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 5)

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Document Control Sheet

Filename:	10431 2020-11 McAuleys Lane TIA-rev3				
Job No.:	10431				
Job Captain:	Tony Cromack				
Author:	Tony Cromack				
Client:	McAuleys No. 1 Pty Ltd				
File/Pathname	S:\01 Jobs\10400-10499\10431 53 McAuleys Road, Myocum\01 Administration\02 Reports\TIA\rev 3\10431 2020-11 McAuleys Lane TIA-rev3.docx				
Revision No:	Date:	Checked By		Issued By	
		Name	Signed	Name	Signed
0	26.11.20	A. Hyde		T. Cromack	
1	9.03.22	A. Hyde		T. Cromack	
2	20.05.22	A. Hyde		T. Cromack	
3	21.06.22	A. Hyde		T. Cromack	
4	6.10.22	A. Hyde		T. Cromack	
5	8.06.24	A. Hyde		T. Cromack	

Revision No:	Description
0	Original issue
1	Comments added re driveway at 110 Mullumbimby Road
2	Revision for left in/left out at 110 Mullumbimby Road
3	Revision to include further comments from Council and BRS review
4	Traffic volume and crash data updated
5	Revision to include further Council comments on traffic volumes and growth rates

Table of Contents

List of Tables

List of Figures

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 39 community title lots.

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.

This version of the report (Revision 5) is updated in response to Council's RFI dated 16 April 2024.

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 39 community title lots.

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)

Mullumbimby Road

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.

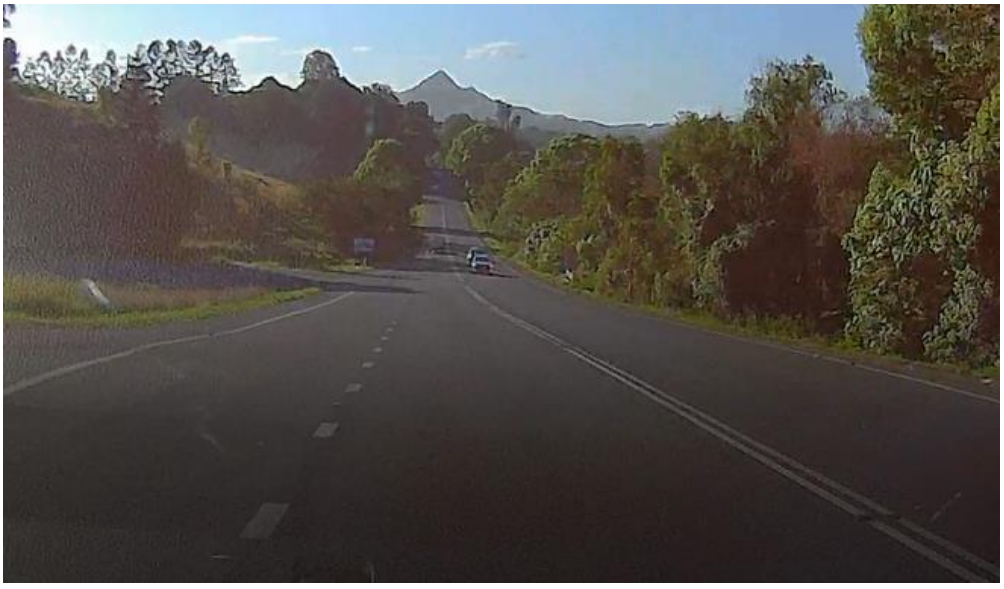


Photo 3: McAuleys Lane/Mullumbimby Road Intersection
(looking north along Mullumbimby Road)

3.3.2 Future Roadway Systems

Byron Shire Council is currently seeking funding to upgrade Mullumbimby Road, including the intersection with McAuleys Lane. The funding application is also seeking to include an extension of the Mullum to Bruns cycleway/shared path.

3.3.3 Existing Traffic Volumes and Conditions

(updated for Revision 5, with 2024 data added)

National Traffic Surveys Pty Ltd (NTS) were engaged by APP to provide current traffic volume data. A tube counter was installed in McAuleys Lane and cameras were installed in Mullumbimby Road for the period 30 April to 6 May 2024. Data is summarised in **Table 1**. The highest traffic volumes were recorded on Tuesday 30 April 2024, and it is those peak hour values provided in Table 1.

Table 1: Available Traffic Volume Data

Year	Road	Location	Daily (Two-Way)	Weekday Peak Hour (Two Way)	Weekday Peak Hour (Two Way)	HV%
2024	McAuleys Lane	500m S of Mullumbimby Road	678	70 (PM)	64 (AM)	4.8
2024	Mullumbimby Road	Between McAuleys Lane and Saddle Road	13,035	1,363 (PM)	1,348 (AM)	2.7

Council has requested that the following compound growth rates be applied:

- McAuleys Lane 6.0%
- Mullumbimby Road 4.1%

Based on this, the adopted pre-development (2025) traffic volumes are summarised in **Table 2**.

Table 2: Adopted Pre-Development Traffic Volumes 2025

Year	Road	Location	Daily (Two-Way)	Weekday Peak Hour (Two Way)	Weekday Peak Hour (Two Way)	HV%
2025	McAuleys Lane	500m S of Mullumbimby Road	719	74 (PM)	68 (AM)	4.8
2025	Mullumbimby Road	Between McAuleys Lane and Saddle Road	13,569	1,419 (PM)	1,403 (AM)	2.7

3.3.4 Public Transport Systems

Regional and school bus services operate along Mullumbimby Road.

There is a school bus service on McAuleys Lane between Myocum Road and Bilin Road. There are no known school bus services using the eastern end of 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 and McAuleys Lane.

3.3.6 Accident History

(updated for Revision 5)

Crash data has been obtained from the *'Transport for NSW, Centre for Road Safety'* website. In the 5-year period between 2018 and 2022, there has been 4 crashes recorded near the site:

- All crashes occurred at the McAuleys Lane/Mullumbimby Road intersection.
- Three crashes were intersection related (rear end, cross traffic). Two resulted in moderate injuries, one was a non-casualty crash. One crash occurred at dusk.
- The other was a 'run-off-road-into-object' crash resulting in a moderate injury. Crash occurred at night. Speed was a contributing factor.

For the same period:

- 12 other crashes were recorded on Mullumbimby Road between James Street, Mullumbimby and Gulgan Road (7 of these north-west of the McAuleys Lane intersection, and 5 south-east of the intersection including a fatality in 2019).
- 1 crash was recorded on McAuleys Lane south-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 (39 community title lots) and the generation rates shown in **Table 3**.

Table 3: Traffic Generation Rates

Development level	AADT	Peak Hour Vehicle Trips Volume
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 of 39 community title lots, and the traffic generation rates above, the proposed traffic generation is calculated in **Table 4**.

Table 4: Proposed Traffic Generation

Development level	Predicted daily traffic (veh/day)	Predicted peak hourly traffic (veh/hr)
Community Title Lots (no dual occupancies)	288.6	30.4
Community Title Lots (assume 50% dual occupancies)	432.9	45.6

It is a reasonable assumption that 50% of the lots may have dual occupancies, and this is considered in the traffic modelling.

4.1.2 Trip Distribution

It is estimated that 95% of traffic leaving the site would head east to Mullumbimby Road, and 5% would head west to Myocum Road. Based on the recent NTS traffic volume data, at Mullumbimby Road the split is currently approx. 67% east (Byron Bay/highway) and 33% west (Mullumbimby).

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 (2035) have been obtained using the growth rates specified in Section 3.3.3 over a 10-year period.

Table 5: Projected Through Traffic Volumes 2035

Year	Road	Location	Daily (Two-Way)	Weekday Peak Hour (Two Way)	Weekday Peak Hour (Two Way)	HV%
2035	McAuleys Lane	500m S of Mullumbimby Road	1,288	133 (PM)	122 (AM)	4.8
2035	Mullumbimby Road	Between McAuleys Lane and Saddle Road	20,279	2,121 (PM)	2,097 (AM)	2.7

** 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 2025
- Case 2 - Developed traffic flow 2025
- Case 3 - Undeveloped traffic flow 2035
- Case 4 - Developed traffic flow 2035

Adopting the estimated traffic generation and trip distributions, summaries of PM peak hour traffic are provided in **Table 6** below.

Table 6: PM Peak Hour Total Traffic Volumes (2025 and 2035)

Road	Case 1	Case 2	Case 3	Case 4
McAuleys Lane	74	117	133	176
Mullumbimby Road	1419	1448	2121	2150

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 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]
Rolling	B	378
	C	684
	D	1026
	E	1800

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 LOS on McAuleys Lane is currently Level B or better (<378 veh/hr). If the site remained undeveloped, it would continue to be Level B or better to year 2035 (**Table 6**).

The estimated traffic movements generated by the proposed development (up to 46 vehicle movements per hour) will not alter the current or projected LOS experienced on McAuleys Lane.

The LOS on Mullumbimby Road is currently Level E (<1800 veh/hr) which is outside the RMS recommended performance standards. If the site remained undeveloped, the LOS would deteriorate further by the year 2035 (**Table 6**).

The estimated traffic movements generated by the proposed development (up to 46 vehicle movements per hour, or up to 29 veh/hr at 33:67 split) will not alter the current or projected LOS 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 using the PM peak hour traffic volumes in **Table 6** (taken on 30 April 2024) 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 LOS 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 movement summaries for the modelled existing intersection for Cases 1 to 4 are provided in **Attachment 2**. 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 (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
McAuleys Lane	B	28.5	C	35.9	F	716	F	2161
Mullumbimby Road	A	12.3	A	12.8	B	21.6	B	25.1

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 2025 (Case 2) results in minor increases in delay and a reduction in the LOS for the right turn from McAuleys Lane to Level C. The traffic increase to 2035 (without development traffic) (Case 3) results in an increase in delay to reduce the LOS to Level B in the right turn from Mullumbimby Road, but significantly increases delays in right turn movements from McAuleys Lane (reduction in LOS to Level F). With the introduction of development traffic, the 2035 figures (Case 4) show a further increase in delays but no further change in LOS.

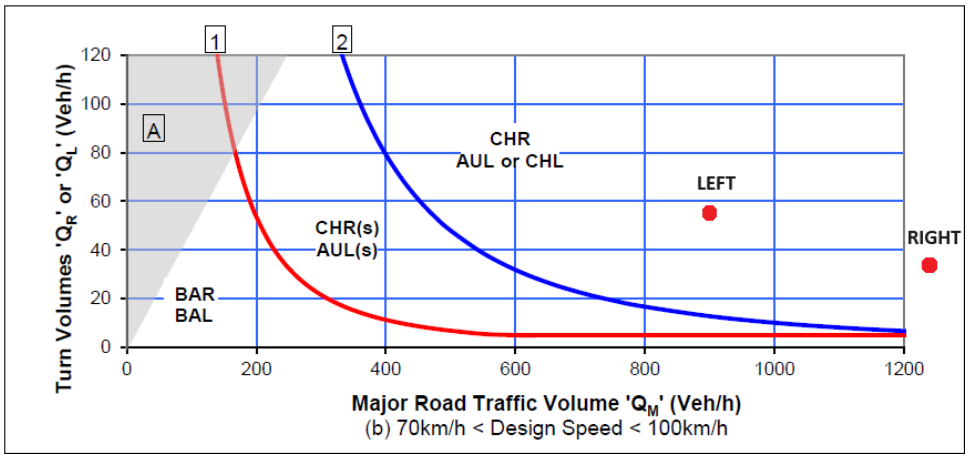
An intersection upgrade will be required (refer Section 6.1.1).

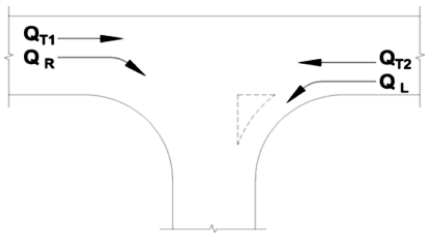
5.3.2 Turn Lane Warrants

Turn lane warrants have been checked using developed case 2035 traffic volumes (Case 4).

For right turns (worst case PM), apply the peak hour through volume for Mullumbimby Road (2036 veh/hr) and the estimated right turn volume into McAuleys Lane (33 veh/hr) to the figure below (reproduced from Figure 3.25, Austroads *'Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management'*, 2020).

For left turns (worst case PM), apply 901 veh/hr for Mullumbimby Road and 57 veh/hr for left turns into McAuleys Lane.





Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	= Q_{T1} + Q_{T2} + Q_L
		Yes	= Q_{T1} + Q_{T2}
	Left	Yes or no	= Q_{T2}
Four-lane two-way	Right	No	= 50% x Q_{T1} + Q_{T2} + Q_L
		Yes	= 50% x Q_{T1} + Q_{T2}
	Left	Yes or no	= 50% x Q_{T2}
Six-lane two-way	Right	No	= 33% x Q_{T1} + Q_{T2} + Q_L
		Yes	= 33% x Q_{T1} + Q_{T2}
	Left	Yes or no	= 33% x Q_{T2}

Source: TMR (2016a).

According to the Austroads figure, a channelised right turn and an auxiliary or channelised left turn treatment is 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'* (2021).

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	110m	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.*

The new intersection of the internal road onto McAuleys Lane has been assessed for a design speed of 60km/h. Traffic volume data provided by Council for McAuleys Lane indicated that both the mean and median recorded travel speeds were approx. 50km/h. The SISD for 50km/h is 97m. therefore it is considered that the available sight distances for this intersection are generally compliant with actual travel speeds in this area. 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 generally 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 estimated to be between 1000-1500vpd.

- Austroads *'Guide to Road Design Part 3: Geometric Design'* (2021) specifies minimum design standards for rural roads. From Austroads Table 4.5, for a design AADT of 1000-3000, the minimum standard is 7.0m traffic lanes (2 x 3.5m) with 2.0m shoulders (min shoulder seal 1.0m)
- Northern Rivers Local Government (NRLG) '*Development Design Specification D1: Geometric Road Design (Urban and Rural)'* (Dec 2019), specifies minimum design standards for rural roads. From Table T1.27, for a design AADT over 1000, the minimum standard is 7.5m seal with 1.5m 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 NRLG or Austroads design standards. 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 has been only 1 recorded crash on McAuleys Lane in the last five years (west of the proposed subdivision). In the same period, there has been 4 recorded crashes at the Mullumbimby Road/McAuleys Lane 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 generally 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 comments and recommendations are made to improve safety at the intersection. These comments and recommendations include responses to address the concerns of the landowner at 110 Mullumbimby Road, and other issues raised by Council:

- 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
- Widened shoulders will be provided on Mullumbimby Road (similar to existing) at the driveway to 110 Mullumbimby Road to facilitate left turns into and out of the driveway
- At Saddle Road a ‘No U-Turn’ sign will be installed for eastbound traffic
- The existing dedicated left turn lane on Mullumbimby Road shall be extended approx. 30m. Designs shall ensure that sufficient space is available on the shoulder for a bus to stop outside of the turn lane.
- Upgrade intersection line marking and provide a ‘Give Way’ sign and hold line in McAuleys Lane
- Install ‘Advance Road Name’ signs (G1-207) on Mullumbimby Road in both approaches to the McAuleys Lane intersection. Provide also ‘Rural Road Name’ sign (G3-5) opposite the McAuleys Lane intersection.

Advance Road Name
(G1-207)

- Provide 1m wide shoulders on Mullumbimby Road for the extent of the intersection upgrade
- Provide 'Crest' signs in Mullumbimby Road in both approached to the crest at Saddle Road.

Mullumbimby Road/Saddle Road Intersection

The Mullumbimby Road/Saddle Road intersection is located on Mullumbimby Road approx. 250m south of the McAuleys Lane intersection. The intersection is approx. 70m south of the crest in Mullumbimby Road. Sight distances from this intersection (to the north) are restricted by the crest.

There are existing 'Advance Road Name' (G1-207) signs in both approaches on Mullumbimby Road. There are 'Stop' signs controlling the intersection, however there is no hold line. There is a dividing barrier line (BB) in Mullumbimby Road, and a 20m length of BB line in Saddle Road.

There are no recorded traffic accidents at this intersection in the last 5 years.

To maintain safety at this intersection, it is proposed to:

- Provide a hold line in Saddle Road
- Maintain clear linemarking at the intersection on completion of the McAuleys Lane intersection upgrade. This will include continuing the edge line through the pavement returns in the intersection. This may also include continuing a lane edge line through the intersection, and adding raised retro-reflective pavement markers (RRPM) and guide posts for added delineation.

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, partially due to the road environment. Where using main roads, pedestrians and cyclists currently share these roads with other 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 (weekday) traffic volume on Mullumbimby Road is approx. 13,035 vpd.
- The bulk of the traffic (almost 90%) is between 7:00am and 5:00pm.
- There has been 4 recorded crashes at the intersection in the last 5 years. One of these was a run-off-road crash.
- Of the intersection related crashes, one occurred at dusk.
- 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 could easily be accommodated within the development if required. Currently, bus services do not travel along McAuleys Lane between Mullumbimby Road and the site. A bus stop is located on Mullumbimby Road near the McAuleys Lane intersection.

5.7 Pedestrians and Cyclists

Subject to implementation of the recommended upgrades, 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 within the development. These paths shall extend to McAuleys Lane. All internal 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)*' (Dec 2019), 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; footpaths and bicycle paths are network dependent.

The internal public roads would be classified as 'local streets' and shall have a 7-9m wide sealed carriageway with mountable kerbs (where applicable), in a minimum 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)*' (Dec 2019):

- The streets intersect at right angles or not less than 70°.
- Adequate sight distance is available at each intersection. It is recommended that landscaping and signage which can potentially block visibility, be kept clear of the sight lines at the intersection.
- Cul-de-sac treatments have been checked for HRV swept paths (adequate for garbage collection vehicles). A full compliance check should be undertaken at Subdivision Works 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 between the site access road and Mullumbimby Road 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 proposes to extend the existing left deceleration/turn lane (westbound) in Mullumbimby Road and add 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 movement summaries for the modelled intersection (for Cases 2 and 4, AM and PM) are provided in **Attachment 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	15.9	A	14.4	C	40.6	C	29.7
Mullumbimby Road	A	12.3	A	11.2	B	21.9	B	17.4

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 2025 and 2035 scenarios, AM and PM. The proposed intersection performs satisfactorily.

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 estimated traffic movements generated by the proposed development will not alter the current or projected 'level of service' experienced on the local roads.
- **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 NRLG or Austroads design standards.
- **Traffic Safety** – to improve safety at the McAuleys Lane/Mullumbimby Road intersection it is proposed to extend the existing left deceleration/turn lane (westbound) in Mullumbimby Road and add a channelised right turn lane and 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

Subject to implementation of the recommended upgrades, the proposed development is not expected to create a significant increased risk to pedestrians or cyclists. Internal pedestrian paths will be provided.

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. Extend the existing left deceleration/turn lane (westbound) in Mullumbimby Road. The existing dedicated left turn lane on Mullumbimby Road shall be extended approx. 30m. Designs shall ensure that sufficient space is available on the shoulder for a bus to stop outside of the turn lane.
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 and out of the driveway.
6. At Saddle Road a 'No U-Turn' sign will be installed for eastbound traffic
7. Install 'Advance Road Name' signs (G1-207) on Mullumbimby Road in both approaches to the McAuleys Lane intersection. Provide also 'Rural Road Name' sign (G3-5) opposite the McAuleys Lane intersection.

Advance Road Name
(G1-207)

8. Provide 1m wide shoulders on Mullumbimby Road for the extent of the intersection upgrade
9. Provide 'Crest' signs in Mullumbimby Road in both approached to the crest at Saddle Road.
10. 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:

11. Widen McAuleys Lane as required from Mullumbimby Road to the new internal road (approx. 600m) to achieve the minimum NRLG or Austroads design standards. 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.
12. Provide advance warning signs for curves – check warrants to determine if advisory speed signs are also required. Provide where necessary.
13. Curve delineation devices – check warrants to determine if CAMs are required – provide where necessary.
14. Guide posts – check spacing of guide posts. Provide additional where necessary.
15. Safety barriers – check warrants to determine if safety barriers are required. Provide as required.
16. Install clear and compliant speed limit signage.

For the new McAuleys Lane/Internal Road intersection:

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

For the Mullumbimby Road/Saddle Road intersection:

19. Provide a hold line in Saddle Road
20. Maintain clear linemarking at the intersection on completion of the McAuleys Lane intersection upgrade. This will include continuing the edge line through the pavement returns in the intersection. This may also include continuing a lane edge line through the intersection, and adding raised retro-reflective pavement markers (RRPM) and guide posts for added delineation.

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.

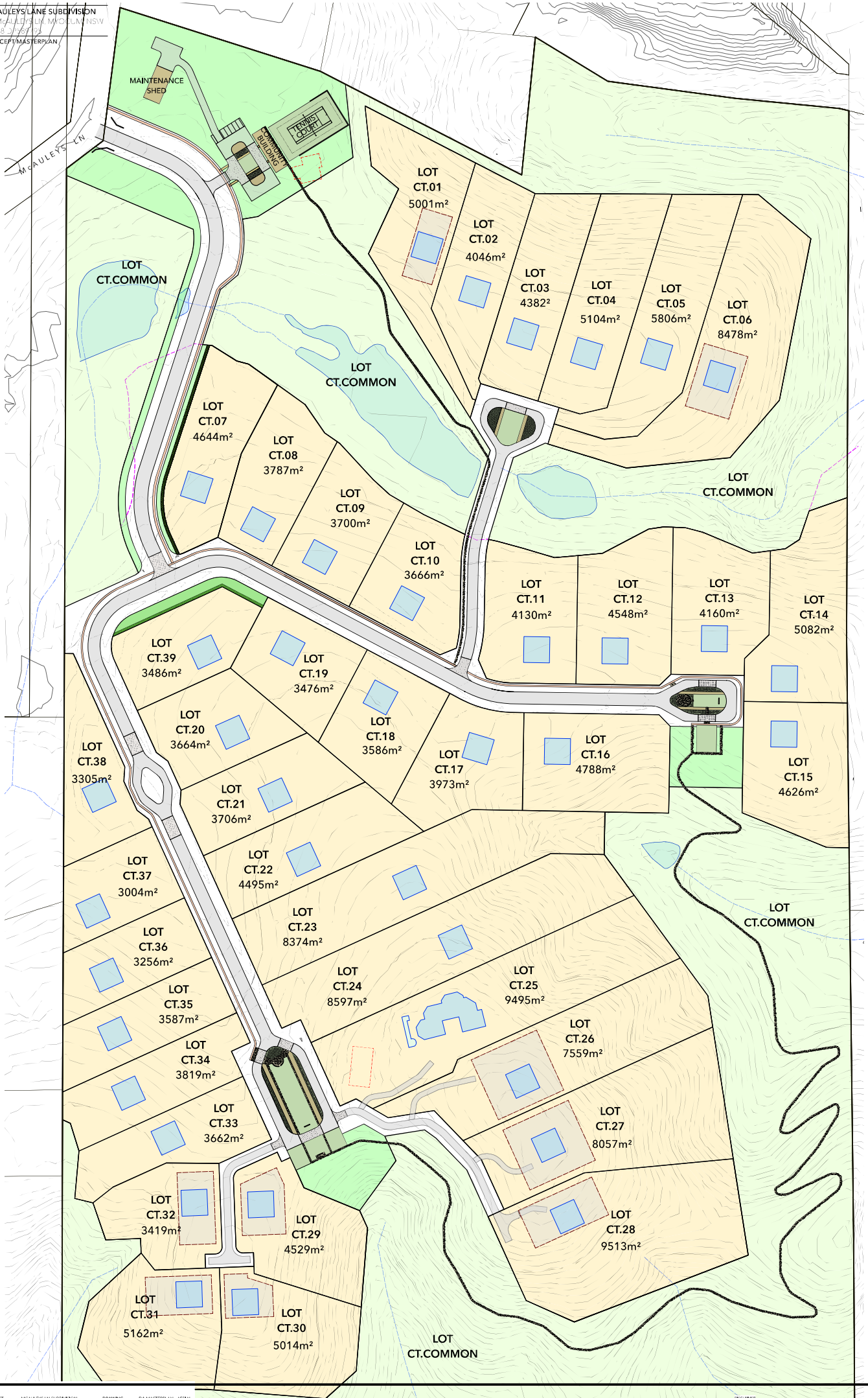
11. Attachments

Attachment 1	Concept Subdivision Plan
Attachment 2	SIDRA Movement Summaries (Cases 1 to 4) – Existing Intersection
Attachment 3	McAuleys Lane/Mullumbimby Road Intersection Upgrade Concept
Attachment 4	SIDRA Movement Summaries (Cases 2 and 4, AM and PM) – Proposed Upgraded Intersection

ATTACHMENT 1

Attachment 1: Concept Subdivision Plan

MCAULEYS LANE SUBDIVISION
53 MCAULEYS LN, MYOCUM, NSW
LOT 8 DP787159
CONCEPT MASTERPLAN



LEGEND

- CONTOURS 1m
- HOUSE SITE
- COMMUNITY BUILDINGS
- LOT BOUNDARY
- VMP/REGENERATION AREA (REFER ECOLOGY REPORT)
- MANAGED LANDSCAPE (REFER LANDSCAPE PLAN)
- PROTECTED TREES (REFER ECOLOGY REPORT)
- FOOTPATH CONC / GRAVEL
- NEW ROAD - INTERNAL

PROJECT	MCAULEYS LN SUBDIVISION	DRAWING	DA MASTERPLAN – AERIAL
ADDRESS	53 MCAULEYS LN, MYOCUM, NSW	JOB NO.	1819
		DATE	18.09.23 SCALE 1:1000
DOCUMENT	DEVELOPMENT APPLICATION	DRAWING NO.	DA.1.03 REV NO. C

DISCLAIMER

VENU. DESIGN GROUP

ATTACHMENT 2

Attachment 2: SIDRA Movement Summaries (Cases 1 to 4) – Existing Intersection

MOVEMENT SUMMARY

Site: 101 [ex int case 1 2025 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	15	0.0	15	0.0	0.016	7.6	LOS A	0.1	0.4	0.47	0.67	0.47	51.3
3	R2	All MCs	21	0.0	21	0.0	0.143	28.5	LOS B	0.4	2.9	0.89	0.95	0.89	39.7
Approach			36	0.0	36	0.0	0.143	19.9	LOS B	0.4	2.9	0.72	0.84	0.72	43.8
East: mullumbimby															
4	L2	All MCs	21	0.0	21	0.0	0.012	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	661	2.7	661	2.7	0.341	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			682	2.6	682	2.6	0.341	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.2
West: mullumbimby															
11	T1	All MCs	791	2.9	791	2.9	0.403	0.3	LOS A	0.3	2.3	0.04	0.05	0.05	79.2
12	R2	All MCs	15	0.0	15	0.0	0.403	12.3	LOS A	0.3	2.3	0.04	0.05	0.05	72.8
Approach			805	2.9	805	2.9	0.403	0.5	NA	0.3	2.3	0.04	0.05	0.05	79.0
All Vehicles			1523	2.7	1523	2.7	0.403	0.8	NA	0.4	2.9	0.04	0.06	0.04	77.6

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 [ex int case 2 2025 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	29	0.0	29	0.0	0.033	7.7	LOS A	0.1	0.7	0.47	0.70	0.47	51.3
3	R2	All MCs	53	0.0	53	0.0	0.376	35.9	LOS C	1.2	8.5	0.92	1.01	1.11	36.8
Approach			82	0.0	82	0.0	0.376	25.8	LOS B	1.2	8.5	0.76	0.90	0.88	40.9
East: mullumbimby															
4	L2	All MCs	52	0.0	52	0.0	0.028	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	661	2.7	661	2.7	0.341	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			713	2.5	713	2.5	0.341	0.6	NA	0.0	0.0	0.00	0.05	0.00	78.4
West: mullumbimby															
11	T1	All MCs	791	2.9	791	2.9	0.428	0.6	LOS A	0.8	6.0	0.09	0.11	0.11	78.1
12	R2	All MCs	29	0.0	29	0.0	0.428	12.8	LOS A	0.8	6.0	0.09	0.11	0.11	71.9
Approach			820	2.8	820	2.8	0.428	1.1	NA	0.8	6.0	0.09	0.11	0.11	77.9
All Vehicles			1615	2.5	1615	2.5	0.428	2.1	NA	1.2	8.5	0.08	0.12	0.10	74.7

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 [ex int case 3 2035 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	22	0.0	22	0.0	0.039	10.2	LOS A	0.1	0.8	0.67	0.86	0.67	49.5
3	R2	All MCs	33	0.0	33	0.0	1.524	716.4	LOS F	9.6	67.4	1.00	1.50	3.40	4.7
Approach			55	0.0	55	0.0	1.524	431.2	LOS F	9.6	67.4	0.87	1.24	2.29	7.4
East: mullumbimby															
4	L2	All MCs	32	0.0	32	0.0	0.017	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	987	2.7	987	2.7	0.510	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			1019	2.6	1019	2.6	0.510	0.4	NA	0.0	0.0	0.00	0.02	0.00	78.9
West: mullumbimby															
11	T1	All MCs	1182	2.9	1182	2.9	0.635	2.9	LOS A	3.8	27.1	0.08	0.09	0.21	74.7
12	R2	All MCs	22	0.0	22	0.0	0.635	21.6	LOS B	3.8	27.1	0.08	0.09	0.21	69.0
Approach			1204	2.9	1204	2.9	0.635	3.2	NA	3.8	27.1	0.08	0.09	0.21	74.6
All Vehicles			2278	2.7	2278	2.7	1.524	12.2	NA	9.6	67.4	0.06	0.09	0.17	62.4

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 [ex int case 4 2035 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	37	0.0	37	0.0	0.066	10.3	LOS A	0.2	1.4	0.67	0.86	0.67	49.5
3	R2	All MCs	63	0.0	63	0.0	3.189	2160.9	LOS F	29.4	205.9	1.00	1.87	5.23	1.6
Approach			100	0.0	100	0.0	3.189	1368.6	LOS F	29.4	205.9	0.88	1.50	3.55	2.6
East: mullumbimby															
4	L2	All MCs	62	0.0	62	0.0	0.034	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	987	2.7	987	2.7	0.510	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			1049	2.5	1049	2.5	0.510	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.4
West: mullumbimby															
11	T1	All MCs	1182	2.9	1182	2.9	0.683	6.3	LOS A	8.0	57.4	0.13	0.15	0.42	69.5
12	R2	All MCs	37	0.0	37	0.0	0.683	25.1	LOS B	8.0	57.4	0.13	0.15	0.42	64.6
Approach			1219	2.8	1219	2.8	0.683	6.9	NA	8.0	57.4	0.13	0.15	0.42	69.3
All Vehicles			2368	2.6	2368	2.6	3.189	61.6	NA	29.4	205.9	0.10	0.16	0.37	33.7

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.

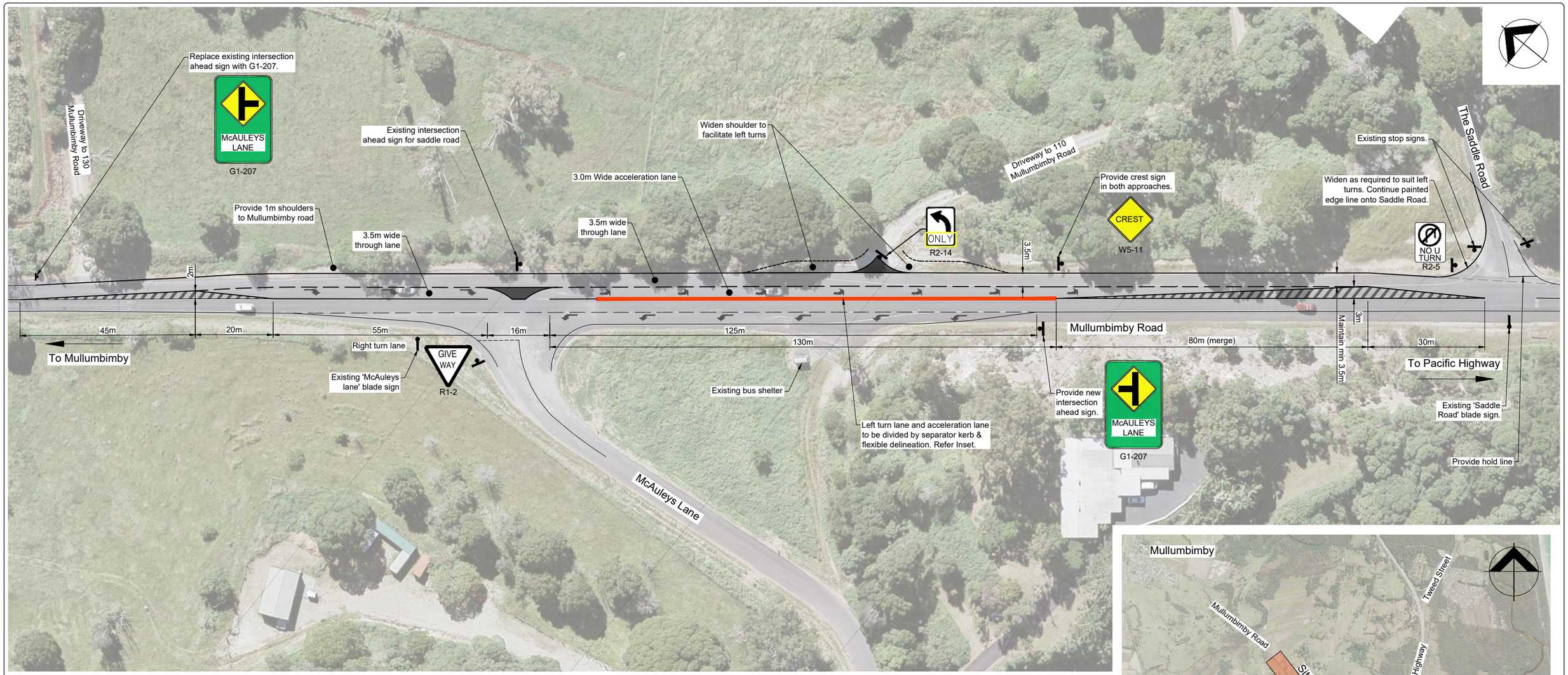
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

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.

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
D	17/06/2022	Amended Intersection Layout	EMR
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		0 5 10 15 20 25
Checked	AH	Datum	
Approved	TC	Drafting File	10431_Intersection_Linemarking_IssD.dwg
Date	07/12/2020	Design File	
Job No.	10431	Dwg No.	SK01
		Issue	D

ATTACHMENT 4

Attachment 4: SIDRA Movement Summaries (Cases 2 & 4, AM and PM) – Proposed Upgraded Intersection

MOVEMENT SUMMARY

Site: 101 [des int case 2 AM 2025 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	38	0.0	38	0.0	0.063	9.4	LOS A	0.2	1.3	0.57	0.82	0.57	50.1
3	R2	All MCs	55	0.0	55	0.0	0.155	15.9	LOS B	0.5	3.5	0.71	0.88	0.71	47.0
Approach			93	0.0	93	0.0	0.155	13.2	LOS A	0.5	3.5	0.65	0.85	0.65	48.2
East: mullumbimby															
4	L2	All MCs	56	0.0	56	0.0	0.031	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	735	6.6	735	6.6	0.389	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			791	6.1	791	6.1	0.389	0.6	NA	0.0	0.0	0.00	0.04	0.00	78.4
West: mullumbimby															
11	T1	All MCs	694	8.6	694	8.6	0.372	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
12	R2	All MCs	22	0.0	22	0.0	0.042	12.3	LOS A	0.1	1.0	0.65	0.84	0.65	58.9
Approach			716	8.4	716	8.4	0.372	0.5	NA	0.1	1.0	0.02	0.03	0.02	78.8
All Vehicles			1599	6.8	1599	6.8	0.389	1.3	NA	0.5	3.5	0.05	0.08	0.05	75.8

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 [des int case 2 PM 2025 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	29	0.0	29	0.0	0.043	8.6	LOS A	0.1	0.9	0.50	0.75	0.50	50.7
3	R2	All MCs	53	0.0	53	0.0	0.127	14.4	LOS A	0.4	2.9	0.65	0.85	0.65	48.1
Approach			82	0.0	82	0.0	0.127	12.3	LOS A	0.4	2.9	0.60	0.82	0.60	49.0
East: mullumbimby															
4	L2	All MCs	52	0.0	52	0.0	0.028	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	661	2.7	661	2.7	0.341	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			713	2.5	713	2.5	0.341	0.6	NA	0.0	0.0	0.00	0.05	0.00	78.4
West: mullumbimby															
11	T1	All MCs	791	2.9	791	2.9	0.409	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
12	R2	All MCs	29	0.0	29	0.0	0.048	11.2	LOS A	0.2	1.2	0.59	0.80	0.59	59.9
Approach			820	2.8	820	2.8	0.409	0.5	NA	0.2	1.2	0.02	0.03	0.02	78.7
All Vehicles			1615	2.5	1615	2.5	0.409	1.1	NA	0.4	2.9	0.04	0.08	0.04	76.2

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 [des int case 4 AM 2035 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	49	0.0	49	0.0	0.171	16.3	LOS B	0.5	3.4	0.81	0.93	0.84	45.8
3	R2	All MCs	66	0.0	66	0.0	0.455	40.6	LOS C	1.6	10.9	0.92	1.03	1.19	36.4
Approach			116	0.0	116	0.0	0.455	30.2	LOS C	1.6	10.9	0.88	0.99	1.04	39.9
East: mullumbimby															
4	L2	All MCs	68	0.0	68	0.0	0.037	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	1098	6.6	1098	6.6	0.581	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.3
Approach			1166	6.2	1166	6.2	0.581	0.6	NA	0.0	0.0	0.00	0.04	0.00	78.3
West: mullumbimby															
11	T1	All MCs	1037	8.6	1037	8.6	0.556	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.4
12	R2	All MCs	22	0.0	22	0.0	0.097	21.9	LOS B	0.3	2.1	0.85	0.95	0.85	51.0
Approach			1059	8.4	1059	8.4	0.556	0.6	NA	0.3	2.1	0.02	0.02	0.02	78.5
All Vehicles			2341	6.9	2341	6.9	0.581	2.1	NA	1.6	10.9	0.05	0.08	0.06	74.8

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 [des int case 4 PM 2035 (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: mcauley															
1	L2	All MCs	37	0.0	37	0.0	0.094	12.7	LOS A	0.3	1.9	0.73	0.88	0.73	47.9
3	R2	All MCs	62	0.0	62	0.0	0.305	29.7	LOS C	1.0	7.2	0.86	0.98	1.01	41.4
Approach			99	0.0	99	0.0	0.305	23.4	LOS B	1.0	7.2	0.81	0.94	0.90	43.6
East: mullumbimby															
4	L2	All MCs	62	0.0	62	0.0	0.034	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	987	2.7	987	2.7	0.510	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			1049	2.5	1049	2.5	0.510	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.4
West: mullumbimby															
11	T1	All MCs	1182	2.9	1182	2.9	0.611	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.2
12	R2	All MCs	37	0.0	37	0.0	0.115	17.4	LOS B	0.4	2.6	0.80	0.93	0.80	54.4
Approach			1219	2.8	1219	2.8	0.611	0.7	NA	0.4	2.6	0.02	0.03	0.02	78.2
All Vehicles			2367	2.6	2367	2.6	0.611	1.6	NA	1.0	7.2	0.05	0.07	0.05	75.8

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.