Macarthur Grange Planning Proposal
Traffic Impact Assessment

Prepared for:

Toscuz Investments Pty Ltd

19 June 2024

The Transport Planning Partnership

Macarthur Grange Planning Proposal
Traffic Impact Assessment

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APPENDICES

1 Introduction

1.1 Overview

This traffic impact assessment (TIA) report relates to the planning proposal at Macarthur Grange Country Club in Campbelltown Local Government Area. The planning proposal seeks to rezoning the current C3 Environmental Management zone to a range of zones including C2 Environmental Conservation, C4 Environmental Living and RE1 Public Recreation, to allow for:

- 52 rural residential / environmental living lots.
- A restaurant / café / function centre as additional permitted uses in the location of the existing club house.
- A conservation reserve and open space to be dedicated to Council comprising around 50% of the site.

1.2 Report Structure

The report assesses the traffic and parking implications of the planning proposal and is set out as follows:

- Chapter 2 discusses the existing conditions including a description of the subject site,
- Chapter 3 provides a brief description of the planning proposal development,
- Chapter 4 examines the development's traffic generation and its impact,
- Chapter 5 presents the conclusions of the assessment.

2 Existing Conditions

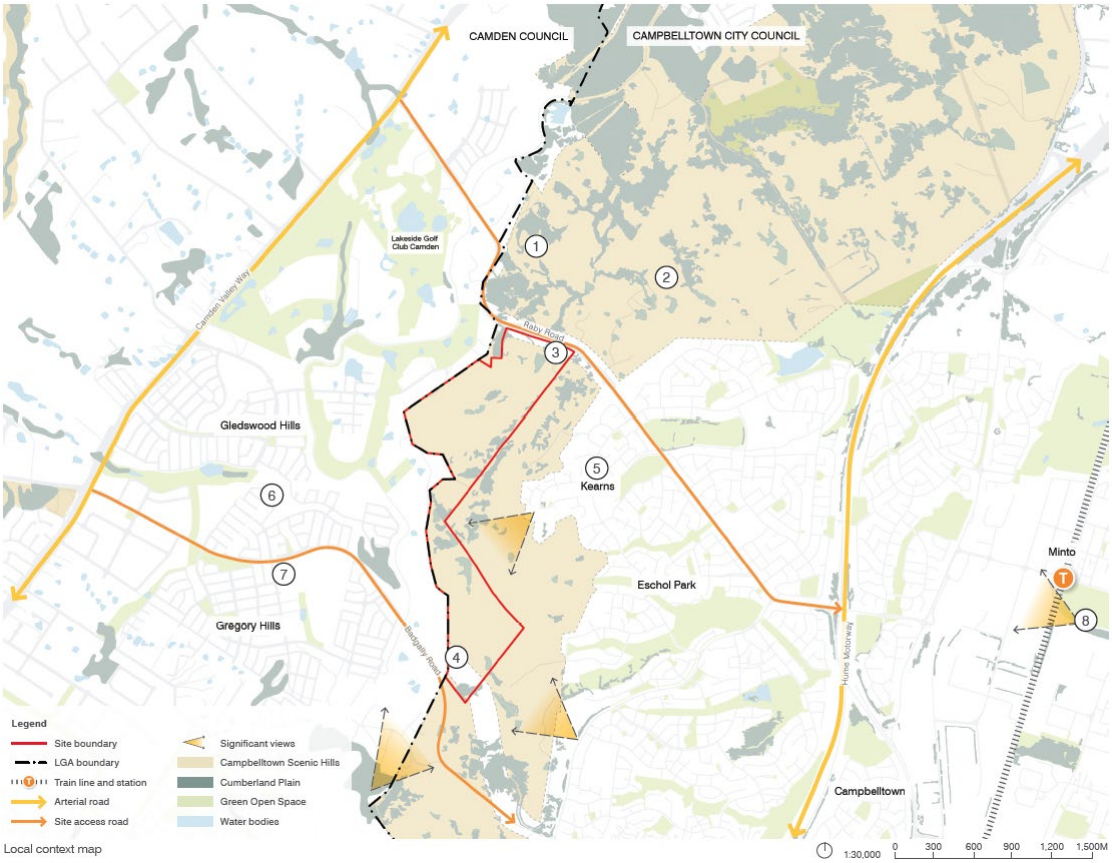
2.1 Site Description

The subject site is referred to as Macarthur Grange, Varroville being Lot 3900, DP 1170905 and has an area of 129.5 ha. The land is located approximately eight kilometres west of the Campbelltown CBD and falls within the local government area of Campbelltown. The site is bounded by Raby Road to the north and Gregory Hills Drive to the South. The land borders the Camden-Campbelltown Local Government Area boundary to the west and is situated within the Scenic Hills Protection Area. This site is occupied by an operational golf course known as Macarthur Grange Golf Club which utilises approximately 71.9 ha of the northern most land.

The subject site is zoned C3 – Environmental Management under the Campbelltown Local Environmental Plan 2015.

The location of the subject site and its surrounds are shown in Figure 2.1.

Figure 2.1: Subject Site and its Environs



Source: Macarthur Grange Redevelopment, Urban Design Report (Architectus).

2.2 Existing Site Access

Vehicle access to the existing Macarthur Grange Country Club is provided on Raby Road, which is a two-lane, two-way regional road with a posted speed limit of 80 km/h. Existing site access arrangement allows vehicles to enter and exit the site in all directions (left-in, left-out, right-in and right-out).

An 80m (excluding taper) left turn deceleration lane is provided for northbound traffic turning left into the site. On the southbound side, a 40m channelised right turn deceleration and storage lane is provided for southbound vehicles entering the site.

A 30m acceleration lane is provided for left turn movement from the site into Raby Road. No storage and acceleration lane are provided at the intersection for right turn movement from the site into Raby Road.

Source: Nearmap

2.3 Road Network

2.3.1 Raby Road

Raby Road is a regional road that connects Hume Motorway and Campbelltown Road to the east and Camden Valley Way to the west. Raby Road is a two-lane, two-way road with the posted speed limit of 80 km/h.

Raby Road curves left as it approaches the Macarthur Grange Country Club access from the east. It also slopes downward at it approaches the Club access from the east. The combination of both horizontal and vertical alignment impacts the ability for vehicles to turn out from the Club access on to Raby Road.

It is noted that Camden Council and Campbelltown City Council are proposing to upgrade Raby Road between Emerald Hills Boulevard and Thunderbolt Drive. The upgrades will include widening of Raby Road in front of the site to a four lane divided carriageway (two lanes in each direction). The proposed upgrades would ban the right-turn movement from the site onto Raby Road due to safety concerns.

The proposed development would comply with this site access restriction if Raby Road was upgraded as per Council's proposal. This is further discussed in Sections 3.2 and 4.3 of this report.

2.3.2 Gregory Hills Drive-Badgally Road

Badgally Road, which links to Gregory Hills Drive has been upgraded during 2018 to a four-lane divided road. The posted speed limit is 70km/h.

The existing intersection of Gregory Hills Drive-Badgally Road / Donovan Boulevard is a signalised intersection. The current layout of the signalised intersection has allowed for a fourth arm to the northeast, which will provide access to the southern portion of the approved subdivision at 190 Raby Road adjacent to the subject site.

2.4 Traffic Surveys

Traffic surveys undertaken for a previous version of this report were undertaken in March 2020 and TTPP considers that the COVID-19 pandemic may have had some impacts on the surveyed data. Therefore, TTPP has undertaken updated traffic surveys for this amended report:

TTPP commissioned the following traffic surveys:

- Automatic tube counts at Raby Road west of the Macarthur Grange Country Club access road and across the club access road between 15 to 21 February 2024 (i.e. 7 days)
- Intersection traffic movement count at the intersection of Raby Road and the Macarthur Grange Country Club access road on Thursday 15 February 2024 during 7AM-9AM and 4PM-6PM.

Unfortunately due to one of the tubes of the automatic tube counter on Raby Road being damaged from 16 February 2024, only the detailed two-way traffic flows and speed data on 15 February 2024 (Thursday) were recorded. However, based on data received from the other tube and the portion of different vehicle types recorded on 15 February, TTPP was able to estimate the total two-way traffic volumes on Raby Road between 16 - 21 February 2024. As a comparison, TTPP has included the automatic tube count data recorded at Raby Road between 7 and 13 March 2020, as presented in Figure 2.2.

2.4.1 Raby Road, West of Macarthur Grange Country Club Access Road

Figure 2.2 shows the combined two-way hourly traffic volume on Raby Road for the 7-day period, for the week starting 7 March 2020.

Figure 2.3 shows the combined two-way hourly traffic volume on Raby Road for the 7-day period for the week starting 15 February 2024. As mentioned above, the two-way traffic volumes between 16-21 February 2024 were estimated based on a single undamaged tube of the counter and the proportions of vehicle types recorded on 15 February 2024.

Figure 2.2: Raby Road, West of Macarthur Grange Country Club Access Road (Combined Two-Way Hourly Traffic between 7-13 March 2020)

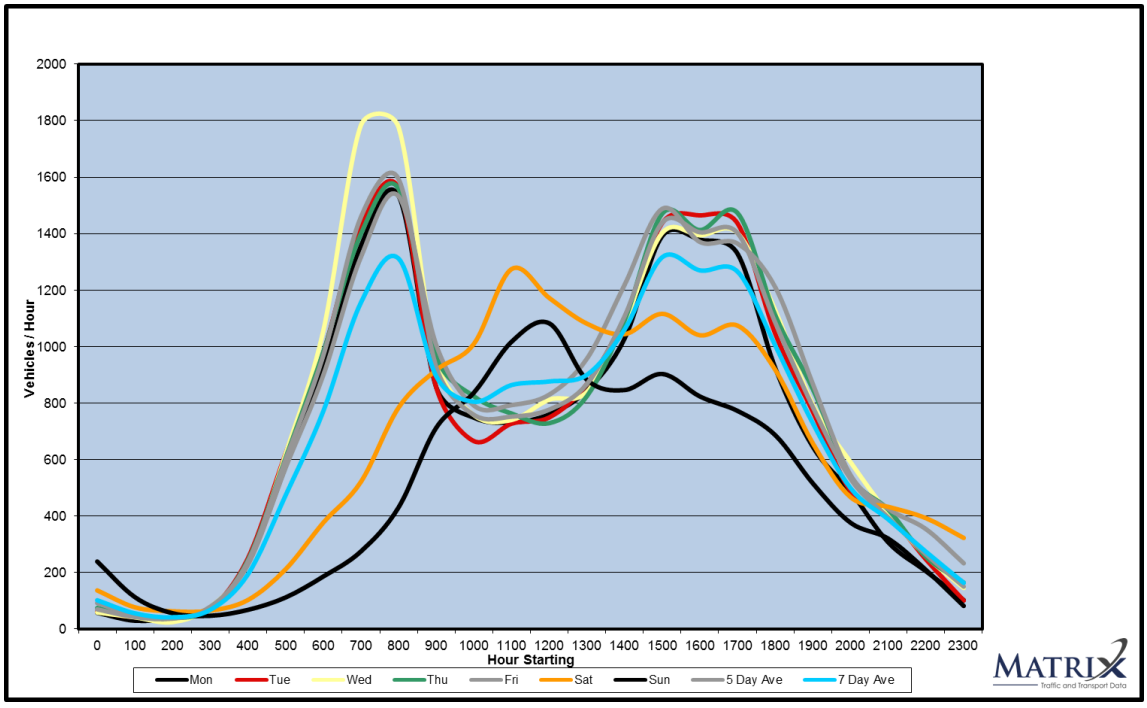
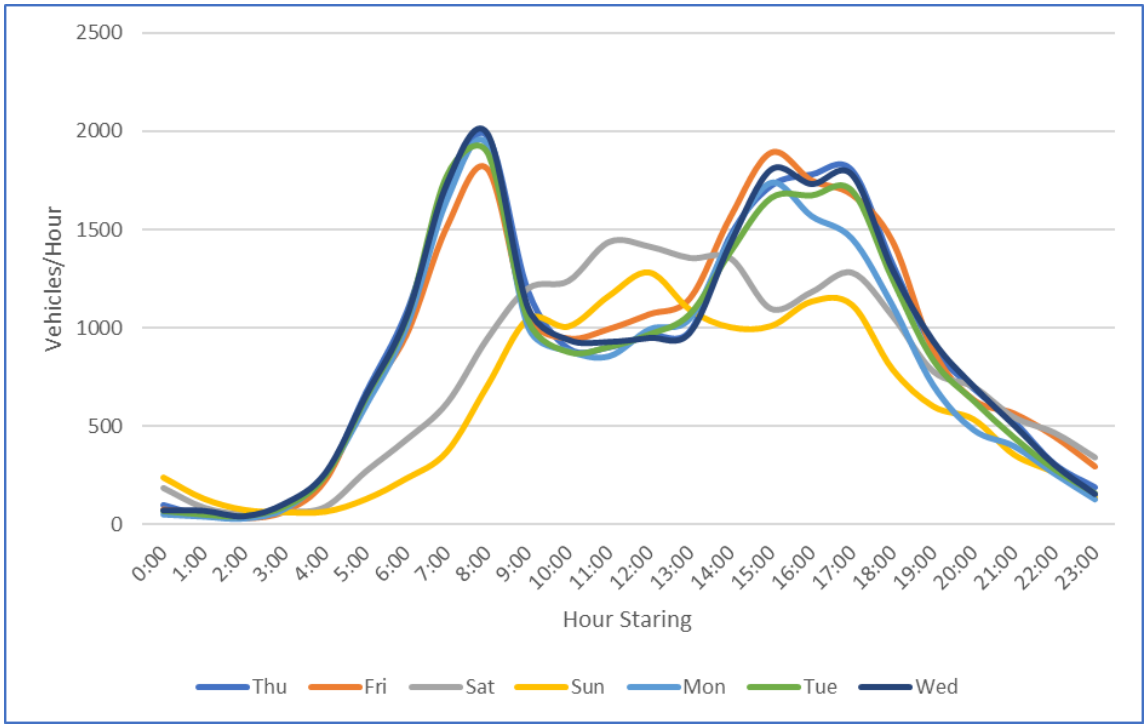


Figure 2.3: Raby Road, West of Macarthur Grange Country Club Access Road (Combined Two-Way Hourly Traffic between 15-21 February 2024)



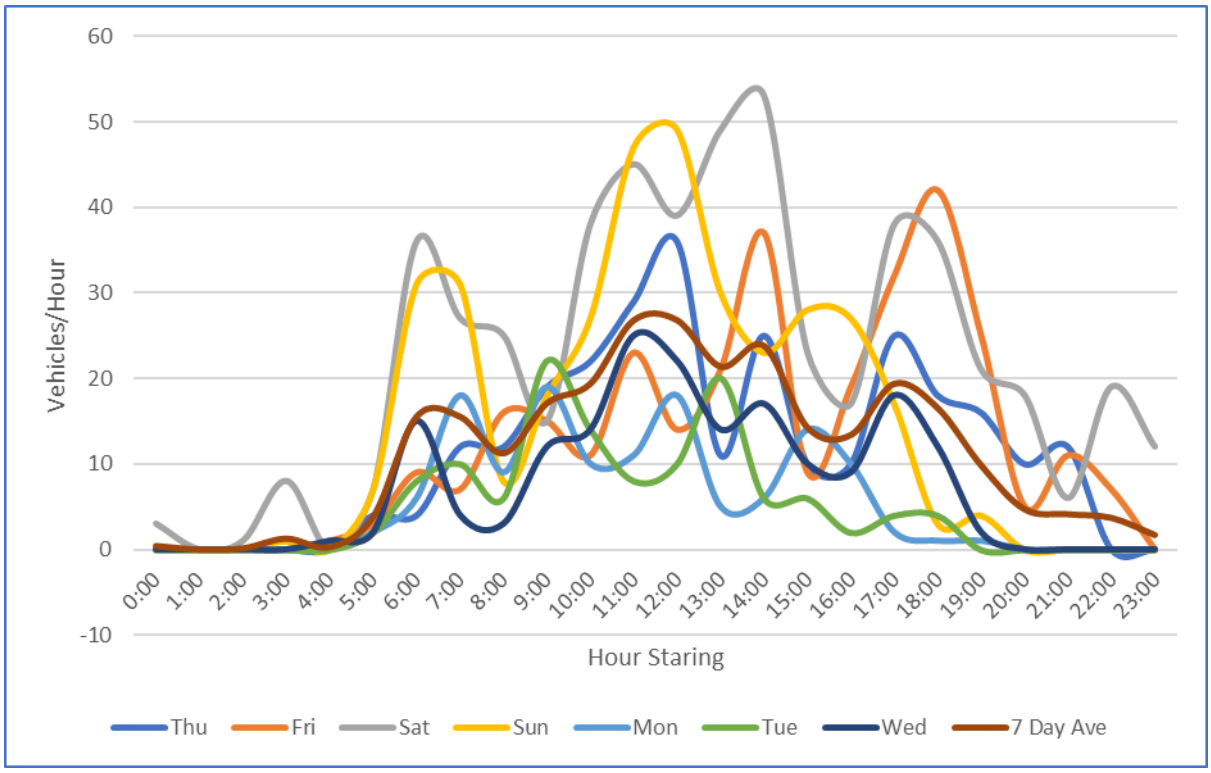
Data collected at Raby Road indicates the following:

- The hourly traffic volumes collected in February 2024 share the similar pattern as the traffic volumes collected in March 2020.
- The peak hourly traffic (two-way) during the weekdays occurs at 8AM and 5PM, ranges between 1,400 and 2,000 vehicles/hour.
- The traffic volumes recorded in 2024 are slightly higher than the traffic volumes recorded in 2020.
- During the 7-day period between 7-13 March 2020, the 85th percentile speed ranged between 82km/hr and 96km/hr.

2.4.2 Macarthur Grange Country Club Access Road

Figure 2.4 shows the combined two-way hourly traffic volume on the existing site access road for the 7-day period, for the week starting 15 February 2024.

Figure 2.4: Macarthur Grange Country Club Access Road (Combined Two-Way Hourly Traffic between 15-21 February 2024)



Data collected at Macarthur Grange access road indicates the following:

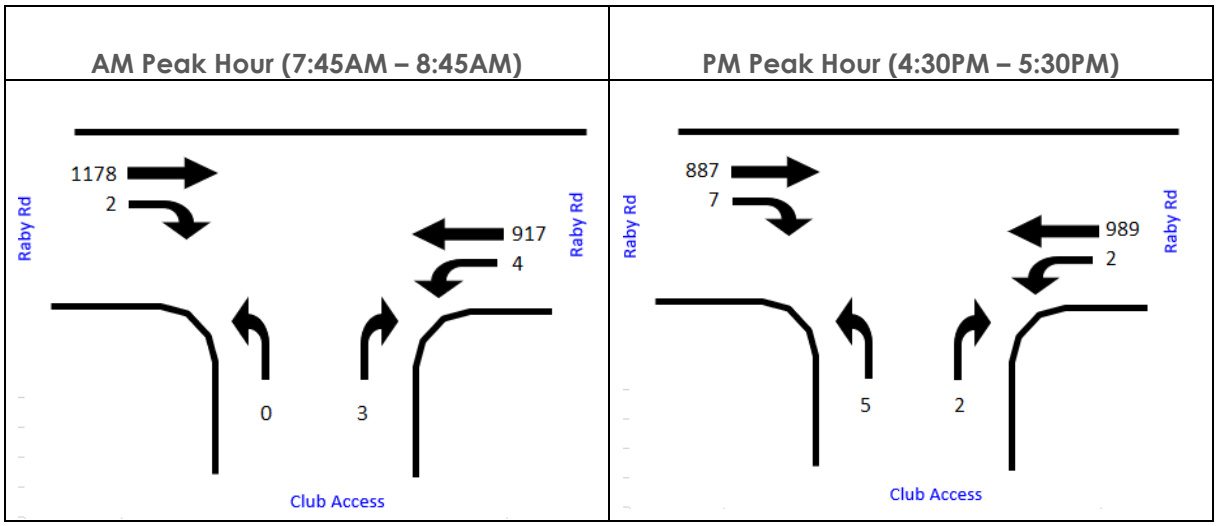
- The site peak hourly volume (two-way) during the survey period was 53 vehicles/hour between 2 – 3pm on Saturday. Generally, the site peak hour occurs between 12AM and 3PM.
- Saturday and Sunday recorded higher volumes compared to weekdays. Friday recorded higher volumes compared to other weekdays. Friday, Saturday and Sunday daily volumes were 307, 536 and 351 vehicles respectively.

2.4.3 Raby Road/Macarthur Grange Country Club Access Road Intersection

Based on the survey data, the network peak hours have been calculated as 7:45am-8:45am and 4:30pm-5:30pm.

The turning movement volumes for the AM and PM peak periods are shown in Figure 2.5.

Figure 2.5: Existing Traffic Volumes (Friday 13 March 2020)



2.5 Intersection Operation

The existing operation of the key intersections have been assessed using SIDRA Intersection 9.1, a computer-based modelling package which assesses intersection performance under prevailing traffic conditions.

SIDRA calculates intersection performance measures such as 'average delay' that vehicles encounter and the level of service (LoS). SIDRA provides analysis of the operating conditions which can be compared to the performance criteria set out in Table 2.1.

Table 2.1: Level of Service Criteria for Intersection Operation

Level of Service	Average Delay (seconds per vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	good operation	good operation
B	15 to 28	good with acceptable delays and spare capacity	acceptable delays and spare capacity
C	29 to 42	satisfactory	satisfactory, but accident study required
D	43 to 56	operating near capacity	near capacity and accident study required
E	57 to 70	at capacity At signals, incidents will cause excessive delays.	at capacity, requires other control mode
F	Greater than 71	unsatisfactory with excessive queuing	unsatisfactory with excessive queuing; requires other control mode

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

Table 2.2 presents a summary of the existing operation of the surveyed intersection.

Table 2.2: Existing Operating Conditions

Intersection	Morning Peak		Afternoon Peak	
	Ave. Delay (s)	LoS	Ave. Delay (s)	LoS
Raby Rd/Site Access	408.6*	F	181.4**	F

NOTE: Worst movement delay is reported for sign-controlled intersections
**right-turn from site access*
***right-turn from site access*

Table 2.2 indicates that the existing worst movement of Raby Road/Macarthur Grange site access intersection is the right turn movement from the site access road into Raby Road, which is performing at capacity with level of service "F" during the morning and afternoon peak periods. This is mainly due to the difficulty experienced by the right turn movement from the site access. However, it is worth noting that the volume of right turning movement is minor, that is, 3 vehicles or less recorded during the weekday AM and PM peak hour. Other movements on Raby Road are performing at level of service A during the morning and afternoon peak periods.

2.6 Public Transport

2.6.1 Train Services

The development site is approximately 4 to 6 km away from three train stations, Minto Station, Leumeah Station and Campbelltown Station, which are on the T8 Airport & South line.

The frequency of trains on T8 Airport & South line are tabulated in Table 2.3.

Table 2.3: Train Frequency (T8 Airport & South Line)

	Weekday Frequency		
T8 Line	**AM Peak**	**PM Peak**	**Off Peak**
To City Circle	5-15 minutes	15 minutes	15 minutes
To Macarthur	15 minutes	5-15 minutes	15 minutes

2.6.2 Bus Services

Bus route 850 Narellan to Minto currently operates along Raby Road. However the nearest bus stops are located at Thunderbolt Drive and Lakeside Entrance, which are approximately 820m east and 1.7km west of the site, respectively.

The service frequency of bus route 850 is about 30 minutes during the morning and afternoon peak periods and 60 minutes during off-peak periods.

3 Proposed Development

3.1 Proposal Description

The planning proposal seeks to rezone the site from C3 Environmental Management to a range of zones including C2 Environmental Conservation, C4 Environmental Living and RE1 Public Recreation.

The Planning Proposal would facilitate development of the site for:

- 52 rural residential / environmental living lots with lot sizes ranging from 0.5ha to 3.2ha.
- A restaurant / café / function centre as additional permitted uses in the location of the existing club house. The future development of the club house within the permitted planning controls would be subject of a separate development application but it is anticipated that the traffic generated by such uses would be outside the traditional traffic morning and evening network peak periods. Accordingly traffic modelling has not assumed any increase on the existing golf club operations for these uses.
- A conservation reserve and open space to be dedicated to Council comprising around 50% of the site.

The development site will be divided into two portions. The northern portion of the site will include 46 residential lots, a function centre / restaurant / café in the location of the existing club house, a lookout park and other open space, as shown in Figure 3.1. Access to the northern portion will be provided via the existing vehicular access off Raby Road. The southern portion of the site will include 6 residential lots and a lookout park with associated open space, as shown in Figure 3.2. Access to the southern portion of the site will be provided via the adjacent site which has been rezoned for low density residential development.

A master site plan is provided in Appendix A.

Figure 3.1: Proposed Subdivision Layout at the Northern Portion of the Site

Figure 3.2: Proposed Subdivision Layout at the Southern Portion of the Site

3.2 Proposed Site Access

The existing site access from Raby Road via the Macarthur Grange Country Club access is to be maintained. Access to the northern portion of the site will be provided via Raby Road.

As mentioned in Section 2.3.1, Camden Council and Campbelltown City Council are proposing to upgrade Raby Road between Emerald Hills Boulevard and Thunderbolt Drive. The upgrades will include widening of Raby Road in front of the site to a four lane divided carriageway (two lanes in each direction). Consequently, the proposed upgrades would ban the right-turn movement from the site onto Raby Road due to safety concerns. The proposed development would comply with this site access restriction if Raby Road was upgraded as per Council's proposal. The alternative site access arrangement post the Raby Road upgrade and the associated impacts are further discussed in Section 3.2 of this report.

Notwithstanding, as shown in Section 2.5, it is difficult for vehicles exiting the site to turn right onto Raby Road at the existing site access road intersection. Therefore, if the Raby Road Upgrade does not take place, it is recommended to upgrade the existing site access intersection with Raby Road to provide a two-stage right turn treatment. The proposed treatment will enable the right turn movement from the site access to be made in two stages.

- Stage 1 – Right turn out from site access with priority given to westbound through movement and right turn movement from Raby Road, moving to the merge lane.
- Stage 2 – Merges with eastbound through traffic at Raby Road.

A traffic assessment is undertaken for the recommended two-stage right turn treatment, as shown in Section 4.2. The SIDRA modelling results indicate that the recommended intersection treatment would improve the performance of the site access intersection significantly.

It is proposed to construct a service road, which extends off Mayfield Place, to provide an alternative access for emergency vehicles.

There is a potential for a new northeastern leg at the intersection of Gregory Hills Drive-Badgally Road and Donovan Boulevard that will be provided for vehicular access to the adjacent approved subdivision site at 190 Raby Road. It is proposed that access to the southern portion of the subject site (6 residential dwellings) is to be provided via the adjacent site to Gregory Hills Drive-Badgally Road. This is subject to approval from the adjacent land owner.

3.3 Proposed Car Parking

Campbelltown Development Control Plan (DCP) 2015 stipulates the car parking rates for the following land uses:

- Residential dwelling – a minimum of one undercover car parking space per dwelling is required for low density residential developments

- Restaurant / café – 1.5 spaces per 10m^2 GFA
- Function Centre – not specified
- Regional open space / lookout point – not specified

It is proposed to comply with the car parking requirements specified in the Council's DCP. Where applicable car parking rates are not specified for the proposed uses, a parking assessment will be undertaken to recommend suitable car parking rates.

Following the approval of the planning proposal, a separate detailed development application will be submitted to Council for approval, which will confirm the exact development yields, vehicle access, and parking provision and layout.

3.4 Proposed Internal Roads

The proposed internal road network is shown in Figure 3.3. The proposed subdivision road network features the following road types:

- Primary Vehicular Circulation – Local Street (Council Category D)
- Secondary Vehicular Circulation – Accessway (Council Category A)

The new roads are to be designed as per the minimum requirements of *Campbelltown DCP 2009 Volume 2 Engineering Design for Development – Table 3.1*. that is, a local street (Category D) is to have a minimum 15m road reserve and incorporate the following:

- 8 m wide road carriageway
- 3.5m wide verge/path on either side of the carriageway

An Accessway (Category A) is required to have a minimum 9m road reserve and incorporate the following:

- 4 m wide road carriageway
- 1.5 verge width or 3.5m plus parking. The additional width is required for provision of minimum 1 parking space per 2 dwellings.

Cross-sections of the local street and accessway are shown in Figure 3.4 and Figure 3.5 respectively. The proposed road reserve and road carriageway of the internal roads comply with Council's Design standards. It is noted that only one accessway is proposed at the southern portion of the site providing access to two residential lots. Since on-site parking will be provided for each dwelling house, on-street parking on the accessway is considered not necessary. Therefore, it is proposed to provide a 2.5m wide verge / path on either side of the carriageway. This is considered acceptable.

Figure 3.3: Proposed Road Network Plan

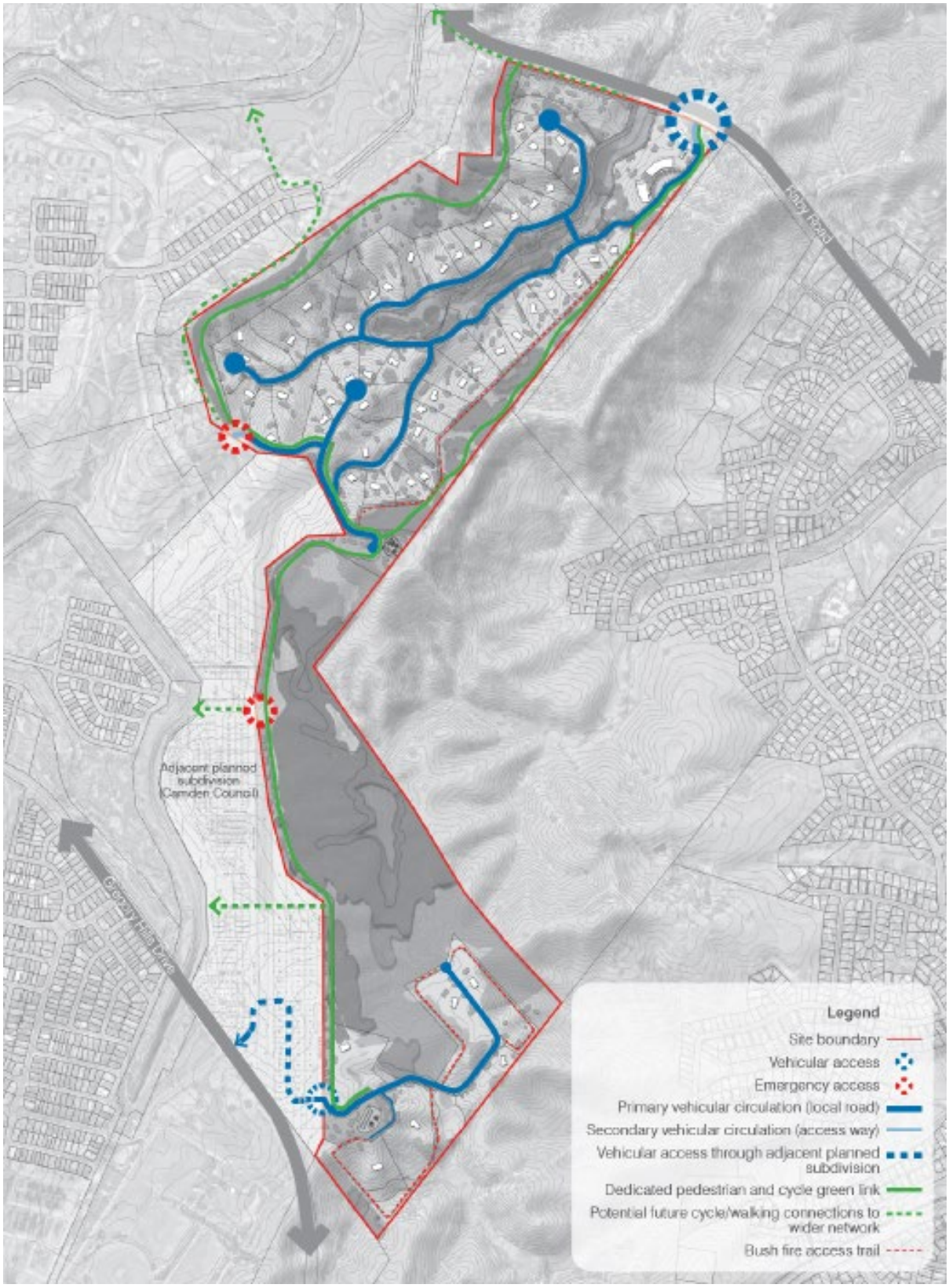


Figure 3.4: Proposed Street Cross-section – Local Street (15m Reserve)

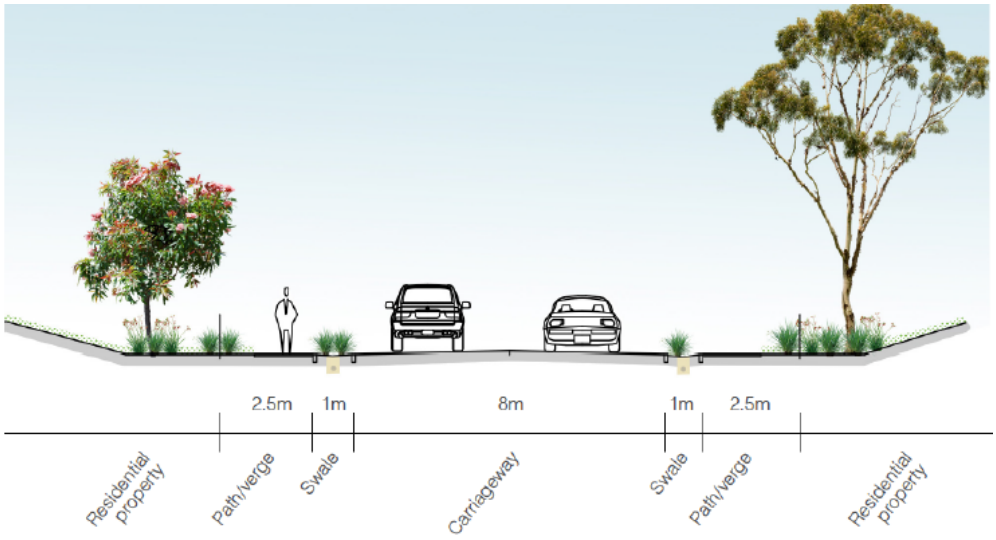
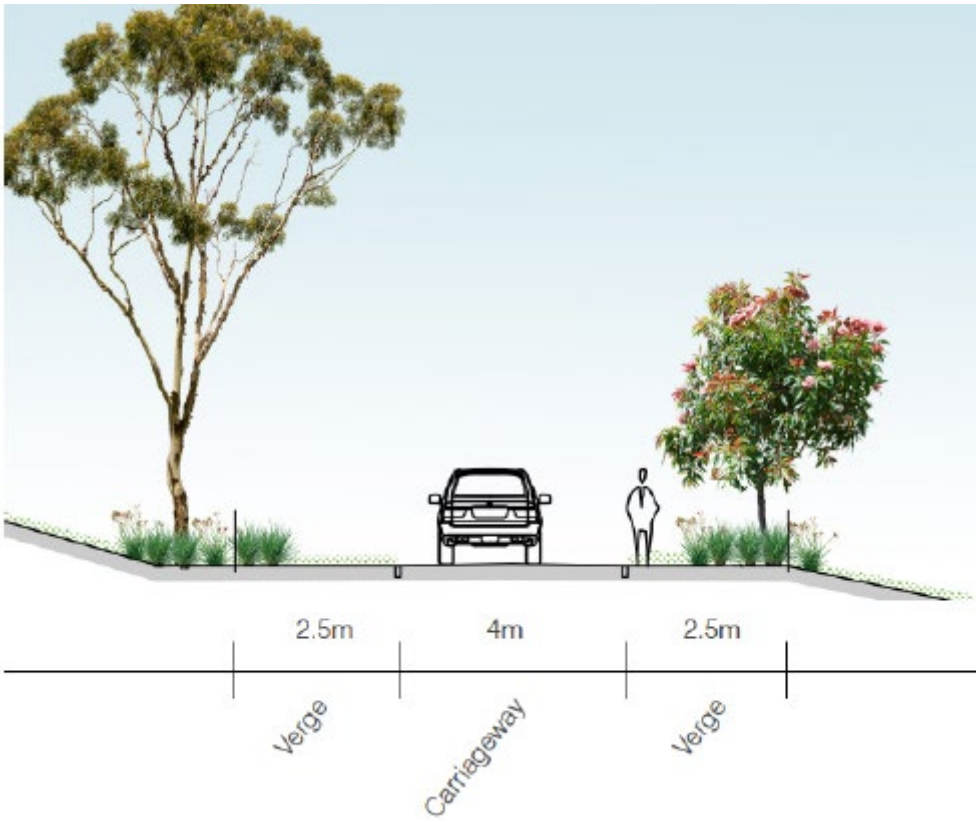


Figure 3.5: Proposed Street Cross-section – Accessway (9m Reserve)



3.5 Proposed Public Transport Access

This planning proposal proposes no changes to the existing public transport in the surrounding of the site. Public transport access to and within the master plan site will not be required.

3.6 Pedestrian and Cycle Movement

Formal footpaths will be provided along the internal roads within the masterplan site to accommodate pedestrian movement. A north-south walking and cycle link will be provided through the site connecting the local parks, lookout parks, riparian open space, and the shared paths on Gregory Hills Drive.

The walking / cycling link has the potential to connect to a future network linking Western City Parklands to the Mt Annan Botanic Gardens. Connections to this wider network is outside the scope of this Planning Proposal.

4 Traffic Assessment

4.1 Traffic Generation

RMS (now TfNSW) provides traffic generation rates for different land uses in their Guide to Traffic Generating Developments (Guide) and in their technical direction TDT 2013/4a containing revised rates.

4.1.1 Residential Lots

TfNSW Technical Direction TDT 2013/4a stipulates the following traffic generation rates for low density residential dwellings in regional areas:

- AM Peak Hour - 0.71 per dwelling
- PM Peak Hour – 0.78 per dwelling

The above rates have been adopted for the residential lots.

Table 4.1: Proposed Development Traffic Generation Estimates

Development Yield	Supply	Trip Rate		Trip Generation Estimate	
		AM Peak	PM Peak	AM Peak	PM Peak
Residential	52 lots	0.71 trips/ dwelling	0.78 trips/ dwelling	37 trips	41 trips

Based on the above traffic generation rates, the 6 dwellings at the southern portion of the site are expected to generate about 4 trips in the AM peak and 5 trips in the PM peak, and the 46 dwellings at the northern portion of the site are expected to generate about 33 trips in the AM peak and 36 trips in the PM peak.

4.1.2 Regional Open Space

Traffic generation rates for open space / lookout park are not specified in TfNSW Guide. It is understood that the proposed open space and lookout parks within the site are provided for the residents of the new dwellings within the site. Occasionally residents from the adjacent site might also visit the lookout parks. However, it is unlikely that the lookout parks would generate considerable levels of traffic during the weekday AM and PM peak periods. It is also expected that majority of the residents and broader community would visit the lookout park via walking or cycling using the proposed green links. Therefore the proposed lookout parks are not expected to generate additional traffic to the surrounding key intersections during the weekday AM and PM peak periods, and would not have noticeable impacts on the surrounding road network.

4.1.3 Club Redevelopment

The future development of the club house within the permitted planning controls would be subject to a separate development application. Notwithstanding, it is anticipated that the traffic generated by such uses would be outside the traditional traffic morning and evening network peak periods. Accordingly, traffic modelling has not assumed any increase on the existing golf club operations for these uses.

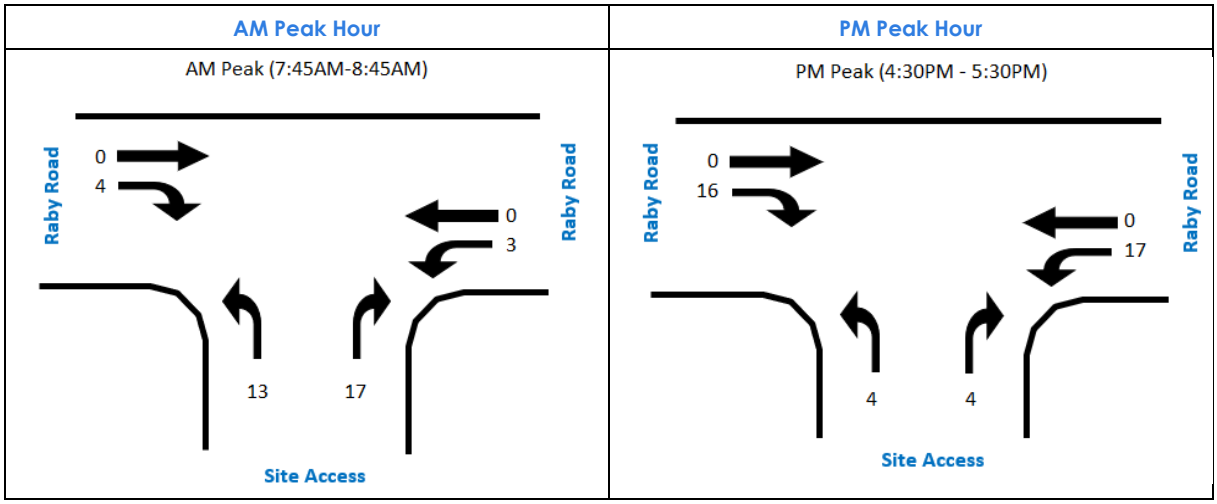
4.1.4 Development Traffic Generation

Based on the above, the proposed development could be expected to generate an additional 37 trips and 41 trips in the AM and PM peak hour respectively.

The southern portion of the site is expected to generate up to 5 vehicle trips to the adjacent site road network and on Badgally Road during the weekday peak hours. This level of traffic generation will not have noticeable impacts on the road network.

For a conservative assessment, it is assumed that all additional traffic generated from the development will be via the existing site access on Raby Road. Using the existing traffic pattern on Raby Road, the turning movement volumes for the development traffic has been assigned as shown in Figure 4.1.

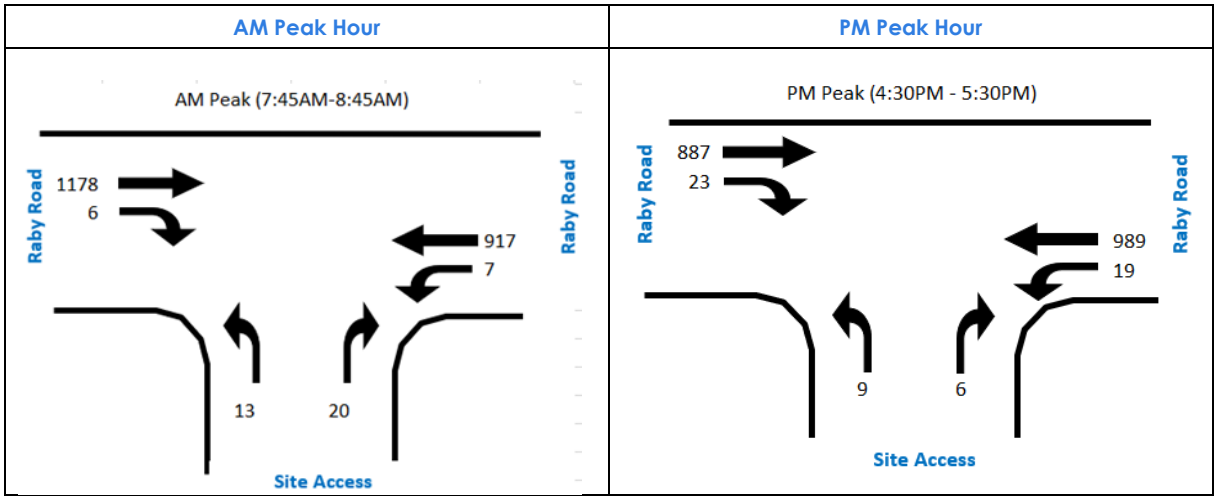
Figure 4.1: Development Traffic (Net Increase)



4.2 Intersection Capacity Assessment

The development generated traffic (i.e. Figure 4.1) is superimposed on the existing traffic (i.e. Figure 2.5). Post development traffic volume is shown in Figure 4.2.

Figure 4.2: Post Development Traffic Volume (Existing Access Arrangements)



The proposed Widening of Raby Road project as described in Paragraph 4.3 would potentially ban the right-turn movement from the site onto Raby Road, but retain the left-in movement into the site and left-out movement from the site onto Raby Road. Operating conditions of Raby Road/Site Access intersection under the no right-turn exit scenario have been assessed using SIDRA Intersection 9.1. Post development traffic movements with the "no right-turn restriction" is shown in Figure 4.3.

Figure 4.3: Post Development Traffic Volume ("No Right-turn" Restriction)

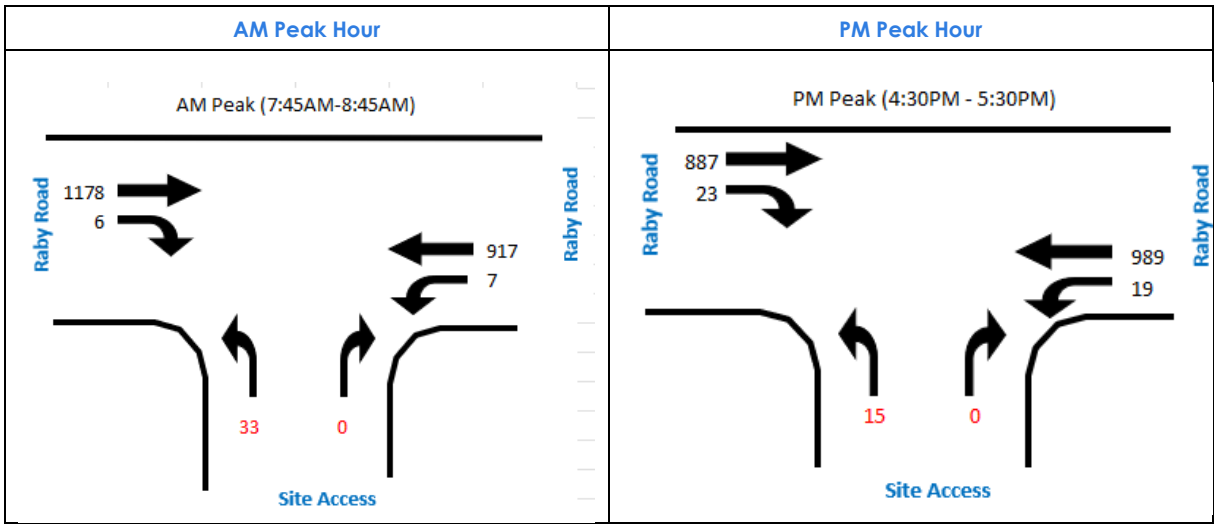


Table 4.2 presents a summary of the post development operation under different scenarios.

Table 4.2: Post Development Operating Conditions

Intersection	Morning Peak		Afternoon Peak	
	Ave. Delay (s)	LoS	Ave. Delay (s)	LoS
Raby Rd/Site Access				
Existing	409	F	181	F
Post development	> 40 minutes	F	216	F
Post development with right turn treatment	25	B	29	C
Post Development with "no right turn exit"	13	A	15	B

NOTE: Worst movement delay is reported for sign-controlled intersections

Table 4.2 indicates that Raby Road/Macarthur Grange site access intersection would continue to experience difficulties exiting the site post development under the existing site access arrangements, mainly due to the right turning movement from the site access.

On this basis, it is recommended to upgrade this intersection to provide a two-stage right turn treatment, similar to the arrangement provided as Raby Road/Gledswood Hill Drive intersection, which is shown in Figure 4.4.

Figure 4.4: Two-Stage Right Turn Treatment at Raby Road/Gledswood Hill Drive

The proposed treatment will enable the right turn movement from the site access to be made in two stages.

- Stage 1 – Right turn out from site access with priority given to westbound through movement and right turn movement from Raby Road, moving to the merge lane.
- Stage 2 – Merges with eastbound through traffic at Raby Road.

As shown in Table 4.2, under the proposed right turn treatment option, intersection results would improve significantly, that is from level of service "F" to "B" in the AM peak and "C" in the PM peak, reducing the average delay for the right turn movement from site access to less than 29 seconds, which is considered satisfactory.

Nonetheless, under Council's proposed site access arrangements of the Raby Road Upgrade, the level of service of the site access intersection would improve from "F" to "A" in the AM peak and "B" in the PM peak. This is considered satisfactory.

Detailed SIDRA results are included in Appendix B.

4.3 Impacts of Raby Road Upgrade on Site Access

A detailed design for Raby Road Upgrade is currently being developed and a business case is underway seeking the funds for the project. The proposed upgrade would widen Raby Road to a four lane carriageway (two lane in each direction), including the section in front of the site.

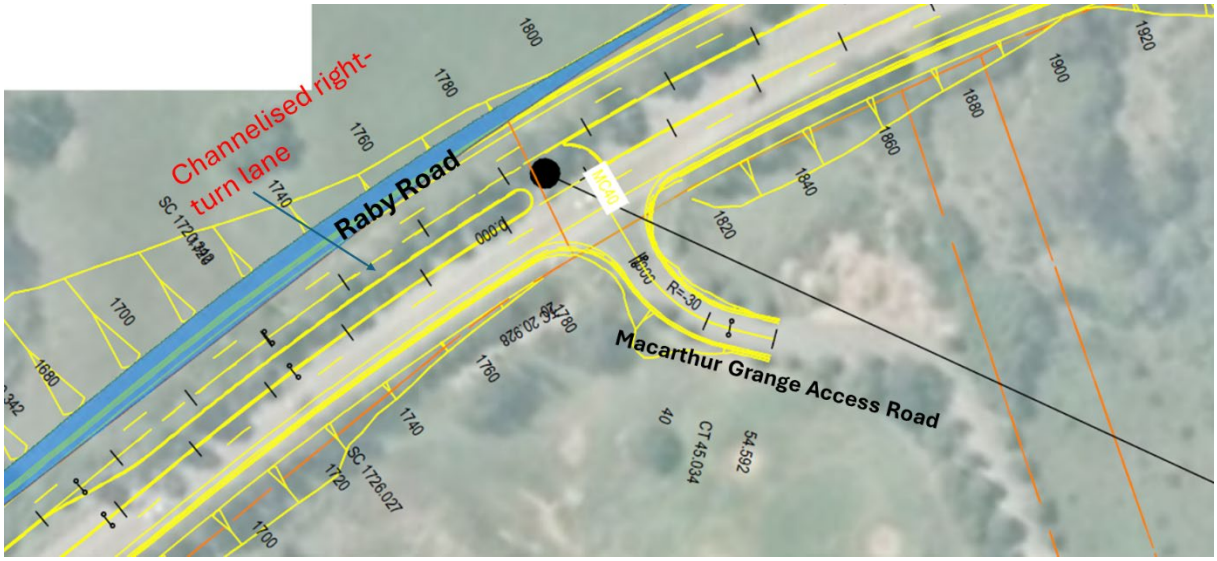
As per the concept design of Raby Road Upgrade (shown in Figure 4.5), a channelised right-turn lane will be maintained to facilitate southbound vehicles turning right from Raby Road into the site. However, right-turn movement from the site into Raby Road will be banned due to safety concerns. Left-in movement into the site and left-out movement from the site onto Raby Road will be permitted.

If the proposed Raby Road Upgrade is approved and funded for construction, the proposed development will comply with the no right-turn restriction from the site access road into Raby Road as per Council's requirement, and the above recommended two-stage right-turn treatment at the intersection with Raby Road would not be required.

Vehicles exiting the site wishing to travel south would need to turn left from Raby Road onto Gledswood Hill Drive (which would be upgraded to a signalised intersection) and use the proposed roundabout on Gledswood Hill Drive, which is approximately 800m from the site access, to turn around and travel on Raby Road southbound. The alternative route for vehicles to travel south from the site is shown in Figure 4.6.

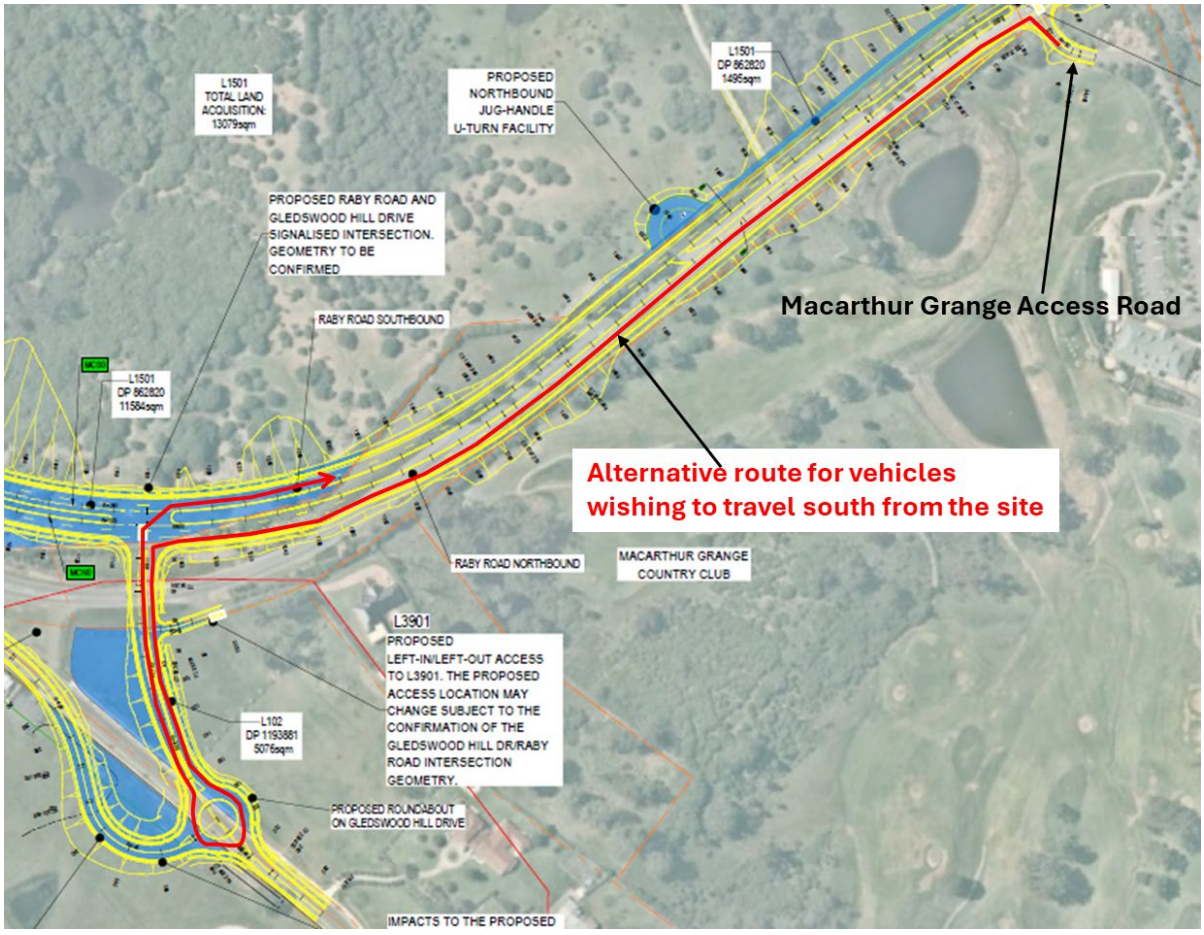
As shown in Figure 4.2, the right-turn traffic volume from the site into Raby Road post development is expected to have 20 vehicles in the AM peak hour and 6 vehicles in the PM peak hour. This level of traffic volume that needs to turn around at the intersection of Raby Road / Gledswood Hill Drive and the roundabout on Gledswood Hill Drive is relatively low and not expected to have noticeable impacts on the operation of the future road network.

Figure 4.5: Concept Design of Raby Road / Macarthur Grange Access Intersection



Source: Raby Road Strategic Concept Design, prepared by Cardno, Revision D, dated 12/08/2020. (https://overtoyou.campbelltown.nsw.gov.au/raby-road-upgrade-concept-design)

Figure 4.6: Alternative Route for Vehicles Need to Travel South from the Site



Base Map: Raby Road Strategic Concept Design, prepared by Cardno, Revision D, dated 12/08/2020. (https://overtoyou.campbelltown.nsw.gov.au/raby-road-upgrade-concept-design)

5 Conclusion

This report relates to the planning proposal for the 129.5ha area at Macarthur Grange Country Club site in Campbelltown Local Government Area.

The proposed development includes 52 rural residential / environmental living lots with lot sizes ranging from 0.5ha to 3.2ha, and a restaurant / café / function centre as additional permitted uses in the location of the existing club house. The future development of the club house within the permitted planning controls would be subject to a separate development application.

The salient findings of this report are presented below.

- The existing site access on Raby Road via the Macarthur Grange Country Club access road is proposed to be maintained to provide access to the northern portion of the site.
- The service road, which extends off Gledswood Hill Drive, would provide an alternative access for emergency vehicles.
- Access to the southern portion of the site will be via the adjacent site access roads to Gregory Hills Drive-Badgally Road. This is subject to approval from the adjacent land owner.
- It is proposed to comply with car parking requirements specified in the Council's DCP.
- The proposed development could be expected to generate additional 37 trips and 41 trips in the AM and PM peak hour, respectively.
- Raby Road/Macarthur Grange site access intersection is currently performing at capacity with level of service "F" during the morning and afternoon peak periods. This is mainly due to the difficulty experienced by the right turning movement from the site access.
- It is recommended to upgrade this intersection to provide a two-stage right turn treatment. It is expected that the proposed treatment option would improve the intersection performance from level of service "F" to "C" or better, which is considered satisfactory.
- Notwithstanding this, if the proposed Raby Road Upgrade is approved and constructed, the above recommended right treatment would not be required and the proposed development will adopt the no right-turn restriction from the site into Raby Road as per Council's requirement. It is anticipated that the site access intersection would perform at level of service "B" or better under Council's proposed site access arrangements, which is considered satisfactory. Vehicles wishing to travel south would use the future signalised intersection of Raby Road / Gledswood Hill Drive and the roundabout on Gledswood Hill Drive to turn around.

Overall, there would be no adverse traffic implications resulting from the proposed development, provided that either Raby Road Upgrade takes place or the proposed two-

stage right turn treatment is provided at the Raby Road/Macarthur Grange site access intersection.

Appendix A

Site Plans

architectus™

Macarthur Grange

Indicative Master Plan

23/05/2024

1:5,000 @ A1 0 50 100 150 200M

Appendix B

SIDRA Movement Summary

MOVEMENT SUMMARY

Site: 101 [EX-AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Existing AM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	1	0.0	1	0.0	0.503	114.0	LOS F	1.2	8.4	1.00	1.01	1.05	9.3
3	R2	All MCs	3	0.0	3	0.0	0.503	408.6	LOS F	1.2	8.4	1.00	1.01	1.05	9.3
Approach			4	0.0	4	0.0	0.503	335.0	LOS F	1.2	8.4	1.00	1.01	1.05	9.3
East: Raby Rd (E)															
4	L2	All MCs	4	0.0	4	0.0	0.002	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	965	3.2	965	3.2	0.505	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			969	3.1	969	3.1	0.505	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.4
West: Raby Rd (W)															
11	T1	All MCs	1240	2.5	1240	2.5	0.646	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	79.1
12	R2	All MCs	2	0.0	2	0.0	0.006	15.2	LOS B	0.0	0.1	0.76	0.81	0.76	51.1
Approach			1242	2.5	1242	2.5	0.646	0.3	NA	0.0	0.1	0.00	0.00	0.00	79.0
All Vehicles			2216	2.8	2216	2.8	0.646	0.9	NA	1.2	8.4	0.00	0.00	0.00	78.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [EX-PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Existing PM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	5	0.0	5	0.0	0.133	16.8	LOS B	0.3	2.4	0.95	0.98	0.95	30.2
3	R2	All MCs	2	0.0	2	0.0	0.133	181.4	LOS F	0.3	2.4	0.95	0.98	0.95	30.2
Approach			7	0.0	7	0.0	0.133	63.8	LOS E	0.3	2.4	0.95	0.98	0.95	30.2
East: Raby Rd (E)															
4	L2	All MCs	2	0.0	2	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	1041	1.8	1041	1.8	0.540	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.4
Approach			1043	1.8	1043	1.8	0.540	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.4
West: Raby Rd (W)															
11	T1	All MCs	934	1.8	934	1.8	0.484	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
12	R2	All MCs	7	0.0	7	0.0	0.025	17.4	LOS B	0.1	0.5	0.80	0.93	0.80	49.5
Approach			941	1.8	941	1.8	0.484	0.3	NA	0.1	0.5	0.01	0.01	0.01	79.2
All Vehicles			1992	1.8	1992	1.8	0.540	0.5	NA	0.3	2.4	0.01	0.01	0.01	78.8

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 [FU-AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development AM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	14	0.0	14	0.0	3.388	2190.7	LOS F	17.6	123.1	1.00	1.52	3.31	1.5
3	R2	All MCs	21	0.0	21	0.0	3.388	2488.2	LOS F	17.6	123.1	1.00	1.52	3.31	1.5
Approach			35	0.0	35	0.0	3.388	2371.0	LOS F	17.6	123.1	1.00	1.52	3.31	1.5
East: Raby Rd (E)															
4	L2	All MCs	7	0.0	7	0.0	0.004	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	965	3.2	965	3.2	0.505	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			973	3.1	973	3.1	0.505	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.4
West: Raby Rd (W)															
11	T1	All MCs	1240	2.5	1240	2.5	0.646	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	79.1
12	R2	All MCs	6	0.0	6	0.0	0.018	15.4	LOS B	0.1	0.4	0.76	0.88	0.76	51.0
Approach			1246	2.5	1246	2.5	0.646	0.3	NA	0.1	0.4	0.00	0.00	0.00	78.9
All Vehicles			2254	2.8	2254	2.8	3.388	36.8	NA	17.6	123.1	0.02	0.03	0.05	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU-PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development PM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	9	0.0	9	0.0	0.393	37.7	LOS C	1.1	7.4	0.98	1.02	1.09	22.0
3	R2	All MCs	6	0.0	6	0.0	0.393	215.7	LOS F	1.1	7.4	0.98	1.02	1.09	22.0
Approach			16	0.0	16	0.0	0.393	108.9	LOS F	1.1	7.4	0.98	1.02	1.09	22.0
East: Raby Rd (E)															
4	L2	All MCs	20	0.0	20	0.0	0.011	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	1041	1.8	1041	1.8	0.540	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.4
Approach			1061	1.8	1061	1.8	0.540	0.3	NA	0.0	0.0	0.00	0.01	0.00	79.1
West: Raby Rd (W)															
11	T1	All MCs	934	1.8	934	1.8	0.484	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
12	R2	All MCs	24	0.0	24	0.0	0.081	17.8	LOS B	0.3	1.8	0.81	0.93	0.81	49.3
Approach			958	1.8	958	1.8	0.484	0.6	NA	0.3	1.8	0.02	0.02	0.02	78.3
All Vehicles			2035	1.8	2035	1.8	0.540	1.3	NA	1.1	7.4	0.02	0.03	0.02	77.2

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 [FU-AM - Stage 1 RT (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development AM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	14	0.0	14	0.0	0.156	15.3	LOS B	0.5	3.4	0.83	0.93	0.83	46.7
3	R2	All MCs	21	0.0	21	0.0	0.156	24.7	LOS B	0.5	3.4	0.83	0.93	0.83	46.7
Approach			35	0.0	35	0.0	0.156	21.0	LOS B	0.5	3.4	0.83	0.93	0.83	46.7
East: Raby Rd (E)															
4	L2	All MCs	7	0.0	7	0.0	0.004	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	965	3.2	965	3.2	0.505	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			973	3.1	973	3.1	0.505	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.4
West: Raby Rd (W)															
11	T1	All MCs	1240	2.5	1240	2.5	0.646	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	79.1
12	R2	All MCs	6	0.0	6	0.0	0.018	15.4	LOS B	0.1	0.4	0.76	0.88	0.76	51.0
Approach			1246	2.5	1246	2.5	0.646	0.3	NA	0.1	0.4	0.00	0.00	0.00	78.9
All Vehicles			2254	2.8	2254	2.8	0.646	0.6	NA	0.5	3.4	0.01	0.02	0.01	78.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU-AM - Stage 2 Merge (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development AM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
3	R2	All MCs	21	0.0	21	0.0	0.043	11.2	LOS A	0.1	0.8	0.74	0.90	0.74	53.1
Approach			21	0.0	21	0.0	0.043	11.2	LOS A	0.1	0.8	0.74	0.90	0.74	53.1
West: Raby Rd (W)															
11	T1	All MCs	1240	2.5	1240	2.5	0.646	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	79.1
Approach			1240	2.5	1240	2.5	0.646	0.3	NA	0.0	0.0	0.00	0.00	0.00	79.1
All Vehicles			1261	2.5	1261	2.5	0.646	0.4	NA	0.1	0.8	0.01	0.02	0.01	78.5

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 [FU-PM - Stage 1 RT (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development PM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	9	0.0	9	0.0	0.077	17.0	LOS B	0.2	1.6	0.84	0.93	0.84	46.2
3	R2	All MCs	6	0.0	6	0.0	0.077	28.8	LOS C	0.2	1.6	0.84	0.93	0.84	46.2
Approach			16	0.0	16	0.0	0.077	21.7	LOS B	0.2	1.6	0.84	0.93	0.84	46.2
East: Raby Rd (E)															
4	L2	All MCs	20	0.0	20	0.0	0.011	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
5	T1	All MCs	1041	1.8	1041	1.8	0.540	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.4
Approach			1061	1.8	1061	1.8	0.540	0.3	NA	0.0	0.0	0.00	0.01	0.00	79.1
West: Raby Rd (W)															
11	T1	All MCs	934	1.8	934	1.8	0.484	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
12	R2	All MCs	24	0.0	24	0.0	0.081	17.8	LOS B	0.3	1.8	0.81	0.93	0.81	49.3
Approach			958	1.8	958	1.8	0.484	0.6	NA	0.3	1.8	0.02	0.02	0.02	78.3
All Vehicles			2035	1.8	2035	1.8	0.540	0.6	NA	0.3	1.8	0.02	0.02	0.02	78.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU-PM - Stage 2 Merge (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development PM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
3	R2	All MCs	6	0.0	6	0.0	0.008	8.3	LOS A	0.0	0.1	0.55	0.74	0.55	55.4
Approach			6	0.0	6	0.0	0.008	8.3	LOS A	0.0	0.1	0.55	0.74	0.55	55.4
West: Raby Rd (W)															
11	T1	All MCs	934	1.8	934	1.8	0.484	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
Approach			934	1.8	934	1.8	0.484	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.5
All Vehicles			940	1.8	940	1.8	0.484	0.2	NA	0.0	0.1	0.00	0.00	0.00	79.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU-AM - No RT (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development AM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	35	0.0	35	0.0	0.044	7.9	LOS A	0.2	1.1	0.47	0.68	0.47	56.0
Approach			35	0.0	35	0.0	0.044	7.9	LOS A	0.2	1.1	0.47	0.68	0.47	56.0
East: Raby Rd (E)															
4	L2	All MCs	7	0.0	7	0.0	0.255	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.3
5	T1	All MCs	965	3.2	965	3.2	0.255	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			973	3.1	973	3.1	0.255	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.7
West: Raby Rd (W)															
11	T1	All MCs	1240	2.5	1240	2.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
12	R2	All MCs	6	0.0	6	0.0	0.014	13.4	LOS A	0.0	0.3	0.69	0.80	0.69	52.7
Approach			1246	2.5	1246	2.5	0.323	0.1	NA	0.0	0.3	0.00	0.00	0.00	79.6
All Vehicles			2254	2.8	2254	2.8	0.323	0.2	NA	0.2	1.1	0.01	0.01	0.01	79.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU-PM - No RT (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

20060 Macarthur Grange Planning Proposal
Post Development PM
Raby Rd/Macarthur Grange Country Club access
Site Category: NA
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: Site Access (S)															
1	L2	All MCs	16	0.0	16	0.0	0.021	8.1	LOS A	0.1	0.5	0.48	0.66	0.48	55.8
Approach			16	0.0	16	0.0	0.021	8.1	LOS A	0.1	0.5	0.48	0.66	0.48	55.8
East: Raby Rd (E)															
4	L2	All MCs	20	0.0	20	0.0	0.275	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.0
5	T1	All MCs	1041	1.8	1041	1.8	0.275	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	79.6
Approach			1061	1.8	1061	1.8	0.275	0.2	NA	0.0	0.0	0.00	0.01	0.00	79.5
West: Raby Rd (W)															
11	T1	All MCs	934	1.8	934	1.8	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
12	R2	All MCs	24	0.0	24	0.0	0.061	14.9	LOS B	0.2	1.5	0.74	0.90	0.74	51.5
Approach			958	1.8	958	1.8	0.242	0.4	NA	0.2	1.5	0.02	0.02	0.02	78.7
All Vehicles			2035	1.8	2035	1.8	0.275	0.4	NA	0.2	1.5	0.01	0.02	0.01	78.9

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.

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