BC	WD	
Logan Reserve Road / Halcyon Way		veh-mins	veh-mins	Change in Delay
	North (LT)	129	129	
	North (TH)	193	193	
	North (RT)	0.00	0	
	East (LT)	165.00	169	
	East (TH)	0.00	0	
	East (RT)	621.00	677	
	South (LT)	0.00	0	
	South (TH)	58.20	58	
	South (RT)	67.50	68	
	West (LT)	0.00	0	
	West (TH)	0.00	0	
	West (RT)	0.00	0	
Total Aggregate		1234	1293	
Percentage Change in Delay		1234	1293	4.8%

The intersection would in aggregate not have more than 5% of additional delay to the AM and PM peak hours. As such no further mitigation measures are considered to be required. The SIDRA detailed results are provided in **Annexure D**. It must be noted that the proposed operating conditions of the development would likely not coincide with the peak hours of background traffic due to the nature of operations. These were evaluated as worst-case.

4.5 Safety Analysis

The road safety impact assessment has been undertaken as per the framework laid out in Part C of the GTIA. This framework relies on the principle that a road's safety is not significantly worsened as a result of the Project, and that any pre-existing or Project -introduced unacceptable safety risk is addressed. The GTIA acknowledges that safety is not readily quantifiable and may require scoring based on expert opinion on the changes to likelihood and/or consequence of a risk being realised.

- Establishing the existing safety risks relevant to the Project TIA study area. Existing safety issues were determined through a desktop review of relevant available data and information including published crash histories
- Identifying the likely new risks or modified risks resulting from the Project
- Completing a risk assessment of the likelihood and consequence of safety risks being increased as a consequence of Project traffic and at Project access points
- Recommending management and mitigation works to ensure the existing safety risk rating for the road is not worsened as a result of the Project and that any unacceptable safety risk is addressed.

As indicated in the GTIA, a road safety assessment is required where:

Figure 4.4: GTIA (2018) Table 6.4 Extract

Road safety	All intersections where the development traffic exceeds 5% of the base traffic for any movement in the design peak periods[3] in the year of opening of each stage All road links where the development traffic exceeds 5% of the base traffic in either direction on the link in the design peak periods[3] in the year of opening of each stage

A safety assessment was carried out to determine whether the proposed development and associated access would have any significant worsening to safety conditions.

The risks inherent on the existing state-controlled road network and associated with the addition of development generated traffic were scored using the risk scoring matrix outlined in TMR's GTIA, as reproduced in Figure 4.5 and Figure 4.6. In undertaking the risk assessment:

- the likelihood of a crash was determined based on the number of similar crashes reported in the historical crash data;
- the consequence of a crash was based on the Killed or Serious Injury (KSI) Indexes reported in Part 4 of TMR's Manual of Uniform Traffic Control Devices (MUTCD) for different crash types / DCA Codes.

Figure 4.5: Safety Risk Score Matrix

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
M: Medium risk
H: High risk

Figure 4.6: Safety Risk Score Classification for Crashes

Likelihood	Property Damage	Minor Injury	Medical Treatment	Hospitalisation	Fatality
Almost certain - More than once or more per week	Medium Risk	Medium Risk	High Risk	High Risk	High Risk
Likely - Once or more per week	Medium Risk	Medium Risk	Medium Risk	High Risk	High Risk
Moderate - Once or more per year (but less than once per week)	Low Risk	Medium Risk	Medium Risk	Medium Risk	High Risk
Unlikely - Once every five or ten years	Low Risk	Low Risk	Medium Risk	Medium Risk	Medium Risk
Rare - Less than once every ten years	Low Risk	Low Risk	Low Risk	Medium Risk	Medium Risk

Crash data from Queensland Globe were evaluated to determine whether significant safety issues prevail at the intersections within the impact assessment area. The crash data is illustrated in Figure 4.7.

Figure 4.7: Crash Locations

ITE CONSULTING Project:	Client:	Figure Name:	Figure Number:
283-293 Logan Reserve Road TIA		Crash History	2

A summary breakdown of the number of crashes by severity is provided in Table 4.9.

Table 4.9: Crash Analysis

Date	Property Damage	Minor Injury	Medical Treatment	Hospitalisation	Fatality
Logan Reserve Road (300m north and south of site)					
Hit Pedestrian					
Multi Vehicle	1		2	1	
Single Vehicle	1		1		
Other					

The safety assessment results of the proposed access are provided in Table 4.10.

Table 4.10 Safety Assessment Results

Access	Without Development				With Development		
	Consequence	Likelihood	Risk Rating	Mitigation	Consequence	Likelihood	Risk Rating
Rear end collision with left turn entry – Very low probability of queueing and provision of an AUL(s)	1	1	L	No action	2	2	L
Rear end collision with right turn entry – Unlawful right turn across linemarking	1	1	L	No action	2	2	L

Logan Reserve Road (300m north and south of site)							
Property Damage Crashes	1	2	L	1	3		L
Minor Injury Crashes	2	2	L	2	3		L
Medical Treatment	3	3	M	3	4		M
Hospitalisation	4	2	M	4	3		M

It was found that there will be no significant worsening of road safety as a result of the proposed development access and anticipated generated traffic volumes. The proposed access arrangement is considered sufficient.

5.0 TRAFFIC DESIGN ASSESSMENT

5.1 Car Parking Arrangements

5.1.1 Car Parking Supply

Council parking requirements for this type of development as well as the parking proposed to be provided are identified in Table 5.1.

Table 5.1 Parking Supply Assessment

Parking Type	Council Requirements	Required Provision	Proposed to be provided
Place of Worship	1 space per 10m² of GFA	52 bays + SRV loading bay	81 bays + SRV Bay

It is evident that the proposed development would provide a sufficient total number of parking bays across the development site to be able to accommodate the statutory required demand. ITE considers that a sufficient supply of parking will be available to accommodate visitor parking needs. In addition, the proposed parking supply exceeds the peak traffic generation (48 vehicles per hour), which indicates sufficient parking supply.

5.1.2 Car Parking Layout

Car parking facilities were designed in accordance with AS2890.1: Parking facilities – Off street car parking and AS2890.2: Parking facilities – Off street commercial vehicle parking facilities. A review of the proposed car parking layout against the requirements of the Australian Standard for Off Street Car Parking (AS/NZS2890.1-2004) is summarised in Table 5.2.

Table 5.2 Car Park Layout Review

Design Element	Australian Standard	Proposed Provision	Comment
Visitor parking	2.5m width x 5.4m minimum length (User Class 2)	2.5m width x 5.4m length to be able to be accommodated on driveways	Fully compliant with Australian Standards.
Circulating Aisle	5.8m width (90-degree parking) which includes required clearances	6.2m	Fully compliant with Australian Standards.

Design Element	Australian Standard	Proposed Provision	Comment
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.30m clear of wall. Bays adjacent to walls are widened by 300mm.	Complies with Australian Standards
Maximum Gradient: Parking bay Parking aisle	1:20 (5.0%) 1:16 (6.25%)	Generally flat	Complies with Council and Australian Standards
Maximum gradient (manoeuvring area) for service vehicle	1:20 (5%)	Generally flat	Complies with Australian Standards
Parking aisle extension	1m beyond last bay and including widening of last bay with 300mm	1m beyond last units	Complies with Australian Standards
Maximum service vehicle roadway grades	1:6.5 (15.4%)	Relatively flat	Complies with Australian Standards
Maximum Ramp Transitions	12.5% summit 15.0% sag Transitions required where grade change is 12.5% and more	No greater than 12.5% at summit and 15% sag.	Complies with Australian Standards

The internal layout is considered to be fully compliant with the requirements of AS2890.1:2004 and AS2890.2:2018.

5.1.3 Servicing Requirements

The design vehicle for the proposed use is a SRV in accordance with Table 9.4.7.3.5 of the Servicing Access and Parking Code. Swept path diagrams are provided in **Annexure C** which demonstrate that the design vehicle can manoeuvre within the site including entering and exiting in a forward gear.

6.0 TRAFFIC IMPACT CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

A traffic impact assessment has been undertaken as part of this letter based on preliminary conceptual development plans for 283-293 Logan Reserve Road, Logan Reserve. The proposed development is understood to include a Queensland Nepalese Cultural Centre. The proposed development would comprise 518.7m^2 of GFA. The following key findings were made:

- The proposed development is located adjacent to Logan Reserve Road which is considered to be the frontage road of the proposed development. Vehicular access to the site is proposed to be provided from Logan Reserve Road which is the lowest order road to which the site has frontage. This will be facilitated by means of a new access RS-051 IPWEAQ standard 6m wide driveway with left turn deceleration lane which will only provide left-in-left-out traffic movements. The proposed access will located approximately 75m south of the Halcyon Way / Logan Reserve Road intersection.
- As indicated in Table 4.1, it is anticipated that 48 (rounded) vehicles would enter and exit the site during the AM peak hour. During the PM peak hour, 43 (rounded) vehicles would enter and exit the site. The highest peak hour trip rate is anticipated to be a weekend AM peak and weekday PM peak. As such a weekend AM peak and weekday PM peak were considered for intersection modelling purposes.
- It was found that sufficient sight distance would be available to meet the minimum requirements of AS2890.1:2004 for both directions of travel at the proposed access.
- The turn warrant analyses indicated that an AUL would be required. In order to balance design outcomes and access / intersection spacing requirements the AUL turn lane configuration as per EDD criteria was adopted in line with AGRD Part 4A. This includes a deceleration taper of 15m and total deceleration length of 25m.
- Allowance is made for in the design to accommodate for up to 21m of queue storage plus an additional 25m with the left turn lane. However, the proposed 95th percentile queueing would be for only 1 vehicle (6m) and thus the proposed internal queue storage of 21m is considered sufficient.
- The Logan Reserve Road / Halcyon Way intersection would in aggregate not have more than 5% of additional delay to the AM and PM peak hours. As such no further mitigation measures are considered to be required. The SIDRA detailed results are provided in **Annexure D**. It must be noted that the proposed operating conditions of the development would likely not co-include with the peak hours of background traffic due to the nature of operations. These were evaluated as worst-case.
- It is evident that the proposed development would provide a sufficient total number of parking bays across the development site to be able to accommodate the statutory required demand. ITE considers that a sufficient supply of parking will be available to accommodate visitor parking needs. In addition, the proposed parking supply exceeds the peak traffic generation (48 vehicles per hour), which indicates sufficient parking supply.

- The internal layout is considered to be fully compliant with the requirements of AS2890.1:2004 and AS2890.2:2018.
- The design vehicle for the proposed use is a SRV in accordance with Table 9.4.7.3.5 of the Servicing Access and Parking Code. Swept path diagrams are provided in **Annexure C** which demonstrate that the design vehicle can manoeuvre within the site including entering and exiting in a forward gear.

6.2 Recommendation

It is recommended that the proposed development be approved from a Traffic Engineering perspective, subject to recommendations made within this Traffic Impact Assessment.

Approved by:

Herman Joubert M.Eng (CIV), CPEng (NZ), CEng (U.K), RPEQ
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ITE Consulting
RPEQ No.: 25899

APPENDIX

A

Layout Plans

SITE PLAN LEGEND

ATF	Acoustic Timber Fence with no gaps
BDY	Boundary
BR	Bike Rack
EAG	Exposed Agg Concrete - sealed
C1	Structural Column - Ground *Refer to structural documentation*
FBC	Fire Booster Cabinet
FEN-#	Fence (# Denotes Type)
GP	Grated Pit
HR-#	Handrail (# Denotes Type)
PD	Planter Drainage *Refer to Hydraulic documentation*
PV	Paving
SMH	Sewer Manhole
RL	Reduced Level
RWO	Rain Water Outlet
SCR	Screen
SWP	Stormwater Pit
TOW	Top of Wall

NOTES

1. Ensure retaining wall and fence does not exceed 2.0m in height to any adjacent properties.
2. All retaining walls over 1.0m in height to be structurally certified and comply with QDC.
3. Landscaping to be constructed generally in accordance with approved Landscape Architect's drawings.

elevation architecture

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Revision

01	Preliminary DA	24/04/2024
A	Updated Site Plan Issue	7/05/2024

Project
Queensland Nepalese Cultural Centre
283-293 Logan Reserve Road Logan Reserve

Client
Queensland Nepalese Cultural Centre (QNCC) Inc.

Stage
Development Approval

Status
NOT FOR CONSTRUCTION

Architect
A.P.

Drawn
M.H

Project No.
1333-02

Scale
1:500, 1:100 at A3

Proposed Site Plan

A-DA-02.01

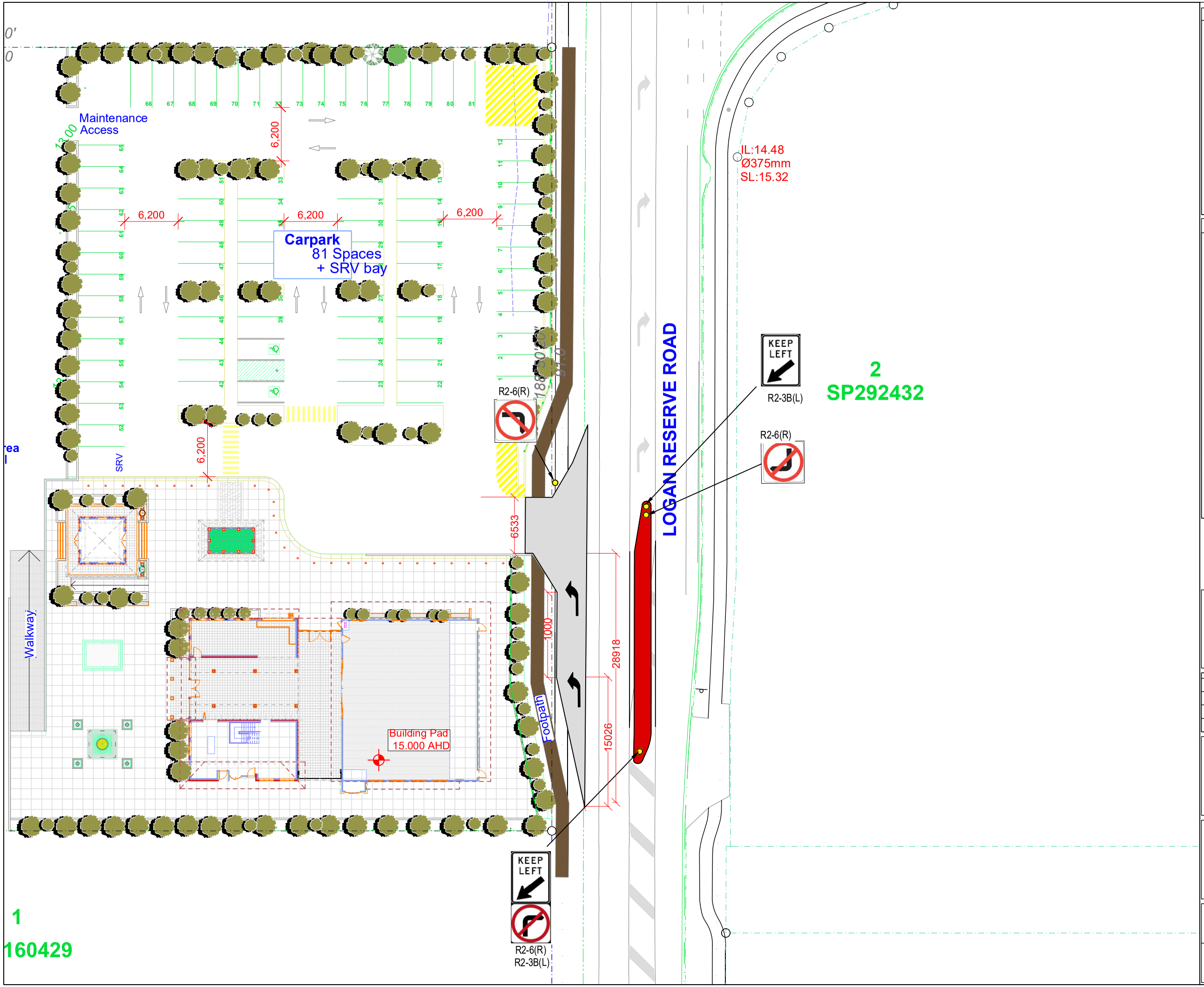
A

P:\Data 1\1333-02 Queensland Nepalese Culture Centre\5.2 Development Application\5.2.1 ArchiCAD\1333-02_Nepalese Culture Centre DA 25_Master.pln

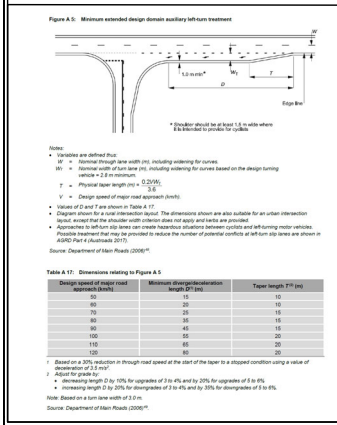
APPENDIX

B

Vehicle Swept Paths



AUL Detials:



Turn Path

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CHECKED:	Herman Joubert	25899	2024/05/27

PROJECT:

283-293 Logan Reserve Road

DRAWING TITLE:

Concept Access Layout

SCALE:	REV:
1:409	-
	DATE: 2024/05/27

DRAWING NUMBER:

01

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Maintenance Access

6,200

6,200

6,200

6,200

Carpark
81 Spaces
+ SRV bay

SRV

6,200

on Area
Level

Walkway

R2-6(R)

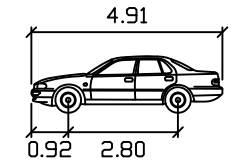
LOGAN RESERVE ROAD

IL:14.4
Ø375
SL:15

1000

28918

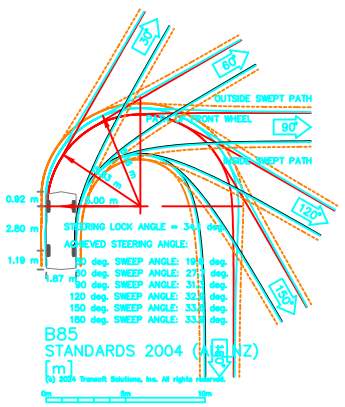
Vehicle Detials:



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

Turn Path



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CHECKED:	Herman Joubert	25899	2024/05/27

PROJECT:

283-293 Logan Reserve Road

DRAWING TITLE:

AS2890.1:2004 B85 Turn Path

SCALE:	REV:
1:273	-
	DATE: 2024/05/27

DRAWING NUMBER: 03

Carpark
81 Spaces
+ SRV bay

n Area
Level

Walkway

Building Pad
15.000 AHD

Footpath

R2-6(R)

LOGAN RESERVE ROAD

KEEP LEFT

1000

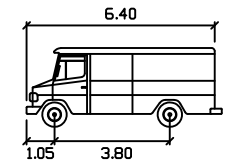
28918

15026

6533

91.0

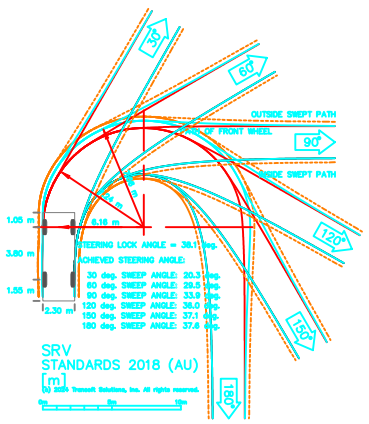
Vehicle Detials:



SRV

	meters
Width	: 2.30
Track	: 2.30
Lock to Lock Time	: 6.0
Steering Angle	: 38.1

Turn Path



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PROJECT:

283-293 Logan Reserve Road

DRAWING TITLE:

AS2890.2:2018 SRV Turn Path

SCALE:	REV:
1:273	-
	DATE: 2024/05/27

DRAWING NUMBER: 02

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APPENDIX

C

Background Traffic Volumes

TRAFFIC COUNT

INTERSECTION: /Halcyon Way/Logan Reserve Rd North App
PERIOD: 6 hours (peak period counts)
DATE: 03-Feb-24

Aera: Logan reserve

ITE CONSULTING

Total Traffic														Hourly Totals
TIME		Traffic Movements												
Start	End	1	2	3	4	5	6	7	8	9	10	11	12	Total	
06:00	06:15														
06:15	06:30														
06:30	06:45														
06:45	07:00														
07:00	07:15														
07:15	07:30														
07:30	07:45														
07:45	08:00														
08:00	08:15														
08:15	08:30														
08:30	08:45														
08:45	09:00														
09:00	09:15					149	1	2		6	2	68		**228**	**228**
09:15	09:30					132	3	1		9	6	85		**236**	**464**
09:30	09:45					134	6	6		9	1	98		**254**	**718**
09:45	10:00					130	3			8	6	91		**238**	**956**
10:00	10:15					114	2	1		7	10	84		**218**	**946**
10:15	10:30					122	1	2		4	8	88		**225**	**935**
10:30	10:45					138	2	2		3	12	85		**242**	**923**
10:45	11:00					136	1	2		2	9	85		**235**	**920**
11:00	11:15					130	1	2		4	10	83		**230**	**932**
11:15	11:30					128	2	1		4	9	79		**223**	**930**
11:30	11:45					130	2	2		3	6	65		**208**	**896**
11:45	12:00					118	1	2		2	7	68		**198**	**859**
12:00	12:15														**629**
12:15	12:30														**406**
12:30	12:45														**198**
12:45	13:00														
13:00	13:15														
13:15	13:30														
13:30	13:45														
13:45	14:00														
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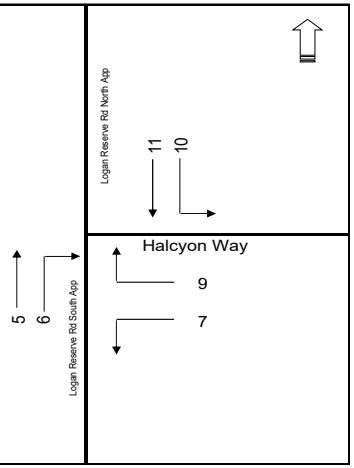
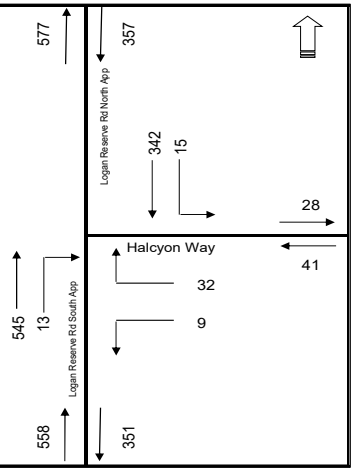
17:00	17:15														
17:15	17:30														
17:30	17:45														
17:45	18:00														
18:00	18:15														
18:15	18:30														
18:30	18:45														
18:45	19:00														
TOTAL						1561	25	23		61	86	979		2735	
EST. 24 HR						**1904**	**31**	**28**		**74**	**105**	**1194**		**3337**	

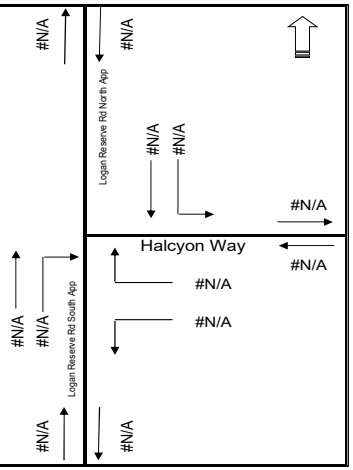
Key Plan



Peak Hour Volumes
AM Peak Hour
(09:00 - 10:00)
PHF : 0.94



Peak Hour Volumes
PM Peak Hour
#N/A
PHF : #N/A



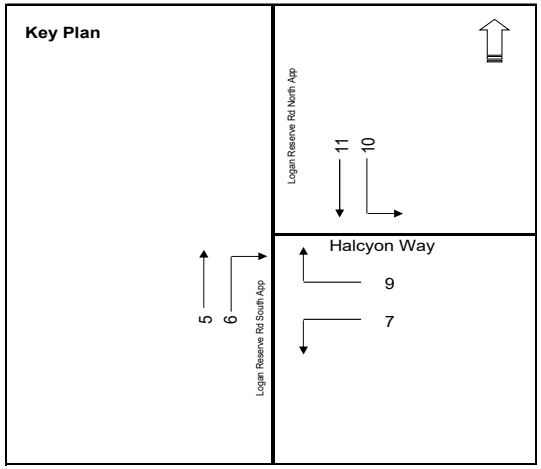
TRAFFIC COUNT

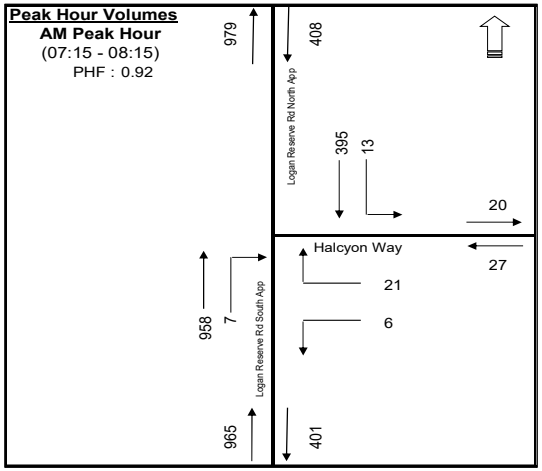
INTERSECTION: /Halcyon Way/Logan Reserve Rd North App
PERIOD: 6 hours (peak period counts)
DATE: 08-Feb-24

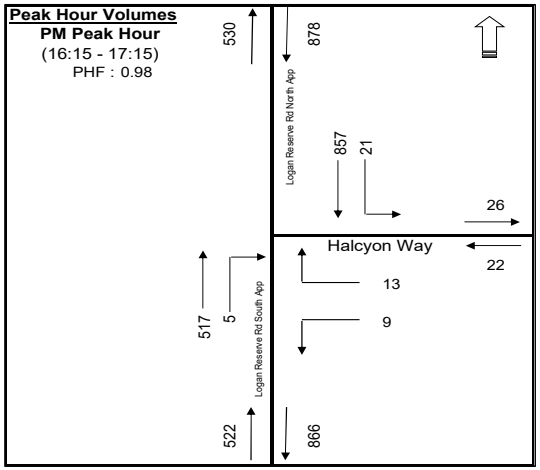
Aera: Logan reserve

ITE CONSULTING

Total Traffic														Hourly Totals
TIME		Traffic Movements												
Start	End	1	2	3	4	5	6	7	8	9	10	11	12	Total	
06:00	06:15														
06:15	06:30														
06:30	06:45					204	1	1		7	2	70		**285**	**285**
06:45	07:00					207	8	2		5	3	66		**291**	**576**
07:00	07:15					188	2	1		4	2	76		**273**	**849**
07:15	07:30					233	2	1		8	5	83		**332**	**1181**
07:30	07:45					237	2	2		5	5	94		**345**	**1241**
07:45	08:00					262	1	1		7	1	110		**382**	**1332**
08:00	08:15					226	2	2		1	2	108		**341**	**1400**
08:15	08:30					212	1	1		4	3	109		**330**	**1398**
08:30	08:45					218	2	1		3	1	98		**323**	**1376**
08:45	09:00					199	2	2		3	1	86		**293**	**1287**
09:00	09:15														**946**
09:15	09:30														**616**
09:30	09:45														**293**
09:45	10:00														
10:00	10:15														
10:15	10:30														
10:30	10:45														
10:45	11:00														
11:00	11:15														
11:15	11:30														
11:30	11:45														
11:45	12:00														
12:00	12:15														
12:15	12:30														
12:30	12:45														
12:45	13:00														
13:00	13:15														
13:15	13:30														
13:30	13:45														
13:45	14:00														
14:00	14:15														
14:15	14:30														
14:30	14:45														
14:45	15:00														
15:00	15:15					142	1	3		3	6	196		**351**	**351**
15:15	15:30					195	2	2		1	5	186		**391**	**742**
15:30	15:45					137	2	2		4	12	187		**344**	**1086**
15:45	16:00					105	2	1		3	6	203		**320**	**1406**
16:00	16:15					106	4	1		4	8	209		**332**	**1387**
16:15	16:30					143	1	6		3	7	196		**356**	**1352**
16:30	16:45					122	3	1		1	4	230		**361**	**1369**
16:45	17:00					128	1	1		5	6	215		**356**	**1405**
17:00	17:15					124		1		4	4	216		**349**	**1422**
17:15	17:30					118	1			2	4	205		**330**	**1396**
17:30	17:45					119	1	1		3	3	200		**327**	**1362**
17:45	18:00					96				1	3	194		**294**	**1300**
18:00	18:15														
18:15	18:30														
18:30	18:45														
18:45	19:00														
TOTAL						3721	41	33		81	93	3337		7306	
EST. 24 HR						**4540**	**50**	**40**		**99**	**113**	**4071**		**8913**	







APPENDIX

D

SIDRA Results

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2035 Weekend PM Peak with development (Site Folder: Future Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	1191	3.0	1191	3.0	0.616	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.4
3	R2	All MCs	12	3.0	12	3.0	1.930	1476.4	LOS F	5.7	40.6	1.00	1.21	2.04	2.4
Approach			1202	3.0	1202	3.0	1.930	14.6	NA	5.7	40.6	0.01	0.01	0.02	48.2
East: Halcyon Way East Approach															
4	L2	All MCs	20	3.0	20	3.0	8.070	6835.2	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
6	R2	All MCs	28	3.0	28	3.0	8.070	6375.0	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
Approach			48	3.0	48	3.0	8.070	6565.1	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
North: Logan Reserve Road North Approach															
7	L2	All MCs	46	3.0	46	3.0	0.025	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	1899	3.0	1899	3.0	0.983	6.5	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
Approach			1945	3.0	1945	3.0	0.983	6.5	NA	0.0	0.0	0.00	0.01	0.00	49.7
All Vehicles			3196	3.0	3196	3.0	8.070	108.9	NA	28.3	202.9	0.02	0.03	0.05	21.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2025 Weekend AM Peak with development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	664	3.0	664	3.0	0.344	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	15	3.0	15	3.0	0.015	7.3	LOS A	0.1	0.4	0.43	0.61	0.43	51.4
Approach			679	3.0	679	3.0	0.344	0.3	NA	0.1	0.4	0.01	0.01	0.01	59.6
East: Halcyon Way East Approach															
4	L2	All MCs	11	3.0	11	3.0	0.161	7.4	LOS A	0.5	3.8	0.75	0.89	0.75	45.3
6	R2	All MCs	36	3.0	36	3.0	0.161	20.5	LOS B	0.5	3.8	0.75	0.89	0.75	45.2
Approach			46	3.0	46	3.0	0.161	17.6	LOS B	0.5	3.8	0.75	0.89	0.75	45.2
North: Logan Reserve Road North Approach															
7	L2	All MCs	17	3.0	17	3.0	0.009	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	385	3.0	385	3.0	0.199	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			402	3.0	402	3.0	0.199	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles			1127	3.0	1127	3.0	0.344	1.0	NA	0.5	3.8	0.04	0.05	0.04	58.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2025 Weekend PM Peak with development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	627	3.0	627	3.0	0.325	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	5	3.0	5	3.0	0.014	13.5	LOS A	0.0	0.3	0.74	0.83	0.74	47.3
Approach			633	3.0	633	3.0	0.325	0.2	NA	0.0	0.3	0.01	0.01	0.01	59.7
East: Halcyon Way East Approach															
4	L2	All MCs	11	3.0	11	3.0	0.193	15.3	LOS B	0.5	3.7	0.90	0.97	0.95	38.3
6	R2	All MCs	15	3.0	15	3.0	0.193	44.6	LOS D	0.5	3.7	0.90	0.97	0.95	38.2
Approach			25	3.0	25	3.0	0.193	32.4	LOS C	0.5	3.7	0.90	0.97	0.95	38.2
North: Logan Reserve Road North Approach															
7	L2	All MCs	23	3.0	23	3.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	965	3.0	965	3.0	0.499	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			988	3.0	988	3.0	0.499	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.4
All Vehicles			1646	3.0	1646	3.0	0.499	0.8	NA	0.5	3.7	0.02	0.03	0.02	59.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

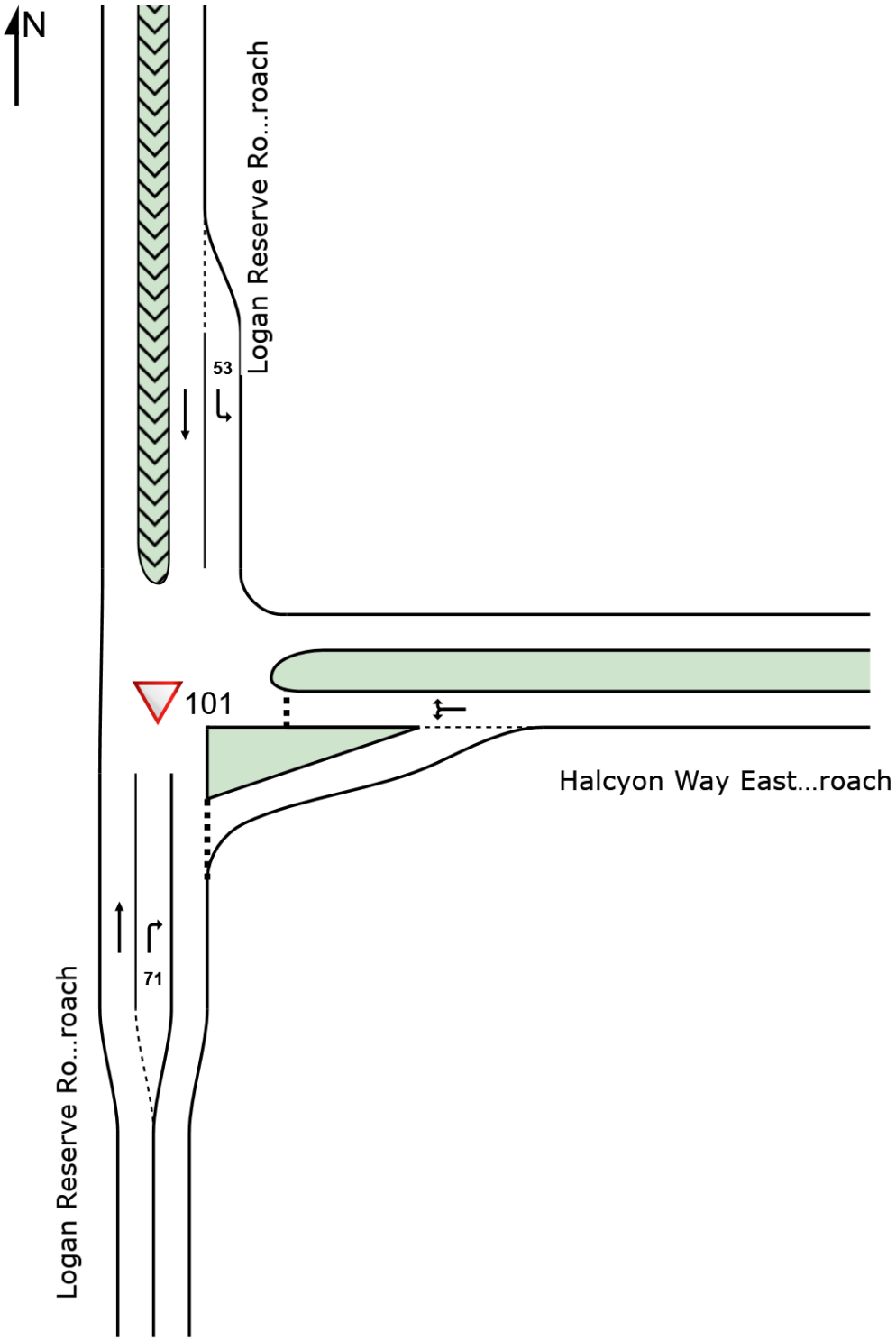
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2025 Weekend AM Peak without development (Site Folder: General)]

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

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



MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2025 Weekend AM Peak without development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	614	3.0	614	3.0	0.318	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	15	3.0	15	3.0	0.016	7.3	LOS A	0.1	0.4	0.44	0.61	0.44	51.4
Approach			628	3.0	628	3.0	0.318	0.3	NA	0.1	0.4	0.01	0.01	0.01	59.6
East: Halcyon Way East Approach															
4	L2	All MCs	11	3.0	11	3.0	0.160	7.5	LOS A	0.5	3.8	0.74	0.89	0.74	45.3
6	R2	All MCs	36	3.0	36	3.0	0.160	20.4	LOS B	0.5	3.8	0.74	0.89	0.74	45.2
Approach			46	3.0	46	3.0	0.160	17.4	LOS B	0.5	3.8	0.74	0.89	0.74	45.2
North: Logan Reserve Road North Approach															
7	L2	All MCs	17	3.0	17	3.0	0.009	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	385	3.0	385	3.0	0.199	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			402	3.0	402	3.0	0.199	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles			1077	3.0	1077	3.0	0.318	1.0	NA	0.5	3.8	0.04	0.06	0.04	58.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2025 Weekend PM Peak without development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	582	3.0	582	3.0	0.301	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	5	3.0	5	3.0	0.014	13.5	LOS A	0.0	0.3	0.74	0.83	0.74	47.3
Approach			587	3.0	587	3.0	0.301	0.2	NA	0.0	0.3	0.01	0.01	0.01	59.7
East: Halcyon Way East Approach															
4	L2	All MCs	11	3.0	11	3.0	0.180	15.0	LOS B	0.5	3.5	0.89	0.96	0.93	39.1
6	R2	All MCs	15	3.0	15	3.0	0.180	41.4	LOS C	0.5	3.5	0.89	0.96	0.93	39.0
Approach			25	3.0	25	3.0	0.180	30.4	LOS C	0.5	3.5	0.89	0.96	0.93	39.0
North: Logan Reserve Road North Approach															
7	L2	All MCs	23	3.0	23	3.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	965	3.0	965	3.0	0.499	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			988	3.0	988	3.0	0.499	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.4
All Vehicles			1601	3.0	1601	3.0	0.499	0.8	NA	0.5	3.5	0.02	0.03	0.02	59.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2035 Weekend AM Peak without development (Site Folder: Future Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	1207	3.0	1207	3.0	0.625	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.3
3	R2	All MCs	28	3.0	28	3.0	0.051	10.7	LOS A	0.2	1.3	0.63	0.82	0.63	49.1
Approach			1236	3.0	1236	3.0	0.625	0.6	NA	0.2	1.3	0.01	0.02	0.01	59.0
East: Halcyon Way East Approach															
4	L2	All MCs	20	3.0	20	3.0	3.204	2005.3	LOS F	41.2	295.7	1.00	2.40	7.03	1.7
6	R2	All MCs	71	3.0	71	3.0	3.204	2133.1	LOS F	41.2	295.7	1.00	2.40	7.03	1.7
Approach			91	3.0	91	3.0	3.204	2104.8	LOS F	41.2	295.7	1.00	2.40	7.03	1.7
North: Logan Reserve Road North Approach															
7	L2	All MCs	34	3.0	34	3.0	0.018	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	758	3.0	758	3.0	0.392	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Approach			792	3.0	792	3.0	0.392	0.4	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehicles			2118	3.0	2118	3.0	3.204	90.4	NA	41.2	295.7	0.05	0.12	0.31	24.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2035 Weekend PM Peak without development (Site Folder: Future Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	1145	3.0	1145	3.0	0.593	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.4
3	R2	All MCs	12	3.0	12	3.0	1.930	1476.4	LOS F	5.7	40.6	1.00	1.21	2.04	2.4
Approach			1157	3.0	1157	3.0	1.930	15.1	NA	5.7	40.6	0.01	0.01	0.02	47.9
East: Halcyon Way East Approach															
4	L2	All MCs	20	3.0	20	3.0	8.070	6836.3	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
6	R2	All MCs	28	3.0	28	3.0	8.070	6375.1	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
Approach			48	3.0	48	3.0	8.070	6565.6	LOS F	28.3	202.9	1.00	1.39	3.06	0.6
North: Logan Reserve Road North Approach															
7	L2	All MCs	46	3.0	46	3.0	0.025	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	1899	3.0	1899	3.0	0.983	6.5	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
Approach			1945	3.0	1945	3.0	0.983	6.5	NA	0.0	0.0	0.00	0.01	0.00	49.7
All Vehicles			3151	3.0	3151	3.0	8.070	110.4	NA	28.3	202.9	0.02	0.03	0.05	20.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Logan Reserve Road_Hibiscus Street Opening Year 2035 Weekend AM Peak with development (Site Folder: Future Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Logan Reserve Road South Approach															
2	T1	All MCs	1258	3.0	1258	3.0	0.651	0.4	LOS A	0.0	0.0	0.00	0.00	0.00	59.3
3	R2	All MCs	28	3.0	28	3.0	0.051	10.7	LOS A	0.2	1.3	0.63	0.82	0.63	49.1
Approach			1286	3.0	1286	3.0	0.651	0.6	NA	0.2	1.3	0.01	0.02	0.01	59.0
East: Halcyon Way East Approach															
4	L2	All MCs	20	3.0	20	3.0	3.765	2510.5	LOS F	43.8	314.6	1.00	2.25	6.41	1.4
6	R2	All MCs	71	3.0	71	3.0	3.765	2662.1	LOS F	43.8	314.6	1.00	2.25	6.41	1.4
Approach			91	3.0	91	3.0	3.765	2628.6	LOS F	43.8	314.6	1.00	2.25	6.41	1.4
North: Logan Reserve Road North Approach															
7	L2	All MCs	34	3.0	34	3.0	0.018	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
8	T1	All MCs	758	3.0	758	3.0	0.392	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Approach			792	3.0	792	3.0	0.392	0.4	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehicles			2168	3.0	2168	3.0	3.765	110.2	NA	43.8	314.6	0.05	0.11	0.28	21.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.