Proposed MHE Lifestyle Community

Traffic Impact Assessment

Browns Lane, North Tamworth NSW

For

LandDynamics AUSTRALIA

September 2024

Traffic Impact Assessment Details

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APPENDICES

1. Introduction

1.1 General

StreetWise Road Safety and Traffic Services have been engaged by Land Dynamics Australia Consultants Pty Ltd to prepare a Traffic Impact Assessment (TIA) report for an Over 55s Manufactured Housing Estate (MHE) Lifestyle Community development at Browns Lane, North Tamworth (Lot 39 DP 22919 & Lot 349 DP753848).

The site is located approximately 6.5 kilometres north-west of the Tamworth CBD, and located within the Tamworth Regional Council local government area.

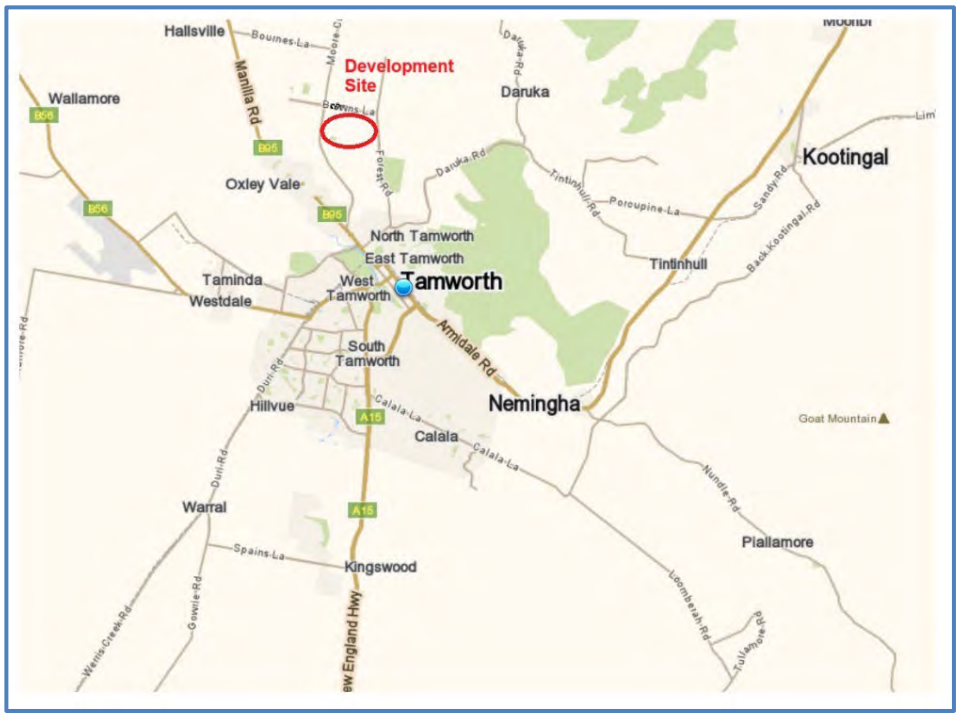


Figure 1.1 Locality Plan

Figure 1.2 Site Plan – Development Site

1.2 Description of Project

This TIA will assess a proposed Over 55s MHE development to be constructed on a 13.687ha site at North Tamworth. The site is bounded by Manilla Road to the west and Browns Lane to the north. The site is located within a generally rural residential area, with large properties surrounding the site.

The proposed development includes 218 residential MHE units, internal access roads, services, stormwater detention basins, carparking, reception area, administration rooms, gymnasiums, pools, bowling green, clubhouse, worksheds and maintenance area, caravan storage and sales office. Access to the site is proposed from Browns Lane. It is likely the development will be constructed and released in stages over a period of around 10 years.

This report relates to the impacts of the development-generated traffic on the local road network.

1.3 Scope of this Traffic Impact Assessment

The following is the scope of this Traffic Impact Assessment:

- Assess the impacts on the local road network of the increased traffic generation
- Assess and quantify the likely traffic generation, in terms of the number of vehicle trips during peak hours, number of trips per day and types of vehicle users.
- Assess and quantify the likely 85th percentile (time – weighted) parking demand. Assess / determine Pedestrian Access and Public Transport needs.
- Assess the road network to identify hazards, areas requiring increased maintenance or areas where efficiency is likely to be degraded.
- Assess existing intersections, and any requirements for upgrade

2. Local Road Network

The proposed development is located on the southern side of Browns Lane.

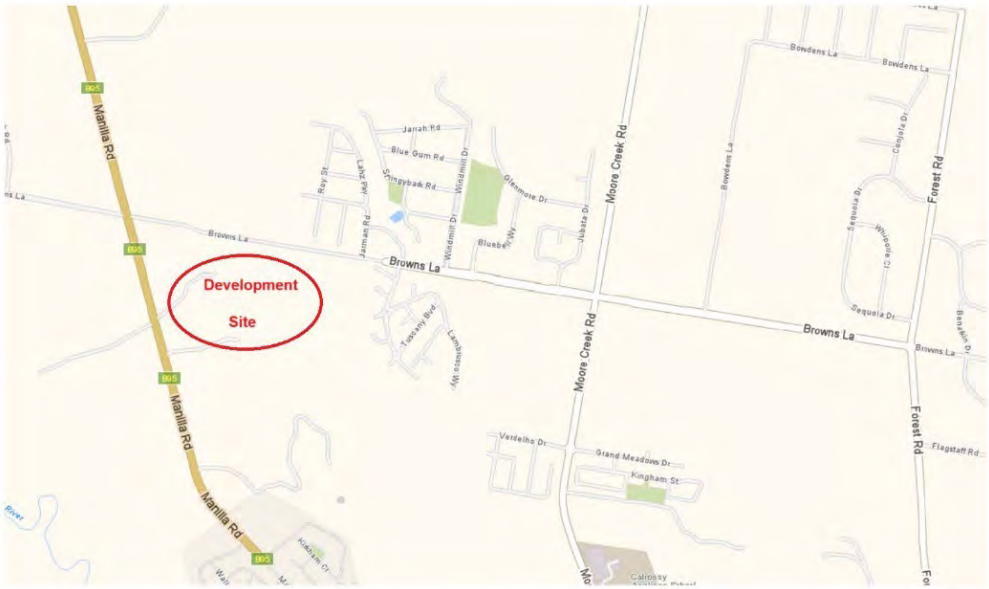


Fig 2.1 Local road network – Hallsville

2.1.1 Browns Lane

Browns Lane is approximately 6.23km long, and runs generally east-west, and is intersected by Manilla Road. The eastern end commences at the northern edge of the Tamworth CBD, and runs through a relatively new urban residential precinct. The speed limit is 50kmh through this section. The landuse changes to cleared paddocks and rural residential dwellings in the vicinity of the proposed development. The speedzone also increases to 60kmh through the rural (southern) section.

Browns Lane continues on the western side of Manilla Road for approximately 1.40kms. The landuse on the western side is rural residential with some equine and farming activities. In the vicinity of the proposed development, Browns Lane, the sealed roadway is approximately 7 - 8m wide. No linemarking or delineation was observed. As can be seen from Figure 2.2 below, Browns Lane also includes , with minimal shoulders and tall grassed verges across the frontage of the site.

Across the frontage of the proposed development, Browns Lane has a generally straight alignment, but also includes an elongated 'S'-shaped curve near the western boundary of the site. The road also grades uphill from Manilla Road to a crest at the eastern boundary of the site.

Fig 2.2 Browns Lane, looking west across frontage of proposed development

2.1.2 Manilla Road

Fossickers Way is a series of country roads located in the Northern Tablelands region of New South Wales, Australia that form a 379-kilometre scenic and tourist drive. The section of road between Manilla and Tamworth (45kms) is a classified road (B95) and is known as Manilla Road.

In the vicinity of the proposed development, the sealed road which is approximately 10m wide with 3.5m wide lanes, and sealed shoulders. The road widens through the intersection, allowing southbound traffic to veer around any vehicle queuing to turn right into Browns Lane. However, the northbound lane has a significant 'drop off' at the edge of seal, with a number of vehicles observed to reduce speed or stop behind right turning vehicles (Figure 2.3). Delineation includes linemarked centreline, edgelines and white guideposts.

This section of Manilla Road is signposted as an 80kmh speedzone. The speedzone increases to 100kmh approximately 500m west of the intersection.

Fig 2.3 Manilla Road, looking south at edge of seal at intersection

2.1.3 Intersection of Browns Lane & Manilla Road

The intersection of Browns Lane and Manilla Road is a 4-way intersection, with Browns Lane being the minor side road. There is currently minimal widening and sealed shoulder on Manilla Road to allow through traffic to pass any vehicle slowing, queuing or turning right into both sides of Browns Lane. However, StreetWise noted some vehicles stopping behind vehicles waiting to turn right into the eastern side of Browns lane, while others veered wider onto the unsealed shoulder.

The intersection is controlled by Give Way signs and hold lines on both sides of Browns Lane, which gives priority to traffic on Manilla Road. The intersection does not include any streetlighting.

Fig 2.4 Existing intersection of Browns Ln & Manilla Rd (Aug 2024)

The speedzone on Manilla Road, in the vicinity of the Browns Lane intersection, is 80kmh. The required Safe Intersection Sight Distance (SISD) in an 80kmh speedzone is 181m. Given the flat terrain and straight road alignments, the required 181m is available (see Figure 2.5 below).

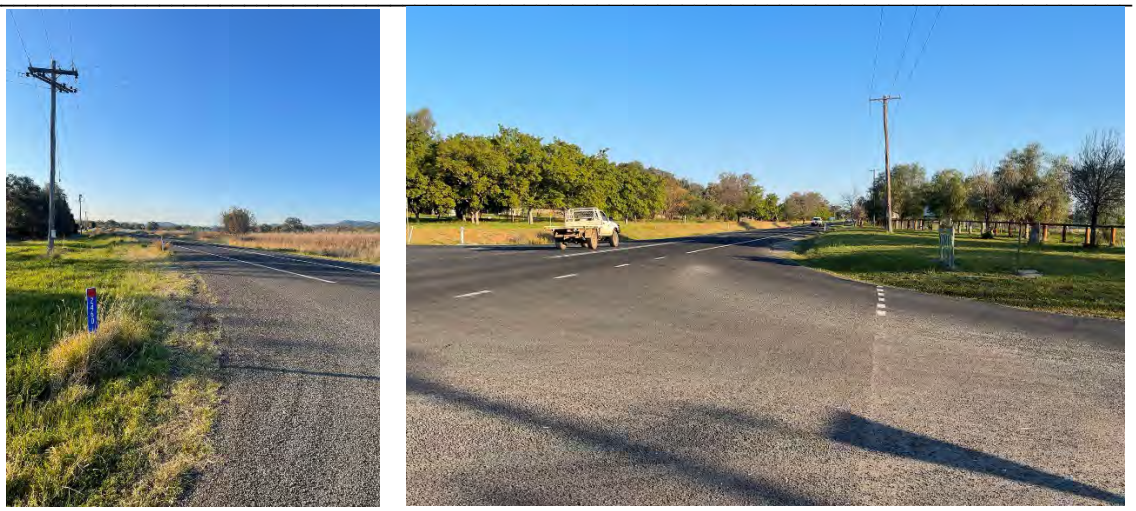


Fig 2.5 Looking north (L) & south (R) at Manilla Road from Browns Lane

2.1.4 Heavy Vehicle Routes

Figure 2.6 below shows approved heavy vehicle route in the vicinity of the proposed development. Manilla Road is suitable for vehicles up to 25/26m B-doubles. Browns Lane is not currently approved for use by heavy vehicles.

Fig 2.6 Approved heavy vehicle routes near Hallsville (TfNSW website)

3. Existing Traffic Volumes

3.1 Intersection of Browns Lane & Manilla Road

StreetWise undertook a manual traffic count at the intersection of Manilla Road and Browns Lane at North Tamworth (Hallsville) on Tuesday 11th and Wednesday 12th of September 2024. The count covered a 2 hour period in the morning and afternoon and determined the AM and PM peak hours through the intersection.

The AM peak period was 7:30 – 8:30am, and the turn movements and volumes are shown below (Figure 3.1). There was a total of 545 vehicle movements through the intersection during the morning peak hour, of which 23 were heavy vehicles (4.2%).

	1		2		3		4		5		6		7		8		9		10		11		12			
	Manilla Road (Southbound)						Browns Lane (eastbound						Manilla Road (Northbound)						Browns Lane (westbound)							
	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy		
7.30 to 7.45	3	1	76	0	1	0	0	0	0	0	10	0	4	1	19	1	3	1	6	0	0	0	4	1	131	
7.45 to 8.00	10	0	73	4	1	0	0	0	0	0	6	0	5	0	25	1	2	1	7	0	0	0	7	0	142	
8.00 to 8.15	7	0	68	3	0	0	1	1	0	0	4	0	4	0	22	1	4	0	6	1	0	0	11	0	133	
8.15 to 8.30	11	0	75	5	0	0	0	0	0	0	9	0	5	0	17	1	2	0	6	0	0	0	8	0	139	545
	31	1	292	12	2	0	1	1	0	0	29	0	18	1	83	4	11	2	25	1	0	0	30	1		

Figure 3.1 – Summary of AM peak hour movements

The PM peak period was 3:30 – 4:30pm, and the turn movements and volumes are shown below (Figure 3.2). There was a total of 548 vehicle movements through the intersection during the peak hour, of which 19 were heavy vehicles (3.5%).

	1		2		3		4		5		6		7		8		9		10		11		12			
	Manilla Road (Southbound)						Browns Lane (eastbound						Manilla Road (Northbound)						Browns Lane (westbound)							
	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy	Light	Hvy		
3.30 to 3.45	3	0	39	4	0	0	1	0	0	0	0	0	9	0	62	2	2	1	4	0	2	0	8	1	138	138
3.45 to 4.00	4	0	36	3	0	0	0	0	1	0	6	0	7	0	60	1	4	1	3	0	2	0	6	0	134	272
4.00 to 4.15	2	0	38	1	0	0	0	0	1	0	4	2	5	0	67	2	7	1	5	0	0	0	6	0	141	413
4.15 to 4.30	4	0	47	0	0	0	0	0	0	0	3	0	7	0	65	0	4	0	3	0	0	0	2	0	135	548
	13	0	160	8	0	0	1	0	2	0	13	2	28	0	254	5	17	3	15	0	4	0	22	1		

Figure 3.2 – Summary of PM peak hour movements

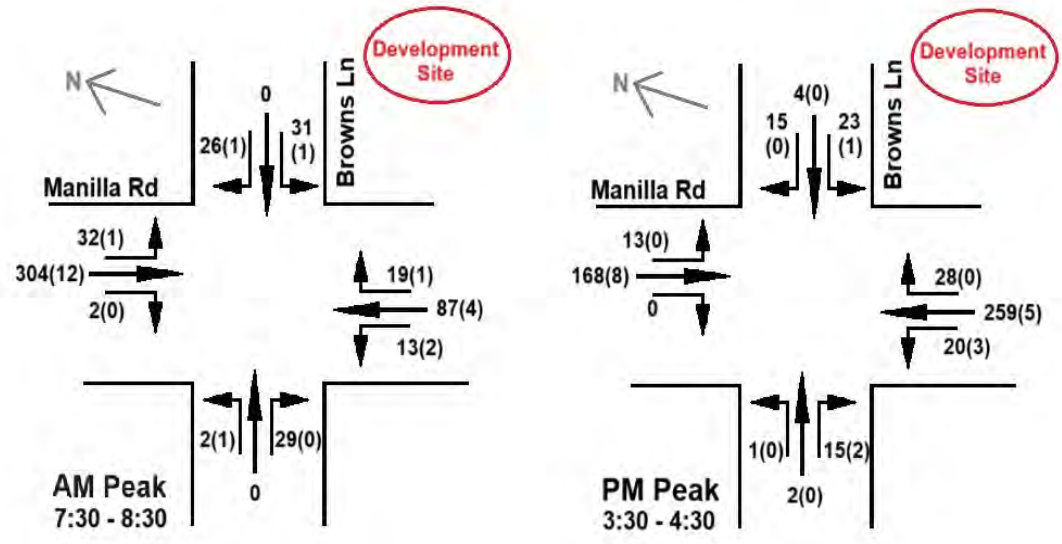


Figure 3.3 – Browns Lane intersection plan showing existing peak hour movements

Based on the volumes shown above, and multiplying the average peak hour numbers by 10, the approximate AADT of the local roads in the vicinity of the development are:

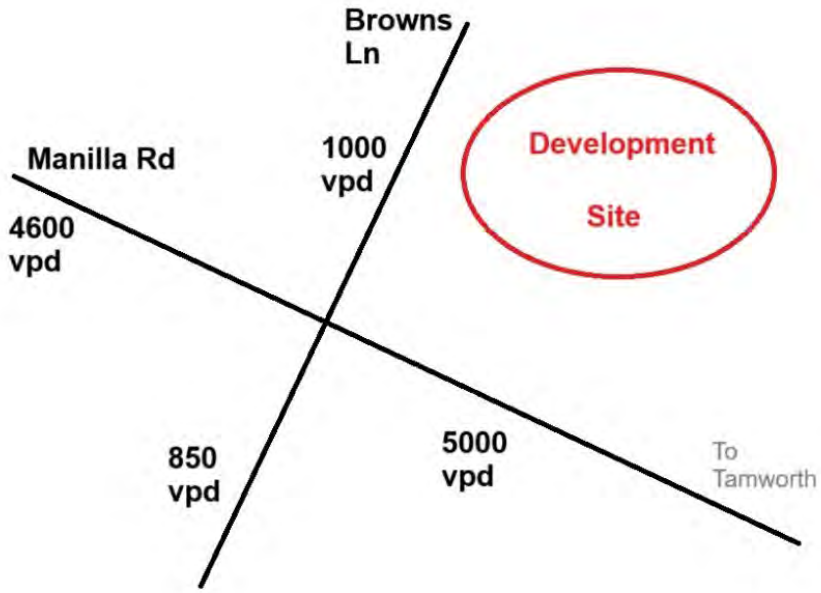


Figure 3.4 – Approximate AADT of local roads

An annual traffic growth rate of 1% has been adopted for this assessment. Recent (Dec 2022) traffic data provided by TfNSW for Fossickers Way to the south of Browns Lane (i.e. towards Tamworth) indicated the AADT is 5302 (both directions).

4. Traffic Generated By Development

4.1 Traffic Generation Rate

There are generally 2 main guidelines for determining traffic generation from various development types:

- Council's Development Control (Tamworth Regional Council DCP – 2010)
- Transport for New South Wales 'Guide to Traffic Generating Developments'

In this case, Council's DCP does not provide any traffic generation rates for various development types.

The TfNSW 'Guide to Traffic Generating Developments' includes trip generation rates for a variety of development types. However, the guide does not include a rate for Manufactured Housing Estates but recommends assessing a similar development in the vicinity of the subject site.

4.1.1 Ocean Club Resort, Lake Cathie

The Ocean Club Resort at Lake Cathie was selected as a comparative development to assess the traffic volumes and patterns generated, as this development is located close to Port Macquarie (Port Macquarie Hastings LGA).

A full day observation count was completed Thursday 28th June 2017 to determine a traffic generation rate to be used in the Traffic Impact Assessment. At the time, the Ocean Club Resort had 155 units occupied, which generated 3.6 vehicle trips per house / lot per day and a weekday average peak hour rate of 0.37 per unit. Figure 4.1 below shows a summary of the hourly traffic generation rates at the Ocean Club Resort. As can be seen from the chart, the main flow of traffic was generally spread over the mid-morning to early afternoon period with a peak period between 12:15pm to

1:15pm i.e. peak traffic movements generated by MHE developments are generally outside normal peak periods within the local road network.

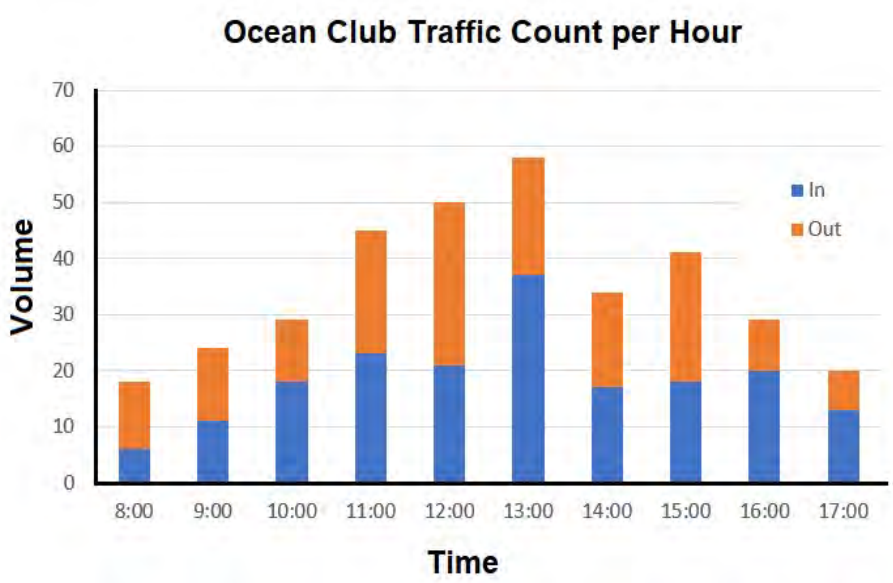


Fig. 4.1 Ocean Club Resort Traffic Flow Data (Thursday 28.07.17)

4.1.2 'Monterey' Over 55s Community, Kendall NSW

StreetWise undertook an all-day traffic count at 'Monterey' Over 55s development at Batar Creek Road, Kendall. The ultimate development, when completed, will have 200 units, but at the time of the traffic count, 32 units were occupied. StreetWise counted 121 movements in & out of the site between 7:00am and 5:00pm, which equates to approximately 3.7 trips per unit per day. It should be noted that this number is likely inflated by work vehicles connected with ongoing construction at the site.

4.1.3 Other sites

StreetWise have prepared traffic assessments for a number of Over 55s development at a range of locations including Port Macquarie, Cessnock and Maclean, and utilised the traffic generation rate of 3.6 trips per unit per day, which has been accepted by numerous councils.

4.2 Future Traffic Generation

The design plans provided to StreetWise indicate that a total of 218 ~~233~~ units are proposed as part of the development. Therefore, the traffic movements to be generated by the development will be:

Total daily trips

218 units X 3.6 trips per day = 785 (781.2)

Peak hour trips

218 units X 0.36 trips per hour = 79 (78.48)

Note: The design plans were amended during the preparation of this report. The changes resulted in the total number of MHE units were reduced from 233 to 218. However, the SIDRA modelling was based on the original 233 MHE units (generating total daily trips of 839 & 84 peak hour trips).

4.3 Traffic Assignment

All future traffic generated by the development will access the site via the proposed entry off Browns Lane. It is then assumed that the majority of future traffic from the development will head south

towards the Tamworth CBD. Traffic movements are likely to be split between turning left towards Manilla Road or right via Browns Lane – say 70% left and 30% right.

The following assumptions have been adopted when considering the distribution of the traffic to be generated by the proposed development.

- AM peak hour – 70% out and 30% in
- PM peak hour – 30% out and 70% in
- Outbound trips - 70% to the west, 30% to the east (similar ratio for inbound trips)
- At Manilla Road – 95% to south (to Tamworth), 5% to north
- Full development may occur within 10 years i.e. 2034.

Note that peak trips generated by the proposed development have been assigned to the AM and PM peak hours in the local road network, even though it is shown that the peak volumes generated by a MHE development are generally in the middle of the day.

Based on the assumptions above, and assuming the peak hour will see 78 peak hour trips generated by the fully completed and occupied MHE development. The estimated distribution of traffic to and from the site is shown in Figure 4.2 below.

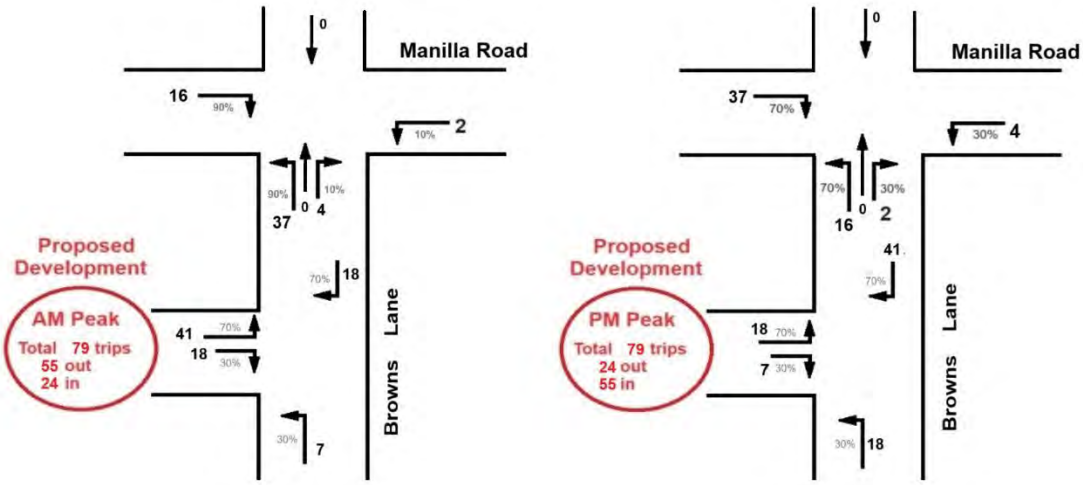


Fig. 4.2 Estimated peak hour trips to & from proposed development

4.4 Impacts on Local Road Network

As discussed above, the proposed development, when completed and fully occupied, will generate an additional 785 vehicle trips per day, including 79 per hour during peak times. Figure 4.2 above shows the distribution of trips generated by the development throughout the local road network. StreetWise consider the majority of impacts will be on Browns Lane and Manilla Road, but traffic is likely to spread quickly and minimise impacts outside of these roads.

4.4.1 Browns Lane

The existing traffic volumes on Browns Lane are relatively low. StreetWise's manual traffic count indicated the daily total is approximately 1000 vehicles, with a total of 108 trips during the AM peak hour and 85 during the PM peak.

As can be seen from Figure 4.2 above, the future development will add an extra 79 trips an hour at peak times onto Browns Lane. However, it should be noted that the peak traffic generation from a

lifestyle community are generally during the middle of the day, with only a small number of trips generated during the peak times on the local road network.

The existing sealed road width of Browns Lane is approximately 7 - 8m, with minimal width shoulders. Figure 4.4 below indicates Browns Lane currently operates at a Level of Service of 'A', and has adequate capacity to cater for the additional traffic to be generated by the proposed development, with no significant reduction in efficiency or safety.

However, the existing roadway is not wide enough to cater for the relatively high number of future turn movements in & out of the proposed development. It is recommended that the northbound side of Browns lane be increased to a minimum of 6m, and a BAR / BAL intersection be provided at the future entry, which would allow northbound vehicles to pass any future vehicle slowing, queuing or turning into the development site (see Section 4.5 below).

4.4.2 Manilla Road

The existing traffic volumes on Manilla Road are moderate. StreetWise's manual traffic count indicated the daily total is around 5000 vehicles, with a total of 500 trips during the AM and PM peak hours.

Manilla Road currently connects the township of Manilla with Tamworth with Manilla Road being a TfNSW classified road. In the vicinity of the development site, Manilla Road is a good quality road, and its width and condition improves towards Tamworth. Based on the TfNSW tables below (Figure 4.4 & 4.5), Manilla Road currently operates at a Level of Service of A or B. Given that the existing AADT is approximately 5,000 vehicles per day, it is considered that Manilla Road has adequate capacity to cater for the development-generated traffic.

The following table from TfNSW 'Guide to Traffic Generating Developments' indicates one lane in an urban situation can cater for up to 380 vehicles an hour while maintaining a satisfactory Level of Service of 'B'.

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Table 4.4
Urban road peak hour flows per direction
TfNSW 'Guide to Traffic Generating Developments'

Fig. 4.4 TfNSW lane capacity and Level of Service

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

Fig. 4.5 TfNSW Level of Service, based on hourly volumes and heavy vehicle percentages

4.4.3 Intersection of Manilla Road & Browns Lane

StreetWise engaged Brett Franklin (Bretts Traffic) to undertake SIDRA modelling of the intersection of Manilla Road and Browns Lane. The computer modelling was done for the existing layout for:

- the current (2024) traffic volumes
- future (2034) traffic volumes when the development is completed and fully occupied
- future (2034) traffic volumes when the development is completed and fully occupied + 200 lots

The existing volumes and movements through the intersection are shown in Figure 3,3 and discussed in Section 3.1 above.

The estimated future volumes and movements are shown in Figure 4.6 below. The following assumptions have been adopted when estimating the future volumes:

- Background traffic growth is 1% per annum
- The development will be completed and fully occupied within 10 years (i.e. by 2034)
- The distribution of future development-generated traffic is discussed in Section 4.3

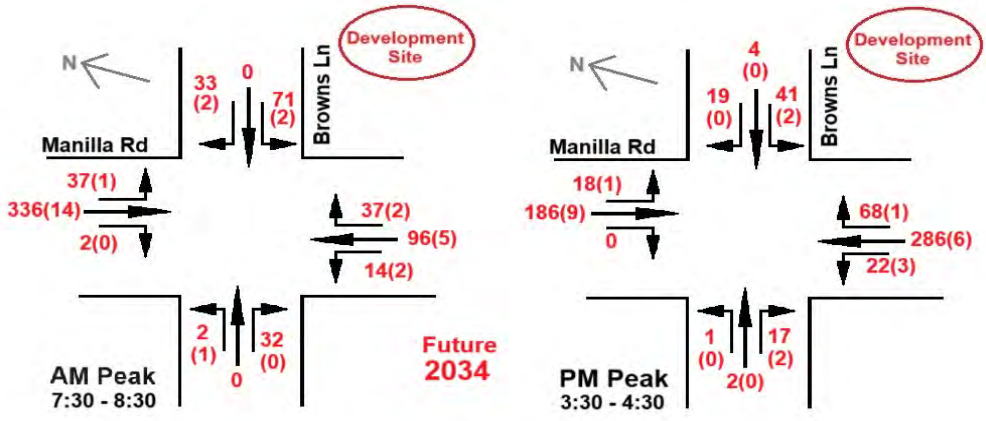


Fig. 4.6 Estimated future traffic volumes through the Manilla Road intersection

StreetWise are aware that other lots in the Browns Lane precinct may be subdivided within the next 10 years, which will add additional traffic movements to the local road network. To check the overall

capacity of the existing intersection of Manilla Road and Browns Lane, StreetWise have added a 3rd scenario to be modelled, which includes an additional 200 residential lots on Browns Lane – 100 on either side of Manilla Road. The 200 lots will generate approximately 1400 additional movements a day, or 140 an hour at peak times, as shown below in Figure 4.7.

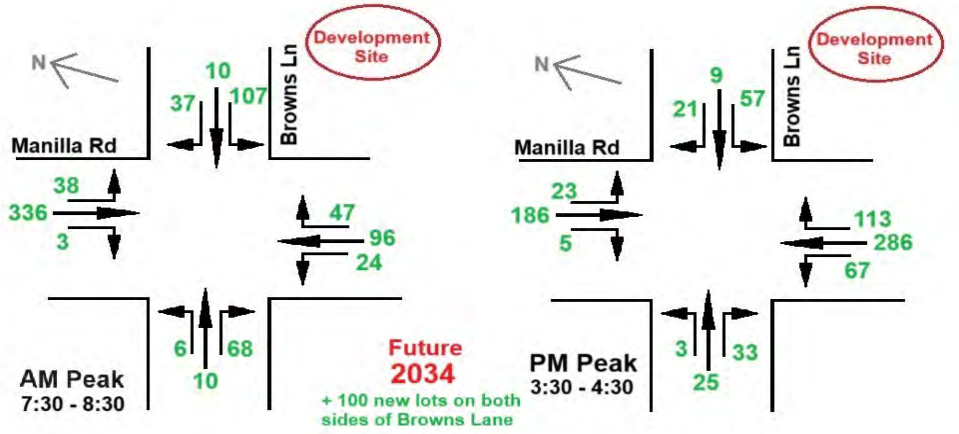


Fig. 4.7 Estimated future traffic volumes through the Manilla Road intersection, including 100 additional lots on either side of Manilla Road

4.4.4 Intersection modelling

StreetWise have also undertaken computer modelling of the existing intersection of Browns Lane and Manilla Road (using SIDRA) which will determine what upgrades may be required to cater for the addition traffic volumes and turn movements (see below).

In summary, the SIDRA modelling indicated the existing 4-way intersection caters for the current moderate traffic volumes, and each of the 12 movements through the layout operates at a Level of Service of 'A' - which is described as representing the best operating condition and service quality from the users' perspective (i.e. free-flow).

The proposed development will add approximately 79 extra movements per hour through the intersection at peak times when completed. As can be seen from the modelling results, the existing intersection has adequate capacity to cater for the future volumes (including development-generated movements and annual growth within the local road network) with minimal reduction of Level of Service.

The following summary has been provided by Brett Franklin in his report:

'The existing intersection operates with a very low Degree of Saturation in 2024 AM and PM peak periods (0.195 and 0.180 respectively) suggesting significant spare capacity.

With addition of the future development, and 10 years of background growth, the intersection will have a similar operation, with all movements remaining at Level of Service A producing minimal queues or delays. DoS increases marginally to 0.217 and 0.226 for the AM and PM, retaining significant spare capacity.

The third scenario assumes 200 lots developed in addition to the 10 years of background growth. Even with background growth plus 200 adjacent residential lots, the intersection still operates with minimal delays and a low DoS (0.226 in AM and 0.285 in PM). All legs continue to operate with LOS A with minimal queues.'

The following tables show a summary of modelling results for AM and PM peak hours for all 3 scenarios. The full results of the SIDRA modelling is included in Appendix C at the rear of this report.

Table 2 - SIDRA output Summary – AM PEAK HOUR

	Exist 2024	2034 With Development	2034 With Development + 200 lots
All - Average Delay	2.6s	3.4s	4.5s
All - LOS	A	A	A
All - Degree of Saturation	0.195	0.217	0.226
Worst Leg (delay)	WEST	WEST	WEST
Worst Leg – Average Delay	10.1s	11.4s	12.3s
Worst Leg - LOS	A	A	A
Worst Leg - 95% queue	<5m	<5m	5m

Fig. 4.8 SIDRA modelling results for AM peak hour for 3 scenarios

Table 3 - SIDRA output Summary – PM PEAK HOUR

	Exist 2024	2034 With Development	2034 With Development + 200 lots
All - Average Delay	2.0s	2.7s	4.1s
All - LOS	A	A	A
All - Degree of Saturation	0.180	0.226	0.285
Worst Leg (delay)	WEST	WEST	WEST
Worst Leg – Average Delay	11.3s	12.9s	13.3s
Worst Leg - LOS	A	A	A
Worst Leg - 95% queue	<5m	<5m	5m

Fig. 4.9 SIDRA modelling results for PM peak hour for 3 scenarios

In summary, the layout of the existing 4-way intersection of Manilla Road and Browns Lane has adequate capacity to cater for existing and future (2034) traffic volumes and movements, while maintaining a Level of Service of 'A'.

Note that LOS A describes primarily free-flow operation. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at the boundary intersections is minimal. The travel speed exceeds 80% of the base free-flow speed (BFFS).

4.4.5 Future Intersection Upgrade

A large area to the north-west of the existing intersection of Manilla Road and Browns Lane has been identified as a future development precinct, and the area appears to have been rezoned in 2023 from primary production zone to residential zones. A previous traffic report by SECA stated:
"The updated includes previous analysis and comment relating to the Hills Plains Planning Proposal 2016 which included traffic generation from Stratheden and Hills Plain, and the impact on the Browns Lane/Manilla Road intersection. It was concluded that a roundabout would ultimately be required and this was confirmed by TfNSW (formerly RMS) comment at the time."

However, based on the SIDRA modelling results shown in Section 4.4.4 above, the additional traffic movements to be generated by the proposed 218 unit MHE development will not have any significant impacts on the operation or efficiency of the existing 4-way intersection layout. Each movement through the existing intersection will continue to operate at a Level of Service of 'A', and there will be no requirement to upgrade the existing layout.

4.5 Future Site Access

It is proposed to access the future development from a new intersection and access road off the eastern side of Browns Lane. The design plans indicate the access will be located approximately 80m west of an existing concrete driveway and gate. This location provides optimum sight distance on that section of road, with 200+m of sight towards the east (crest of hill) and 200+m of sight distance to the west (horizontal curve).

Fig. 4.10 Sight distance from the proposed site access location to the east (L) and west (R)

As can be seen from Figure 4.11 below, the proposed site access will be wide enough for 2 lanes and cater for the turnpaths of the largest expected vehicles (i.e. garbage truck). The entry area will also provide a turn-around and parking area.

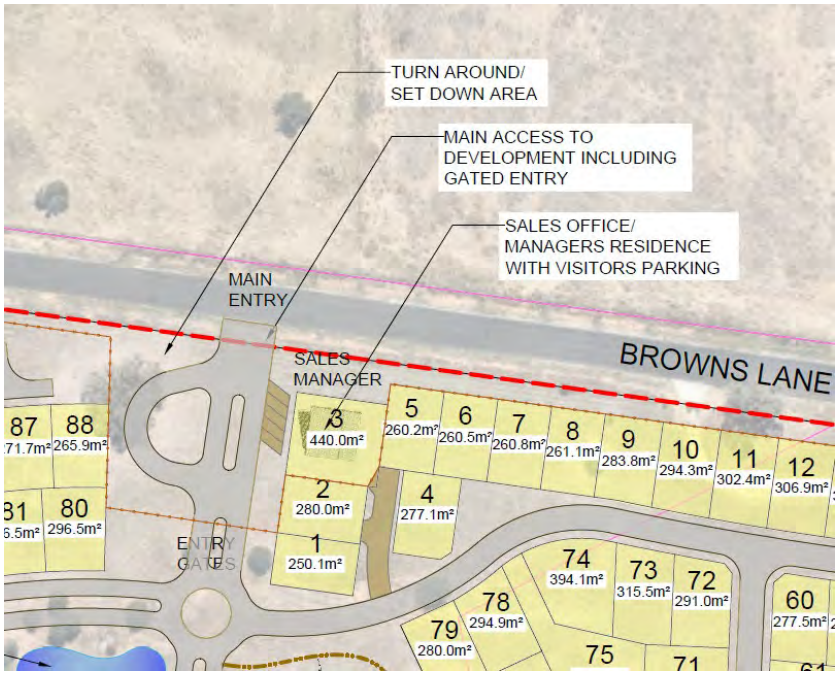


Fig. 4.11 Detail from current design plans of the proposed entry off Browns Lane.

As discussed previously, the existing width of Browns Lane is 7 – 8m with no formal shoulders in the vicinity of the proposed development. It is recommended that Browns Lane be widened in the vicinity of the proposed site access to accommodate a Basic Right Turn (BAR) intersection (as per Austroads Guide to Road Design Part 4A: 'Unsignalised and Signalised Intersections'). A concept layout is provided below, based on the dimensions for a 60kmh speedzone. Further details of a BAR intersection are shown in Appendix C at the rear of this report.

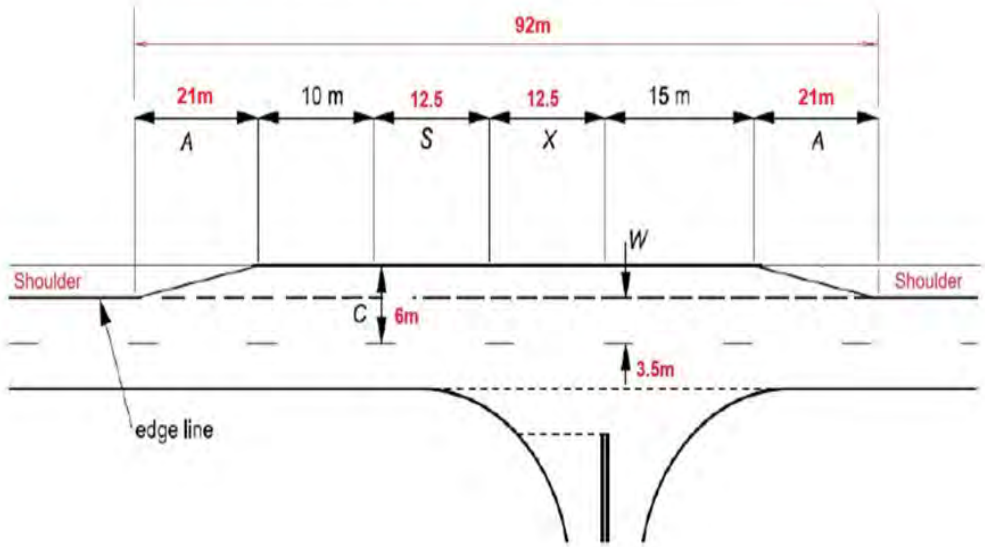


Fig. 4.12 Concept plan showing proposed upgrade of intersection at entry off Browns Lane

The above BAR intersection layout has adequate width for right turn storage of 2 cars or 1 large vehicle (say garbage compactor), while allow eastbound vehicles to safely pass any vehicle slowing, queuing or turning right into the proposed development.

4.6 Future Emergency Access

The design plans indicate an emergency access is proposed across the western boundary of the site. The road will only be available for emergency vehicles, and access by residents will not be permitted. It is proposed to locate the emergency access off Manilla Road, approximately 500m south of the existing Browns Lane intersection. The sealed width of Manilla Road at this location is 11m, and sight distance in both directions exceeds 200m.

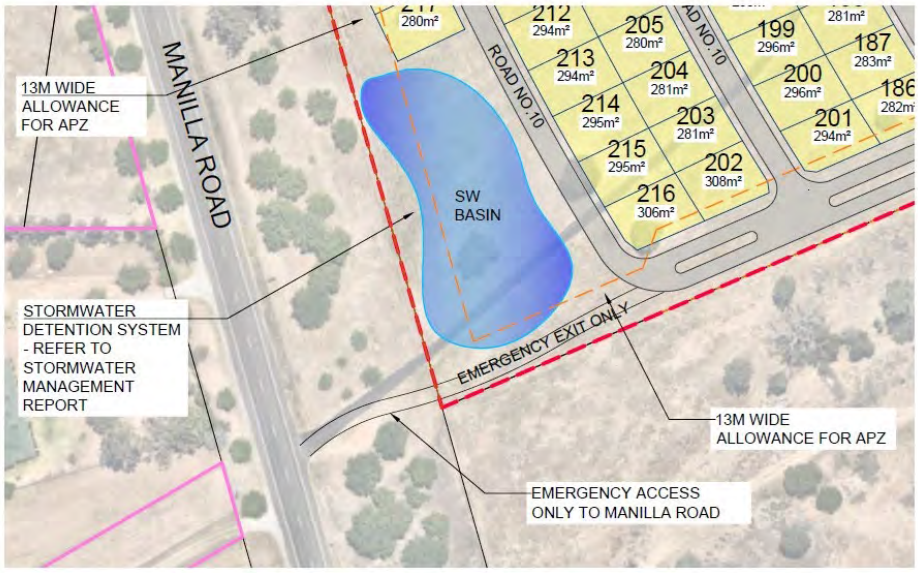


Fig. 4.13 Concept plan showing location of proposed emergency access

Fig. 4.14 Proposed emergency access road, looking north on Manilla Road

Fig. 4.15 Proposed emergency access road, looking south on Manilla Road

5. Road Safety

5.1 Local road network

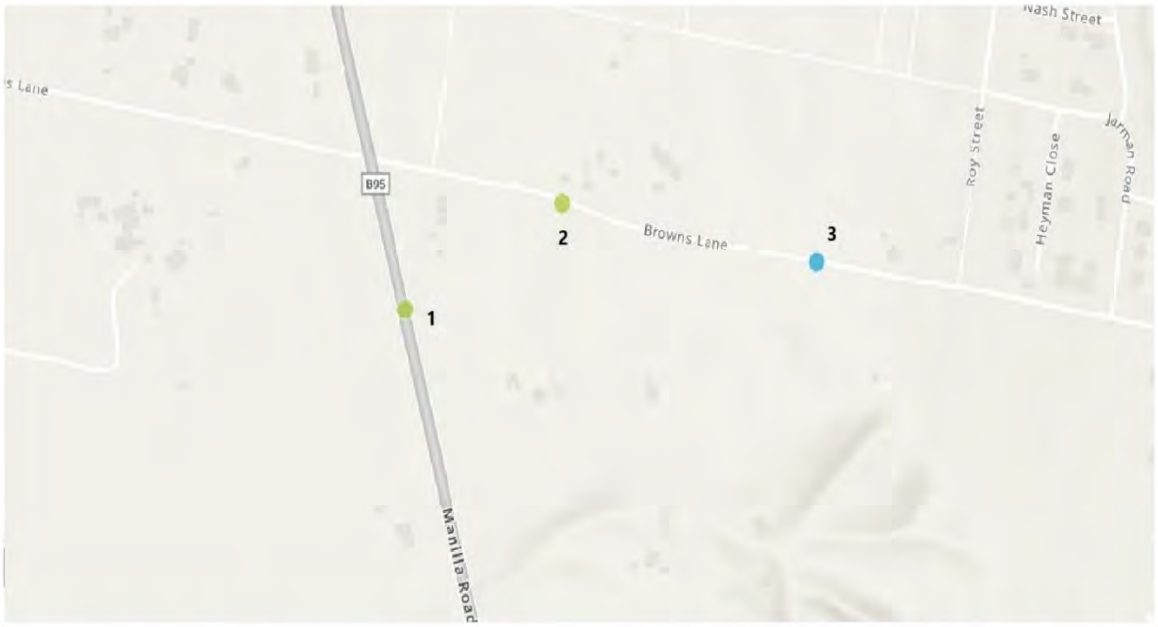
The development will generate approximately 78 additional trips per hour at peak times. Given that the existing volumes on local roads are relatively low, and the local road network has adequate capacity to cater for the extra traffic, it is expected that the development will result in minimal reduction in efficiency or road safety. Also, it should be noted that peak traffic generation from MHE developments are generally around the middle of the day, and have little impact on the normal AM & PM peak hours within the local road network.

The existing sealed width of Browns Lane (approx. 8m) is adequate to cater for the additional traffic to be generated by the development, with minimal reduction in the existing Level of Service. The recommended widening at the proposed site access off Browns Lane will allow northbound vehicles to safely pass any vehicle slowing, queuing or turning right into the development.

The existing layout at the intersection of Manilla Road and Browns Lane currently operates efficiently, with all movements having a Level of Service of 'A'. The additional traffic to be generated by the development will not result in any significant reduction in Level of Service.

5.2 Crash history

The Transport for New South Wales website includes recent crash information in the vicinity of the proposed development. As can be seen from the diagram below, there have been 2 single vehicle crashes on Browns Lane, and 1 on Manilla Road in the past 6 years. All 3 occurred in darkness, and involved vehicles losing control. It should noted that no crashes have occurred at the intersection of Browns Lane and Manilla Road.



	Reporting year	Crash Id	Degree of crash	RUM - code	RUM - description	Type of location	Natural lighting	Longitude	Latitude	Number killed	Number injured
1	2022	1311539	Serious Injury	70	Off road to left	2-way undivided	Darkness	150.887164	-31.042783		1
2	2019	1210448	Serious Injury	81	Off left/rt bnd=>obj	2-way undivided	Darkness	150.889710	-31.041558		2
3	2019	1219710	Moderate Injury	74	On road-out of cont.	2-way undivided	Darkness	150.893812	-31.042226		2

Fig. 5.1 TfNSW crash map in the vicinity of the proposed development

5.3 Pedestrians & cycling

There are currently no pedestrian or cycling facilities in the vicinity of the proposed development. This likely as a result of the relatively steep grade on this section of Browns Lane, the lack of residential development and the lack of connectivity with other footpath and cycling facilities.

The map (below) Tamworth Regional Council's 'Integrated Transport Plan', which was recently adopted by Council (13 August 2024). The plan indicates a cycle way or bike lane is proposed at the eastern end of Browns Lane, but not at the western end i.e. across the frontage of the proposed development.

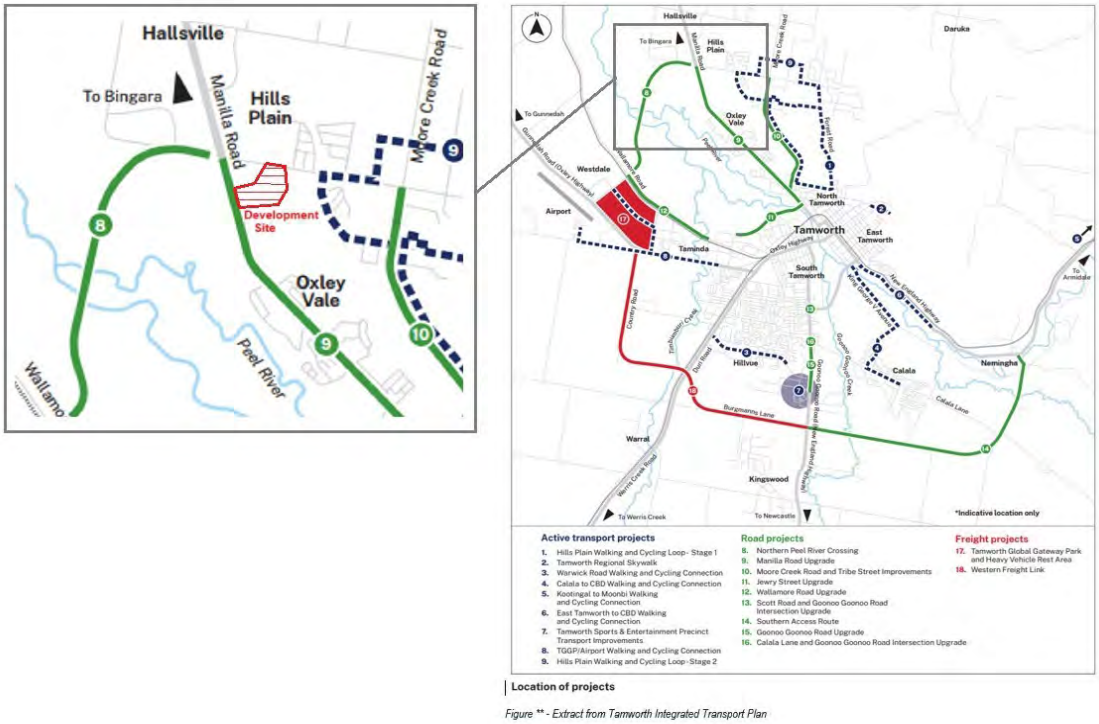


Figure ** - Extract from Tamworth Integrated Transport Plan

Fig. 5.2 Future cycling facilities - Tamworth Integrated Transport Plan

Also, given the relatively steep grade on Browns Lane, it is likely that any footpath will be unsuitable for many pedestrians. Also, there are minimal pedestrian facilities in the area, and a general lack of connectivity i.e. any footpath across the frontage of the proposed development would not connect with any other pedestrian infrastructure.

However, it may be possible to utilise the proposed emergency access road to allow residents to walk from the future MHE site to Manilla Road. Consideration should also be given to including an additional bus stop in this location to service the development.

6. Development Onsite Road Network & Parking

6.1 Internal Subdivision Access Roads

All internal roads will comply with Tamworth Regional Council's Guidelines, and the requirements of Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021 [NSW] Part 2 - Manufactured home estates and manufactured homes.

6.2 Parking

Parking requirements and the required number of allocated parking spaces is referenced in the MHE Development application and associated planning documents. From this information and in consideration of the derived traffic generation in Section 5.1 parking requirements are to be provided with reference to Australian Standard AS 2890.1 – 1993 Off Street Car Parking, AS 2890.3-1993 Bicycle Parking Facilities, AS 2890.4 Bus Parking

7. Pedestrian Access And Public Transport

7.1 Pedestrian Access

Minimal pedestrian facilities are currently provided in the vicinity of the proposed development. See Section 5.3 above).

7.2 Cycling Access

Minimal cycling facilities (i.e. cycleways, bike lanes, shared paths etc) are currently provided in the vicinity of the proposed development. StreetWise observed a small number of cyclists using Browns Lane during the site inspection / traffic count (see Section 5.3 above)..

7.3 Public Transport

A daily bus service utilises Manilla Road a few times day, with a set down / pick up location at Hallsville (approximately 700m north of Browns Lane). The service (No.443) runs between Manilla and Tamworth CBD twice a day. The existing bus stop is too far to expect residents to walk from the proposed development. However, it is possible that the future MHE development will provide a mini bus service for residents.

Fig. 7.1 Plan showing route of current daily bus services through North Tamworth.

Daily bus services also provide student access to a number of schools throughout the Tamworth area. Figure 7.2 below shows the school bus routes in the vicinity of the proposed development, and current student pick-up / set-down locations. As can be seen from the map, there are no current school bus services in Browns Lane across the frontage of the proposed development.

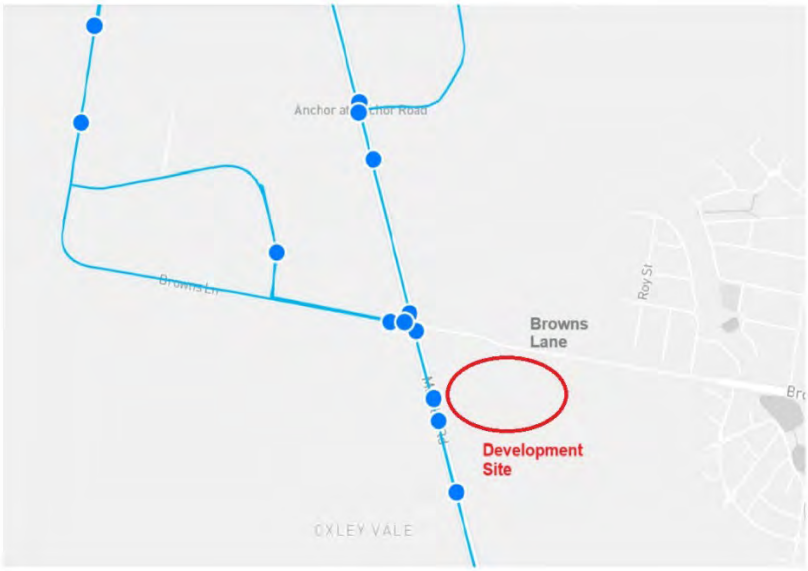


Fig. 7.2 Plan showing route of current daily school bus services near development site

8. Summary

StreetWise Road Safety and Traffic Services has been engaged by Land Dynamics Australia Consultants Pty Ltd to prepare a Traffic Impact Assessment (TIA) report for a proposed Manufactured Housing Estate (MHE) development to be provided on Lot 39 DP 22919 & Lot 349 DP753848 at Browns Lane, North Tamworth, NSW.

The proposed development includes a total of 218 MHE units, internal roads & parking, landscaping, various facilities including swimming pools, gymnasiums, bowling greens, caravan storage etc.

A rate of 3.6 trips per day per MHE unit has been adopted for this assessment. In total, the Manufactured Housing Estate will include 218 MHE units and generate a total of 79 peak hour trips and 785 daily trips when completed and fully occupied.

Overall traffic volumes to be generated by MHE proposal, and the surrounding road network, will remain well below the Austroads thresholds. It should also be noted that the peak traffic generation from future MHE development will generally be during the middle of the day, and have minimal impact on the existing peak hours traffic within the surrounding local road network i.e. the peak traffic generation by the proposed MHE development will not have any significant impacts on existing congestion, and will have minimal impacts on existing road safety and efficiency.

It should also be noted that Manufactured Housing Estates tend to attract older residents, many of whom are retired or not working full time. Assessment of similar developments (as per RMS guidelines), indicate that residents tend to avoid travelling at peak times if possible, and peak traffic generation from the proposed development is expected between late morning and early afternoon i.e. not conflict with peak times within the local road network.

The internal MHE road layout will conform with MHE Designs and Council's guidelines.

SIDRA modelling indicates the existing intersection of Manilla Road and Browns Lane currently operates at a Level of Service (LoS) of 'A', and has adequate capacity to cater for additional traffic volumes.

The SIDRA modelling also indicates that the intersection will satisfactorily cater for the future (2034) traffic movements to be generated by the completed and fully occupied development of the Manufactured Housing Estate. The future intersection will still operate at a Level of Service of 'A'. Additional modelling was also undertaken to include 100 future lots on either side of Manilla Road (i.e. a total of 200 lots) to determine the capacity of the existing intersection layout. The modelling indicated the existing layout can cater for 10 years network growth, the proposed development (218 MHE units) and 200 additional residential lots, with no significant reduction in Level of Service.

The proposed Manufactured Housing Estate includes future on-site facilities such as a community club house, pool, tennis court, bowling green, men's shed etc. which reduce the need for residents to travel outside the site. The developers also propose a community bus, which will also reduce the overall number of trips generated by the site.

Browns Lane has adequate width to cater for future traffic volumes, including additional movements generated by the completed and fully occupied MHE development. However, it is recommended that the eastbound side of Browns Lane be widened to create a simple T-intersection (BAR) to safely cater for future movements in and out of the future development.

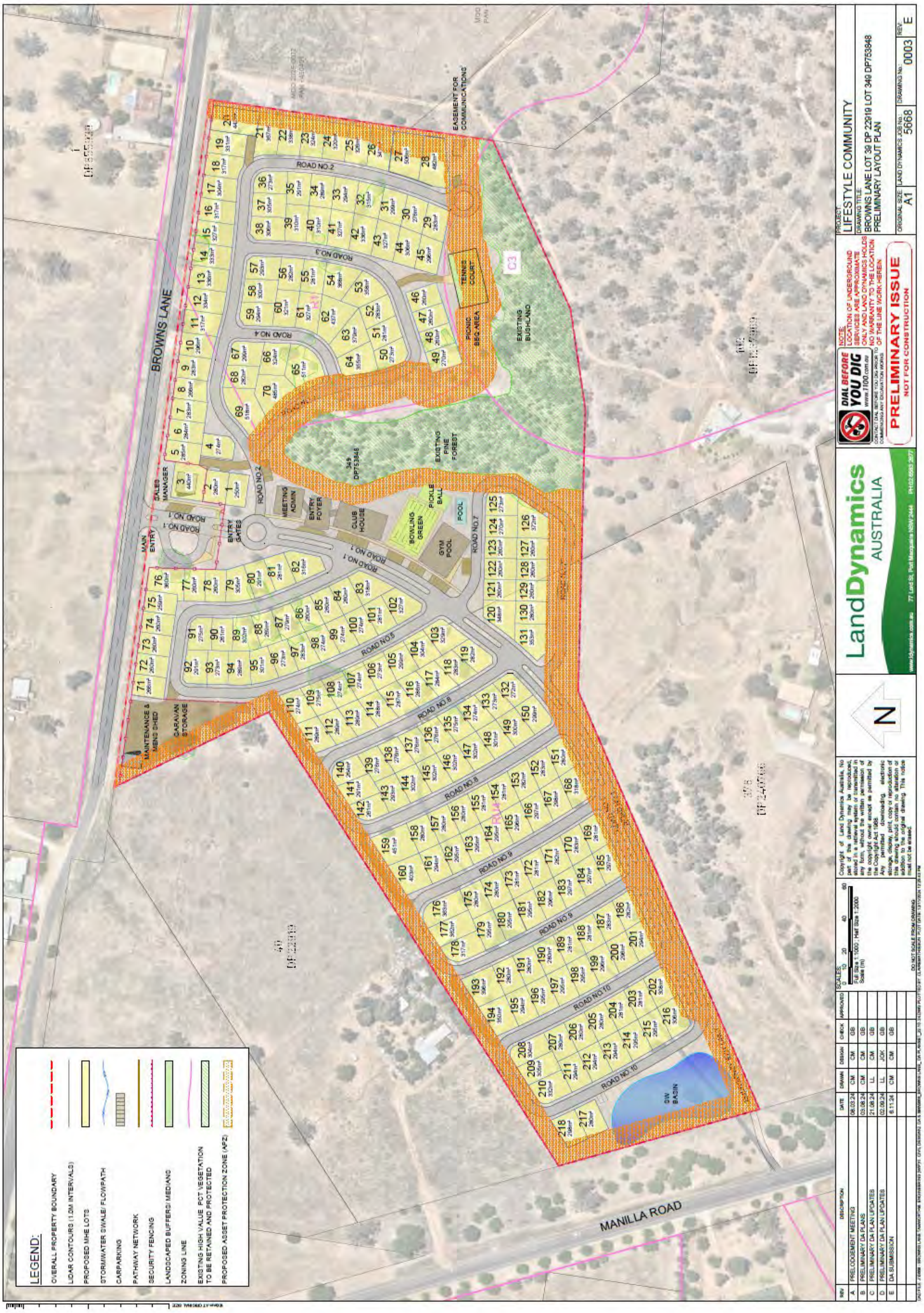
9. Recommendations

This report estimates the traffic movements to be generated by the proposed Manufactured Housing Estate at Browns Lane, North Tamworth, and assesses the impacts of the increased traffic on the local road network. Based on this assessment, StreetWise recommend the following:

- All internal roads of the proposed development will comply with Tamworth Regional Council's guidelines, and the requirements of Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021 [NSW] Part 2 - Manufactured home estates and manufactured homes.
- All internal parking facilities are to be designed and constructed in accordance with provided with reference to Australian Standard AS 2890.1 – 1993 Off Street Car Parking, AS 2890.3-1993 Bicycle Parking Facilities, AS 2890.4 Bus Parking
- The existing intersection layout of Browns Lane and Manilla Road has adequate capacity to cater for future (2034) traffic volumes, including annual growth within the local road network, and traffic to be generated by the proposed MHE development.
- Browns Lane should be widened to meet the minimum requirements of a BAR intersection (as per Austroads 'Guide to Road Design Part 4A: Unsignalised and Signalised Intersections') at the proposed entry to the proposed development.
- The proposed emergency access road off a straight, level section of Manilla Road, will be located at an existing driveway location with adequate sight distance in both directions. The access road will be used occasionally and for emergency purposes only. The access road may be suitable for pedestrian access to future bus services on Manilla Road.
- Consideration should be given to the layout of the future site entry, particularly the location of any fencing, walls or landscaping, with a view to maximising sight distance for vehicles entering or exiting the site.

In summary, StreetWise Road Safety and Traffic Services recommend that the proposed development as being a suitable development based on the predicted traffic impacts. The additional vehicle trips to be generated by the development will not have a significant impact on the efficiency or safety of the local road network, and that the local roads and intersections have the capacity to cater for the additional trips generated by the development, with minimal upgrades required.

APPENDIX A
PROPOSED DEVELOPMENT LAYOUT PLANS


BROWNS LANE
MANILLA ROAD
LEGEND:
OVERALL PROPERTY BOUNDARY
PROPOSED MHE LOTS
CARPARKING
PATHWAY NETWORK
SECURITY FENCING
LANDSCAPED BUFFERS/ MEDIANS
ZONING LINE
EXISTING HIGH VALUE PCT VEGETATION TO BE RETAINED AND PROTECTED
PROPOSED ASSET PROTECTION ZONE (APZ)
MAIN ENTRY
CLUB HOUSE
BOWLING GREEN
GYM POOL
POOL
PICKLE BALL
TENNIS COURT
EXISTING BUSHLAND
EXISTING PINE FOREST
SW BASIN
LandDynamics
AUSTRALIA
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION
LIFESTYLE COMMUNITY
BROWNS LANE LOT 39 DP 22919 LOT 349 DP753848
PRELIMINARY LAYOUT PLAN
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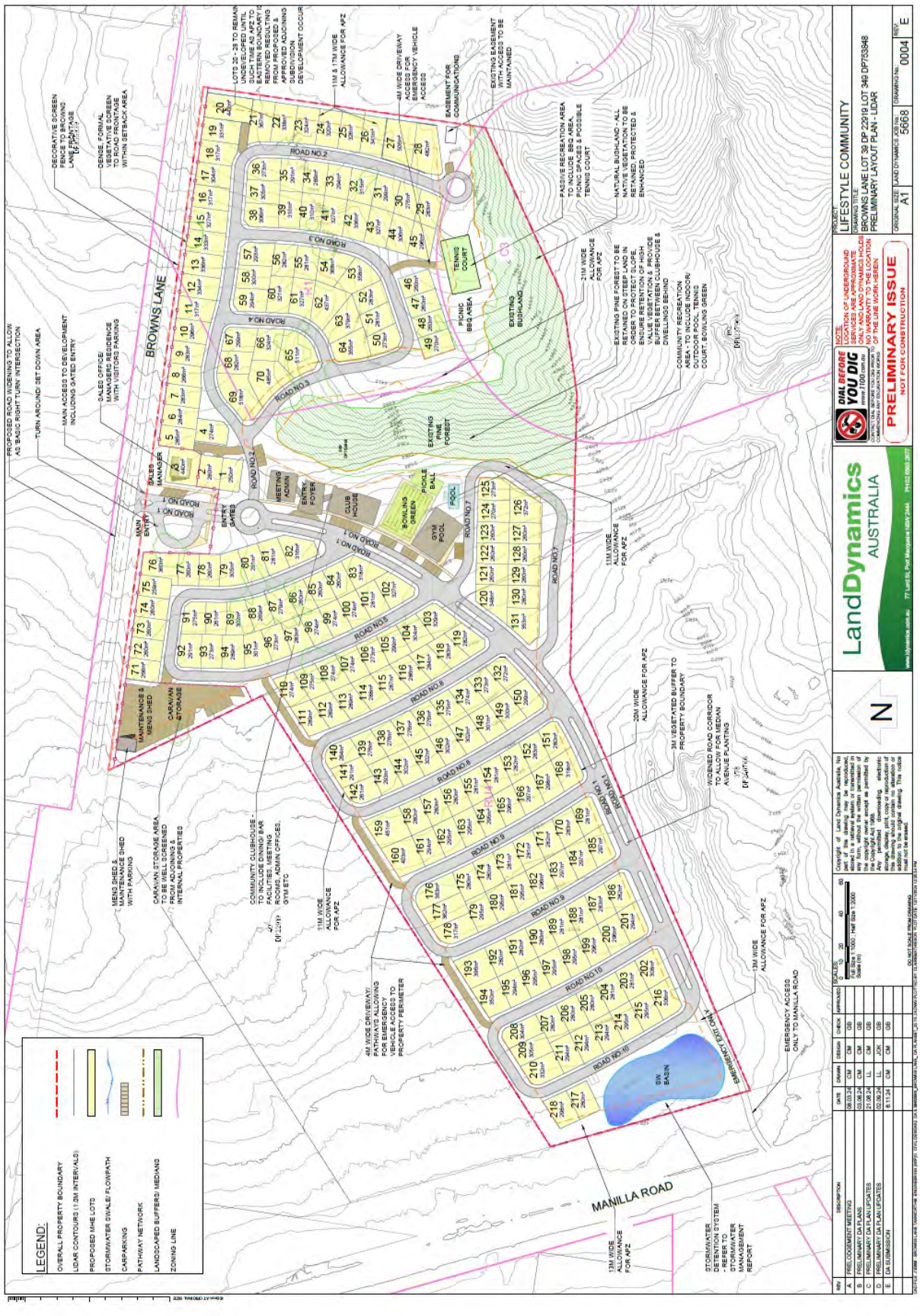
BROWNS LANE
MANILLA ROAD
LEGEND:
OVERALL PROPERTY BOUNDARY
LIDAR CONTOURS (1.0M INTER/ALS)
PROPOSED MHE LOTS
STORMWATER SWALE/ FLOWPATH
CARPARKING
PATHWAY NETWORK
LANDSCAPED BUFFER/ MEDIANS
ZONING LINE
ROAD NO.1
ROAD NO.2
ROAD NO.3
ROAD NO.4
ROAD NO.5
ROAD NO.6
ROAD NO.7
ROAD NO.8
ROAD NO.9
ROAD NO.10
ROAD NO.11
MAIN ENTRY
ENTRY GATES
SALES MANAGER
MEETING ADMIN
ENTRY FOYER
CLUB HOUSE
BOWLING GREEN
PICKLE BALL
POOL
GYM POOL
TENNIS COURT
PICNIC BBQ AREA
EXISTING BUSHLAND
EXISTING PINE FOREST
MAINTENANCE & MENS SHED
CARAVAN STORAGE
BIN BASIN
EMERGENCY EXIT ONLY
LandDynamics AUSTRALIA
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION
LIFESTYLE COMMUNITY
BROWNS LANE LOT 39 DP 22919 LOT 349 DP753848
PRELIMINARY LAYOUT PLAN - LIDAR
DRAWING No. 0004 REV E

APPENDIX B
TRAFFIC COUNTS

		1			2			3			4			5			6				
																				15 Min Total	60 min Total
Time		Hughes Street (Westbound)			Left into Quicks Road			Left out of Quicks Road			Right Out of Quicks Road			Right in to Quicks Road			Hughes Street (Eastbound)				
Start	*Finish*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
7:00 AM	7:15 AM	2	1	3	0	0	0	1	0	1	0	0	0	1	1	2	10	2	12	18	
7:15 AM	7:30 AM	2	2	4	0	0	0	1	0	1	0	0	0	1	0	1	1	2	3	9	
7:30 AM	7:45 AM	5	0	5	0	0	0	2	0	2	0	0	0	1	1	2	5	0	5	14	
7:45 AM	8:00 AM	5	0	5	0	0	0	3	1	4	0	1	1	3	0	3	5	0	5	18	*59*
8:00 AM	8:15 AM	11	1	12	0	0	0	5	0	5	0	0	0	3	0	3	8	2	10	30	*71*
8:15 AM	8:30 AM	13	1	14	0	0	0	0	0	0	1	0	1	0	0	0	10	0	10	25	*87*
8:30 AM	8:45 AM	5	0	5	0	0	0	6	0	6	0	0	0	1	0	1	4	0	4	16	***89***
	Total	43	5	48	0	0	0	18	1	19	1	1	2	10	2	12	33	4	37	**130**	

Peak Hour

		1			2			3			4			5			6				
																				15 Min Total	60 min Total
Time		Hughes Street (Westbound)			Left into Quicks Road			Left out of Quicks Road			Right Out of Quicks Road			Right in to Quicks Road			Hughes Street (Eastbound)				
Start	*Finish*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
3:15 PM	3:30 PM	9	1	10	1	0	1	0	0	0	1	0	1	4	0	4	10	0	10	26	
3:30 PM	3:45 PM	12	0	12	3	0	3	6	1	7	1	0	1	5	0	5	7	1	8	36	
3:45 PM	4:00 PM	5	0	5	3	0	3	3	0	3	1	0	1	4	1	5	12	1	13	30	
4:00 PM	4:15 PM	9	1	10	0	0	0	2	0	2	0	0	0	2	0	2	6	1	7	21	*113*
4:15 PM	4:30 PM	6	1	7	1	0	1	6	0	6	0	0	0	4	0	4	11	0	11	29	***116***
4:30 PM	4:45 PM	7	1	8	0	0	0	0	0	0	1	0	1	3	0	3	10	0	10	22	*102*
4:45 PM	5:00 PM	10	2	12	0	0	0	1	0	1	0	2	2	2	0	2	8	0	8	25	*97*
	Total	58	6	64	8	0	8	18	1	19	4	2	6	24	1	25	64	3	67	**189**	

Time		1			2			3			4			5			6				
		Mulwala / Barooga Rd (Southbound)			Right into Hughes St			Left out of Hughes St			Right Out of Hughes St			Left in to Hughes St			Mulwala / Barooga Rd (Northbound)			15 Min Total	60 min Total
Start	Finish	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
7:00 AM	7:15 AM	4	2	6	0	0	0	0	0	0	4	1	5	2	0	2	5	1	6	19	
7:15 AM	7:30 AM	1	0	1	0	0	0	1	0	1	5	3	8	3	0	3	6	1	7	20	
7:30 AM	7:45 AM	5	0	5	0	0	0	1	0	1	4	0	4	7	0	7	3	1	4	21	
7:45 AM	8:00 AM	4	0	4	1	0	1	0	0	0	8	1	9	16	0	16	3	0	3	33	93
8:00 AM	8:15 AM	5	0	5	0	0	0	0	0	0	5	1	6	4	0	4	3	0	3	18	92
8:15 AM	8:30 AM	7	1	8	1	0	1	0	0	0	6	0	6	6	1	7	2	0	2	24	96
8:30 AM	8:45 AM	7	1	8	0	0	0	0	0	0	5	0	5	7	0	7	6	0	6	26	101
8:45 AM	9:00 AM	1	3	4	0	0	0	1	0	1	2	0	2	5	1	6	4	1	5	18	86
	Total	34	7	41	2	0	2	3	0	3	39	6	45	50	2	52	27	3	30	179	

Peak Hour

Time		1			2			3			4			5			6				
		Mulwala / Barooga Rd (Southbound)			Right into Hughes St			Left out of Hughes St			Right Out of Hughes St			Left in to Hughes St			Mulwala / Barooga Rd (Northbound)			15 Min Total	60 min Total
Start	Finish	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
3:15 PM	3:30 PM	4	0	4	0	0	0	0	0	0	3	0	3	4	0	4	3	1	4	15	
3:30 PM	3:45 PM	2	2	4	0	0	0	1	2	3	11	0	11	7	1	8	3	1	4	30	
3:45 PM	4:00 PM	4	0	4	2	0	2	0	0	0	4	1	5	10	0	10	5	1	6	27	
4:00 PM	4:15 PM	3	1	4	1	0	1	2	0	2	7	0	7	6	1	7	6	0	6	27	99
4:15 PM	4:30 PM	2	1	3	0	0	0	0	0	0	5	1	6	10	1	11	7	2	9	29	113
4:30 PM	4:45 PM	4	0	4	3	0	3	0	0	0	4	0	4	6	1	7	3	0	3	21	104
4:45 PM	5:00 PM	4	0	4	1	0	1	1	0	1	9	2	11	6	0	6	3	2	5	28	105
5:00 PM	5:15 PM	5	0	5	0	0	0	1	0	1	4	0	4	3	0	3	9	0	9	22	100
	Total	28	4	32	7	0	7	5	2	7	47	4	51	52	4	56	39	7	46	199	

APPENDIX C
SIDRA MODELLING RESULTS

Bretts Traffic Engineering Pty Ltd
ABN 67 438 709 188
4 Ranch Court
ALICE RIVER, QLD, 4817
Ph: 0429 069 069

StreetWise Road Safety & Traffic Services Pty Ltd
PO Box 1395
PORT MACQUARIE NSW 2444
Attention: Andy Davis

23 September 2024

RE: PROPOSED MHE DEVELOPMENT, BROWNS LANE, TAMWORTH, NSW: SIDRA MODEL OUTPUTS & REPORT (Rev 01).

Dear Andy,

The following is a summary of the Sidra Model assumptions and results for the above project.

Inputs

- Posted speed limits
  - 80km/h all legs of all intersections
- SIDRA default values used unless noted otherwise
- Intersection volumes as per email dated 17.09.2024, appended
- Heavy Vehicle volumes noted as 5% from manual traffic count by StreetWise

Assumptions and/or modifications to Sidra model defaults

- SIDRA default values for Peak Flow Factor (95%) and Peak Period (30 minutes per hour); and
- Model Type = New South Wales
- GAP acceptance for sign-controlled intersections adopted from Appendix E of RMS Traffic Modelling Guidelines v1.0 (2013), with TWSC calibration factors turned off. Gap Acceptance parameters are summarised in the table below:

Table 1 – Gap Acceptance parameters

Movement	Gap Acceptance (s)	Follow Up Headway (s)
Right turn from Major Rd	4.0	2.0
Left Turn from Minor Rd	4.5	2.5
Through from Minor Rd	5.0	3.0
Right Turn from Minor Rd	5.5	3.5

SIDRA Model Output Summary

Detailed outputs are appended, with a summary of outputs is in the table below.

Table 2 - SIDRA output Summary – AM PEAK HOUR

	Exist 2024	2034 With Development	2034 With Development + 200 lots
All - Average Delay	2.6s	3.4s	4.5s
All - LOS	A	A	A
All - Degree of Saturation	0.195	0.217	0.226
Worst Leg (delay)	WEST	WEST	WEST
Worst Leg – Average Delay	10.1s	11.4s	12.3s
Worst Leg - LOS	A	A	A
Worst Leg - 95% queue	<5m	<5m	5m

Table 3 - SIDRA output Summary – PM PEAK HOUR

	Exist 2024	2034 With Development	2034 With Development + 200 lots
All - Average Delay	2.0s	2.7s	4.1s
All - LOS	A	A	A
All - Degree of Saturation	0.180	0.226	0.285
Worst Leg (delay)	WEST	WEST	WEST
Worst Leg – Average Delay	11.3s	12.9s	13.3s
Worst Leg - LOS	A	A	A
Worst Leg - 95% queue	<5m	<5m	5m

BRETTSTRAFFIC ENGINEERING

RE: PROPOSED MHE DEVELOPMENT, BROWNS LANE, TAMWORTH, NSW: SIDRA MODEL OUTPUTS & REPORT (Rev 01).

Discussion:

The existing intersection operates with a very low Degree of Saturation in 2024 AM and PM peak periods (0.195 and 0.180 respectively) suggesting significant spare capacity.

With addition of the future development, and 10 years of background growth, the intersection will have a similar operation, with all movements remaining at Level of Service A producing minimal queues or delays. DoS increases marginally to 0.217 and 0.226 for the AM and PM, retaining significant spare capacity.

The third scenario assumes 200 lots developed in addition to the 10 years of background growth. Even with background growth plus 200 adjacent residential lots, the intersection still operates with minimal delays and a low DoS (0.226 in AM and 0.285 in PM). All legs continue to operate with LOS A with minimal queues.

Should you require any further information please contact the undersigned on 0429 069 069.

Yours faithfully

Brett Franklin
B.Eng.(hons) MIEAust CPEng NER MIPWEAQ RPEQ

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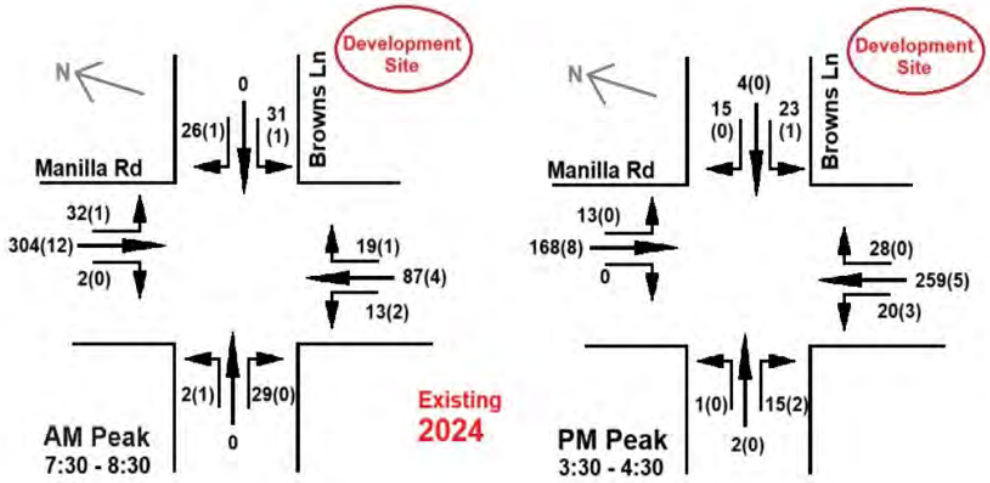
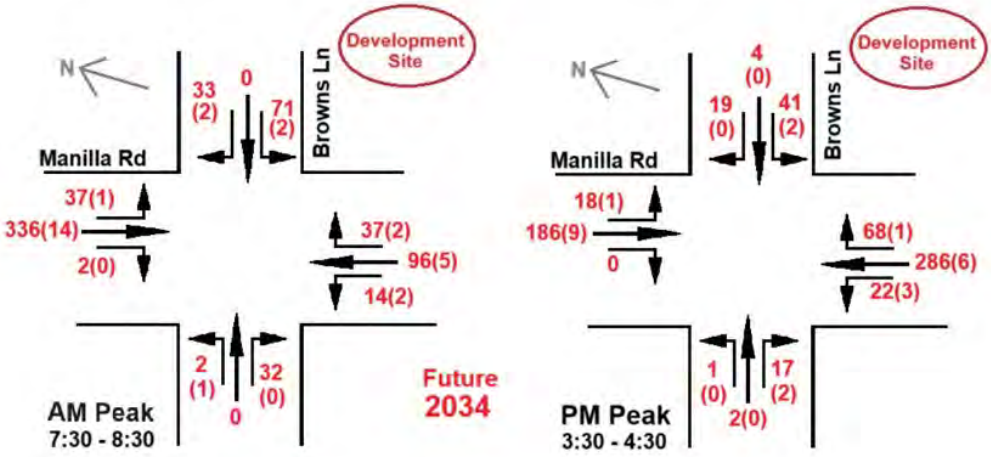
Appendix A – MOVEMENT VOLUMES (INPUT)

1. **Existing volumes**
   From StreetWise manual traffic count. The local volumes included approx 5% heavy vehicles. See existing intersection layout below (aerial photo).

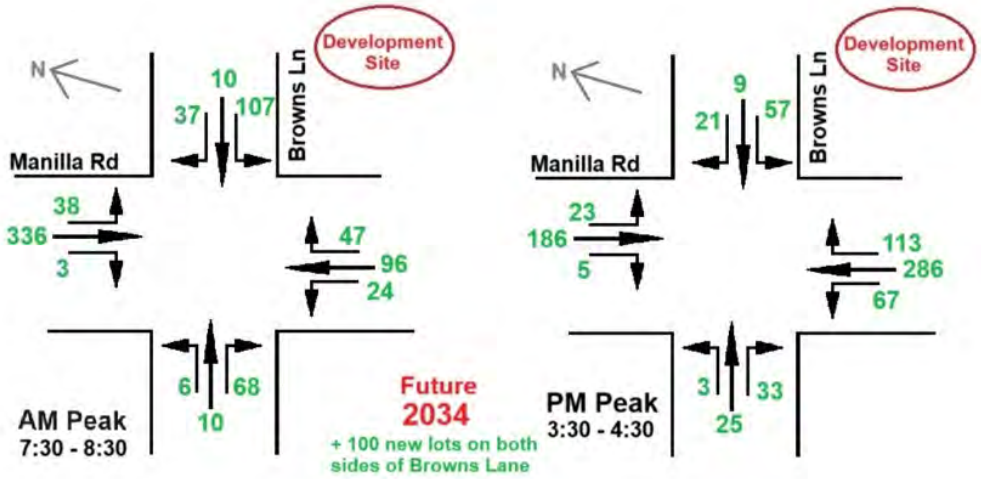


2. **Future volumes (2034)**
   Includes additional traffic generated by completed 233 unit MHE development + 1% annual growth in local road network.



3. Future volumes (2034) + 100 lots on both sides of Browns Lane

Council wants us to test the intersection for 2034 with additional development in the area. I've estimated an additional 200 lots on Browns Lane, with 100 on either side of Manilla Road.



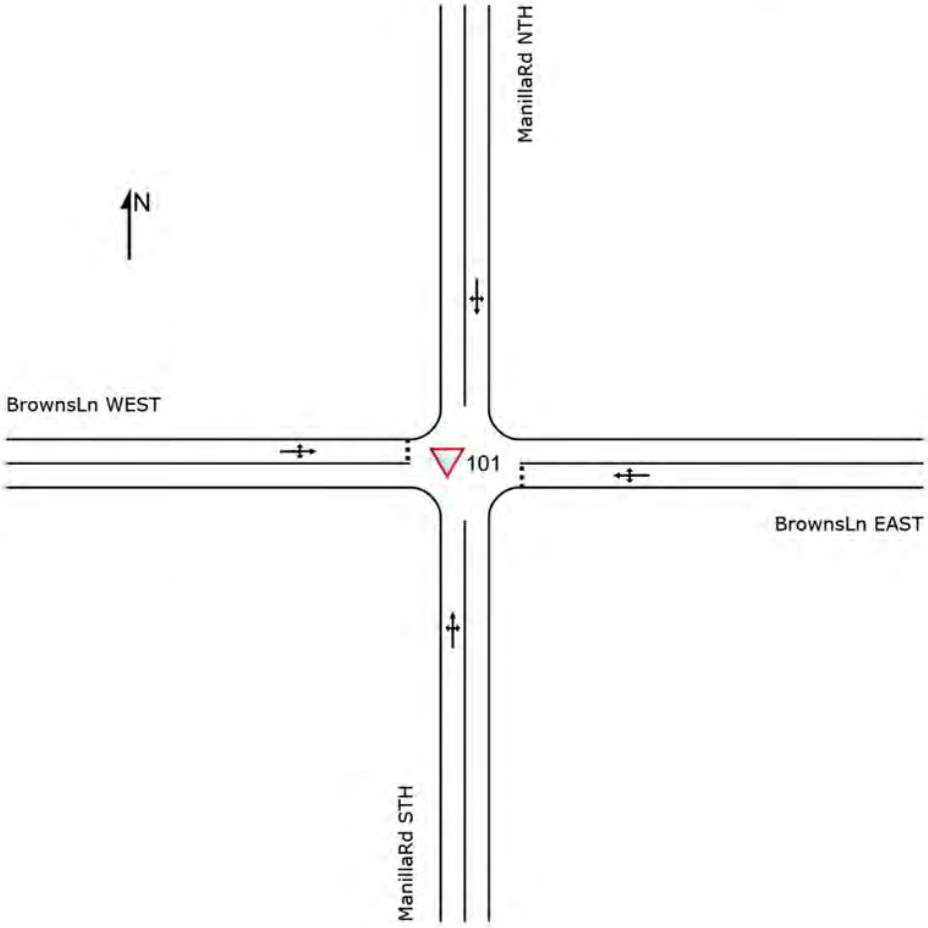
Appendix B – SIDRA OUTPUTS (2024 existing)

SITE LAYOUT

▽Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 Exist (Site Folder: 2024 Existing)]

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

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



MOVEMENT SUMMARY

Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 Exist (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
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: ManillaRd STH															
1	L2	All MCs	16	13.3	16	13.3	0.078	8.2	LOS A	0.2	1.6	0.20	0.28	0.20	64.8
2	T1	All MCs	96	4.4	96	4.4	0.078	0.4	LOS A	0.2	1.6	0.20	0.28	0.20	75.5
3	R2	All MCs	21	5.0	21	5.0	0.078	8.2	LOS A	0.2	1.6	0.20	0.28	0.20	67.5
Approach			133	5.6	133	5.6	0.078	2.6	NA	0.2	1.6	0.20	0.28	0.20	72.7
East: BrownsLn EAST															
4	L2	All MCs	34	3.1	34	3.1	0.087	8.6	LOS A	0.3	2.2	0.46	0.72	0.46	60.8
5	T1	All MCs	1	0.0	1	0.0	0.087	8.8	LOS A	0.3	2.2	0.46	0.72	0.46	62.2
6	R2	All MCs	28	3.7	28	3.7	0.087	10.6	LOS A	0.3	2.2	0.46	0.72	0.46	60.4
Approach			63	3.3	63	3.3	0.087	9.5	LOS A	0.3	2.2	0.46	0.72	0.46	60.7
North: ManillaRd NTH															
7	L2	All MCs	35	3.0	35	3.0	0.195	7.0	LOS A	0.0	0.2	0.00	0.07	0.00	71.3
8	T1	All MCs	333	3.8	333	3.8	0.195	0.0	LOS A	0.0	0.2	0.00	0.07	0.00	78.8
9	R2	All MCs	2	0.0	2	0.0	0.195	6.6	LOS A	0.0	0.2	0.00	0.07	0.00	72.3
Approach			369	3.7	369	3.7	0.195	0.7	NA	0.0	0.2	0.00	0.07	0.00	77.9
West: BrownsLn WEST															
10	L2	All MCs	3	33.3	3	33.3	0.059	8.1	LOS A	0.2	1.4	0.47	0.71	0.47	52.5
11	T1	All MCs	1	0.0	1	0.0	0.059	8.8	LOS A	0.2	1.4	0.47	0.71	0.47	61.5
12	R2	All MCs	31	0.0	31	0.0	0.059	10.4	LOS A	0.2	1.4	0.47	0.71	0.47	60.9
Approach			35	3.0	35	3.0	0.059	10.1	LOS A	0.2	1.4	0.47	0.71	0.47	60.1
All Vehicles			600	4.0	600	4.0	0.195	2.6	NA	0.3	2.2	0.12	0.22	0.12	73.3

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 [Browns Ln & Manilla Rd PM Peak 2024 Exist (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
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: ManillaRd STH															
1	L2	All MCs	24	13.0	24	13.0	0.180	7.7	LOS A	0.3	2.0	0.09	0.14	0.09	66.4
2	T1	All MCs	278	1.9	278	1.9	0.180	0.1	LOS A	0.3	2.0	0.09	0.14	0.09	77.5
3	R2	All MCs	31	3.4	31	3.4	0.180	7.5	LOS A	0.3	2.0	0.09	0.14	0.09	69.8
Approach			333	2.8	333	2.8	0.180	1.3	NA	0.3	2.0	0.09	0.14	0.09	75.8
East: BrownsLn EAST															
4	L2	All MCs	25	4.2	25	4.2	0.057	7.8	LOS A	0.2	1.4	0.39	0.65	0.39	61.2
5	T1	All MCs	4	0.0	4	0.0	0.057	9.1	LOS A	0.2	1.4	0.39	0.65	0.39	62.8
6	R2	All MCs	16	0.0	16	0.0	0.057	10.5	LOS A	0.2	1.4	0.39	0.65	0.39	62.3
Approach			45	2.3	45	2.3	0.057	8.9	LOS A	0.2	1.4	0.39	0.65	0.39	61.7
North: ManillaRd NTH															
7	L2	All MCs	14	0.0	14	0.0	0.106	7.0	LOS A	0.0	0.1	0.01	0.05	0.01	72.7
8	T1	All MCs	185	4.5	185	4.5	0.106	0.0	LOS A	0.0	0.1	0.01	0.05	0.01	79.0
9	R2	All MCs	1	0.0	1	0.0	0.106	6.9	LOS A	0.0	0.1	0.01	0.05	0.01	72.5
Approach			200	4.2	200	4.2	0.106	0.5	NA	0.0	0.1	0.01	0.05	0.01	78.5
West: BrownsLn WEST															
10	L2	All MCs	1	0.0	1	0.0	0.043	8.1	LOS A	0.1	1.0	0.52	0.76	0.52	60.1
11	T1	All MCs	2	0.0	2	0.0	0.043	8.9	LOS A	0.1	1.0	0.52	0.76	0.52	60.4
12	R2	All MCs	18	11.8	18	11.8	0.043	11.8	LOS A	0.1	1.0	0.52	0.76	0.52	56.5
Approach			21	10.0	21	10.0	0.043	11.3	LOS A	0.1	1.0	0.52	0.76	0.52	57.1
All Vehicles			599	3.5	599	3.5	0.180	2.0	NA	0.3	2.0	0.10	0.17	0.10	74.5

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.

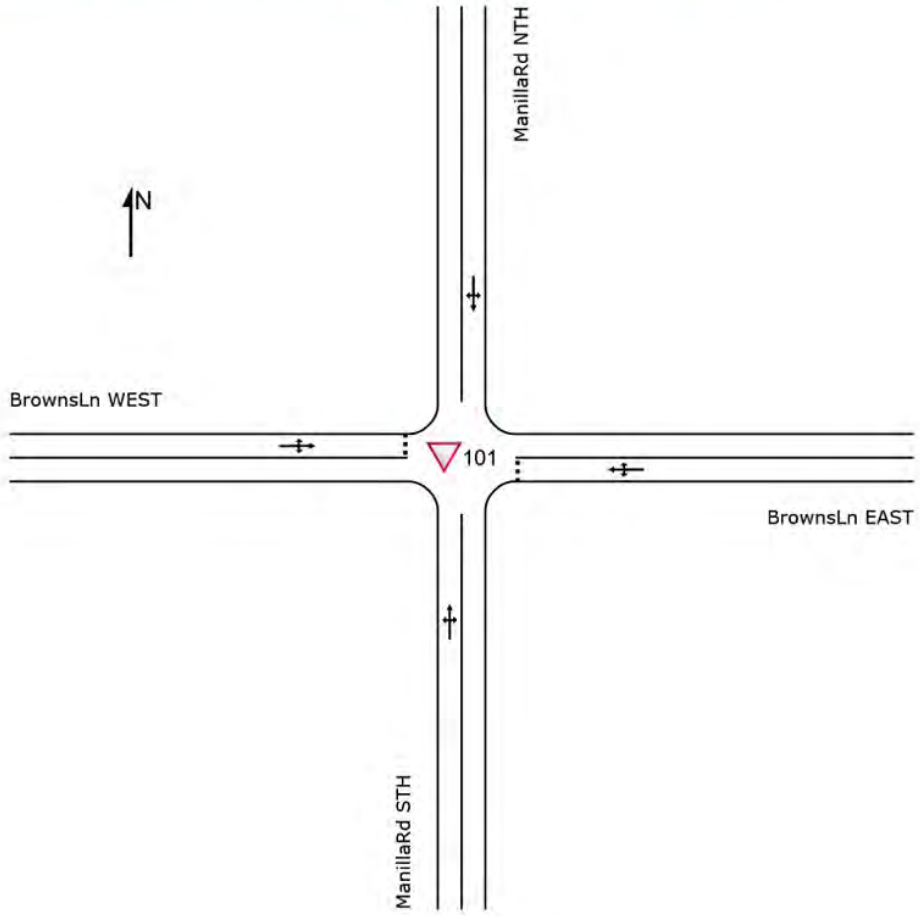
Appendix C – SIDRA OUTPUTS (2034 w/dev)

SITE LAYOUT

▽Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 w/dev (Site Folder: 2034 Future Development)]

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

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



MOVEMENT SUMMARY

▽Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 w/dev (Site Folder: 2034 Future Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
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: ManillaRd STH															
1	L2	All MCs	17	12.5	17	12.5	0.103	8.6	LOS A	0.4	2.9	0.30	0.38	0.30	64.0
2	T1	All MCs	106	5.0	106	5.0	0.103	0.8	LOS A	0.4	2.9	0.30	0.38	0.30	74.0
3	R2	All MCs	41	5.1	41	5.1	0.103	8.4	LOS A	0.4	2.9	0.30	0.38	0.30	66.3
Approach			164	5.8	164	5.8	0.103	3.5	NA	0.4	2.9	0.30	0.38	0.30	70.8
East: BrownsLn EAST															
4	L2	All MCs	77	2.7	77	2.7	0.159	8.9	LOS A	0.6	4.3	0.50	0.75	0.50	60.5
5	T1	All MCs	1	0.0	1	0.0	0.159	9.8	LOS A	0.6	4.3	0.50	0.75	0.50	61.7
6	R2	All MCs	37	5.7	37	5.7	0.159	12.1	LOS A	0.6	4.3	0.50	0.75	0.50	59.4
Approach			115	3.7	115	3.7	0.159	10.0	LOS A	0.6	4.3	0.50	0.75	0.50	60.2
North: ManillaRd NTH															
7	L2	All MCs	40	2.6	40	2.6	0.217	7.0	LOS A	0.0	0.2	0.00	0.07	0.00	71.4
8	T1	All MCs	368	4.0	368	4.0	0.217	0.0	LOS A	0.0	0.2	0.00	0.07	0.00	78.7
9	R2	All MCs	2	0.0	2	0.0	0.217	6.6	LOS A	0.0	0.2	0.00	0.07	0.00	72.2
Approach			411	3.8	411	3.8	0.217	0.7	NA	0.0	0.2	0.00	0.07	0.00	77.9
West: BrownsLn WEST															
10	L2	All MCs	3	33.3	3	33.3	0.075	8.1	LOS A	0.2	1.8	0.52	0.76	0.52	51.5
11	T1	All MCs	1	0.0	1	0.0	0.075	9.6	LOS A	0.2	1.8	0.52	0.76	0.52	60.2
12	R2	All MCs	34	0.0	34	0.0	0.075	11.7	LOS A	0.2	1.8	0.52	0.76	0.52	59.7
Approach			38	2.8	38	2.8	0.075	11.4	LOS A	0.2	1.8	0.52	0.76	0.52	58.9
All Vehicles			727	4.2	727	4.2	0.217	3.4	NA	0.6	4.3	0.18	0.28	0.18	71.7

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 [Browns Ln & Manilla Rd PM Peak 2024 w/dev (Site Folder: 2034 Future Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
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: ManillaRd STH															
1	L2	All MCs	26	12.0	26	12.0	0.226	7.9	LOS A	0.6	4.5	0.17	0.22	0.17	65.7
2	T1	All MCs	307	2.1	307	2.1	0.226	0.3	LOS A	0.6	4.5	0.17	0.22	0.17	76.0
3	R2	All MCs	73	1.4	73	1.4	0.226	7.6	LOS A	0.6	4.5	0.17	0.22	0.17	69.4
Approach			406	2.6	406	2.6	0.226	2.1	NA	0.6	4.5	0.17	0.22	0.17	74.0
East: BrownsLn EAST															
4	L2	All MCs	45	4.7	45	4.7	0.089	7.9	LOS A	0.3	2.3	0.42	0.66	0.42	60.7
5	T1	All MCs	4	0.0	4	0.0	0.089	10.3	LOS A	0.3	2.3	0.42	0.66	0.42	62.5
6	R2	All MCs	20	0.0	20	0.0	0.089	11.9	LOS A	0.3	2.3	0.42	0.66	0.42	61.9
Approach			69	3.0	69	3.0	0.089	9.2	LOS A	0.3	2.3	0.42	0.66	0.42	61.2
North: ManillaRd NTH															
7	L2	All MCs	20	5.3	20	5.3	0.120	7.1	LOS A	0.0	0.1	0.01	0.06	0.01	70.4
8	T1	All MCs	205	4.6	205	4.6	0.120	0.0	LOS A	0.0	0.1	0.01	0.06	0.01	78.8
9	R2	All MCs	1	0.0	1	0.0	0.120	6.9	LOS A	0.0	0.1	0.01	0.06	0.01	72.3
Approach			226	4.7	226	4.7	0.120	0.7	NA	0.0	0.1	0.01	0.06	0.01	78.0
West: BrownsLn WEST															
10	L2	All MCs	1	0.0	1	0.0	0.056	8.2	LOS A	0.2	1.3	0.58	0.82	0.58	58.5
11	T1	All MCs	2	0.0	2	0.0	0.056	9.9	LOS A	0.2	1.3	0.58	0.82	0.58	58.8
12	R2	All MCs	20	10.5	20	10.5	0.056	13.5	LOS A	0.2	1.3	0.58	0.82	0.58	55.5
Approach			23	9.1	23	9.1	0.056	12.9	LOS A	0.2	1.3	0.58	0.82	0.58	55.9
All Vehicles			725	3.5	725	3.5	0.226	2.7	NA	0.6	4.5	0.16	0.23	0.16	72.9

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.

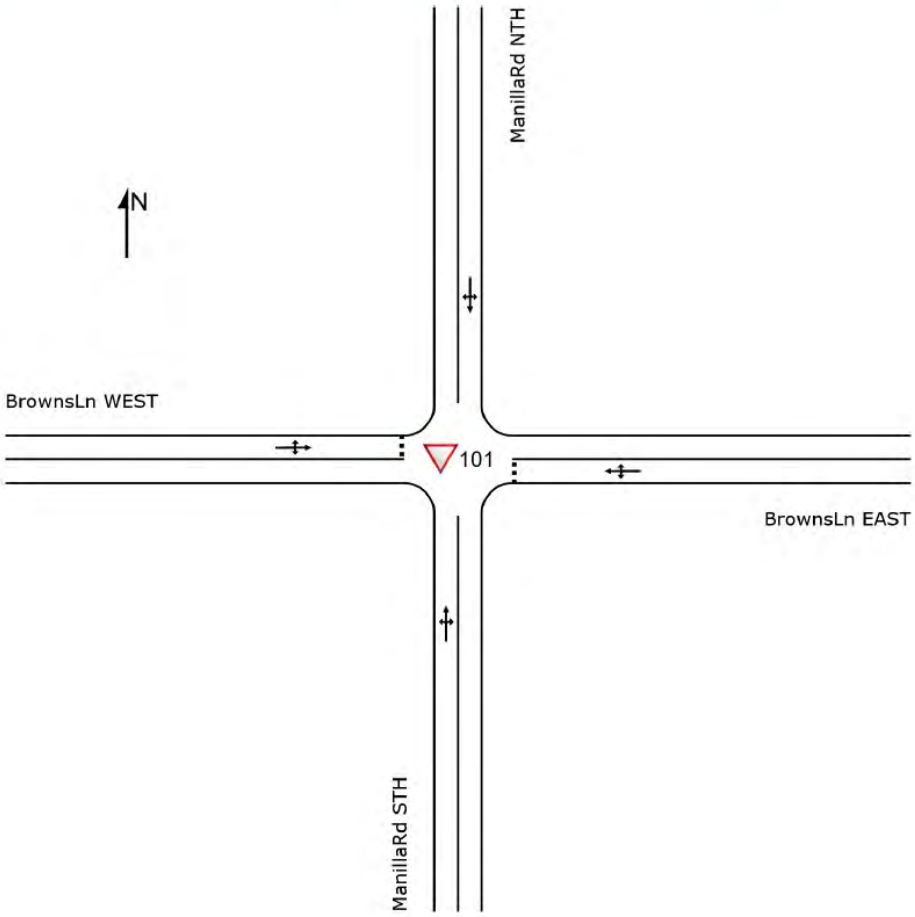
Appendix D – SIDRA OUTPUTS (2024 w/dev+200 lots)

SITE LAYOUT

Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 w/dev +200 (Site Folder: 2034 Future Development +200)]

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

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



MOVEMENT SUMMARY

▽Site: 101 [Browns Ln & Manilla Rd AM Peak 2024 w/dev +200 (Site Folder: 2034 Future Development +200)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h]	Demand Flows [HV] %	Arrival Flows [Total veh/h]	Arrival Flows [HV] %	Deg Satn v/c	Aver Delay sec	Level of Service	95% Back Of Queue [Veh. veh]	95% Back Of Queue [Dist] m	Prop Que	Eff Stop Rate	Aver No. of Cycles	Aver Speed km/h
South: ManillaRd STH															
1	L2	All MCs	27	7.7	27	7.7	0.117	8.5	LOS A	0.5	3.6	0.34	0.43	0.34	64.9
2	T1	All MCs	106	5.0	106	5.0	0.117	0.9	LOS A	0.5	3.6	0.34	0.43	0.34	73.0
3	R2	All MCs	52	4.1	52	4.1	0.117	8.4	LOS A	0.5	3.6	0.34	0.43	0.34	65.9
Approach			185	5.1	185	5.1	0.117	4.1	NA	0.5	3.6	0.34	0.43	0.34	69.7
East: BrownsLn EAST															
4	L2	All MCs	115	1.8	115	1.8	0.226	9.0	LOS A	0.9	6.3	0.52	0.75	0.52	60.7
5	T1	All MCs	11	0.0	11	0.0	0.226	10.3	LOS A	0.9	6.3	0.52	0.75	0.52	61.6
6	R2	All MCs	41	5.1	41	5.1	0.226	12.7	LOS A	0.9	6.3	0.52	0.75	0.52	59.5
Approach			166	2.5	166	2.5	0.226	10.0	LOS A	0.9	6.3	0.52	0.75	0.52	60.5
North: ManillaRd NTH															
7	L2	All MCs	41	2.6	41	2.6	0.218	7.0	LOS A	0.0	0.2	0.01	0.07	0.01	71.4
8	T1	All MCs	368	4.0	368	4.0	0.218	0.0	LOS A	0.0	0.2	0.01	0.07	0.01	78.6
9	R2	All MCs	3	0.0	3	0.0	0.218	6.7	LOS A	0.0	0.2	0.01	0.07	0.01	72.2
Approach			413	3.8	413	3.8	0.218	0.7	NA	0.0	0.2	0.01	0.07	0.01	77.8
West: BrownsLn WEST															
10	L2	All MCs	7	14.3	7	14.3	0.187	7.7	LOS A	0.7	4.6	0.58	0.81	0.58	55.2
11	T1	All MCs	11	0.0	11	0.0	0.187	10.1	LOS A	0.7	4.6	0.58	0.81	0.58	59.3
12	R2	All MCs	72	0.0	72	0.0	0.187	13.1	LOS A	0.7	4.6	0.58	0.81	0.58	58.8
Approach			89	1.2	89	1.2	0.187	12.3	LOS A	0.7	4.6	0.58	0.81	0.58	58.5
All Vehicles			854	3.6	854	3.6	0.226	4.5	NA	0.9	6.3	0.24	0.36	0.24	69.7

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 [Browns Ln & Manilla Rd PM Peak 2024 w/dev +200 (Site Folder: 2034 Future Development +200)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
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: ManillaRd STH															
1	L2	All MCs	74	4.3	74	4.3	0.285	7.8	LOS A	1.1	7.9	0.24	0.33	0.24	66.9
2	T1	All MCs	307	2.1	307	2.1	0.285	0.4	LOS A	1.1	7.9	0.24	0.33	0.24	74.0
3	R2	All MCs	120	0.9	120	0.9	0.285	7.6	LOS A	1.1	7.9	0.24	0.33	0.24	67.9
Approach			501	2.1	501	2.1	0.285	3.2	NA	1.1	7.9	0.24	0.33	0.24	71.4
East: BrownsLn EAST															
4	L2	All MCs	62	3.4	62	3.4	0.126	7.9	LOS A	0.5	3.3	0.45	0.67	0.45	60.7
5	T1	All MCs	9	0.0	9	0.0	0.126	11.9	LOS A	0.5	3.3	0.45	0.67	0.45	62.1
6	R2	All MCs	22	0.0	22	0.0	0.126	13.3	LOS A	0.5	3.3	0.45	0.67	0.45	61.5
Approach			94	2.2	94	2.2	0.126	9.6	LOS A	0.5	3.3	0.45	0.67	0.45	61.0
North: ManillaRd NTH															
7	L2	All MCs	25	4.2	25	4.2	0.127	7.3	LOS A	0.1	0.5	0.04	0.11	0.04	70.3
8	T1	All MCs	205	4.6	205	4.6	0.127	0.1	LOS A	0.1	0.5	0.04	0.11	0.04	78.2
9	R2	All MCs	5	0.0	5	0.0	0.127	8.1	LOS A	0.1	0.5	0.04	0.11	0.04	71.8
Approach			236	4.5	236	4.5	0.127	1.0	NA	0.1	0.5	0.04	0.11	0.04	77.1
West: BrownsLn WEST															
10	L2	All MCs	3	0.0	3	0.0	0.160	8.3	LOS A	0.5	3.8	0.64	0.87	0.64	58.0
11	T1	All MCs	26	0.0	26	0.0	0.160	11.3	LOS A	0.5	3.8	0.64	0.87	0.64	58.4
12	R2	All MCs	37	5.7	37	5.7	0.160	15.2	LOS B	0.5	3.8	0.64	0.87	0.64	56.3
Approach			66	3.2	66	3.2	0.160	13.3	LOS A	0.5	3.8	0.64	0.87	0.64	57.2
All Vehicles			897	2.8	897	2.8	0.285	4.1	NA	1.1	7.9	0.24	0.34	0.24	70.2

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.

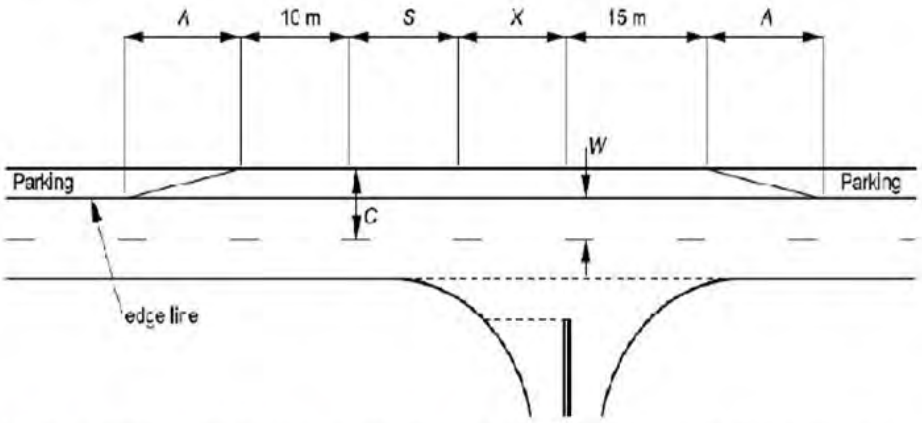
APPENDIX D
AUSTROADS BAR INTERSECTION LAYOUT

7.5 Urban Right-turn Treatments – Undivided Roads

7.5.1 Urban Basic Right-turn Treatment (BAR)

The BAR turn treatment shown in Figure 7.6 is applicable at intersections of two-lane urban roads and minor local roads where traffic volumes do not warrant a higher order treatment. It should provide sufficient pavement width for the design through vehicle to pass a vehicle waiting to turn right. The absolute minimum pavement width on a horizontal straight should be 6.0 m between the centreline and the edge of the pavement or kerb line while 6.5 m is the preferred minimum as it is adequate for heavy vehicles (excluding road trains) to pass right-turning vehicles.

Figure 7.6: Basic right-turn treatment (BAR) for a two-lane urban road



Notes. This diagram does not show any specific bicycle facilities. Where required bicycle facilities should be provided in accordance with this Part.

The dimensions of the treatment are defined thus:

W – Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.

C – On straights – 6.0 m minimum
– 6.5 m minimum for 19 m semi-trailers and B-doubles
– 7.0 m minimum for Type 1 and Type 2 road trains
On curves – widths as above + curve widening (based on widening for the design turning vehicle plus – widening for the design through vehicle).

$$A = \frac{0.5V(C-W)}{3.6}$$

Increase length A on tighter curves (e.g. where side friction demand is greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer, the minimum speed used to calculate A is 80 km/h.

V = Design speed of major road approach (km/h).

S = Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).

X = Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).

Source: Department of Main Roads (2006)[30].