Ardill Payne & PARTNERS

ENGINEERS PLANNERS SURVEYORS ENVIRONMENTAL PROJECT MANAGEMENT

TRAFFIC IMPACT ASSESSMENT

Proposed Rural Residential Subdivision

Lot 8 DP 589795
53 McAuleys Lane, Myocum

for:
McAuleys No. 1 Pty Ltd

November 2020
(Revision 2)

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Table of Contents

1. Introduction 4

2. Proposed Development 5

2.1 Background Development 5

2.2 Description of Proposed Development 5

2.2.1 Phasing and Timing 5

2.2.2 Location and Site Plan 5

3. Existing Area Conditions 7

3.1 Study Area 7

3.1.1 Area of Influence 7

3.2 Study Area Land Use 7

3.2.1 Existing Land Uses 7

3.2.2 Adjoining Land Use 7

3.2.3 Existing Zoning 7

3.2.4 Anticipated Future Development 7

3.3 Site Accessibility 7

3.3.1 Existing Roads and Intersections 7

3.3.2 Future Roadway Systems 10

3.3.3 Existing Traffic Volumes and Conditions 10

3.3.4 Public Transport Systems 10

3.3.5 Pedestrians and Cyclists 11

3.3.6 Accident History 11

4. Projected Traffic 12

4.1 Site Traffic 12

4.1.1 Trip Generation 12

4.1.2 Trip Distribution 12

4.1.3 Modal Split 13

4.2 Through Traffic 13

4.3 Total Estimated Traffic 13

5. Traffic Analysis 14

5.1 Site Access 14

5.2 Road Capacities and Level of Service 14

5.3 Intersections 15

5.3.1 Intersection Capacity 15

5.3.2 Turn Lane Warrants 16

5.3.3 Intersection Sight Distances 17

5.4 Amenity 17

5.5 Traffic Safety 18

5.5.1 Street Lighting 20

5.6 Public Transport 21

5.7 Pedestrians and Cyclists 21
5.8 Circulation 21
6. Improvement Analysis 23
6.1 Recommended Improvements to Accommodate Increased Traffic 23
6.1.1 Intersection Upgrade 23
7. Findings 24
7.1 Roads and Intersections 24
7.2 Site Access and Circulation 24
7.3 Pedestrians and Cyclists 24
7.4 Public Transport 24
7.5 Compliance with Local Codes 25
8. Recommendations 26
9. Conclusion 28
10. Scope of Engagement 29
11. Attachments 30

List of Tables

Table 1: Available Traffic Volume Data 10
Table 2: Adopted Pre-Development Traffic Volumes 2020 10
Table 3: Traffic Generation Rates 12
Table 4: Proposed Traffic Generation 12
Table 5: Projected Through Traffic Volumes 2030 13
Table 6: Peak Hour Total Traffic Volumes (2020 and 2030) 13
Table 7: Two Way Peak Hour Flows on Two Lane Rural Roads 14
Table 8: Level of Service Criteria for Intersections 15
Table 9: Overview of SIDRA Outputs – Existing Intersection Layout 15
Table 10: Intersection Sight Distances 17
Table 11: Overview of SIDRA Outputs – Proposed Intersection Layout 23

List of Figures

Figure 1: Site Location 6
Figure 2: Site Aerial Plan 6

1. Introduction

Ardill Payne & Partners (APP) has been engaged by McAuleys No. 1 Pty Ltd to prepare a Traffic Impact Assessment for a proposed rural residential subdivision at Lot 8 DP 589795, 53 McAuleys Lane, Myocum, to accompany the lodgement of a Planning Proposal and LEP Amendment Request with Byron Shire Council.

It is expected that the proposal will yield in the order of 35 large residential lots, 6 neighborhood/community title lots, and 1 association/community title lot.

The '*Byron Shire Rural Land Use Strategy 2017*' (BSRLUS) was approved by the Department of Planning and Environment in June 2018 with the final document being dated July 2018. The subject land is identified as a Priority Site 1 for Rural Lifestyle Living Opportunities (in both Table 10 and Map 3a of the BSRLUS) and is mapped as "Potential 'R5 Large Lot Residential' expansion areas" under the BSRLUS.

Section 4.2 of BSRLUS, *'Process for implementing Land Release Program enabling future rural lifestyle living opportunities'*, provides that:

> *"The sites identified in Table 10 and Maps 3, 3a and 3b are in a rural zone that does not permit Large Lot Residential Subdivision (Sites 1-3) or conversion to Rural Community Title Subdivision (Site 4).*
>
> *With exception of certain land parcels identified in the Byron LEP 2014 'Multiple Occupancy and Community Title Map', the above opportunities can only be realised by amending Byron LEP 2014, by a process known as a Planning Proposal. As discussed in Section 4.1 above, landowners in sites '1' and '2' must undertake an intersection 'capacity and functionality' assessment prior to commencing the Planning Proposal process. This is necessary to determine the nature and cost of any required road intersection upgrades to accommodate future development of these sites, which must be funded by the respective landowners....".*

As required by the above in respect of Site 1, an intersection assessment/analysis has been undertaken and is included in this Traffic Impact Assessment at Section 5.3.

This report also provides details regarding the current traffic situation, the level of service provided by surrounding roads, and the impact the proposed development will have on these roads.

2. Proposed Development

2.1 Background Development

The subject land is largely cleared with some scattered paddock trees and some stands of vegetation in the northern part of the site. The site also contains a dwelling house and associated improvements/structures.

2.2 Description of Proposed Development

As shown on the concept subdivision plan, it is expected that the proposal will yield in the order of:

- 35 x large residential lots
- 6 x neighbourhood/community title lots
- 1 x association/community title lot

The concept subdivision plan is provided in **Attachment 1**.

2.2.1 Phasing and Timing

The aim is to develop the site in one stage.

2.2.2 Location and Site Plan

The land is situated within the Byron Shire Council Local Government Area. The land is described in real property terms as Lot 8 DP 589795, and is known as 53 McAuleys Lane, Myocum.

The site is on the southern side of McAuleys Lane and is located approx. 3.5km east of the Mullumbimby CBD.

The site location is shown in **Figure 1**. An aerial plan is shown in **Figure 2**.

Figure 1: Site Location

Figure 2: Site Aerial Plan

3. Existing Area Conditions

3.1 Study Area

3.1.1 Area of Influence

The area of influence will include McAuleys Lane (primarily between the site and Mullumbimby Road) and Mullumbimby Road.

3.2 Study Area Land Use

3.2.1 Existing Land Uses

The site is approximately 34.82ha in size and contains a dwelling house and associated improvements/structures and is largely cleared with a number of scattered small stands of bushland and paddock trees.

3.2.2 Adjoining Land Use

The surrounding lands are mainly rural residential properties, largely cleared with scattered stands of bushland.

3.2.3 Existing Zoning

The subject land is mapped under the Byron Local Environmental Plan (BLEP) 2014 as part RU2 – Rural Landscape Zone and part E2 – Environmental Conservation Zone.

3.2.4 Anticipated Future Development

There are no known other planned developments in the area.

3.3 Site Accessibility

Access to the site will be from McAuleys Lane. A new internal road will be constructed approx. 600m from the Mullumbimby Road intersection.

3.3.1 Existing Roads and Intersections

Current descriptions and conditions for the roads and intersections potentially impacted by the development are provided below:

McAuleys Lane

McAuleys Road is a sealed rural minor road and extends from Mullumbimby Road in the east, to Myocum Road in the west (approx. 3.8km in length). From Mullumbimby Road to the proposed new internal road, the distance is approx. 600m.

The road is rural in nature (roadside shoulders and table drains) and is undulating with several tight curves. There are several intersections and numerous rural driveways along its length. The sealed road width varies between 5.0 and 7.0m. Some sections have little or no shoulders, with steep embankments near the road edge.

The road has speed derestriction signs at both ends – signs advise drivers to 'Drive to Conditions'. It is noted that current travel speeds are low due to the road condition and environment.

At the time of inspection, sections of the pavement and seal of McAuleys Lane were in a poor condition (cracks, potholes, uneven surface).

Photo 1: McAuleys Lane (looking west at the site)

<u>Mullumbimby Road</u>

Mullumbimby Road is a regional road (RR463) connecting Gulgan Road (old Pacific Highway) in the east, to Station Street, Mullumbimby.

The road is generally an undivided two-lane two-way sealed rural road with 2 x 3.5m travel lanes and sealed shoulders 0.5-1.0m wide. Edge and centre lines are marked. The speed zoning is mainly 80km/h. At the time of inspection, Mullumbimby Road was in reasonably good condition.

Regional and school bus services run along Mullumbimby Road.

Photo 2: Mullumbimby Road
(looking south – McAuleys Lane intersection in background)

McAuleys Lane/Mullumbimby Road Intersection

A left deceleration lane and basic right turn treatment are provided on Mullumbimby Road; tapered flares are provided on McAuleys Lane to accommodate turning vehicles.

There are no advance warning signs for the McAuleys Lane intersection on Mullumbimby Road (westbound). There are also no 'Stop' or 'Give Way' signs, or a hold line, on McAuleys Lane.

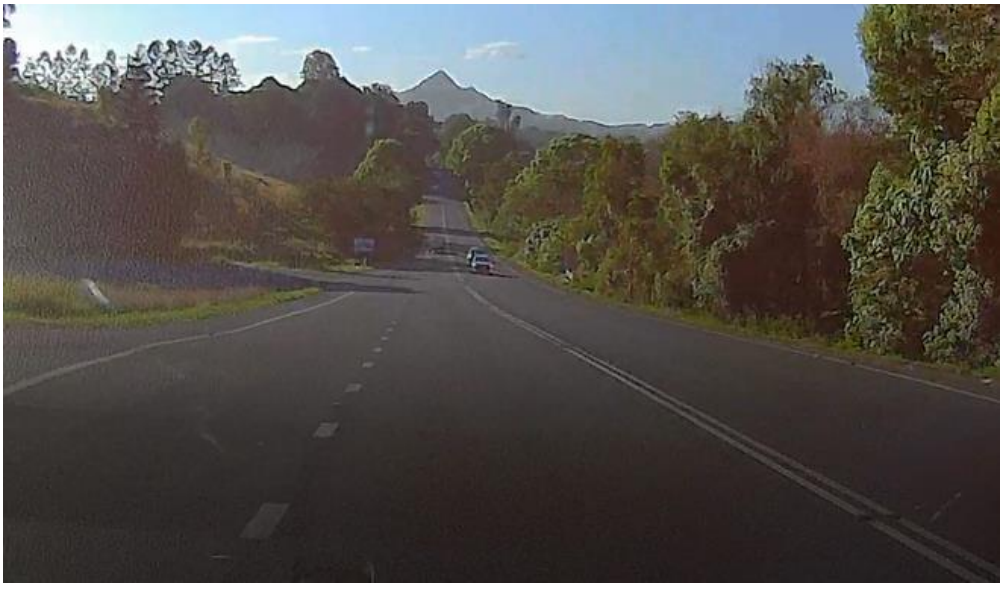


Photo 3: McAuleys Lane/Mullumbimby Road Intersection
(looking north along Mullumbimby Road)

3.3.2 Future Roadway Systems

There are no known plans for any other future roadway systems.

3.3.3 Existing Traffic Volumes and Conditions

Current traffic volumes for the McAuleys Lane and Mullumbimby Road were obtained from Byron Shire Council sources and are shown in **Table 1**.

Table 1: Available Traffic Volume Data

Year	Road	Station Identifier	Direction	Type	Volume	HV%
2016/17	McAuleys Lane	BSC-17/21	Two Way	Daily	633	5
2020	McAuleys Lane	SP0595	Two Way	Daily	465	6.5
2016/17	Mullumbimby Road	BSC-20/21	Two Way	Daily	11,275	6.8
2002	Mullumbimby Road	017 – SEG 222-223	Two Way	Daily	6,537	3.0

- Based on physical on-site traffic counts undertaken by APP on 21 September 2020, the McAuleys Lane traffic counts from Station BSC-17/21 appear to be more representative of actual current counts and have been adopted as the base pre-development traffic volume for McAuleys Lane.
- Generally, in this region, a 2.5% annual compound traffic growth value is adopted when detail surveys and traffic forecasts are not available.

Based on this, and using the growth rate above, the adopted pre-development traffic volumes are summarised in **Table 2**.

Table 2: Adopted Pre-Development Traffic Volumes 2020

Year	Road	Direction	Type	Volume	HV%
2020	McAuleys Lane	Two Way	Daily	633	5
2020	Mullumbimby Road	Two Way	Daily	12,142	6.8

3.3.4 Public Transport Systems

Regional and school bus services operate along Mullumbimby Road. Buses do not appear to use McAuleys Lane.

3.3.5 Pedestrians and Cyclists

There are no formal pedestrian footpaths or cycleways near the site. Pedestrians and cyclists generally use the grass verges and/or road shoulders. Recreational cyclists use Mullumbimby Road.

3.3.6 Accident History

(updated for Revision 2)

Crash data has been obtained from the *'Transport for NSW, Centre for Road Safety'* website. In the 5-year period between between 2016 and 2020, there has been only 1 crash recorded near the site:

- This crash occurred at the McAuleys Lane/Mullumbimby Road intersection.
- Crash was a rear end collision in 2016, at dusk, resulting in a moderate injury.

For the same period, there has been 9 other crashes recorded on Mullumbimby Road between James Street, Mullumbimby and Gulgan Road (6 of these being between the fruit stall driveway and Gulgan Road, including a fatality in 2019). There has also been 2 other recorded crashes on McAuleys Lane west of the site.

4. Projected Traffic

4.1 Site Traffic

4.1.1 Trip Generation

The RMS *'Guide to Traffic Generating Developments'* (2002) provides trip rates for a number of different land uses. Updated traffic generation rates provided in the RMS '*Technical Direction TDT 2013/04: Guide to Traffic Generating Developments, Updated Traffic Surveys'* are used where applicable.

Annual average daily traffic (AADT) and peak vehicle trip volumes per hour generated by the development can be estimated based on the estimated yield (35 low density residential lots, 6 neighborhood/community title lots, and 1 association/community title lot) and the generation rates shown in **Table 3**.

Table 3: Traffic Generation Rates

Development level	AADT	Peak Hour Vehicle Trips Volume
Low Density Residential Dwellings	7.4 trips/dwelling	0.78 trips/dwelling
Community Title Lots	7.4 trips/dwelling	0.78 trips/dwelling

(According to the RMS Guide, a trip is defined as a one-way vehicular movement from one point to another excluding the return journey. Therefore, a return trip to/from a land use is counted as two trips).

Based on the estimated yield and traffic generation rates above, the proposed traffic generation is calculated in **Table 4**.

Table 4: Proposed Traffic Generation

Development level	Rate	Predicted daily traffic	Predicted peak hourly traffic
Low Density Residential Dwellings	35	259	27.3
Community Title Lots	6	44.4	4.7
TOTAL		303.4	32

4.1.2 Trip Distribution

On leaving the site, it is estimated that 95% of traffic will head east to Mullumbimby Road, and 5% will head west to Myocum Road. At Mullumbimby Road, the split is roughly 50:50 east:west.

4.1.3 Modal Split

Due to the residential nature of the development, most vehicle trips (post construction) will be by private car.

4.2 Through Traffic

The traffic volumes at the 10-year horizon have been obtained using a growth rate of 2.5% per year over a 10-year period.

Table 5: Projected Through Traffic Volumes 2030

Year	Road	Direction	Type	Volume *	HV%
2030	McAuleys Lane	Two Way	Daily	810	5
2030	Mullumbimby Road	Two Way	Daily	15,543	6.8

** not including projected development traffic*

4.3 Total Estimated Traffic

Combining the existing and projected through traffic with the additional site traffic for both the current year and 10-year development horizon allows for the determination of traffic flows in the following four cases:

- Case 1 - Undeveloped traffic flow 2020
- Case 2 - Developed traffic flow 2020
- Case 3 - Undeveloped traffic flow 2030
- Case 4 - Developed traffic flow 2030

Summaries of peak hour traffic are provided in **Table 6** below.

Table 6: Peak Hour Total Traffic Volumes (2020 and 2030)

Road	Case 1	Case 2	Case 3	Case 4
McAuleys Lane	63	93	81	111
Mullumbimby Road	1214	1230	1554	1570

5. Traffic Analysis

5.1 Site Access

Access to the site will be from a new internal road, to be constructed approx. 600m from the Mullumbimby Road intersection.

The concept subdivision plan is provided in **Attachment 1**.

5.2 Road Capacities and Level of Service

To aid interpretation of the impacts of the proposed development on traffic flows, the RMS *'Guide to Traffic Generating Developments'*, Version 2.2 (2002), provides acceptable ranges of peak vehicle flows for various Levels of Service (LOS) experienced on rural roads. The intention is to at least maintain the existing Level of Service for the streets adjacent to the site.

Road capacity 'levels of service' are defined by the RMS for rural roads as shown in **Table 7**, with the highest level of service being Level A (free flow), with service deteriorating to Level F (forced flow).

Table 7: Two Way Peak Hour Flows on Two Lane Rural Roads

Terrain	Level of Service	5% Heavy Vehicles (veh/hr) – 80km/h [1]
Level	B	531
	C	873
	D	1395
	E	2250

1. *Road capacities for 80km/h are between 85-95% of figures in RMS table for 100km/h*

The following performance standards are recommended:

Weekday Peak Hour Flows

Major Roads: Level of service C

Minor Roads: Level of service C (desirable)

Recreational Peak Hours (weekends)

Major Roads: Level of service D

Minor Roads: Level of service D (desirable)

The 'level of service' on McAuleys Lane is currently Level B or better (<531 veh/hr). If the site remained undeveloped, it would continue to be Level B or better to year 2030 (**Table 6**).

The estimated traffic movements generated by the proposed development (up to 32 vehicle movements per hour) will not alter the current or projected 'level of service' experienced on McAuleys Lane.

The 'level of service' on Mullumbimby Road is currently Level D (<1395 veh/hr). If the site remained undeveloped, it would deteriorate to Level E by year 2030 (**Table 6**), which is outside the RMS recommended performance standard.

The estimated traffic movements generated by the proposed development (up to 32 vehicle movements per hour, or 16 vph at 50:50 split) will not alter the current or projected 'level of service' experienced on Mullumbimby Road.

5.3 Intersections

5.3.1 Intersection Capacity

The McAuleys Lane/Mullumbimby Road intersection has been modelled in SIDRA (for the existing configuration) for the 4 cases listed in Section 4.3 and the peak hour traffic volumes in **Table 6** to obtain the LOS and Average Delay (secs/veh) outputs listed in **Table 9**. The existing configuration has a left deceleration lane and a basic right turn treatment from Mullumbimby Road.

Table 4.2 of the RMS *'Guide to Traffic Generating Developments'*, Version 2.2 (2002) (reproduced as **Table 8** below), sets out average delays for levels of service, and provides the baseline for this assessment.

Table 8: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Give Way & Stop Signs
A	< 14	Good operation
B	15 - 28	Acceptable delays and spare capacity
C	29 - 42	Satisfactory, but accident study required
D	43 - 56	Near capacity & accident study required
E	56 - 70	At capacity, requires another control mode

SIDRA model layouts for the modelled intersection are provided in **Attachment 2**, in addition to movement summaries for Cases 1 - 4. Movement summaries contain traffic flows in each lane in addition to the LOS and Average Delay for each modelled case.

Table 9: Overview of SIDRA Outputs – Existing Intersection Layout

Location	Case 1		Case 2		Case 3		Case 4	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
McAuleys Lane	B	22.3	B	25.4	D	53.4	F	72.2
Mullumbimby Road	A	12.4	A	12.8	B	17.1	B	17.6

LOS and DOS are for the worst-case movements (right turns)

Based on the results shown in **Table 9**, the introduction of development traffic in 2020 (Case 2) results in only a minor increase in delay and does not change the LOS on both roads. The traffic increase to 2030 (without development traffic) (Case 3) results in a minor increase in delay to reduce LOS to B in the right turn from Mullumbimby Road, but significantly increases delays to reduce LOS to D in right turn movements from McAuleys Lane. With the introduction of development traffic, the 2030 figures (Case 4) show a further deterioration for right turns from McAuleys Lane to LOS F.

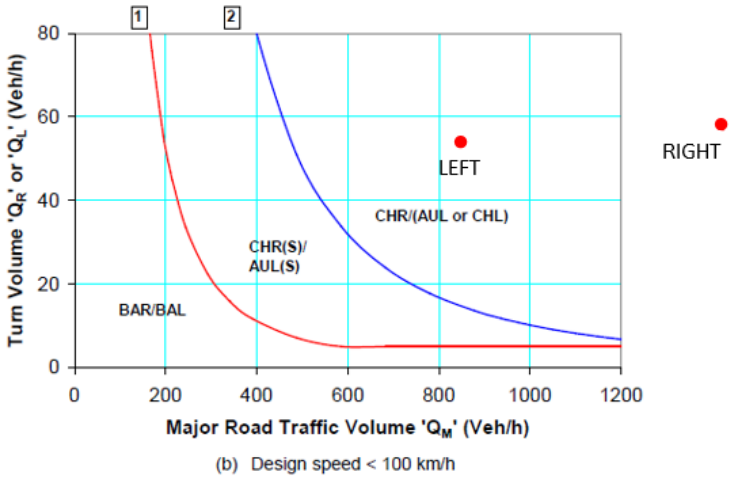
An intersection upgrade will be required (refer Section 6.1.1).

5.3.2 Turn Lane Warrants

Turn lane warrants have been checked using developed case 2030 traffic volumes (Case 4).

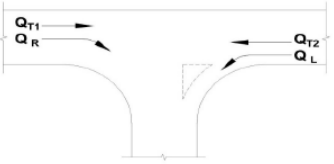
For right turns (worst case PM), apply the peak hour through volume for Mullumbimby Road (1566vph) and the estimated right turn volume into McAuleys Lane (57vph) to the figure below (reproduced from Figure A10, Austroads AGRD04-17).

For left turns (worst case PM), apply 848vph for Mullumbimby Road and 54vph for left turns into McAuleys Lane.



(b) Design speed < 100 km/h

Figure A 11: Calculation of the major road traffic volume parameter Q_M



Turn type	Splitter island	Q_m (veh/h)
Right	No	$= Q_{T1} + Q_{T2} + Q_L$
Right	Yes	$= Q_{T1} + Q_{T2}$
Left	No/yes	$= Q_{T2}$

Source: Arndt and Troutbeck (2006).

According to the Austroads figure, channelised right turn and an auxiliary or channelised left turn treatments are warranted. An intersection upgrade will be required (refer Section 6.1.1). Safety issues will be discussed in Section 5.5.

5.3.3 Intersection Sight Distances

Observed and required Safe Intersection Sight Distances (SISD) and Approach Sight Distances (ASD) are as shown in **Table 10**. Compliance has been assessed against Austroads *'Guide to Road Design Part 4A: Unsignalised and Signalised Intersections'* (2017).

Table 10: Intersection Sight Distances

Intersection	Sight Distance Actual (Left)	Sight Distance Actual (Right)	SISD Required	ASD Required	Intersection Suitability
McAuleys Lane/Mullumbimby Road	>200m	180m	181m (1)	114m (1)	Compliant
New Internal Road/McAuleys Lane	120m	90m	123m (2)	73m (2)	Generally compliant

1) *For a design speed of 80km/h on Mullumbimby Road; reaction time 2.0sec.*
2) *Assumes a design speed of 60km/h on McAuleys Lane; reaction time 2.0sec.*

It is recommended that landscaping and signage which can potentially block visibility, be kept clear of the sight lines at the intersections.

Based on the above, all intersections satisfy Austroads sight distance requirements.

5.4 Amenity

Amenity is primarily the concern of minor roads. The amenity of an area can be impacted by increase in traffic volume, proportion of heavy vehicles, increases in speed, road widths, and surface condition:

- there will be an increase in traffic on the local roads due to the new development
- proportion of heavy vehicles should not change
- vehicle speed should not change
- road width and surface condition are addressed below.

McAuleys Lane

McAuleys Lane is an existing sealed road with a seal width varying between 5-7m. Post development the projected traffic volume is between 500-1000vpd.

- Austroads *'Guide to Road Design Part 3: Geometric Design'* (2016) specifies minimum design standards for rural roads. From Austroads Table 4.5, for a design AADT of 500-1000, the minimum standard is 6.2-7.0m traffic lanes (2 x 3.1/3.5m) with 1.5m shoulders (min shoulder seal 0.5m)
- Northern Rivers Local Government (NRLG) '*Development Design Specification D1: Geometric Road Design (Urban and Rural)'* (June 2018), specifies minimum design standards for rural roads. From Table T1.27, for a design AADT of 500-1000, the minimum standard is 7.0m traffic lanes (2 x 3.5m) with 1.0m shoulders.

It is recommended that McAuleys Lane be widened as required from Mullumbimby Road to the new internal road (approx. 600m) to meet the minimum Austroads design standard. It is noted that some parts of this section are close to the required standard.

The road condition (pavement and surface) should be improved with any proposed upgrade works.

5.5 Traffic Safety

There have been no recorded traffic accidents on McAuleys Lane in the last five years. In the same period, there have been 3 recorded crashes on Mullumbimby Road at the intersection (refer Section 3.3.6).

A Road Safety Audit (RSA) on McAuleys Lane was undertaken in September 2020 (*'Road Safety Audit: Existing Road, McAuleys Lane between Mullumbimby Road and Myocum Road'*, Ardill Payne & Partners, Sept 2020). The main findings of the RSA relevant to the section of McAuleys Lane between the site and Mullumbimby Road are:

- Width and condition of the lane
- Lack of advance warning signs and advisory speed signs for curves
- Lack of adequate curve delineation devices
- Presence of roadside hazards, such as embankments, trees, fences, etc.
- Speed limit on McAuleys Lane is unclear.

McAuleys Lane

For the section of McAuleys Lane between Mullumbimby Road and the new internal road, it is recommended that the following be provided to improve safety:

- Widen McAuleys Lane as required (has been addressed in Section 5.4 of this report).
- Provide advance warning signs for curves – check warrants to determine if advisory speed signs are also required (RMS *'Delineation Manual: Section 17 - Alignment Signs and Markers'* and AS 1742.2). Provide where necessary.
- Check warrants to determine if CAMs are required on the curves – provide where necessary (RMS *'Delineation Manual: Section 17 - Alignment Signs and Markers'* and AS 1742.2).
- Check warrants for safety barriers (Austroads *'Guide to Road Design, Part 6: Roadside Design, Safety and Barriers'* and RMS Supplements). Provide as required.
- Install clear and compliant speed limit signage (RTA *'NSW Speed Zoning Guidelines'*, 2011). At start of McAuleys Lane, replace existing sign with 'End 80' (R4-12) and 'Reduce Speed to Conditions' (G9-318-1).

McAuleys Lane/Mullumbimby Road Intersection

At present, there is a dedicated left turn lane and provision for basic right turns from Mullumbimby Road at the intersection.

From Section 5.3.2, a channelised right turn and an auxiliary or channelised left turn treatment in Mullumbimby Road is warranted. To reduce delays for right turns from McAuleys Lane, an auxiliary (acceleration and merging) lane is required in Mullumbimby Road. This arrangement is commonly referred to as a 'rural seagull treatment'.

Sight distances are satisfactory (refer Section 5.3.3.).

A concept plan of the proposed intersection upgrade is provided in **Attachment 3.**

The landowner at 110 Mullumbimby Road has raised concerns regarding the proposed intersection design and safety concerns about access to and from their driveway, which enters onto Mullumbimby Road roughly opposite the existing bus shelter (approx. 90m south-east of the McAuleys Lane intersection). The landowner's concerns are that the proposed intersection design will prevent:

- a safe right-hand turn into driveway coming into Mullumbimby
- a safe right-hand turn exiting the driveway to Mullumbimby due to the close proximity of the through lane including the turning lane
- a safe left-hand turn due to the through lane and the turning lane.

In summary, the following recommendations are made to improve safety at the intersection. These recommendations include responses to address the concerns of the landowner at 110 Mullumbimby Road:

- A 'rural seagull treatment' is proposed for the McAuleys Lane/Mullumbimby Road intersection (refer Section 6.1.1 for analysis)
- An auxiliary (acceleration and merging) lane is required in Mullumbimby Road. The acceleration lane extends across the driveway to 110 Mullumbimby Road
- Without the acceleration lane, delays for right turns from McAuleys Lane are significant, with the LOS for this movement outside RMS acceptable limits
- The length of the acceleration lane cannot be reduced to stop short of the driveway to 110 Mullumbimby Road. The shorter length will not allow sufficient distance for a vehicle to accelerate to through traffic speed and safely merge. A shorter lane would result in vehicles having to stop in the acceleration lane, before accelerating from zero to merge. This is a significant safety risk
- Therefore, it is proposed to provide a left in/left out intersection for the driveway to 110 Mullumbimby Road
- To access 110 Mullumbimby Road from the east, drivers will need to perform a U-turn at the McAuleys Lane intersection
- To exit 110 Mullumbimby Road to head west (to Mullumbimby), drivers will need to initially turn left, and perform a U-turn at the fruit stall driveway approx. 690m east of the site

- To prevent right turns in and out of 110 Mullumbimby Road, an enhanced lane separation device (plastic separator kerb) will be installed along the centreline of Mullumbimby Road, with flexible delineators at 5m centres. The spacing of the delineators shall be reduced to 2m opposite the driveway (details are included on the intersection concept plan in **Attachment 3**). Arched reflectors shall also be provided on the separator kerb
- At the driveway to 110 Mullumbimby Road, a raised splitter island will be provided to direct traffic 'left out' only. Relevant signage ('Left Only') will also be installed on the island
- A widened shoulder will be provided (similar to existing) at the driveway to 110 Mullumbimby Road to facilitate left turns into the driveway
- At Saddle Road a 'No U-Turn' sign will be installed for eastbound traffic
- Upgrade intersection line marking and provide a 'Give Way' sign and hold line in McAuleys Lane
- Install an advance warning sign ('Side Road Intersection') on Mullumbimby Road westbound for the McAuleys Lane intersection.

McAuleys Lane/New Internal Road Intersection

The intersection of the new internal road with McAuleys Lane will be designed to cater for the traffic generated by the proposed development. It is recommended that this intersection be sign controlled ('Give Way'). The intersection kerb radii shall provide for compliant service vehicle access and egress. Sight distances are satisfactory (refer Section 5.3.3.).

The following recommendations are made to provide a safe intersection:

- Install 'Give Way' signs and appropriate hold line.
- Install advance warning signs ('Side Road Intersection') on McAuleys Lane in both approaches.

Pedestrian and cyclist numbers are low in the vicinity of the site. Where using main roads, pedestrians and cyclists currently share these roads with other heavy vehicles, with little known problems.

Subject to implementation of the recommended upgrades, the additional peak hour traffic movements are unlikely to raise any significant adverse safety issues for local transport and users of the local and regional road network.

5.5.1 Street Lighting

Council has raised the issue of street lighting at the Mullumbimby Road intersection. APP has reviewed the AS 1158 street lighting warrants, and note the following:

- The existing traffic volume on Mullumbimby Road is approx. 12,000 vpd
- There has been only 1 recorded accident at the intersection in the last 5 years
- It is proposed to channelise the intersection and install a traffic control device (enhanced lane separation)

Based on an assessment of the warrants, it is debatable whether street lighting of the intersection is warranted. The developer is open to further discussions with Council on this matter. If it is agreed that street lighting of the intersection is warranted, a solar streetlight (or two) may be an economical solution.

5.6 Public Transport

Most vehicle trips will be by private car.

The proposed development will generate additional demand for public transport services, including school bus services. These services will be catered for by the bus companies based on demand and can easily be accommodated within the development if required. Currently, bus services do not travel along McAuleys Lane. A bus stop is located on Mullumbimby Road near the McAuleys Lane intersection.

5.7 Pedestrians and Cyclists

The proposed development is not expected to create a significant increased risk to pedestrians or cyclists.

Pedestrian paths shall be provided on one side of each local street. These paths shall extend to McAuleys Lane. All pathways shall be provided in accordance with the Northern Rivers Local Government Development and Design Manual.

5.8 Circulation

Internal Roads

NRLG '*Development Design Specification D1: Geometric Road Design (Urban and Rural)*' (June 2018), Table D1.5, provides the following design characteristics of roads in residential subdivisions:

- Access Street – up to 100vpd; carriageway width 6m; road reserve width 14m; verge width 3m minimum each side; mountable kerbs.
- Local Street – up to 2000vpd; carriageway width 7-9m; road reserve width 15-17m; verge width 3.5m minimum each side; mountable kerbs; pathways network dependent.

The internal public roads are classified as 'local streets' and shall have a 7-9m wide sealed carriageway with mountable kerbs both sides, in a 15-17m wide road reserve. A pedestrian pathway shall be provided on one side of each street, providing an internal path network extending to McAuleys Lane. A suitable temporary turn-around for service vehicles shall be provided on each dead-end street.

Internal Intersections

Internal intersections have been checked for compliance with NRLG '*Development Design Specification D1: Geometric Road Design (Urban and Rural)*' (June 2018):

- The streets intersect at right angles or not less than 70°.

- Adequate sight distance is available on each of the approach legs of the intersection. It is recommended that landscaping and signage which can potentially block visibility, be kept clear of the sight lines at the intersection.
- Intersection and cul-de-sac radii are in accordance with NRLG standards and are adequate for garbage collection vehicles. A full compliance check should be undertaken at Construction Certificate stage.

A layout of the proposed internal roads is included in the concept subdivision plan provided in **Attachment 1**.

6. Improvement Analysis

6.1 Recommended Improvements to Accommodate Increased Traffic

Recommended improvements to accommodate the increase in traffic essentially relate to traffic function and safety:

- Upgrade McAuleys Lane as required – discussed in Sections 5.4
- Upgrade McAuleys Lane/Mullumbimby Road intersection – discussed in Sections 5.3 and 5.5, and analysed below in Section 6.1.1

6.1.1 Intersection Upgrade

The proposed intersection configuration retains the existing left deceleration/turn lane (westbound) in Mullumbimby Road and adds a channelised right turn lane and acceleration lane (eastbound). A concept plan of the proposed intersection upgrade is provided in **Attachment 3**.

The upgraded intersection has been modelled in SIDRA for the 2 developed cases listed in Section 4.3 (Cases 2 and 4, for both AM and PM) and the peak hour traffic volumes in **Table 6** to obtain the LOS and Average Delay (secs/veh) outputs listed in **Table 11**.

SIDRA model layouts for the modelled intersection are provided in **Attachment 4**, in addition to movement summaries for Cases 2 and 4. Movement summaries contain traffic flows in each lane in addition to the LOS and Average Delay for each modelled case.

Table 11: Overview of SIDRA Outputs – Proposed Intersection Layout

Location	Case 2 - AM		Case 2 - PM		Case 4 - AM		Case 4 - PM	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
McAuleys Lane	B	15.3	A	12.6	B	22.5	B	16.6
Mullumbimby Road	A	12.5	A	10.3	B	16.5	A	12.2

LOS and DOS are for the worst-case movements (right turns)

Based on the results shown in **Table 11**, the introduction of development traffic to the proposed intersection upgrade results in all movements being within acceptable limits, for both the 2020 and 2030 scenarios, AM and PM.

7. Findings

An assessment of potential traffic issues associated with the proposed development was undertaken by Ardill Payne & Partners. This assessment examines what impact the increased traffic movements will have on the local traffic flows and road network.

The issues addressed in this report and the associated findings and recommendations are summarised below:

7.1 Roads and Intersections

- **Traffic Efficiency** – traffic movements will increase due to the proposed development. However, the 'level of service' currently experienced on local roads will generally not be reduced.
- **Intersections** – The level of service of the existing intersection will decrease – an intersection upgrade is proposed (refer comments in 'Traffic Safety' below).
- **Traffic Amenity** – it is proposed to widen McAuleys Lane from Mullumbimby Road to the new internal road, as required, to achieve minimum Austroads design standards.
- **Traffic Safety** – to improve safety at the McAuleys Lane/Mullumbimby Road intersection it is proposed to provide a channelised right turn lane and an acceleration lane (eastbound). An auxiliary (acceleration and merging) lane is required in Mullumbimby Road. To accommodate the intersection, it is proposed to provide a left in/left out intersection for the driveway to 110 Mullumbimby Road. An enhanced lane separation device will be installed in Mullumbimby Road to prevent right turns in or out of this driveway (further discussion refer Section 5.5).

  Other safety measures should be implemented along McAuleys Lane in accordance with the findings of the 'Road Safety Audit' (refer Section 5.5)

7.2 Site Access and Circulation

The site access location is suitable for the intended range of vehicle movements and intersection sight distance is adequate.

7.3 Pedestrians and Cyclists

The proposed development is not expected to create a significant increased risk to pedestrians or cyclists.

7.4 Public Transport

The proposed development will generate additional demand for public transport services, including school bus services. These services will be catered for by the bus companies based on demand.

7.5 Compliance with Local Codes

All planned and recommended works shall be constructed in accordance with Austroads and NRLG standards, and any other relevant local codes and regulations.

In view of the above it is assessed that if the recommended improvements are implemented, the safety and efficiency of the local road network will not be unduly affected by the increase in the number of vehicle movements that will be generated by the proposal.

8. Recommendations

It is recommended that the proponent implement the following as their contribution to improve amenity and safety in relation to the traffic impacts of the application.

For Mullumbimby Road and McAuleys Lane/Mullumbimby Road intersection:

1. Provide a channelised right turn lane and acceleration lane (eastbound) on Mullumbimby Road. An auxiliary (acceleration and merging) lane is also required in Mullumbimby Road.
2. Upgrade intersection line marking and provide a 'Give Way' sign and hold line in McAuleys Lane.
3. Modify the driveway entrance to 110 Mullumbimby Road to provide for left in/left out only. This will include a raised splitter island and relevant signage ('Left Only'
4. Install an enhanced lane separation device (plastic separator kerb) along the centreline of Mullumbimby Road, with flexible delineators at 5m centres. The spacing of the delineators shall be reduced to 2m opposite the driveway to 110 Mullumbimby Road (details are included on the intersection concept plan in **Attachment 3**). Arched reflectors shall also be provided on the separator kerb
5. Provide a widened shoulder (similar to existing) at the driveway to 110 Mullumbimby Road to facilitate left turns into the driveway.
6. At Saddle Road a 'No U-Turn' sign will be installed for eastbound traffic
7. Install an advance warning sign ('Side Road Intersection') on Mullumbimby Road westbound for the McAuleys Lane intersection
8. Undertake further discussions with Council with regard to street lighting of the intersection.

For the section of McAuleys Lane between Mullumbimby Road and the new internal road:

9. Widen McAuleys Lane as required from Mullumbimby Road to the new internal road (approx. 600m) to achieve the minimum Austroads design standard. It is noted that some parts of this section are close to the required standard and will not require widening. The road condition (pavement and surface) should be improved with any proposed upgrade works.
10. Provide advance warning signs for curves – check warrants to determine if advisory speed signs are also required. Provide where necessary.
11. Curve delineation devices – check warrants to determine if CAMs are required – provide where necessary.
12. Guide posts – check spacing of guide posts. Provide additional where necessary.
13. Safety barriers – check warrants to determine if safety barriers are required. Provide as required.
14. Install clear and compliant speed limit signage.

For the new McAuleys Lane/Internal Road intersection:

15. Install 'Give Way' signs and appropriate hold line.
16. Install an advance warning sign ('Side Road Intersection') on McAuleys Lane in both approaches.

9. Conclusion

It is concluded that the proposed development will impose an increase in the number of daily and peak hourly trips on the local roads. The implementation of recommended improvements will improve amenity and safety in relation to the traffic impacts of the application.

As such it is concluded that upon implementation of the recommendations contained in this report, the impacts on the capacity, safety, and amenity of the surrounding road network and intersections due to the proposed development can be successfully managed.

10. Scope of Engagement

This report has been prepared by Ardill Payne & Partners (APP) at the request of McAuley No. 1 Pty Ltd, for the purpose of a Traffic Impact Assessment for the proposed rural residential subdivision at 53 McAuleys Lane, Myocum, and is not to be used for any other purpose or by any other person or corporation.

This report has been prepared from the information provided to us and from other information obtained as a result of enquiries made by us. APP accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this document for a purpose other than that described above.

To avoid this advice being used inappropriately it is recommended that you consult with APP before conveying the information to another who may not fully understand the objectives of the report. This report is meant only for the subject site/project and should not be applied to any other.

11. Attachments

Attachment 1	Concept Subdivision Plan
Attachment 2	SIDRA Model Layout and Outputs (Cases 1 to 4) – Existing Intersection
Attachment 3	McAuleys Lane/Mullumbimby Road Intersection Upgrade Concept
Attachment 4	SIDRA Model Layout and Outputs (Cases 2 and 4) – Proposed Upgraded Intersection

ATTACHMENT 1

Attachment 1: Concept Subdivision Plan

MCAULEYS LANE SUBDIVISION

53 McAULEYS LN, MYOCUM, NSW
LOT 8 DP589795

CONCEPT MASTERPLAN

SCALE 1:3000 at A3

0m 100m 200m 300m

PROJECT	MCAULEYS LN SUBDIVISION	DRAWING	CONCEPT MASTERPLAN
ADDRESS	53 MCAULEYS LN.	JOB NO.	1819
	MYOCUM, NSW	DATE	28.08.20
DOCUMENT	SKETCH PLAN -CONFIDENTIAL	DRAWING NO.	SK.2.21
		SCALE	1:3000
		REV NO.	B

VENU. DESIGN GROUP

ATTACHMENT 2

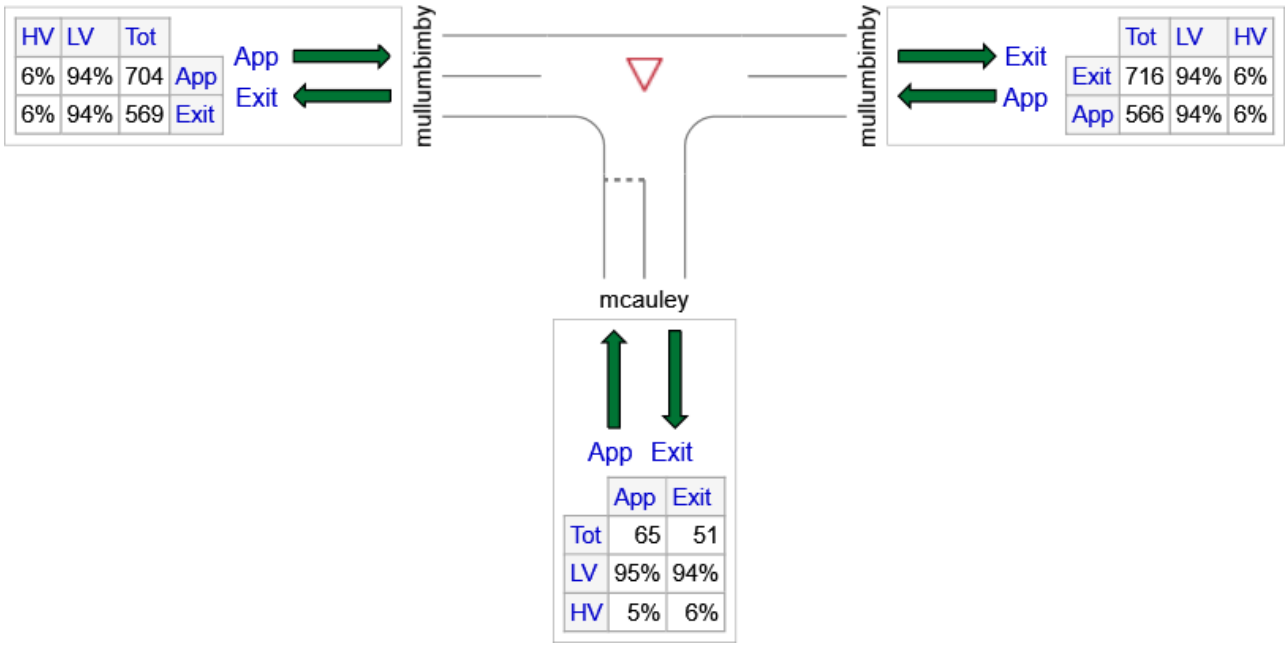
Attachment 2: SIDRA Model Layout and Outputs (Cases 1 to 4) – Existing Intersection

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [ex int case 1 2020 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [ex int case 1 2020 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	32	5.0	34	5.0	0.034	7.4	LOS A	0.1	0.8	0.43	0.67	0.43	52.1
3	R2	30	5.0	32	5.0	0.156	22.3	LOS B	0.5	3.4	0.85	0.94	0.85	42.9
Approach		62	5.0	65	5.0	0.156	14.6	LOS B	0.5	3.4	0.63	0.80	0.64	47.2
East: mullumbimby														
4	L2	29	6.0	31	6.0	0.017	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	65.0
5	T1	509	6.0	536	6.0	0.283	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		538	6.0	566	6.0	0.283	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.8
West: mullumbimby														
11	T1	650	6.0	684	6.0	0.364	0.4	LOS A	0.5	4.0	0.07	0.02	0.09	78.7
12	R2	19	6.0	20	6.0	0.364	12.4	LOS A	0.5	4.0	0.07	0.02	0.09	72.8
Approach		669	6.0	704	6.0	0.364	0.7	NA	0.5	4.0	0.07	0.02	0.09	78.6
All Vehicles		1269	6.0	1336	6.0	0.364	1.3	NA	0.5	4.0	0.07	0.06	0.08	76.2

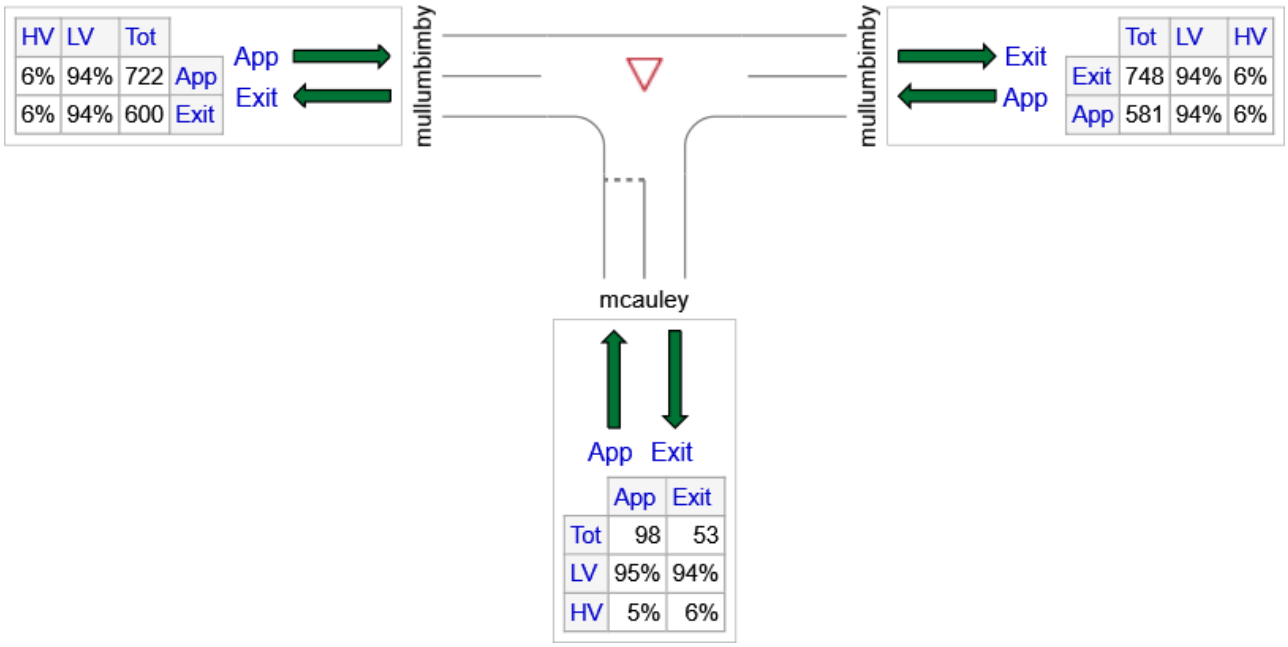
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [ex int case 2 2020 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [ex int case 2 2020 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	48	5.0	51	5.0	0.052	7.5	LOS A	0.2	1.2	0.44	0.69	0.44	52.0
3	R2	45	5.0	47	5.0	0.249	25.4	LOS B	0.8	5.8	0.87	0.97	0.97	41.4
Approach		93	5.0	98	5.0	0.249	16.1	LOS B	0.8	5.8	0.65	0.82	0.70	46.3
East: mullumbimby														
4	L2	30	6.0	32	6.0	0.018	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	65.0
5	T1	522	6.0	549	6.0	0.290	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		552	6.0	581	6.0	0.290	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.8
West: mullumbimby														
11	T1	666	6.0	701	6.0	0.374	0.4	LOS A	0.6	4.4	0.07	0.02	0.09	78.6
12	R2	20	6.0	21	6.0	0.374	12.8	LOS A	0.6	4.4	0.07	0.02	0.09	72.7
Approach		686	6.0	722	6.0	0.374	0.8	NA	0.6	4.4	0.07	0.02	0.09	78.5
All Vehicles		1331	5.9	1401	5.9	0.374	1.7	NA	0.8	5.8	0.08	0.08	0.10	75.0

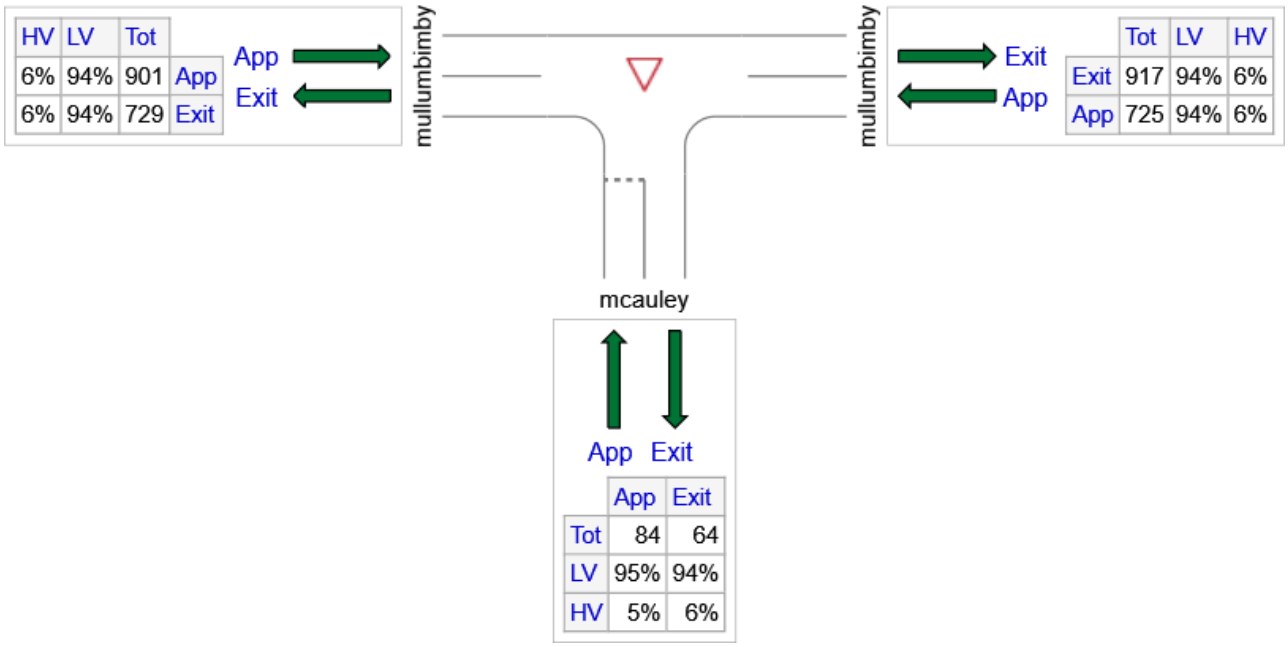
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [ex int case 3 2030 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [ex int case 3 2030 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	41	5.0	43	5.0	0.052	8.2	LOS A	0.2	1.2	0.50	0.74	0.50	51.5
3	R2	39	5.0	41	5.0	0.435	53.4	LOS D	1.3	9.8	0.95	1.03	1.15	31.4
Approach		80	5.0	84	5.0	0.435	30.3	LOS C	1.3	9.8	0.72	0.88	0.82	39.3
East: mullumbimby														
4	L2	37	6.0	39	6.0	0.022	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
5	T1	652	6.0	686	6.0	0.362	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		689	6.0	725	6.0	0.362	0.5	NA	0.0	0.0	0.00	0.03	0.00	78.8
West: mullumbimby														
11	T1	832	6.0	876	6.0	0.476	0.9	LOS A	1.2	8.5	0.11	0.02	0.16	77.8
12	R2	24	6.0	25	6.0	0.476	17.1	LOS B	1.2	8.5	0.11	0.02	0.16	72.0
Approach		856	6.0	901	6.0	0.476	1.3	NA	1.2	8.5	0.11	0.02	0.16	77.6
All Vehicles		1625	6.0	1711	6.0	0.476	2.4	NA	1.3	9.8	0.09	0.07	0.12	74.5

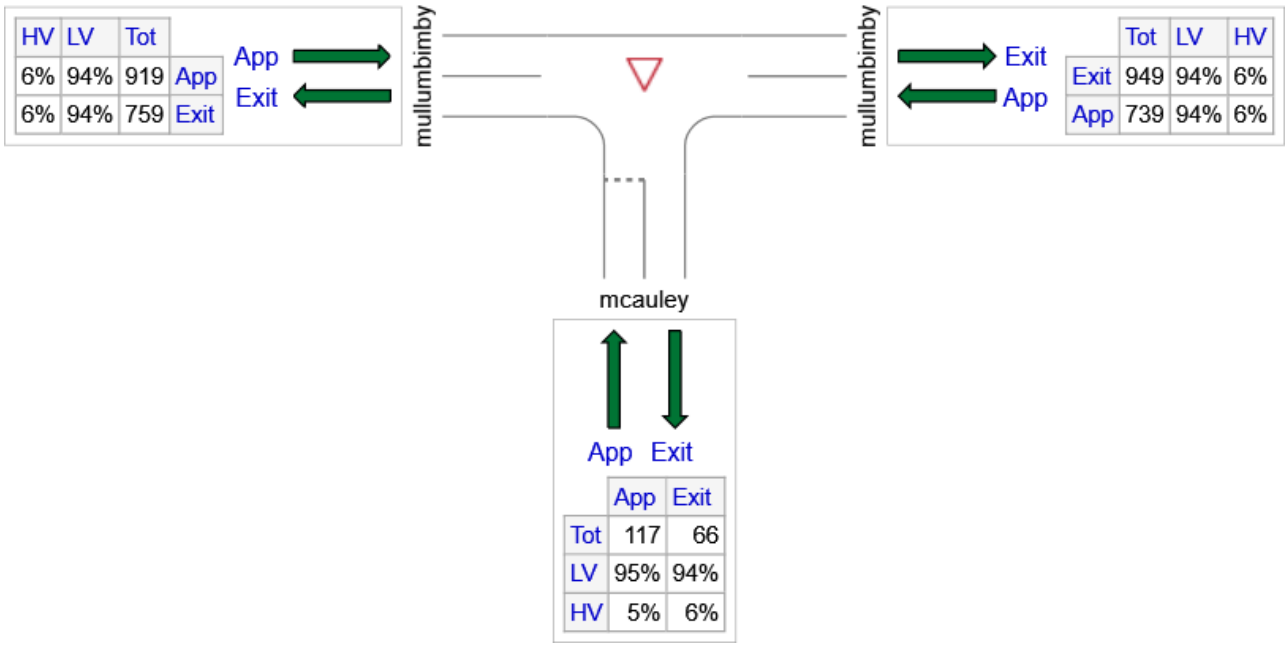
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [ex int case 4 2030 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [ex int case 4 2030 (Site Folder: General)]

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

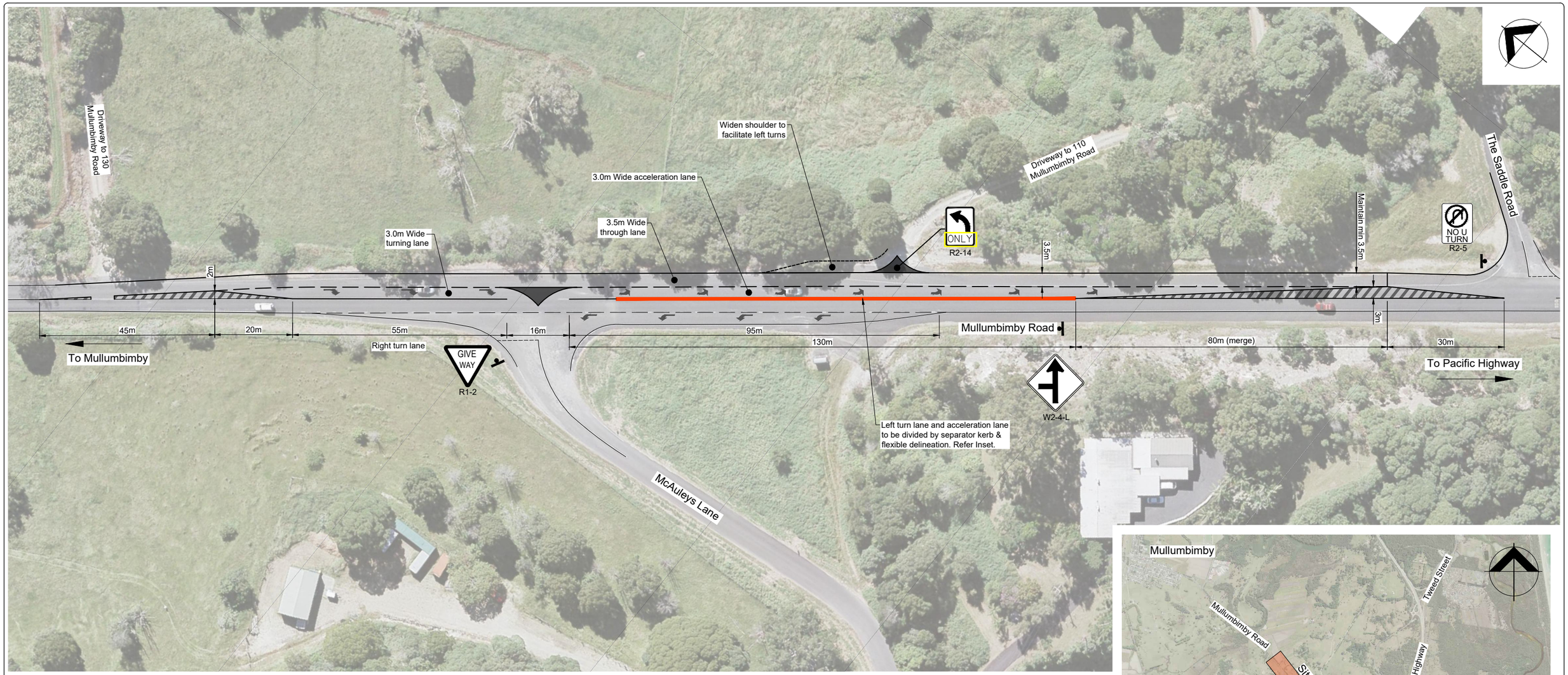
Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	57	5.0	60	5.0	0.074	8.3	LOS A	0.2	1.7	0.51	0.77	0.51	51.4
3	R2	54	5.0	57	5.0	0.651	72.2	LOS F	2.2	16.1	0.97	1.09	1.40	27.1
Approach		111	5.0	117	5.0	0.651	39.4	LOS C	2.2	16.1	0.73	0.92	0.94	35.8
East: mullumbimby														
4	L2	38	6.0	40	6.0	0.023	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
5	T1	664	6.0	699	6.0	0.369	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		702	6.0	739	6.0	0.369	0.5	NA	0.0	0.0	0.00	0.03	0.00	78.7
West: mullumbimby														
11	T1	848	6.0	893	6.0	0.487	0.9	LOS A	1.3	9.3	0.12	0.02	0.17	77.6
12	R2	25	6.0	26	6.0	0.487	17.6	LOS B	1.3	9.3	0.12	0.02	0.17	71.8
Approach		873	6.0	919	6.0	0.487	1.4	NA	1.3	9.3	0.12	0.02	0.17	77.4
All Vehicles		1686	5.9	1775	5.9	0.651	3.5	NA	2.2	16.1	0.11	0.09	0.15	72.4

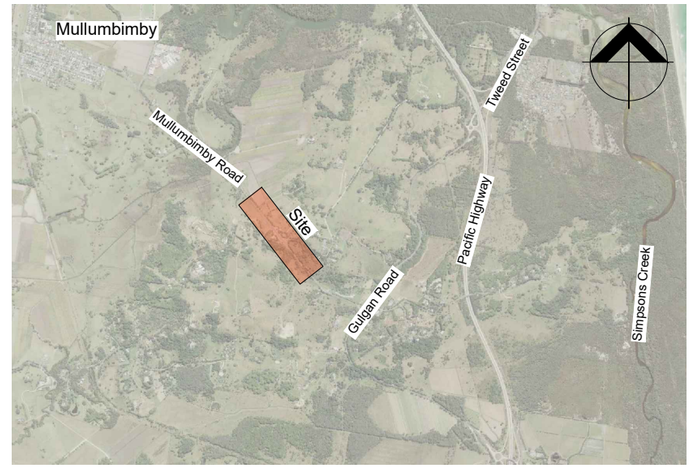
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ATTACHMENT 3

Attachment 3: McAuleys Lane/Mullumbimby Road Intersection Upgrade Concept



Intersection Layout
1:500 @ A1



Site Locality
1:25000 @ A1

Inset

PLANS ARE CONCEPT ONLY

This plan is NOT to be used for construction purposes unless it carries the approval stamp of the local authority.

Issue	Date	Description	App'd
C	19/05/2022	LAYOUT AMENDMENTS	TC
B	17/03/2022	RURAL BAL ADDED TO THE SADDLE ROAD	AH
A	07/12/2020	ORIGINAL ISSUE	TC

Client: McAuleys No.1 PTY LTD

Project: 53 McAuleys Road, Myocum, NSW

Title: Concept Intersection Layout

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Design	TC	Scale	1:500 @ A1, 1:1000 @ A3
Drawn	EMR	Datum	
Checked	AH	Drafting File	10431_Intersection_Linemarking_IssC.dwg
Approved	TC	Design File	
Date	07/12/2020	Dwg No.	SK01
Job No.	10431	Issue	C

ATTACHMENT 4

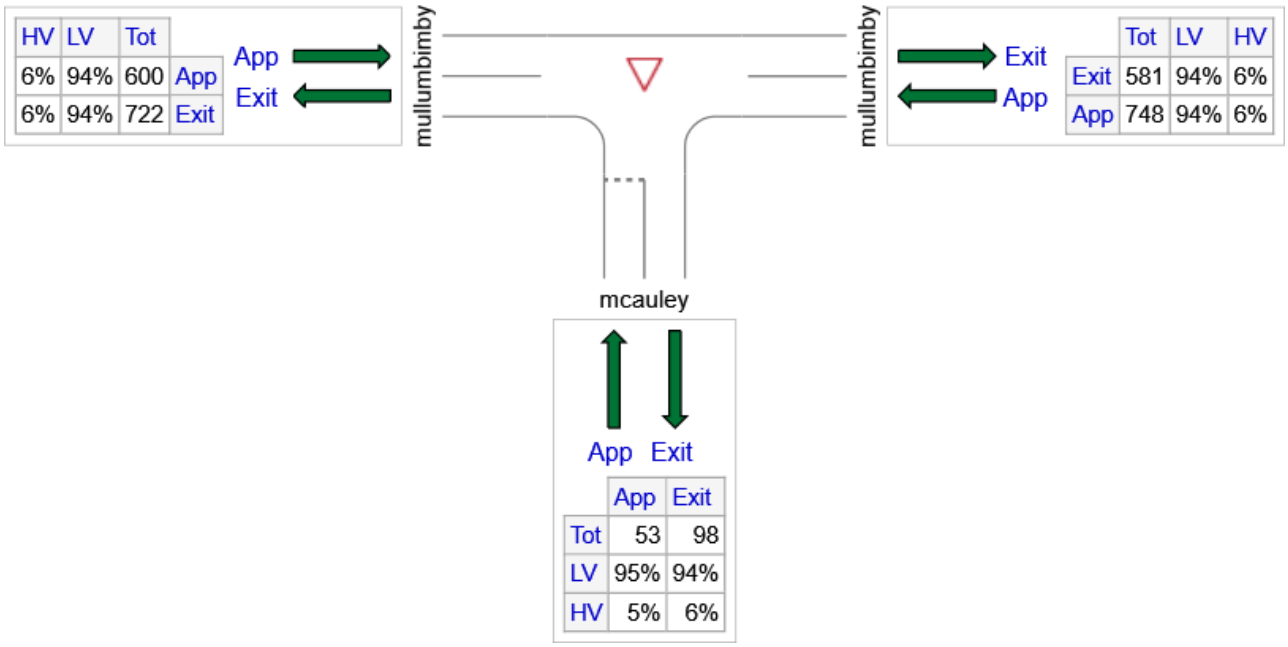
Attachment 4: SIDRA Model Layout and Outputs (Cases 2 & 4) – Proposed Upgraded Intersection

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [des int case 2 AM 2020 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [des int case 2 AM 2020 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	20	5.0	21	5.0	0.035	9.3	LOS A	0.1	0.7	0.54	0.77	0.54	50.7
3	R2	30	5.0	32	5.0	0.091	15.3	LOS B	0.3	2.1	0.70	0.87	0.70	47.3
Approach		50	5.0	53	5.0	0.091	12.9	LOS A	0.3	2.1	0.64	0.83	0.64	48.6
East: mullumbimby														
4	L2	45	6.0	47	6.0	0.027	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
5	T1	666	6.0	701	6.0	0.370	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		711	6.0	748	6.0	0.370	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.6
West: mullumbimby														
11	T1	522	6.0	549	6.0	0.292	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
12	R2	48	6.0	51	6.0	0.096	12.5	LOS A	0.3	2.5	0.65	0.87	0.65	59.0
Approach		570	6.0	600	6.0	0.292	1.1	NA	0.3	2.5	0.05	0.07	0.05	77.5
All Vehicles		1331	6.0	1401	6.0	0.370	1.2	NA	0.3	2.5	0.05	0.08	0.05	76.3

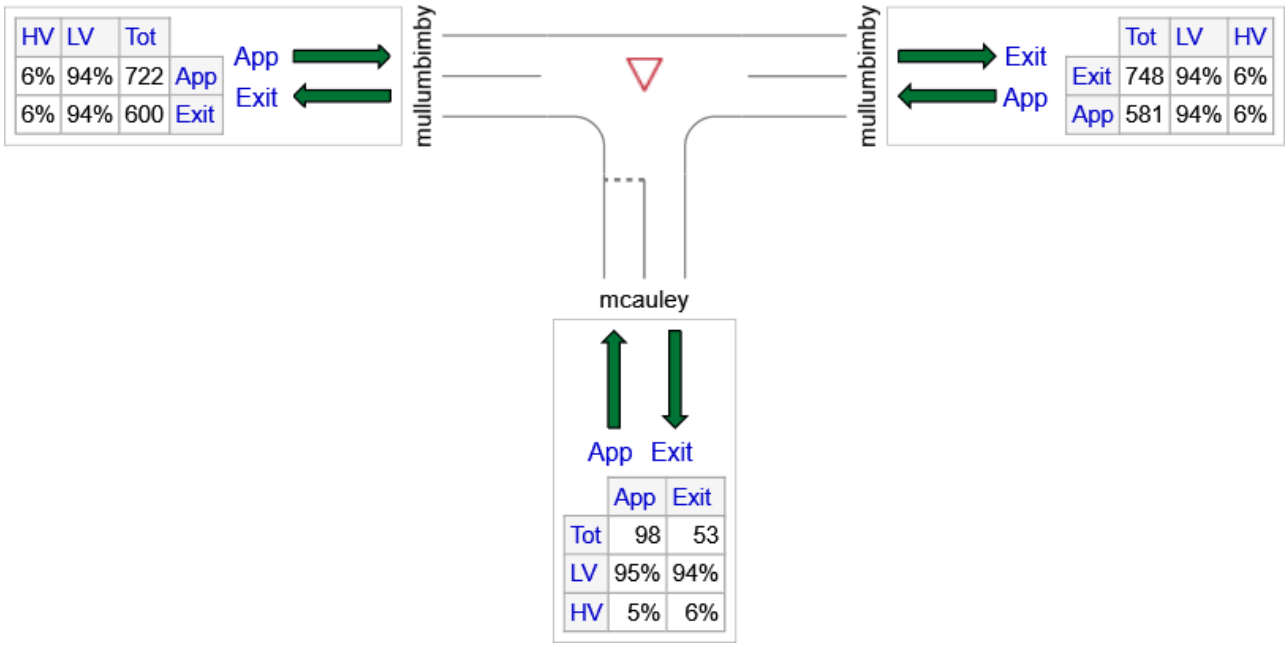
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [des int case 2 PM 2020 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [des int case 2 PM 2020 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	48	5.0	51	5.0	0.067	8.2	LOS A	0.2	1.5	0.46	0.73	0.46	51.5
3	R2	45	5.0	47	5.0	0.098	12.6	LOS A	0.3	2.4	0.57	0.82	0.57	49.3
Approach		93	5.0	98	5.0	0.098	10.3	LOS A	0.3	2.4	0.51	0.77	0.51	50.4
East: mullumbimby														
4	L2	30	6.0	32	6.0	0.018	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	65.0
5	T1	522	6.0	549	6.0	0.290	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		552	6.0	581	6.0	0.290	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.8
West: mullumbimby														
11	T1	666	6.0	701	6.0	0.370	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
12	R2	20	6.0	21	6.0	0.030	10.3	LOS A	0.1	0.8	0.54	0.74	0.54	61.2
Approach		686	6.0	722	6.0	0.370	0.4	NA	0.1	0.8	0.02	0.02	0.02	79.0
All Vehicles		1331	5.9	1401	5.9	0.370	1.1	NA	0.3	2.4	0.04	0.08	0.04	75.9

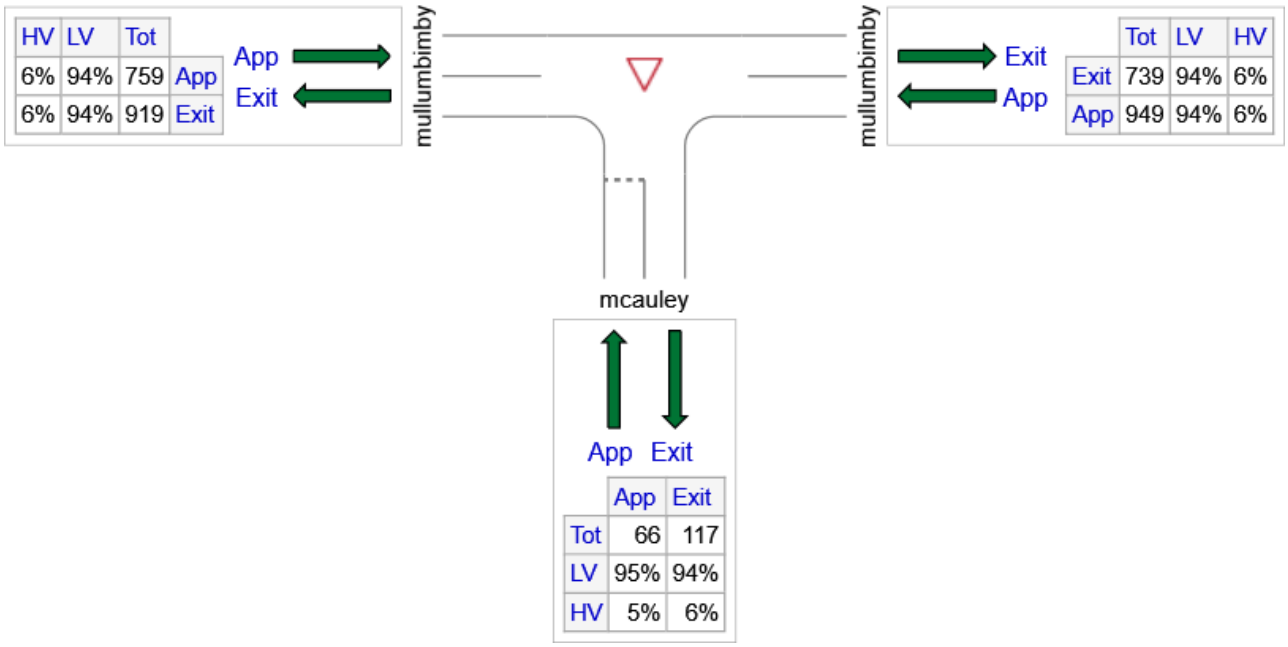
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [des int case 4 AM 2030 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [des int case 4 AM 2030 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	25	5.0	26	5.0	0.061	11.8	LOS A	0.2	1.3	0.68	0.86	0.68	49.0
3	R2	38	5.0	40	5.0	0.179	22.5	LOS B	0.6	4.1	0.82	0.93	0.84	43.5
Approach		63	5.0	66	5.0	0.179	18.3	LOS B	0.6	4.1	0.77	0.91	0.78	45.5
East: mullumbimby														
4	L2	54	6.0	57	6.0	0.032	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
5	T1	848	6.0	893	6.0	0.471	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach		902	6.0	949	6.0	0.471	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.5
West: mullumbimby														
11	T1	664	6.0	699	6.0	0.371	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
12	R2	57	6.0	60	6.0	0.169	16.5	LOS B	0.6	4.2	0.78	0.92	0.78	55.5
Approach		721	6.0	759	6.0	0.371	1.4	NA	0.6	4.2	0.06	0.07	0.06	77.0
All Vehicles		1686	6.0	1775	6.0	0.471	1.6	NA	0.6	4.2	0.05	0.09	0.06	75.8

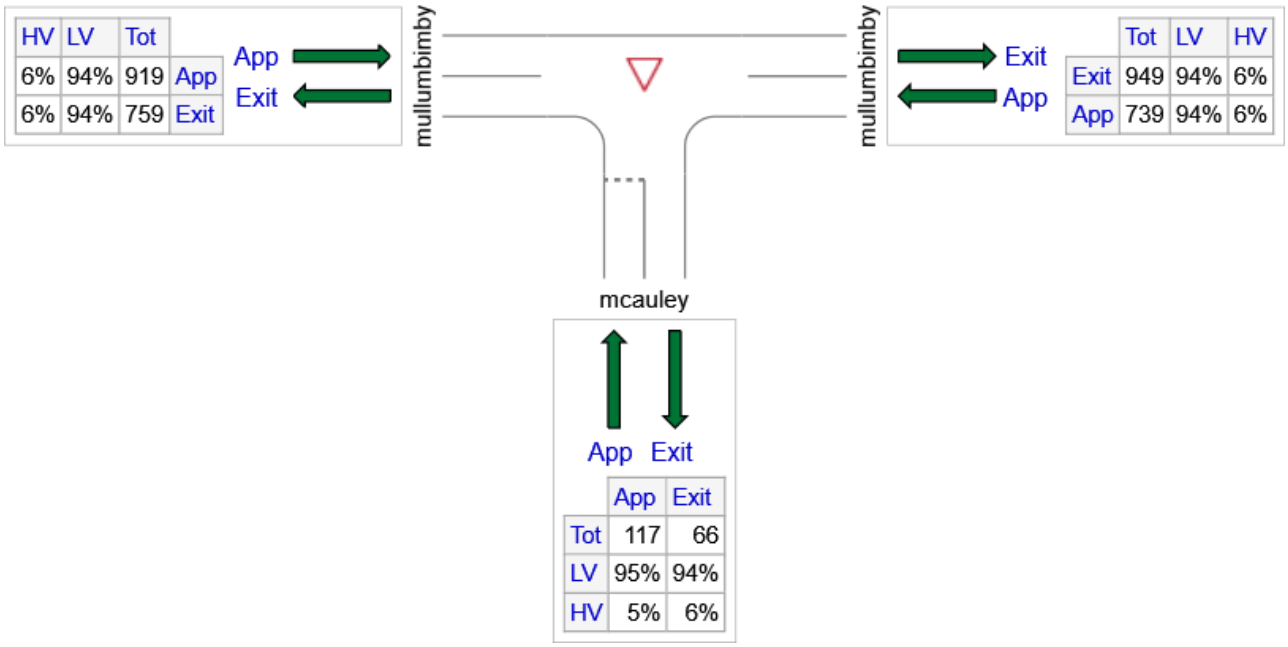
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPROACH AND EXIT FLOWS

Total Values for All Movement Classes Based on Site Demand Flow Rates (veh/h)

Site: 101 [des int case 4 PM 2030 (Site Folder: General)]

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



MOVEMENT SUMMARY

Site: 101 [des int case 4 PM 2030 (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: mcauley														
1	L2	57	5.0	60	5.0	0.099	9.5	LOS A	0.3	2.1	0.56	0.81	0.56	50.6
3	R2	54	5.0	57	5.0	0.157	16.6	LOS B	0.5	3.8	0.70	0.87	0.70	47.4
Approach		111	5.0	117	5.0	0.157	12.9	LOS A	0.5	3.8	0.63	0.84	0.63	49.0
East: mullumbimby														
4	L2	38	6.0	40	6.0	0.023	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
5	T1	664	6.0	699	6.0	0.369	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		702	6.0	739	6.0	0.369	0.5	NA	0.0	0.0	0.00	0.03	0.00	78.7
West: mullumbimby														
11	T1	848	6.0	893	6.0	0.471	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
12	R2	25	6.0	26	6.0	0.049	12.2	LOS A	0.2	1.3	0.63	0.83	0.63	59.3
Approach		873	6.0	919	6.0	0.471	0.5	NA	0.2	1.3	0.02	0.02	0.02	78.8
All Vehicles		1686	5.9	1775	5.9	0.471	1.3	NA	0.5	3.8	0.05	0.08	0.05	75.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.