STRATHEDEN PLANNING PROPOSAL 2021

PP-2021-7149

TRAFFIC IMPACT ASSESSMENT

CONTENTS:

1. Traffic Impact Assessment (SECA Solution)
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30 June 2019

P1235 BSA Stratheden Stud Rezoning

Bath Stewart Associate
P O Box 403
Tamworth NSW 2340

Attn: Sonya Vickery

Dear Sonya,

Re: Traffic Impact Assessment for the proposed residential subdivision rezoning, Oxley Vale, NSW

Further to our site visit and a review of the provided documentation for the proposed rural residential subdivision located off Manilla Road, Oxley Vale, we provide the following traffic impact assessment. This assessment has been prepared in accordance with the Austroads Guidelines and Section 2.3 of the RMS Guide to Traffic Generating Developments, which provides the structure for the reporting of key issues to be addressed when determining the impacts of traffic associated with a development. This guide indicates that the use of this format and checklist ensures that the most significant matters are considered by the relevant road authority.

The report has also taken into consideration the planning requirements outlined in the Tamworth Regional Development Control Plan 2010 and the Draft Tamworth Strategic Transport Model GTA Consultants 2016.

The proposed rezoning relates to land on the corner of Manilla Road and Browns Lane, Oxley Vale as shown in Figure 1 to follow. The subject site incorporates:

- Lots 1-5 in DP 997767,
- Lots 4 and 12 in DP 245544,
- Lots 3 and 5 in DP 209387,
- Lot 4 in DP 212658.

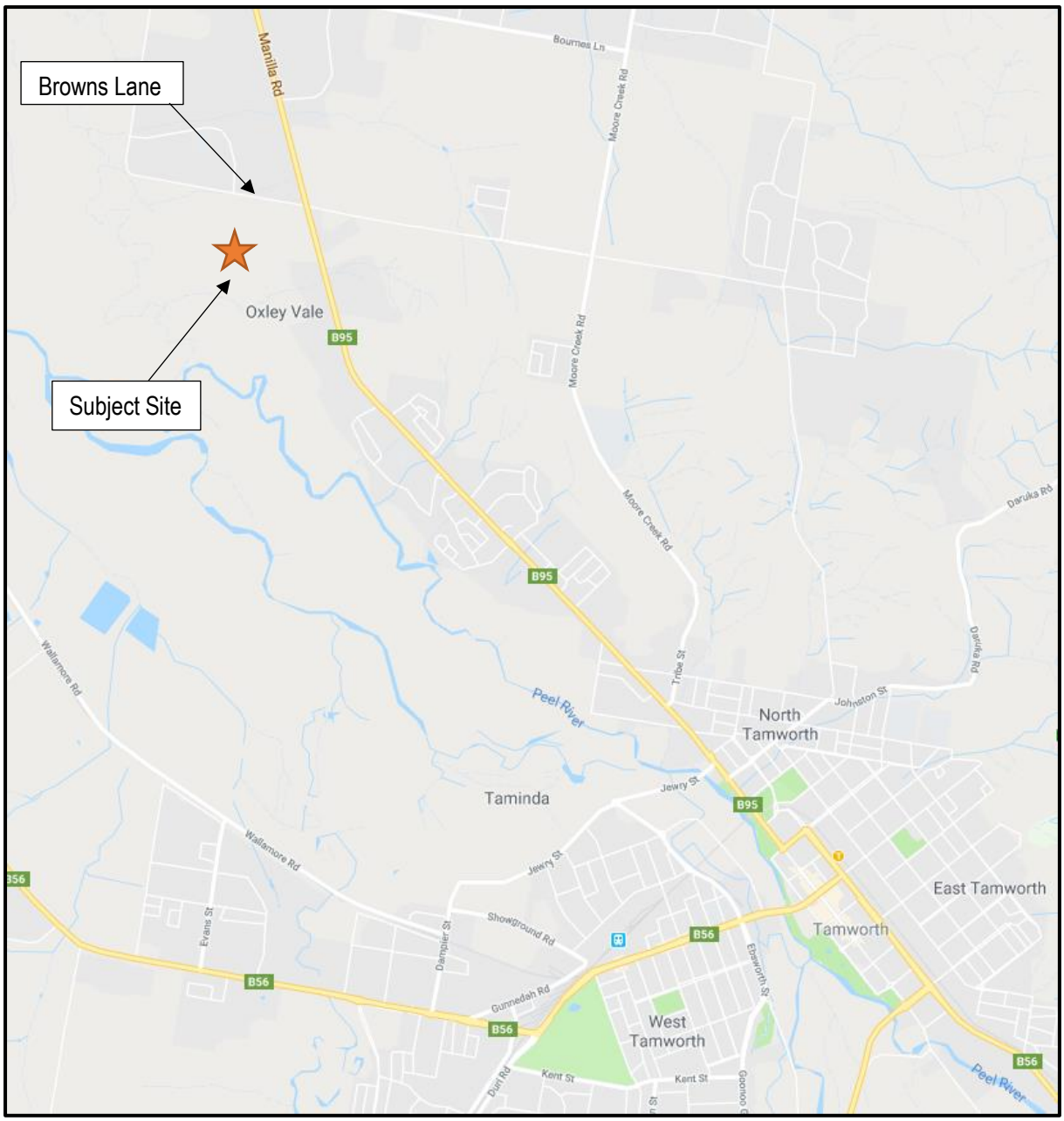


Figure 1 – Subject site in the context of the local road network

A summary of the key issues and their comments are provided below:

Item	Comment
Existing Situation	
2.1 Site Location and Access	The proposed rezoning relates to land located on the corner of Browns Lane and Manilla Road, Oxley Vale. The site is currently occupied by the Stratheden Stud horse agistment, with access to the site provided via an existing sealed driveway off Manilla Road and an informal access off Browns Lane. There is a further access to the subject site off Manilla Road, being an unsealed driveway located to the south of the Stratheden Stud access.
2.2.1 Road Hierarchy	**Manilla Road** is a state classified road (MR63) providing connection from Tamworth to areas in the north-west, including Manilla and Barraba. In the locality of the subject site it provides one lane of travel in each direction with a sealed surface in the order of 11 meters wide and no kerb or guttering. There are no street lights or pedestrian facilities, reflecting the existing limited development in the area. Manilla Road operates under the posted speed limit of 80km/hr, increasing to 100km/hr 180 metres to the north of Browns Lane. **Browns Lane** is a local collector road with an east-west orientation and provides the main connection for local traffic accessing the state road network (Manilla Road). To the west of Manilla Road, it provides a single lane of travel in each direction with a sealed pavement in the order of 7 meters wide with widening at the intersection to allow for turning movements. No street lighting or pedestrian footpaths are provided. The posted speed limit on Browns Lane passing the subject site is 80km/hr. Manilla Road connects with Browns Lane via a 4-way cross intersection, with Manilla Road having priority. There is no formal deceleration lane for left turns into Browns Lane from the north or south, however an informal shoulder provided within close proximity to Browns Lane allowing a driver to slow down and pass a turning vehicle. The width on the western leg of Browns Lane allows for 2 vehicles to hold adjacent to one another, to allow for both right and left turning movements to occur concurrently. Browns Lane to the west provides an unsealed surface which also widens significantly at the intersection with Manilla Road to improve the efficiency of turning movements. There is no line marking on Browns Lane in this location. Manilla Road is a state classified road under the control of RMS, whilst Browns Lane is a local road under the control of Tamworth Regional Council.
2.2.2 Current and Proposed Roadworks, Traffic Management Works and Bikeways	No road works are currently occurring in the vicinity of the subject site. No traffic management works are currently planned in the immediate vicinity of the subject site. The Draft Tamworth Strategic Transport Model completed by GTA Consultants on behalf of Tamworth Regional Council and RMS has identified the Browns Lane / Manilla Road intersection for upgrade to a roundabout as part of the future development of the land relating to this

<table>
<tr><th>Item</th><th>Comment</th></tr>
<tr><td></td><td>assessment (Stratheden Stud), in conjunction with the ongoing development of the Hills Plain Urban Release Area to the east of Manilla Road. Upgrading of this intersection is also identified in Council's Section 94 contributions plan, with a timing of 2021 proposed.

To the south of the site, the NSW Government is funding upgrades to Manilla Road between Tribe and Jewry streets, Tamworth. The works involve removing two roundabouts at the Jewry Street intersection and installing new traffic lights with pedestrian crossings at both Jewry Street and Tribe Street. Work is expected to start in the first half of 2019.

Due to the semi-rural nature of the area, there is generally a low demand for pedestrian or cyclist movements. There is no existing cycling infrastructure in the vicinity. Council Section 94 plan includes an allowance for cycleways along Manilla Road, with a delivery between 2013-2023.</td></tr>
<tr><td>2.3 Traffic Flows</td><td></td></tr>
<tr><td>2.3.1 Daily Traffic Flows</td><td>As part of the project work, Seca Solution collected traffic data at the intersection of Browns Lane and Manilla Road to determine the current road operation and traffic volumes along these roads. These surveys were completed during the afternoon (4:00pm to 6:00 pm) on Monday 25th June 2018 and the morning (7:00am to 9:15am) on Tuesday 26th June 2018, with the peak hours determined as 7:45am to 8:45am and 4:30pm to 5:30pm.

A summary of the current traffic flows during the peak hours is provided below in Table 1.

Table 1 – Peak hour traffic volumes

<table>
<tr><th>Location</th><th>Distribution</th><th>AM</th><th>PM</th></tr>
<tr><td rowspan="2">Manilla Road (South of Browns Lane)</td><td>Northbound</td><td>113</td><td>254</td></tr>
<tr><td>Southbound</td><td>271</td><td>157</td></tr>
<tr><td rowspan="2">Browns Lane (West of Manilla Road)</td><td>Eastbound</td><td>21</td><td>14</td></tr>
<tr><td>Westbound</td><td>8</td><td>21</td></tr>
</table>

Manilla Road to the south of Browns Lane has peak two-way volumes of 384 vehicles in the AM and 411 vehicles in the PM. The RMS Guide to Traffic Generating Developments provides advice on the capacity of urban roads based on peak hour flows per direction. Under the RMS Guidelines Manilla Road is currently operating at LoS B with less than 380 vehicles per direction in the peak hours (maximum 271 southbound in the AM).

Browns Lane is a collector road providing access to residential properties along its length, as well as the main link to Manilla Road. The RMS Guide provides performance standards for collector streets, based on environmental capacity, with an environmental goal of 300 vehicles per hour and a maximum of 500 vehicles per hour. Taking an average of the peak hour flows along Browns Lane gives 32 vehicles, which is well within the desired capacity.

RMS guidelines indicate that peak hours typically represent around 10% of the daily traffic flows. This would indicate that the daily traffic flows along</td></tr>
</table>

Item	Comment
	Manilla Road (south of Browns Lane) are in the order of 3,975 vehicles per day, whilst daily traffic flows along Browns Lane (west of Manilla Road) are in the order of 320 vehicles per day.
2.3.2 AADT	There is no AADT data available in the immediate locality of the subject site.
2.3.3 Daily Traffic Flow Distribution	In the AM, traffic flows on Manilla Road are predominantly southbound with the reverse occurring in the evening reflecting local residents travelling to/from work in Tamworth.
2.3.4 Vehicle Speeds	No speed surveys were completed as part of the survey work. Given the straight alignment of Manilla Road passing the subject site it is considered drivers would travel at or slightly above the posted speed limit.
2.3.5 Existing Site Flows	The proposed development site is currently operating as a horse agistment and stud business, with this use generating low traffic movements. Access is currently available off both Manilla Road and Browns Lane.
2.3.6 Heavy Vehicle Flows	There were minimal heavy vehicles recorded during the traffic surveys. In the AM peak there were 13 heavy vehicles recorded, equating to 3% of the total traffic flows through the intersection. A number of these related to school buses, including the 1 movement relating to Browns Lane. In the PM peak there were 20 heavy vehicles recorded, equating to just under 5% of the total traffic flows. All of these related to through movements along Manilla Road.
2.3.7 Current Road Network Operation	The intersection of Manilla Road and Browns Lane is well laid out, with good visibility on all approaches. Observations during the traffic surveys show that the intersection operates well with minimal delays and congestion. There are regular gaps in the flow of traffic along Manilla Road to allow for turning movements out of Browns Lane. In the case where through vehicles were required to pass a vehicle slowing to turn into Browns Lane (right in or left in) this occurred without needing to come to a complete stop, with sufficient width available to pass. During the traffic surveys these movements were observed to occur infrequently consistent with the relatively low demand for turning vehicles.
2.4 Traffic Safety and Accident History	A review of accident data provided by the RMS **(Attachment B)** indicates that no accidents have been recorded at the intersection of Manilla Road and Browns Lane, in the period between July 2012 and June 2017. The nearest accidents were recorded along Manilla Road, with one approximately 600 metres to the south of Browns Lane relating to a B-Double travelling southbound going off road, resulting in moderate injury and a further accident 350 metres to the north of Browns Lane involving a southbound car going off road into a tree. Given the good road alignment and low number of crashes it is considered that Manilla Road in the vicinity of the subject site operates in a safe and appropriate manner. The intersection of Browns Lane and Manilla Road

Item	Comment
	operates in a safe manner given the good visibility available for turning movements and the relatively low number of turning movements in/out of Browns Lane.
2.5 Parking Supply and Demand	
2.5.1 On-street Parking Provision	No demand for on-street parking was observed during the site work. There is limited development in the locality, with parking demands for each lot catered for on site.
2.5.2 Off-street Parking Provision	There is no-formal off-street parking in the general locality of the subject site. Given the size of the lots parking can be accommodated within individual holdings.
2.5.3 Current Parking Demand and Utilisation	No demand observed for on-street parking along Manilla Road or Browns Lane.
2.5.4 Short term set down or pick up areas	There are no formal set down or pick up areas in the vicinity of the site. A school bus was observed to use the informal verge to the north of Browns Lane (west of Manilla Road) to pick up students.
2.6 Modal Split	Given the rural nature of the area and the proximity to services, it is considered the vast majority of commuters travel to work via private vehicle, however school bus services are provided through the locality.
2.7 Public Transport	
2.7.1 Rail Station Locations	The nearest operating train station is in Tamworth 6.6 kilometres south-east of the subject site.
2.7.2 Bus Stops and Associated Facilities	There are no formal bus stops in the locality along Manilla Road or Browns Lane. School services are hail and ride to meet local demands.
2.7.3 Transport Services	There is limited public transport throughout the locality reflective of the rural nature of the area and the limited demand. Public buses are operated by Tamworth Buslines with Manilla to Tamworth Route 443 being the only service passing the subject site, providing two services in each direction per weekday with none on weekends.
2.8 Pedestrian Network	There are no pedestrian footpaths in the locality reflective of the rural nature of the area and low pedestrian demands.
2.9 Other Proposed Developments	A review of the Tamworth Regional Council DA Tracker shows there are no significant developments proposed in the immediate locality of the subject site. There is ongoing development of the Hills Plain Urban Release Area along Browns Lane to the east of Manilla Road.
The Development	
3.1.1 Nature of Development	The proposal allows for the rezoning of land pertaining to 815 Manilla Road, Oxley Vale and incorporating Lots 1-5 in DP 997767, Lots 4 and 12 in DP 245544, Lots 3 and 5 in DP 209387 and Lot 4 in DP 212658, to allow for residential development. The potential yield for the site will be in the

Item	Comment
	order of 1,100 lots, with the proposed layout plan provided in **Attachment A**. The development will be staged and constructed over a number of years in order to meet market demands. The implementation of this staging is currently undetermined. Given the size of the development it is proposed that in the long term access to the arterial road network (Manilla Road) would be provided via two intersections being: • A new intersection on Manilla Road in the location of the existing driveway access, • The intersection of Manilla Road and Browns Lane. As discussed above (Section 2.2.2) Council proposes the intersection of Manilla Road / Browns Lane to be upgraded to a roundabout. The Section 94 plan identifies an indicative timeframe of 2021 with no further clarification available at this point in time. These accesses have been assessed in conjunction with this proposal. A detailed assessment of the access options and associated Sidra modelling is provided in this report.
3.1.2 Access and Circulation Requirements	The layout of the subdivision will be designed in accordance with Council requirements to allow for two way vehicle movements throughout the site. All vehicles shall be able to access the external road network in a forward direction.
3.2 Access	As discussed above vehicle access to the arterial road network will be provided via two intersections which will allow for all turning movements into and out of the site onto Manilla Road. The layout of these intersections shall be dependent upon the staging of the development. The proposed layout also includes access streets off Browns Lane, with these allowing for an even distribution of development flows along the internal roads for the subdivision
3.2.1 Driveway Location	Internal driveway locations will be detailed in conjunction with individual development applications for each lot. They will be located to suit the internal site layout and will be designed in accordance with Council requirements and AS2890.
3.2.2 Sight Distances	Sight distance for the existing Browns Lane/Manilla Road intersection has been assessed in accordance with the Austroads Guide to Road Design Part 4A. The critical requirement in this location will be Safe Intersection Sight Distance (SISD), which requires sufficient distance for a driver on the major road to observe a vehicle on the minor road and decelerate if required to avoid a collision. For the posted speed limit of 80km/hr on Manilla Road a SISD of 183 metres is nominated in each direction out of Browns Lane. Manilla Road in the locality provides a straight horizontal and vertical alignment, with

Item	Comment
	visibility to the left and right being a minimum of 250 metres. As such, sight lines at this intersection satisfy the requirements of the Austroads Guide. The access driveway on Manilla Road also satisfies the above sight distance requirements, with a minimum of 250 metres again available in each direction. Browns Lane along the northern boundary of the site provides a straight horizontal and vertical road alignment, allowing for excellent visibility along its length. For the posted speed limit of 80km/hr along Browns Lane sight distance of 183 metres is required, which can be satisfied along the length of the site frontage.
3.2.3 Service Vehicle Access	There will be occasional demands for delivery vehicles within the site and these will be able to be accommodated within the road pavement. The internal design of the roads will be in accordance with the Council DCP which will cater for the swept path requirements for waste collection vehicles and the occasional delivery vehicle.
3.2.4 Queuing at entrance to site	Allowing for the distribution of traffic across multiple access points with the majority of inbound trips to be left turns there are no vehicle queues expected for this development. Vehicles exiting the site onto Browns Lane shall be distributed across four intersections. Any queues at the Manilla Road exit shall be contained within the site.
3.2.5 Comparison with existing site access	There are two existing access driveways located off Manilla Road, with a further access off Browns Lane. The layout of these reflect typical domestic access in the locality, with widths in the order of 3 metres upon entry and gated control provided. The existing southern access driveway on Manilla Road will be upgraded to form a new intersection allowing access to the development. The remaining two access driveways shall not be utilised. New intersections shall be constructed along Browns Lane to provide access to the internal roads for the subdivision.
3.2.6 Access to Public Transport	There is limited existing public transport in the locality. The development of this land and the Hills Plain Urban Release Area may see an opportunity for bus services to be extended.
3.3 Circulation	
3.3.1 Pattern of circulation	All vehicles will be able to enter and exit the site in a forward direction and travel along the internal roadways to access the residential lots. Roadways will allow for two-way movements.
3.3.2 Internal Road width	All internal roads are to be constructed in accordance with Council's adopted Engineering Standards and Guidelines.
3.3.3 Internal Bus Movements	The future road layout of the subdivision shall be designed to accommodate public transport services in accordance with Council requirements.
3.3.4 Service Area Layout	No dedicated service area required for this type of development.

Item	Comment
3.4 Parking	
3.4.1 Proposed Supply	The supply of parking for residences will be provided within each individual lot consistent with the DCP rate. As per typical residential subdivisions additional parking will be available on-street.
3.4.2 Authority Parking	Tamworth Regional Council DCP provides the following parking rates for single residential dwelling houses: • 2 spaces per dwelling, which shall be located behind the building line as set by Council. The design for the individual lots will be subject to separate Development Applications with parking to be addressed as part of these.
3.4.3 Parking Layout	Driveways and garages will be designed in accordance with Council DCP requirements.
3.4.4 Parking Demand	Normal parking demands will be accommodated on site in accordance with Council DCP requirements. Parking will be provided for the residential lots as per the DCP and additional peak parking demands can be accommodated on the internal roads as required.
3.4.5 Service Vehicle Parking	No dedicated service vehicle parking required on site. The occasional service vehicle will be able to park on the internal roads as required to service the individual dwellings within the site.
3.4.6 Pedestrian and Bicycle Facilities	Tamworth Council Guidelines indicate a road within a residential subdivision servicing 15 lots or more must include a constructed pedestrian footpath. There are no existing footpaths or cycling infrastructure in the locality reflecting its semi-rural nature. Given the proximity to the urban environment in Oxley Vale and Tamworth it is considered there will be minimal pedestrian demands external to the subdivision.
Traffic Assessment	
4.1 Traffic Generation	Standard traffic generation rates for low density residential development of this nature are provided in the updated technical direction published by the RMS (TDT2013/04a August 2013). For regional NSW, the guide provides a peak hour rate of 0.71 vehicles per dwelling in the AM peak and 0.78 vehicles per dwelling in the PM peak with 7.4 trips per day per dwelling. For the proposed subdivision of up to 1,100 residential lots, this provides: • 781 vehicle trips in the morning peak hour, • 858 vehicle trips in the afternoon peak hour and • 8,140 trips per day. This allows for full development of the site, with staging subject to market demands. The above vehicle trips will be distributed across the two intersections providing access to the development. Based on the site layout, the

Item	Comment
	following split of development traffic has been assigned to each intersection: • 650 lots to access the site via Browns Lane (59%) • 450 lots to access the site via the new southern Site Access (41%) The above gives the following traffic generation inbound/outbound during the AM and PM peaks, with a standard split for residential development of 20/80 inbound/outbound applied in the AM and the reverse in the PM. **Manilla Road / Browns Lane:** • AM = 462 trips (92 inbound / 370 outbound) • PM = 507 trips (406 inbound / 101 outbound) **Manilla Road / Site Access:** • AM = 320 trips (64 inbound / 256 outbound) • PM = 351 trips (281 inbound / 70 outbound)
4.1.1 Daily and Seasonal Factors	Limited daily and seasonal variation in traffic movements associated with the development, other than normal variation between workdays Monday to Friday and weekends.
4.1.2 Pedestrian Movements	The site is not located close to shops nor within easy walking distance of educational or commercial developments. As such pedestrian demands for the development are considered to be minimal.
4.2 Hourly distribution of trips	Typical residential development sees peak demands relating to the AM and PM peak periods, with the majority (80%) outbound in the morning with the opposite in the afternoon/evening.
4.2.1 Origin / destinations assignment	For this assessment it has been assumed the vast majority of vehicle movements will be to/from the south of the subdivision toward Tamworth, based on the location of the subject site and minimal infrastructure and population to the north and west. There is the opportunity for commuters to travel to the east along Browns Lane to access the growing residential area, with this also providing an alternative route to schools in North Tamworth, as well as Tamworth Hospital. Given the above, the following trip distribution has been allowed at the intersection of Manilla Road / Browns Lane: • 80% to/from the south, • 5% to/from the north and • 15% to/from the east. For the intersection of Manilla Road / Site access a trip distribution of: • 95% to/from the south and • 5% to/from the north has been applied.

Item	Comment
	The above distributions have been applied to the scenarios modelled, discussed in the Sidra Assessment to follow.
4.3 Impact on Road Safety	The existing Manilla Road / Browns Lane intersection saw no accidents in the 5 year period between 2012 and 2017. This intersection provides good visibility, allowing for the safe movements of vehicles in and out of the side road (Browns Lane) and the relatively low through movements on Manilla Road. The future upgrade of the Manilla Road/ Browns Lane intersection identified by Council shall provide additional capacity at this location, allowing for increased turn movements. This upgrade will be in accordance with Austroads and RMS requirements. The straight alignment of Manilla Road at the proposed upgraded site access (Lot 778) will allow for suitable sight distances and the construction of an intersection in accordance with Austroads requirements. This intersection shall provide an appropriate layout to ensure road safety is maintained. Given the above, it is considered that the development will have an acceptable impact on road safety.
4.4 Impact of Generated Traffic	
4.4.1 Impact on Daily Traffic Flows	Manilla Road is a state classified road operating at Level of Service B with daily flows in the order of 3,975 vehicles per day. This road can operate with peak hour flows of up to 1400vph per direction (LoS E). Allowing for peak hour flows to represent 10% of daily flows the additional hourly trips impacting Manilla Road could be in the order of 690 trips northbound in the PM. Hourly trips would therefore increase to an indicative level of 950 vehicles, below the critical LoS E. As the peak hour flows are acceptable is it concluded that the impact on daily traffic flows are within the capacity of this major urban road.
4.4.2 Peak Hour Impacts on Intersections	The key intersections that could be impacted upon by the development are: • Manilla Road and Browns Lane • Manilla Road / Site Access The operation of these intersections has been assessed using SIDRA intersection modelling as detailed below.
4.4.3 Impact of Construction Traffic	All construction work will be located on site with minimal interaction with the local road network. There will be a requirement for construction vehicles (light and heavy) to access the site with the majority of the construction work located on the site. Construction of the new site access shall require a Construction Traffic Management Plan outlining appropriate controls which shall be prepared by the contractor in conjunction with the WAD for the project.

Item	Comment
	The construction traffic will be less than the traffic associated with the finished development and as such is considered to have an acceptable impact upon the local road network.
4.4.4 Other Developments	There is further residential development approved to the east of the site off Browns Lane, with the proposed upgrade of Manilla Road/Browns Lane to a roundabout to accommodate ongoing development in this area.
4.5 Public Transport	
4.5.1 Options for improving services	No requirement to improve services.
4.5.2 Pedestrian Access to Bus Stops	Pedestrian access to bus stops can be provided in accordance with Council.
4.6 Recommended Works	
4.6.1 Improvements to Access and Circulation	Ensure access and internal roads / driveways are designed and constructed in accordance with Council requirements.
4.6.2 Improvements to External Road Network	The Site Access off Manilla Road shall be designed to accommodate the development flows, pending the future staging of the development. This is discussed further in the Access Assessment following.
4.6.3 Improvements to Pedestrian Facilities	Given the location of the development and its distance to shops and services there is no improvement required to pedestrian facilities along Manilla Road.
4.6.4 Effect of Recommended Works on Adjacent Developments	No works proposed that will impact on adjacent developments.
4.6.5 Effect of Recommended Works on Public Transport Services	None.
4.6.6 Provision of LATM Measures	None Required.
4.6.7 Funding	All internal site work will be funded by the developer.

Access Assessment

The key intersections of Manilla Road / Browns Lane and Manilla Road / Site Access have been assessed using SIDRA, based on the traffic data collected by Seca Solution and the traffic flows associated with the proposed development which have been calculated in Section 4.1 and assigned in accordance with Section 4.2.1 above.

As discussed in Section 3.1.1 the development will be staged, subject to market forces.

Existing Situation

Manilla Road / Browns Lane

Modelling for the existing Manilla Road / Browns Lane intersection has been undertaken to determine the current operation of this intersection. The results of the SIDRA analysis are presented below.

Table 2 – SIDRA results, AM/PM peak existing flows 2018 at the intersection of Manilla Road / Browns Lane

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	8.0 / 7.2	0.6 / 0.8
	Right Turn	A / A	7.5 / 7.1	
Browns Lane (Westbound)	Left Turn	A / A	7.7 / 7.4	0.4 / 0.3
	Through	A / A	7.3 / 7.5	
	Right Turn	A / A	8.6 / 8.7	
Manilla Road (Southbound)	Left Turn	A / A	7.3 / 7.2	0.1 / 0.1
	Right Turn	A / A	7.0 / 7.5	
Browns Lane (Eastbound)	Left Turn	A / A	8.5 / 7.7	0.7 / 0.4
	Through	A / A	7.4 / 7.5	
	Right Turn	A / A	8.7 / 8.9	

As seen above the intersection currently operates at the highest LoS for all turning movements, with minimal delays and congestion.

Future Situation – Roundabout Constructed

Council has identified this intersection for upgrade to a roundabout, allowing for the increases in traffic associated with the proposed development, as well as the future development within the Hills Plain Urban Release Area.

Council's traffic modelling (Tamworth Traffic Study, completed by GTA Consultants 2016) has determined the suitable treatment for a roundabout in this location allowing for the identified developments within the area. As the level of traffic associated with the proposed Stratheden Stud northern development (approximately 600 lots) is included in this assessment it is not considered necessary to model this roundabout intersection further with this upgrade suitable to provide for **Scenario 1** being the development of the northern lands first.

An extract of the traffic study is provided to follow, with the intersection configuration shown in Figure 2 and the Sidra results shown in Figure 3.

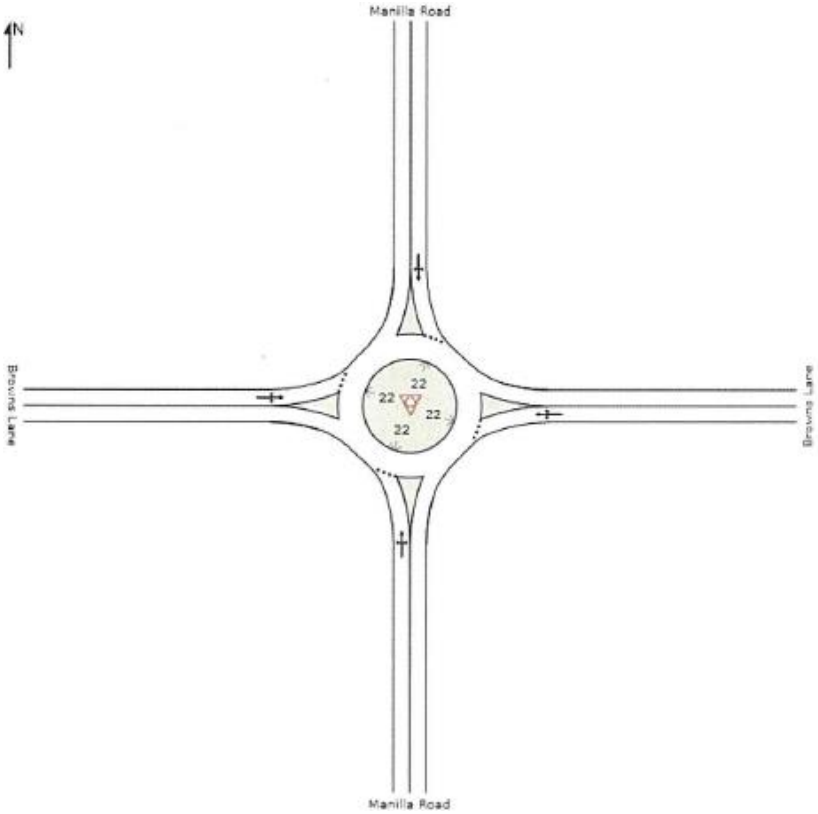


Figure 2 – Roundabout configuration for Manilla Road / Browns Lane identified in the Tamworth Traffic Study (GTA 2016)

Table 7.2: Manilla Road / Browns Lane - Intersection Analysis Summary

Time Period		2020		2030		2040	
		DOS	LOS	DOS	LOS	DOS	LOS
4-1	AM Peak Hour	0.22	LOS A	0.24	LOS A	0.26	LOS A
4-1	PM Peak Hour	0.22	LOS A	0.25	LOS A	0.28	LOS A

Figure 3 – Sidra results table for Manilla Road / Browns Lane from Tamworth Traffic Study (GTA 2016)

Interim Development (prior to roundabout upgrade) – Existing Intersection + Northern Development

To determine the capacity of the **existing** intersection of Manilla Road / Browns Lane to accommodate the development of the northern lands the intersection was modelled to include the development traffic only associated with this development, with no allowance for the balance of the Hills Plain URA. Based on the split of development traffic with primary access through this intersection (outlined in Section 4.1 and assigned as per Section 4.2.1) the following distribution of traffic has been assigned through this intersection.

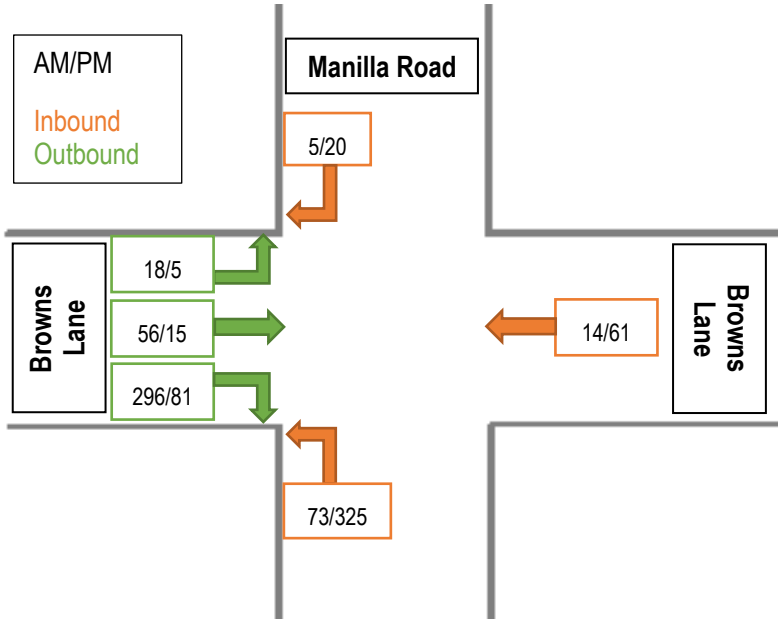


Figure 4 – Distribution of development traffic at Manilla Road / Browns Lane

The Sidra results for this scenario are detailed below.

Table 3 – SIDRA results, AM/PM peak 2018 plus 650 lots at the intersection of Manilla Road / Browns Lane

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	7.1 / 7.0	0.8 / 1.0
	Right Turn	A / A	7.6 / 7.3	
Browns Lane (Westbound)	Left Turn	A / A	7.8 / 7.4	0.9 / 3.2
	Through	A / A	7.8 / 11.0	
	Right Turn	A / A	9.2 / 9.2	
Manilla Road (Southbound)	Left Turn	A / A	7.6 / 9.6	0.4 / 2.0
	Right Turn	A / A	7.3 / 9.4	
Browns Lane (Eastbound)	Left Turn	A / A	9.1 / 7.8	27.5 / 5.4
	Through	A / A	10.4 / 9.3	
	Right Turn	A / A	12.3 / 11.9	

The above results show that the intersection would continue to operate at the existing LoS A with the additional traffic generated by the northern development, with negligible increases in average delays and queues for all movements.

It is noted however that the increased turning volumes would see upgrades to turn treatments required at this intersection under the Austroads Warrants. As such, despite the acceptable operation in terms of delays and queueing, the intersection requires upgrade based on the Austroads warrants with consideration of road safety implications.

Intersection Upgrade

A review of the Austroads Warrants has determined there is minimal additional capacity for turning movements into Browns Lane (west) at this intersection without triggering the need for upgrade to allow for higher treatments. This development would generate a demand for left turns into Browns Lane (west). There were 20 such movements recorded during the traffic survey. Applying the warrants an additional 15 left turns can be accommodated by the existing layout. This allows for 25 additional lots to utilise the access to Browns Lane (west) prior to upgrade.

Given this intersection is identified for upgrade to a roundabout under Council's Section 94 Contribution Plan it is not considered desirable/viable to provide for upgrades to turn treatments as a short-term solution to allow for development past 25 lots.

Once the upgrade to the intersection of Manilla Road / Browns Lane to a roundabout is undertaken, traffic associated with the northern lands (650 lots) can be accommodated.

Southern Development – Manilla Road / Site Access

Allowing for the development of the southern land the staging for this has been assessed based on the development of a primary access to Manilla Road from Lot 778.

The following scenarios have been assessed:

1. Operation of Manilla Road / Site Access intersection with partial development (450 lots)
2. Operation of Manilla Road / Site Access intersection with full development (450 lots plus northern lands accessing via Browns Lane).
3. Operation of Manilla Road / Site Access for future design year (2028) allowing for background growth along Manilla Road.
4. Operation of Manilla Road / Site Access for future design year (2028) allowing for other developments.

Operation of proposed Manilla Road / Site Access intersection, with partial development (450 lots).

This scenario allows for staging of the development to see the southern area developed prior to the northern area, with allowance for traffic generated by lots that shall have primary access via the Manilla Road / Site Access intersection. Based on the split of development traffic with primary access through this intersection (outlined in Section 4.1 and assigned as per Section 4.2.1) the following distribution of traffic has been assigned.

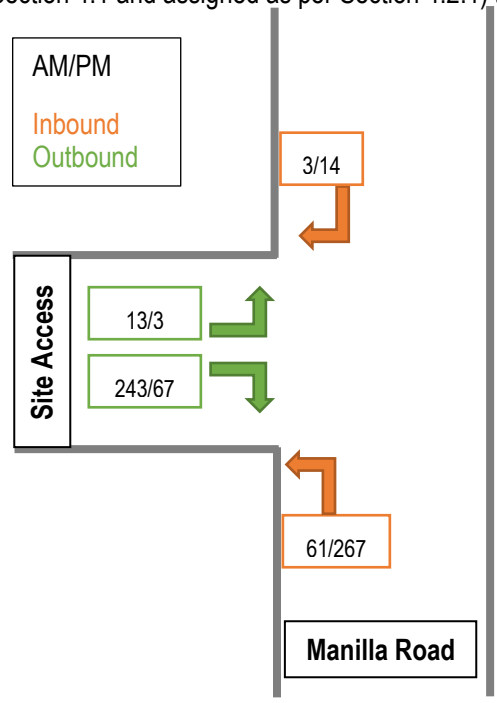


Figure 5 – Distribution of development traffic at Manilla Road / Site Access with partial development

The above traffic volumes were added to the existing through movements along Manilla Road and analysed using Sidra.

The road layout at the existing driveway access in this location allows no provision for through traffic to pass a turning vehicle, with no turn treatments provided and minimal shoulder width available. The required layout to accommodate the split of development traffic through the proposed Manilla Road / Site Access intersection has been assessed based on a review of the Austroads Warrants (Austroads Guide to Road Design 2017 - Part 6, Figure 2.2.6). Using the above development flows in Figure 5 it has been determined that the intersection will require minimum AUL and CHR(S) turn treatments at this intersection based on:

Left Turn: Q_L= 267, Q_M= 254 (Off chart, extrapolating would require an AUL given the high volume of left turns)

Right Turn: Q_R= 14, Q_M= 678 (Shown below ●)

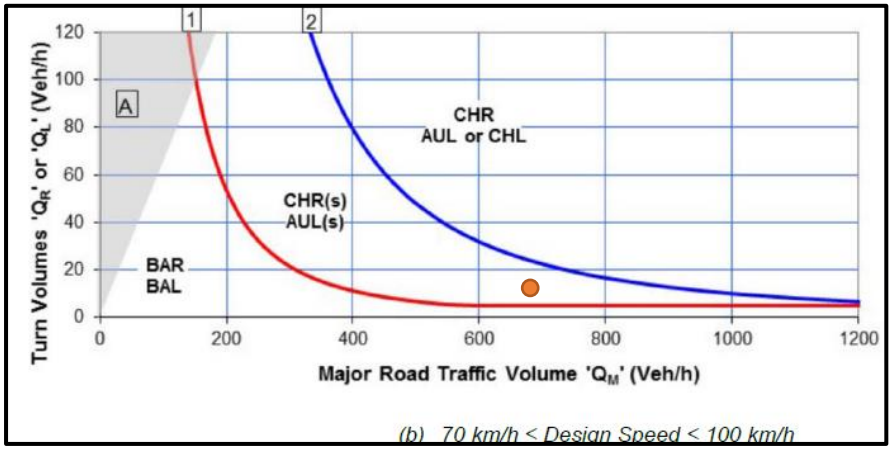


Figure 6 – Austroads Warrants

The Sidra assessment has been modelled to reflect these turn treatments. The results for this scenario are detailed below.

Table 4 – SIDRA results, AM/PM peak existing plus partial development 2018 at the intersection of Manilla Road / Site Access

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	7.0 / 7.0	0.0 / 0.0
	Approach	A / A	2.5 / 3.6	
Manilla Road (Southbound)	Right Turn	A / A	7.3 / 9.1	0.2 / 1.2
	Approach	A / A	0.1 / 1.1	
Site Access	Left Turn	A / A	5.2 / 5.5	9.0 / 2.3
	Right Turn	A / A	7.1 / 7.5	

The above results show that the intersection will operate at LoS A allowing for the traffic generated by the development.

Operation of Manilla Road / Site Access intersection with full development

This scenario is based on the premise that the intersection of Browns Lane has been upgraded to a roundabout and that the northern lands (650 lots) have been developed. The balance of the Hills Plain URA **has not** been released in this scenario. This therefore sees an increase in through movements along Manilla Road passing this southern site access associated with the northern lands traffic.

The following distribution of traffic has been assigned:

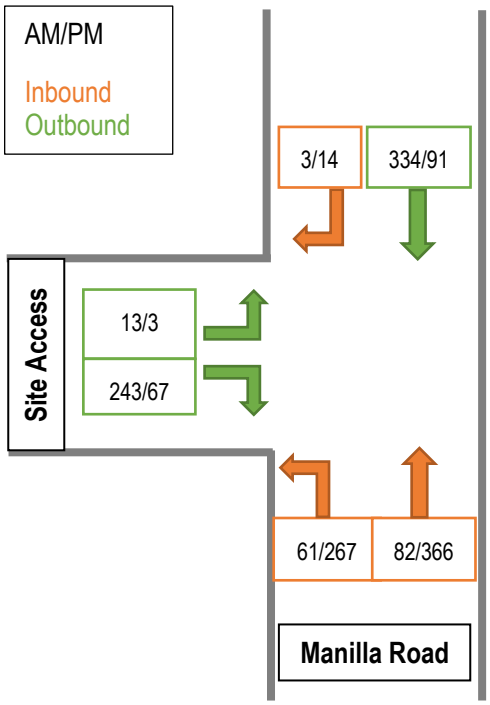


Figure 7 – Distribution of development traffic at Manilla Road / Site Access allowing for full development

It is noted that the increase in traffic flows along Manilla Road sees a full CHR turn treatment required at this intersection under the Austroads Warrants, as well as the previously identified AUL.

The Sidra results for this scenario are detailed to follow.

Table 5 – SIDRA results, AM/PM peak existing plus full development 2018 at the intersection of Manilla Road / Site Access

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	7.0 / 7.1	0.0 / 0.0
	Approach	A / A	1.7 / 2.3	
Manilla Road (Southbound)	Right Turn	A / A	7.9 / 13.0	0.2 / 2.4
	Approach	A / A	0.1 / 1.5	
Site Access	Left Turn	A / A	7.0 / 7.4	16.9 / 4.1
	Right Turn	A / A	12.6 / 12.4	

The above results show that the intersection will operate at LoS A allowing for the traffic generated by the whole of development. The additional through traffic for vehicles travelling to/from Browns Lane sees delays and queuing increase but remain at the highest LoS.

Operation of Manilla Road / Site Access for future design year (2028) allowing for background growth along Manilla Road

Full development flows, plus an allowance for 3% background growth per annum along Manilla Road through to 2028. Distribution as per previous Figure 7.

As per normal RMS requirements, the intersection was then assessed allowing for background growth, with a conservative 3% per annum allowed for along Manilla Road to 2028. The results of the SIDRA assessment for the future design year are shown below.

Table 6 – SIDRA results, AM/PM peak full development plus background growth to 2028 at the intersection of Manilla Road / Site Access

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	7.0 / 7.1	0.0 / 0.0
	Approach	A / A	1.4 / 2.0	
Manilla Road (Southbound)	Right Turn	A / A	8.5 / 17.6	0.3 / 4.4
	Approach	A / A	0.0 / 2.2	
Site Access	Left Turn	A / A	12.2 / 10.4	28.2 / 6.6
	Right Turn	B / B	22.0 / 19.9	

The SIDRA analysis above shows that the intersection of Manilla Road / Site Access can continue to operate to a satisfactory level of service with acceptable delays and congestion for the future design year of 2028. The turning movements out of the Site Access shall see increases in delays as a result of the high background growth applied for through movements, however these remain within acceptable limits.

Operation of Manilla Road / Site Access for future design year (2028) allowing for other developments

This scenario allows for increased traffic on Manilla Road associated with the full development of the URA. Applying the traffic scenario detailed in the Tamworth Traffic Study traffic, 1900 lots would access Manilla Road at the Browns Lane intersection (600 Stratheden lots plus 1300 Hills Plain lots).

Allowing for traffic generation in accordance with the RMS Guide and applying a split of 5% to/from north, 95% to/from south would see the following additional traffic along Manilla Road south of Browns Lane:

AM = 167 northbound / 664 southbound

PM = 730 northbound / 183 southbound

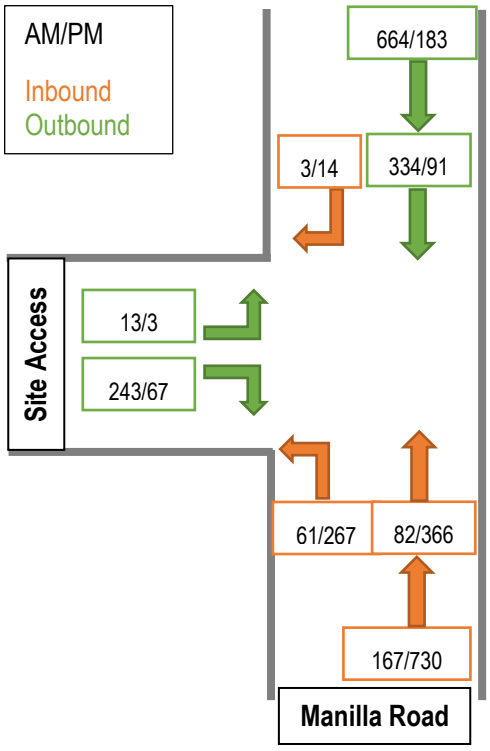


Figure 8 – Distribution of development traffic at Manilla Road / Site Access allowing for other developments

Allowing for the above distribution of traffic, with no additional background growth factor applied gives the following operation for the intersection of Manilla Road / Site Access.

Table 7 – SIDRA results, AM/PM peak proposed development plus other developments at the intersection of Manilla Road / Site Access

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / F	7.0 / 7.8	0.0 / 0.0
	Approach	A / F	1.1 / 2.2	
Manilla Road (Southbound)	Right Turn	A / F	11.8 / 154.6	0.8 / 266.6
	Approach	A / F	0.1 / 83.1	
Site Access	Left Turn	F / F	2110 / 1560	886.2 / 245.8
	Right turn	F / F	2123 / 1596	

The SIDRA analysis above shows that the intersection of Manilla Road and the site access will fail as a result of the large increase in traffic associated with the Hills Plain development.

The Sidra assessment was then modified to accommodate these future traffic demands. The indicative intersection layout was determined as being a roundabout as shown in Figure 9 below.

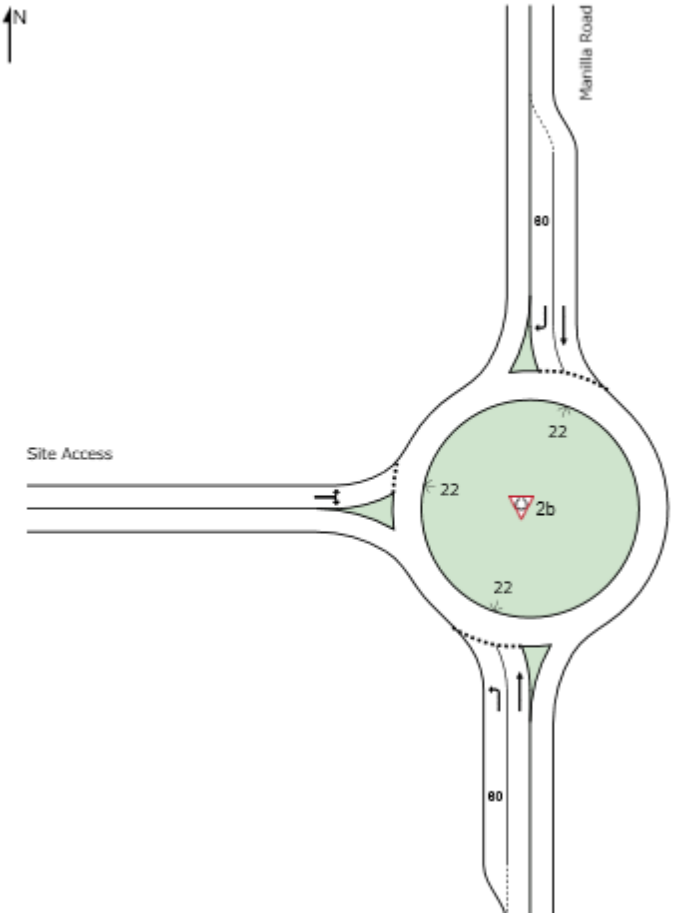


Figure 9 – Required roundabout configuration at Manilla Road / Site Access to accommodate Other Developments

The high volume of through movements at this intersection associated with traffic accessing the Manilla Road / Browns Lane intersection sees demand for additional lanes on Manilla Road to separate turning movements and minimise queuing and delays to through traffic.

The Sidra results are provided below.

Table 8 – SIDRA results, AM/PM peak proposed development plus other developments at the intersection of Manilla Road / Site Access with roundabout upgrade

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
Manilla Road (Northbound)	Left Turn	A / A	5.8 / 5.9	9.0 / 83.9
	Approach	A / A	6.1 / 6.2	
Manilla Road (Southbound)	Right Turn	A / A	12.4 / 11.4	175.7 / 15.6
	Approach	B / A	14.6 / 6.6	
Site Access	Left Turn	A / B	7.6 / 25.9	10.0 / 10.9
	Right turn	A / C	13.0 / 31.3	

It can be seen that with an upgraded roundabout layout the intersection shall be able to accommodate the traffic flows associated with the full development of the URA.

Separate to the capacity of the intersections to accommodate the URA and southern land development, based on the information provided in the Draft Tamworth Traffic Study, traffic volumes on Manilla Road in the vicinity of the subject site are approaching mid-block capacity. There is no indication in the S94 plan of any road duplication in this corridor.

Site Photos

Photo 1 – Cross section of Manilla Road at intersection with Browns Lane, looking north

Photo 2 - Cross section of Manilla Road at intersection with Browns Lane, looking south

Photo 3 – Typical cross section of Browns Lane (west of Manilla Road), looking east

Photo 4 – Typical cross section of Browns Lane (west of Manilla Road), looking west

Conclusion

From the above assessment and the review of the proposal and associated plans against the requirements of the RMS Guide to Traffic Generating Developments and Austroads Guide to Traffic Management, it is considered that the proposed rezoning should have no objections raised on traffic and access grounds.

The potential for additional traffic movements generated by a future 650 lot residential development associated with lands previously identified in the Tamworth Traffic Study and S94 Contribution Plan have been taken into consideration in nominated road upgrades. The opportunity to develop a further 450 lots, being the southern end of the subject site, has been assessed allowing for an upgraded site access onto Manilla Road.

The staging of the land release has been considered in several different scenarios which ultimately require the southern site access upgrade to be to a roundabout standard due to the Hills Plain URA to the north. An interim option would see various levels of turn treatment necessary to accommodate the various scenarios.

Due to the current layout of the Browns Lane/Manilla Road intersection the need for turn treatments restricts initial development to approximately 25 lots before upgrades are required. The cost of these upgrades would not be considered feasible given that the intersection is already the subject of S94 contributions and Council funding.

Low traffic flows along Browns Lane allow for the development to connect as proposed.

The rezoning can meet the requirements of the Development Control Plan in relation to traffic, parking and access as well as the overall planning for the subject site.

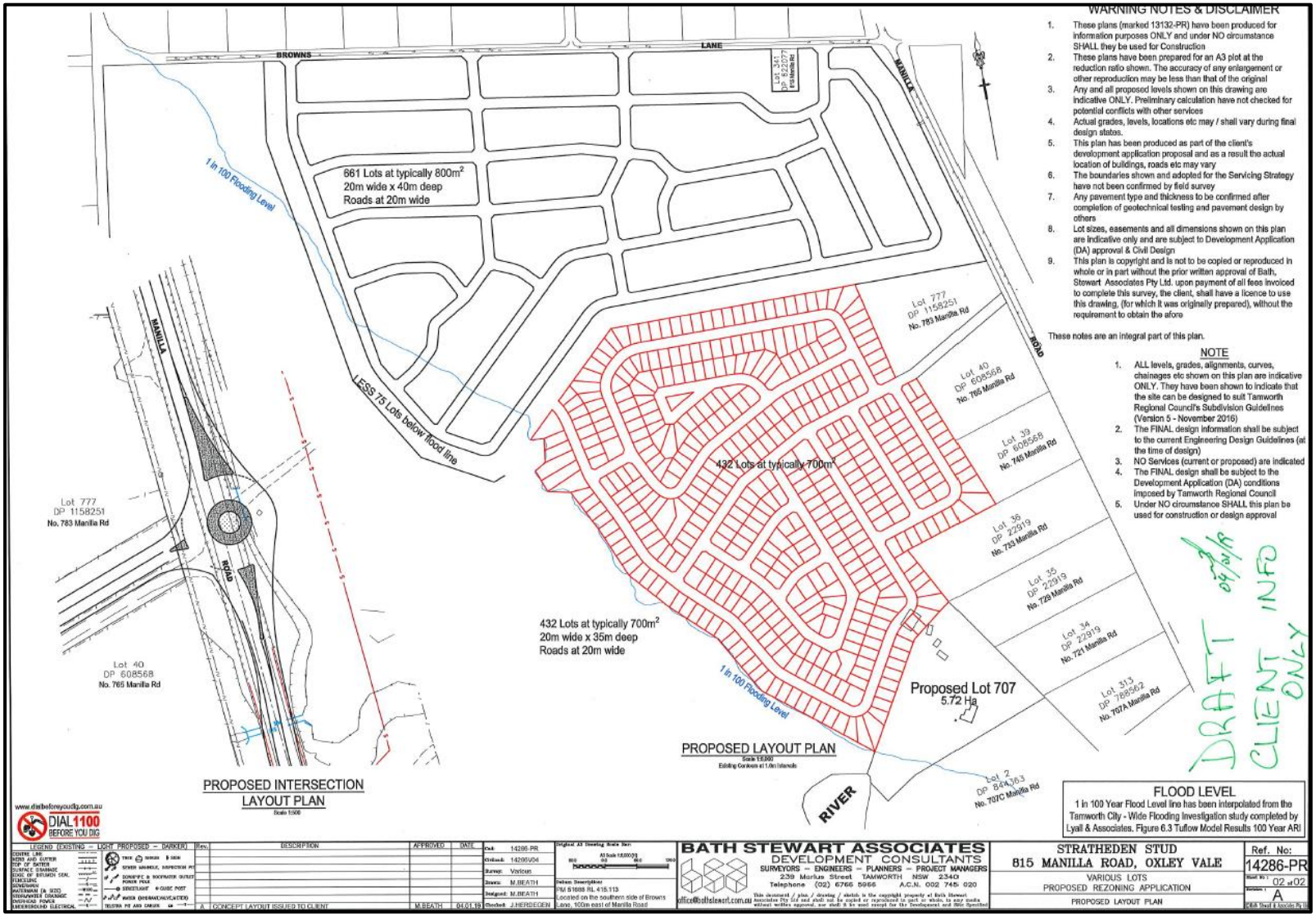
Please feel free to contact our office on 4032 7979, should you have any queries.

Yours sincerely,

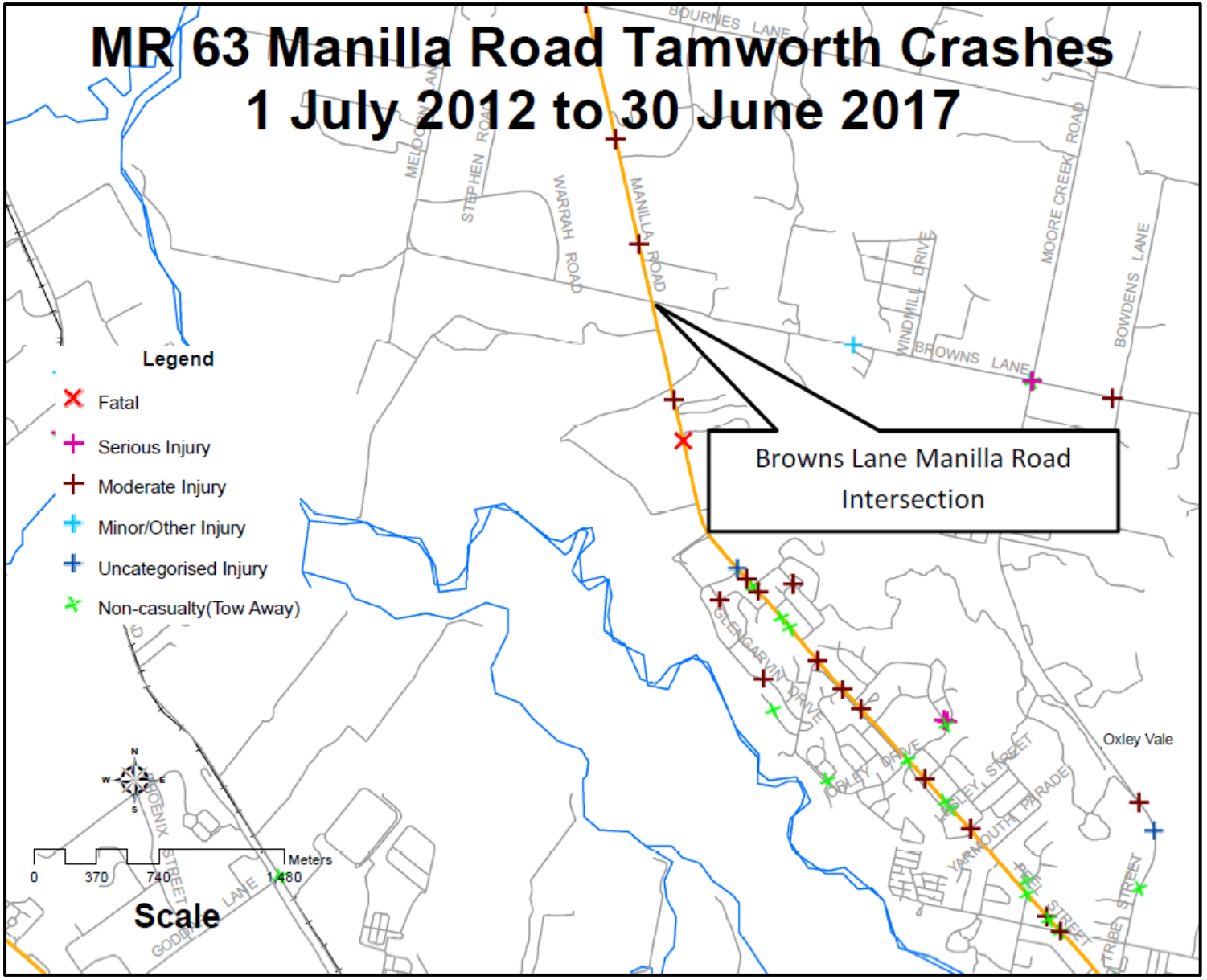
Tyler Neve
Traffic Engineer

Attached:
A – Site Plan
B – Accident Data
C – Survey Data
D – Sidra Results

Attachment A Site Plan



Attachment B RMS Accident Data



Summary Crash Report

Transport for NSW — Centre for Road Safety

# Crash Type		
Car Crash	1	50.0%
Light Truck Crash	0	0.0%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	1	50.0%
'Heavy Truck Crash	*(1)*	*(50.0%)*
Bus Crash	0	0.0%
"Heavy Vehicle Crash	*(1)*	*(50.0%)*
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	0	0.0%
Non intersection	2	100.0%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	2	100.0%
Multi Vehicle	0	0.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	2	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	0	0.0%
Fatigue	0	0.0%

Weather		
Fine	2	100.0%
Rain	0	0.0%
Overcast	0	0.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	0	0.0%
Dry	2	100.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	1	50.0%
Dusk	0	0.0%
Darkness	1	50.0%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	1	50.0%
Off road on straight, hit object	1	50.0%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	1	50.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	0	0.0%	100 km/h zone	1	50.0%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less		~ School Travel Time Involvement		
	0	0.0%		0	0.0%

Day of the Week												
Monday	0	0.0%	Wednesday	0	0.0%	Friday	0	0.0%	Sunday	0	0.0%	WEEKEND	1	50.0%
Tuesday	1	50.0%	Thursday	0	0.0%	Saturday	1	50.0%	WEEKDAY	1	50.0%			

CRASHES	2	
Fatal	0	0.0%
Serious inj.	0	0.0%
Moderate inj.	2	100.0%
Minor/Other inj.	0	0.0%
Uncategorised inj.	0	0.0%
Non-casualty	0	0.0%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	1	50.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	1	50.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark	
1	of	1	in Dark 100.0%

CASUALTIES	2	
Killed	0	0.0%
Seriously inj.	0	0.0%
Moderately inj.	2	100.0%
Minor/Other inj.	0	0.0%
Uncategorised inj.	0	0.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
1	2016	1
1	2014	1

McLean Periods		%	Week
A	0	0.0%	17.9%
B	0	0.0%	7.1%
C	0	0.0%	17.9%
D	1	50.0%	3.5%
E	0	0.0%	3.6%
F	0	0.0%	10.7%
G	0	0.0%	7.1%
H	0	0.0%	7.1%
I	1	50.0%	12.5%
J	0	0.0%	10.7%

#Holiday Periods												
New Year	0	0.0%	Easter	0	0.0%	Queen's BD	0	0.0%	Christmas	0	0.0%	Easter SH	0	0.0%	Sept./Oct. SH	0	0.0%
Aust. Day	0	0.0%	Anzac Day	0	0.0%	Labour Day	0	0.0%	January SH	0	0.0%	June/July SH	0	0.0%	December SH	0	0.0%

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed	Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors	S	F
Northern Region																											
Tamworth Regional LGA																											
Hallsville																											
Manilla Rd																											
1103212	P	21/05/2016	Sat	14:30	350	m	N BROWNS LANE	2WY	STR	Fine	Dry	100	1	CAR	M75	S in MANILLA RD	100	Proceeding in lane	MC	0	0	1	0	0			
E61471359								RUM	73	Off rd rght => obj				Tree/bush													
Oxley Vale																											
Manilla Rd																											
1023041	P	01/04/2014	Tue	00:45		at	NUMBER 766 HN	2WY	STR	Fine	Dry	80	1	BDBL	M29	S in MANILLA RD	80	Proceeding in lane	MC	0	0	1	0	0			
E54490761								RUM	70	Off road to left																	

Report Totals: Crashes: 2 Fatal Crashes(FC): 0 Serious Injury Crashes(SC):0 Moderate Injury Crashes(MC): 2 Minor/Other Injury Crashes(OC): 0 Uncategorised Injury Crashes(UC): 0 Non-Casualty Crashes(NC): 0

Killed(K): 0 Seriously Injured(S): 0 Moderately Injured(M): 2 Minor/Other Injured(O): 0 Uncategorised Injured(U): 0

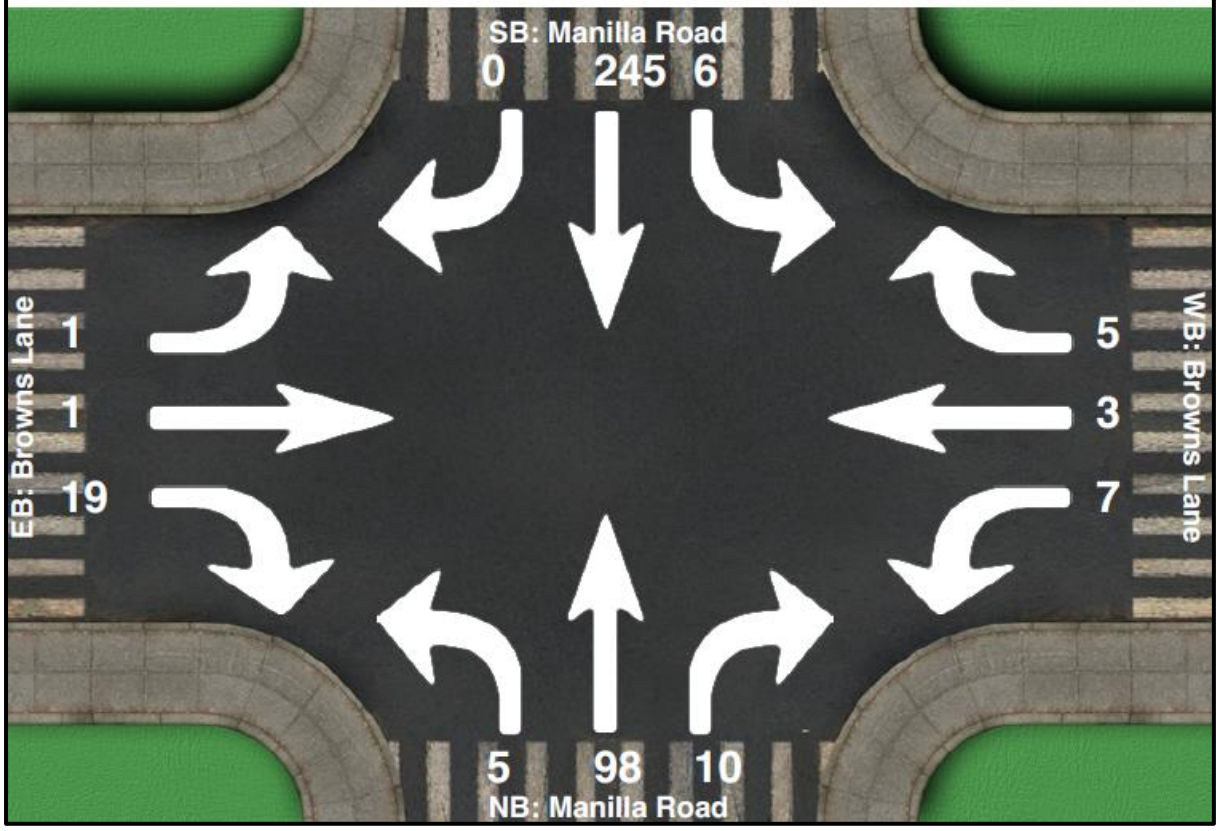
Crashid dataset SECA Browns Lane Manila Road Crashes 1 July 2012 to 30 June 2017
Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data.
Reporting yrs 1996-2004 and 2017 onwards contain uncategorised inj crashes.

Attachment C Survey Data

AM Peak

Intersection Peak Hour

Location:	Manilla Road at Browns Lane, Tamworth
GPS Coordinates:	
Date:	2018-06-26
Day of week:	Tuesday
Weather:	Sunny
Analyst:	TN



Intersection Peak Hour

07:45 - 08:45

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	6	245	0	7	3	5	5	98	10	1	1	19	400
Factor	0.50	0.90	0.00	0.58	0.38	0.62	0.62	0.91	0.62	0.25	0.25	0.79	0.93
Approach Factor	0.92			0.62			0.88			0.75			

Peak Hour Vehicle Summary

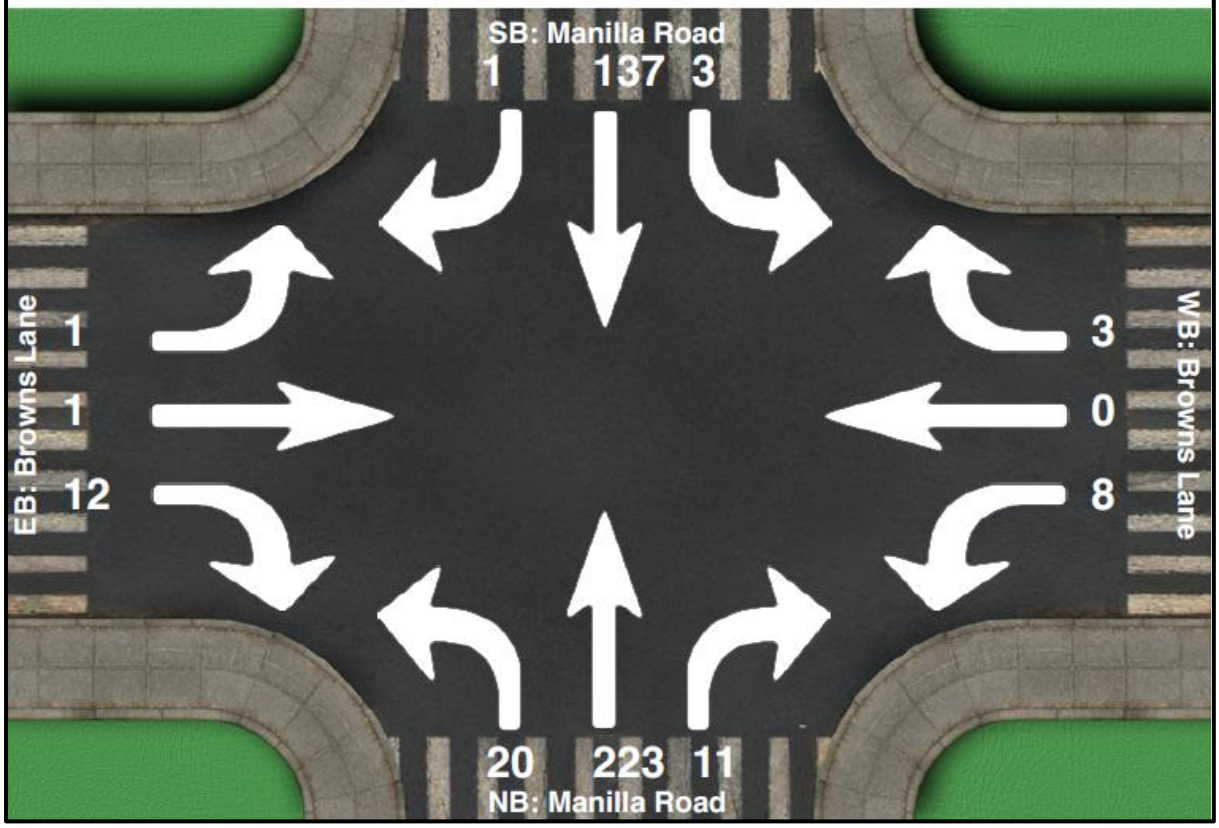
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	5	235	0	7	3	5	4	91	9	0	1	19	379
Truck	0	6	0	0	0	0	0	7	1	0	0	0	14
Bus	1	4	0	0	0	0	1	0	0	1	0	0	7

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

PM Peak

Location: Manilla Road at Browns Lane, Tamworth
GPS Coordinates:
Date: 2018-06-25
Day of week: Monday
Weather: Sunny
Analyst: TN



Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	3	137	1	8	0	3	20	223	11	1	1	12	420
Factor	0.38	0.90	0.25	0.50	0.00	0.38	0.62	0.86	0.69	0.25	0.25	0.75	0.88
Approach Factor	0.90			0.69			0.85			0.70			

Peak Hour Vehicle Summary

Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	3	125	1	8	0	3	19	216	11	1	1	12	400
Truck	0	9	0	0	0	0	1	6	0	0	0	0	16
Bus	0	3	0	0	0	0	0	1	0	0	0	0	4

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Attachment D Sidra Results

Manilla Rd / Browns Lane

MOVEMENT SUMMARY

Site: 1a [2018 AM Existing Browns Lane]

Manilla Road / Browns Lane
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	5	20.0	0.064	8.0	LOS A	0.1	0.6	0.09	0.08	0.09	71.4
2	T1	103	0.0	0.064	0.1	LOS A	0.1	0.6	0.09	0.08	0.09	79.1
3	R2	11	0.0	0.064	7.5	LOS A	0.1	0.6	0.09	0.08	0.09	76.4
Approach		119	0.9	0.064	1.1	NA	0.1	0.6	0.09	0.08	0.09	78.5
East: Browns Lane												
4	L2	7	0.0	0.016	7.7	LOS A	0.1	0.4	0.36	0.62	0.36	72.3
5	T1	3	0.0	0.016	7.3	LOS A	0.1	0.4	0.36	0.62	0.36	68.3
6	R2	5	0.0	0.016	8.6	LOS A	0.1	0.4	0.36	0.62	0.36	69.6
Approach		16	0.0	0.016	7.9	LOS A	0.1	0.4	0.36	0.62	0.36	70.9
North: Manilla Road												
7	L2	6	16.7	0.140	7.3	LOS A	0.0	0.1	0.00	0.02	0.00	74.5
8	T1	258	4.1	0.140	0.0	LOS A	0.0	0.1	0.00	0.02	0.00	79.9
9	R2	1	0.0	0.140	7.0	LOS A	0.0	0.1	0.00	0.02	0.00	75.6
Approach		265	4.4	0.140	0.2	NA	0.0	0.1	0.00	0.02	0.00	79.8
West: Browns Lane												
10	L2	1	100.0	0.029	8.5	LOS A	0.1	0.7	0.38	0.67	0.38	62.4
11	T1	1	0.0	0.029	7.4	LOS A	0.1	0.7	0.38	0.67	0.38	67.8
12	R2	20	0.0	0.029	8.7	LOS A	0.1	0.7	0.38	0.67	0.38	70.8
Approach		22	4.8	0.029	8.7	LOS A	0.1	0.7	0.38	0.67	0.38	70.4
All Vehicles		422	3.2	0.140	1.2	NA	0.1	0.7	0.06	0.09	0.06	78.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1a [2018 PM Existing Browns Lane]

Manilla Road / Browns Lane
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	21	5.0	0.142	7.2	LOS A	0.1	0.8	0.04	0.08	0.04	75.2
2	T1	235	3.1	0.142	0.0	LOS A	0.1	0.8	0.04	0.08	0.04	79.3
3	R2	12	0.0	0.142	7.1	LOS A	0.1	0.8	0.04	0.08	0.04	76.6
Approach		267	3.1	0.142	0.9	NA	0.1	0.8	0.04	0.08	0.04	78.8
East: Browns Lane												
4	L2	8	0.0	0.011	7.4	LOS A	0.0	0.3	0.26	0.60	0.26	72.5
5	T1	1	0.0	0.011	7.5	LOS A	0.0	0.3	0.26	0.60	0.26	68.5
6	R2	3	0.0	0.011	8.7	LOS A	0.0	0.3	0.26	0.60	0.26	69.8
Approach		13	0.0	0.011	7.7	LOS A	0.0	0.3	0.26	0.60	0.26	71.7
North: Manilla Road												
7	L2	3	0.0	0.081	7.2	LOS A	0.0	0.1	0.01	0.02	0.01	76.6
8	T1	144	8.8	0.081	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	79.8
9	R2	1	0.0	0.081	7.5	LOS A	0.0	0.1	0.01	0.02	0.01	75.5
Approach		148	8.5	0.081	0.2	NA	0.0	0.1	0.01	0.02	0.01	79.7
West: Browns Lane												
10	L2	1	0.0	0.020	7.7	LOS A	0.1	0.4	0.41	0.67	0.41	67.8
11	T1	1	0.0	0.020	7.5	LOS A	0.1	0.4	0.41	0.67	0.41	67.7
12	R2	13	0.0	0.020	8.9	LOS A	0.1	0.4	0.41	0.67	0.41	70.7
Approach		15	0.0	0.020	8.7	LOS A	0.1	0.4	0.41	0.67	0.41	70.4
All Vehicles		443	4.8	0.142	1.1	NA	0.1	0.8	0.05	0.09	0.05	78.7

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 1a [2018 AM Browns Lane + Development]

Manilla Road / Browns Lane
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	82	1.3	0.105	7.1	LOS A	0.1	0.8	0.07	0.29	0.07	74.3
2	T1	103	0.0	0.105	0.1	LOS A	0.1	0.8	0.07	0.29	0.07	77.4
3	R2	11	0.0	0.105	7.6	LOS A	0.1	0.8	0.07	0.29	0.07	74.9
Approach		196	0.5	0.105	3.4	NA	0.1	0.8	0.07	0.29	0.07	76.1
East: Browns Lane												
4	L2	7	0.0	0.035	7.8	LOS A	0.1	0.9	0.41	0.66	0.41	72.3
5	T1	18	0.0	0.035	7.8	LOS A	0.1	0.9	0.41	0.66	0.41	68.2
6	R2	5	0.0	0.035	9.2	LOS A	0.1	0.9	0.41	0.66	0.41	69.6
Approach		31	0.0	0.035	8.1	LOS A	0.1	0.9	0.41	0.66	0.41	69.8
North: Manilla Road												
7	L2	6	16.7	0.144	7.6	LOS A	0.1	0.4	0.02	0.03	0.02	74.3
8	T1	258	4.1	0.144	0.0	LOS A	0.1	0.4	0.02	0.03	0.02	79.7
9	R2	6	0.0	0.144	7.3	LOS A	0.1	0.4	0.02	0.03	0.02	75.3
Approach		271	4.3	0.144	0.4	NA	0.1	0.4	0.02	0.03	0.02	79.5
West: Browns Lane												
10	L2	20	5.3	0.560	9.1	LOS A	3.9	27.5	0.58	0.93	0.91	64.6
11	T1	60	0.0	0.560	10.4	LOS A	3.9	27.5	0.58	0.93	0.91	65.0
12	R2	332	0.0	0.560	12.3	LOS A	3.9	27.5	0.58	0.93	0.91	68.7
Approach		412	0.3	0.560	11.9	LOS A	3.9	27.5	0.58	0.93	0.91	68.1
All Vehicles		908	1.5	0.560	6.5	NA	3.9	27.5	0.30	0.51	0.45	73.4

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 1a [2018 PM Browns Lane + Development]

Manilla Road / Browns Lane
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	363	0.3	0.326	7.0	LOS A	0.1	1.0	0.02	0.39	0.02	73.9
2	T1	235	3.1	0.326	0.0	LOS A	0.1	1.0	0.02	0.39	0.02	76.9
3	R2	12	0.0	0.326	7.3	LOS A	0.1	1.0	0.02	0.39	0.02	74.4
Approach		609	1.4	0.326	4.3	NA	0.1	1.0	0.02	0.39	0.02	75.1
East: Browns Lane												
4	L2	8	0.0	0.132	7.4	LOS A	0.5	3.2	0.52	0.78	0.52	70.8
5	T1	65	0.0	0.132	11.0	LOS A	0.5	3.2	0.52	0.78	0.52	66.1
6	R2	3	0.0	0.132	9.2	LOS A	0.5	3.2	0.52	0.78	0.52	67.7
Approach		77	0.0	0.132	10.5	LOS A	0.5	3.2	0.52	0.78	0.52	66.9
North: Manilla Road												
7	L2	3	0.0	0.103	9.6	LOS A	0.3	2.0	0.20	0.10	0.20	74.9
8	T1	144	8.8	0.103	0.7	LOS A	0.3	2.0	0.20	0.10	0.20	78.5
9	R2	22	0.0	0.103	9.4	LOS A	0.3	2.0	0.20	0.10	0.20	73.6
Approach		169	7.5	0.103	2.0	NA	0.3	2.0	0.20	0.10	0.20	78.0
West: Browns Lane												
10	L2	6	0.0	0.219	7.8	LOS A	0.8	5.4	0.57	0.84	0.58	65.5
11	T1	17	0.0	0.219	9.3	LOS A	0.8	5.4	0.57	0.84	0.58	65.4
12	R2	98	0.0	0.219	11.9	LOS A	0.8	5.4	0.57	0.84	0.58	69.0
Approach		121	0.0	0.219	11.4	LOS A	0.8	5.4	0.57	0.84	0.58	68.5
All Vehicles		977	2.2	0.326	5.3	NA	0.8	5.4	0.16	0.43	0.16	74.3

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

Manilla Rd / Site Access

MOVEMENT SUMMARY

Site: 2 [2018 AM Manilla Road/Site Access]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	64	0.0	0.096	7.0	LOS A	0.0	0.0	0.00	0.23	0.00	73.8
2	T1	119	0.9	0.096	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	77.3
Approach		183	0.6	0.096	2.5	NA	0.0	0.0	0.00	0.23	0.00	76.0
North: Manilla Road												
8	T1	285	3.7	0.152	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	79.9
9	R2	3	0.0	0.152	7.3	LOS A	0.0	0.2	0.01	0.01	0.01	60.6
Approach		288	3.6	0.152	0.1	NA	0.0	0.2	0.01	0.01	0.01	79.7
West: Site Access												
10	L2	14	0.0	0.310	5.2	LOS A	1.3	9.0	0.45	0.74	0.49	53.0
12	R2	256	0.0	0.310	7.1	LOS A	1.3	9.0	0.45	0.74	0.49	58.8
Approach		269	0.0	0.310	7.0	LOS A	1.3	9.0	0.45	0.74	0.49	58.6
All Vehicles		741	1.6	0.310	3.2	NA	1.3	9.0	0.17	0.33	0.18	69.9

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 2 [2018 PM Manilla Road/Site Access]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	281	0.0	0.289	7.0	LOS A	0.0	0.0	0.00	0.33	0.00	72.6
2	T1	267	0.4	0.289	0.1	LOS A	0.0	0.0	0.00	0.33	0.00	76.0
Approach		548	0.2	0.289	3.6	NA	0.0	0.0	0.00	0.33	0.00	74.2
North: Manilla Road												
8	T1	165	7.6	0.103	0.4	LOS A	0.2	1.2	0.12	0.06	0.12	78.7
9	R2	15	0.0	0.103	9.1	LOS A	0.2	1.2	0.12	0.06	0.12	59.6
Approach		180	7.0	0.103	1.1	NA	0.2	1.2	0.12	0.06	0.12	77.3
West: Site Access												
10	L2	3	0.0	0.101	5.5	LOS A	0.3	2.3	0.48	0.73	0.48	52.7
12	R2	71	0.0	0.101	7.5	LOS A	0.3	2.3	0.48	0.73	0.48	58.6
Approach		74	0.0	0.101	7.4	LOS A	0.3	2.3	0.48	0.73	0.48	58.4
All Vehicles		802	1.7	0.289	3.4	NA	0.3	2.3	0.07	0.31	0.07	73.1

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 2 [2018 AM Manilla Road/Site Access with Full Development]

Manilla Road / Site Access, with full development flows allowing for through traffic associated with Browns Lane access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	64	0.0	0.135	7.0	LOS A	0.0	0.0	0.00	0.16	0.00	74.5
2	T1	196	0.5	0.135	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	78.0
Approach		260	0.4	0.135	1.7	NA	0.0	0.0	0.00	0.16	0.00	77.1
North: Manilla Road												
8	T1	597	1.8	0.312	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	79.9
9	R2	3	0.0	0.312	7.9	LOS A	0.0	0.2	0.01	0.00	0.01	60.6
Approach		600	1.8	0.312	0.1	NA	0.0	0.2	0.01	0.00	0.01	79.8
West: Site Access												
10	L2	14	0.0	0.499	7.0	LOS A	2.4	16.9	0.70	0.98	1.06	49.3
12	R2	256	0.0	0.499	12.6	LOS A	2.4	16.9	0.70	0.98	1.06	55.6
Approach		269	0.0	0.499	12.3	LOS A	2.4	16.9	0.70	0.98	1.06	55.4
All Vehicles		1129	1.0	0.499	3.4	NA	2.4	16.9	0.17	0.27	0.26	71.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [2018 PM Manilla Road/Site Access with Full Development]

Manilla Road / Site Access, with full development flows allowing for through traffic associated with Browns Lane access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	281	0.0	0.464	7.1	LOS A	0.0	0.0	0.00	0.21	0.00	73.9
2	T1	609	0.2	0.464	0.1	LOS A	0.0	0.0	0.00	0.21	0.00	77.3
Approach		891	0.1	0.464	2.3	NA	0.0	0.0	0.00	0.21	0.00	76.2
North: Manilla Road												
8	T1	251	5.0	0.158	0.9	LOS A	0.3	2.4	0.14	0.04	0.14	78.3
9	R2	15	0.0	0.158	13.0	LOS A	0.3	2.4	0.14	0.04	0.14	59.2
Approach		265	4.8	0.158	1.5	NA	0.3	2.4	0.14	0.04	0.14	77.3
West: Site Access												
10	L2	3	0.0	0.184	7.4	LOS A	0.6	4.1	0.73	0.88	0.75	49.3
12	R2	71	0.0	0.184	12.4	LOS A	0.6	4.1	0.73	0.88	0.75	55.7
Approach		74	0.0	0.184	12.2	LOS A	0.6	4.1	0.73	0.88	0.75	55.5
All Vehicles		1229	1.1	0.464	2.8	NA	0.6	4.1	0.07	0.21	0.08	74.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [2018 AM Manilla Road/Site Access with Background Growth]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	64	0.0	0.166	7.0	LOS A	0.0	0.0	0.00	0.13	0.00	74.8
2	T1	255	0.5	0.166	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	78.4
Approach		319	0.4	0.166	1.4	NA	0.0	0.0	0.00	0.13	0.00	77.6
North: Manilla Road												
8	T1	776	1.8	0.405	0.0	LOS A	0.0	0.3	0.01	0.00	0.01	79.9
9	R2	3	0.0	0.405	8.5	LOS A	0.0	0.3	0.01	0.00	0.01	60.6
Approach		779	1.8	0.405	0.0	NA	0.0	0.3	0.01	0.00	0.01	79.9
West: Site Access												
10	L2	14	0.0	0.723	12.2	LOS A	4.0	28.2	0.87	1.21	1.79	44.0
12	R2	256	0.0	0.723	22.0	LOS B	4.0	28.2	0.87	1.21	1.79	50.9
Approach		269	0.0	0.723	21.5	LOS B	4.0	28.2	0.87	1.21	1.79	50.6
All Vehicles		1367	1.1	0.723	4.6	NA	4.0	28.2	0.17	0.27	0.36	71.5

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 2 [2018 PM Manilla Road/Site Access with Background Growth]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	281	0.0	0.558	7.1	LOS A	0.0	0.0	0.00	0.17	0.00	74.1
2	T1	792	0.2	0.558	0.2	LOS A	0.0	0.0	0.00	0.17	0.00	77.6
Approach		1073	0.1	0.558	2.0	NA	0.0	0.0	0.00	0.17	0.00	76.7
North: Manilla Road												
8	T1	326	5.0	0.209	1.5	LOS A	0.6	4.4	0.16	0.03	0.18	77.5
9	R2	15	0.0	0.209	17.6	LOS B	0.6	4.4	0.16	0.03	0.18	58.6
Approach		340	4.8	0.209	2.2	NA	0.6	4.4	0.16	0.03	0.18	76.8
West: Site Access												
10	L2	3	0.0	0.295	10.4	LOS A	0.9	6.6	0.85	0.97	0.99	45.0
12	R2	71	0.0	0.295	19.9	LOS B	0.9	6.6	0.85	0.97	0.99	51.8
Approach		74	0.0	0.295	19.5	LOS B	0.9	6.6	0.85	0.97	0.99	51.6
All Vehicles		1487	1.2	0.558	2.9	NA	0.9	6.6	0.08	0.18	0.09	75.0

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

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

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 2 [2028 AM Manilla Road/Site Access with Other Developments]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	64	0.0	0.225	7.0	LOS A	0.0	0.0	0.00	0.10	0.00	75.2
2	T1	372	0.3	0.225	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	78.8
Approach		436	0.2	0.225	1.1	NA	0.0	0.0	0.00	0.10	0.00	78.2
North: Manilla Road												
8	T1	1296	0.8	0.671	0.0	LOS A	0.1	0.8	0.01	0.00	0.01	79.9
9	R2	3	0.0	0.671	11.8	LOS A	0.1	0.8	0.01	0.00	0.01	60.6
Approach		1299	0.8	0.671	0.1	NA	0.1	0.8	0.01	0.00	0.01	79.9
West: Site Access												
10	L2	14	0.0	3.324	2110.2	LOS F 11	126.6	886.2	1.00	5.07	16.71	1.7
12	R2	256	0.0	3.324	2123.7	LOS F 11	126.6	886.2	1.00	5.07	16.71	2.4
Approach		269	0.0	3.324	2123.0	LOS F 11	126.6	886.2	1.00	5.07	16.71	2.4
All Vehicles		2004	0.6	3.324	285.7	NA	126.6	886.2	0.14	0.70	2.25	15.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: 2 [2028 PM Manilla Road/Site Access with Other Developments]

Manilla Road / Site Access
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

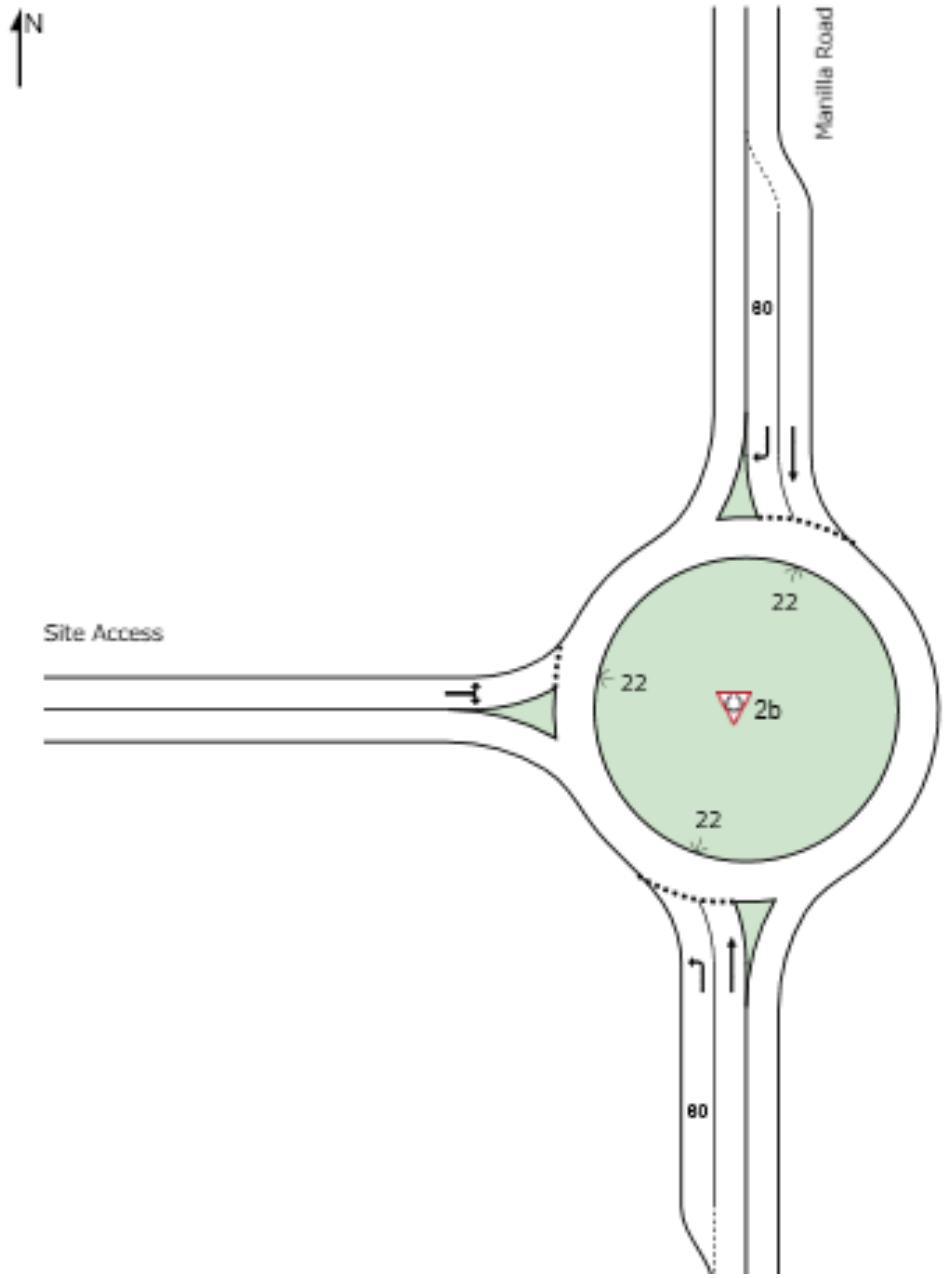
Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	281	0.0	0.858	7.8	LOS A	0.0	0.0	0.00	0.11	0.00	73.7
2	T1	1378	0.1	0.858	1.0	LOS A	0.0	0.0	0.00	0.11	0.00	77.0
Approach		1659	0.1	0.858	2.2	NA	0.0	0.0	0.00	0.11	0.00	76.5
North: Manilla Road												
8	T1	443	2.9	0.646	80.7	LOS F 11	37.2	266.6	1.00	0.04	1.44	36.4
9	R2	15	0.0	0.646	154.6	LOS F 11	37.2	266.6	1.00	0.04	1.44	25.9
Approach		458	2.8	0.646	83.1	NA	37.2	266.6	1.00	0.04	1.44	36.1
West: Site Access												
10	L2	3	0.0	2.656	1560.1	LOS F 11	35.1	245.8	1.00	2.32	6.54	2.2
12	R2	71	0.0	2.656	1596.1	LOS F 11	35.1	245.8	1.00	2.32	6.54	3.1
Approach		74	0.0	2.656	1594.6	LOS F 11	35.1	245.8	1.00	2.32	6.54	3.1
All Vehicles		2191	0.6	2.656	72.6	NA	37.2	266.6	0.24	0.17	0.52	38.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Roundabout at Manilla Road / Site Access to accommodate Other Developments



MOVEMENT SUMMARY

Site: 2b [2028 AM Manilla Road/Site Access with Other Developments]

Manilla Road / Site Access
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	64	0.0	0.049	5.8	LOS A	0.3	1.8	0.04	0.56	0.04	71.1
2	T1	372	0.3	0.201	6.2	LOS A	1.3	9.0	0.04	0.49	0.04	72.4
Approach		436	0.2	0.201	6.1	LOS A	1.3	9.0	0.04	0.50	0.04	72.2
North: Manilla Road												
8	T1	1296	0.8	0.917	14.6	LOS B	24.9	175.7	1.00	0.87	1.33	65.5
9	R2	3	0.0	0.003	12.4	LOS A	0.0	0.1	0.43	0.61	0.43	62.0
Approach		1299	0.8	0.917	14.6	LOS B	24.9	175.7	1.00	0.87	1.32	65.5
West: Site Access												
10	L2	14	0.0	0.252	7.6	LOS A	1.4	10.0	0.53	0.73	0.53	60.8
12	R2	256	0.0	0.252	13.0	LOS A	1.4	10.0	0.53	0.73	0.53	66.4
Approach		269	0.0	0.252	12.8	LOS A	1.4	10.0	0.53	0.73	0.53	66.2
All Vehicles		2004	0.6	0.917	12.5	LOS A	24.9	175.7	0.73	0.77	0.94	67.0

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

MOVEMENT SUMMARY

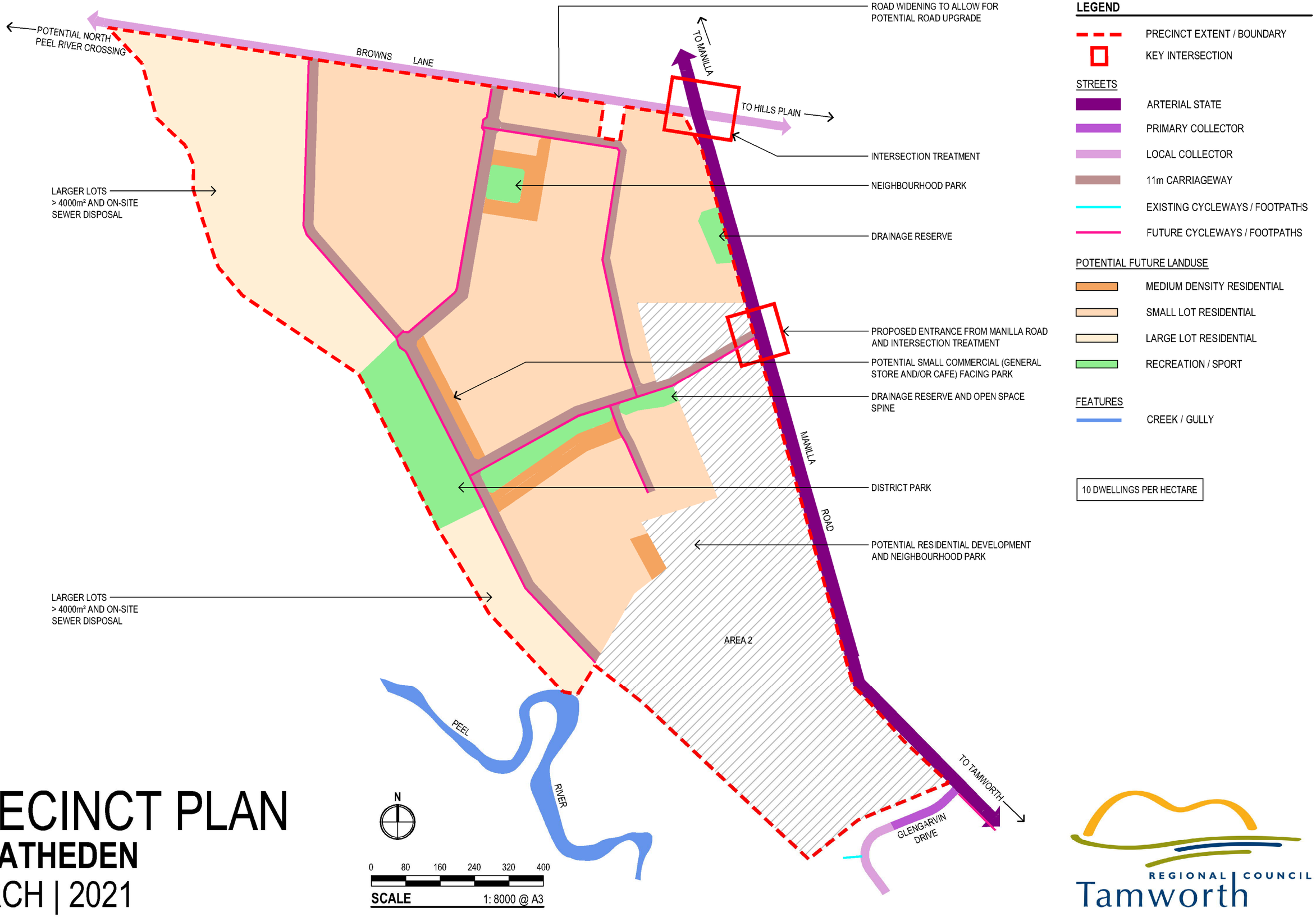
Site: 2b [2028 PM Manilla Road/Site Access with Other Developments]

Manilla Road / Site Access
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Manilla Road												
1	L2	281	0.0	0.220	5.9	LOS A	1.3	9.0	0.10	0.54	0.10	70.8
2	T1	1378	0.1	0.753	6.3	LOS A	12.0	83.9	0.19	0.45	0.19	71.6
Approach		1659	0.1	0.753	6.2	LOS A	12.0	83.9	0.17	0.47	0.17	71.5
North: Manilla Road												
8	T1	443	2.9	0.277	6.5	LOS A	2.2	15.6	0.29	0.48	0.29	70.9
9	R2	15	0.0	0.014	11.4	LOS A	0.1	0.5	0.26	0.62	0.26	62.8
Approach		458	2.8	0.277	6.6	LOS A	2.2	15.6	0.28	0.48	0.28	70.7
West: Site Access												
10	L2	3	0.0	0.209	25.9	LOS B	1.6	10.9	1.00	0.95	1.00	47.5
12	R2	71	0.0	0.209	31.3	LOS C	1.6	10.9	1.00	0.95	1.00	54.7
Approach		74	0.0	0.209	31.0	LOS C	1.6	10.9	1.00	0.95	1.00	54.5
All Vehicles		2191	0.6	0.753	7.1	LOS A	12.0	83.9	0.23	0.49	0.23	70.6

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



PRECINCT PLAN
STRATHEDEN
MARCH | 2021

REGIONAL COUNCIL
Tamworth

BROWNS LANE

MANILLA ROAD

TRC 1 in 100 Year Flood Level
Lyall & Associates Flood Study
May 2019

3.194 ha
1.879 ha
341 DP 822077
4.89 ha
2.000 ha
9565m²
2726m²
1950m²
6351m² PARKLAND
1950m²
5014m²
9855m²
2.553 ha
2.670 ha
1.911 ha
6018m²
1.19 ha
9993m²
1.275 ha
1.857 ha
1.559 ha
3776m²
2.927 ha
1.352 ha
5555m²
14.34 ha
1.438 ha
3.147 ha
PROPOSED ENTRANCE FROM MANILLA ROAD
377 DP 1158251
1.530 ha
6374m²
5669m²
4101m²
3215m²
1.825 ha
4520m²
2.620 ha
1677m²
6051m²
3840m²
1.203 ha
1677m²
1.458 ha
PARKLAND
5.058 ha
3692m²
1.197 ha
3424m²
2.326 ha
2.518 ha
1677m²
4.989 ha
1.556 ha
5273m²
TRC 1 in 100 Year Flood Level
Lyall & Associates Flood Study
May 2019
707 DP 1252037
PARKLAND
40 DP 608568
39
36
35
34 DP 22919
Proposed Road
Proposed Road

STRATHEDEN

ROAD BOULEVARD	
ROAD COLLECTOR - BUS	
INTEGRATED / MEDIUM DENSITY LOTS 250m² - 450m²	2.5 ha
SMALL LOTS > 600m² ROAD 20 WIDE	50.8 ha
LARGE LOTS > 4000m² [ON SITE SEWER DISPOSAL]	24.23 ha
OPEN SPACE - PARK	5.69 ha
OPEN SPACE - DRAINAGE RESERVE & PARK	2.51 ha

PROPOSED TRC SEWER PIPELINE (LOWER LIMIT)
1 in 100 YEAR FLOOD LEVEL
MAJOR CONTOUR 1 METRE INTERVAL

LGA:	TAMWORTH
Locality:	OXLEY VALE
Parish:	WOOLOMOL
County:	INGLIS

Revision		APPROVED	DATE
B	BLOCK AREAS ADDED	DAL	4.11.2021
A	CONCEPTUAL ROAD LAYOUT FOR PLANNING PROPOSAL ISSUED OT COUNCIL	DAL	18.11.2020

CAD Ref:	14286V13
Drawing Ref:	Dwg Concept 4
Survey By:	LS
Drawn By:	DAL
Designed By:	DAL
Checked By:	DAL

Original A1 Drawing Scale Bar:
1:2500 at A1 Plot
Datum Description:
AHD

BATH STEWART ASSOCIATES
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239 Marius Street
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Mr Gerard Maher
CONCEPTUAL ROAD LAYOUT FOR PLANNING PROPOSAL
Lots 1-3 DP 997767, Lots 3 & 5 DP 209387, Lot 4 DP 212658,Lot 12 DP 245544 & Lot 708 DP 1252037
815 Manilla Road Tamworth

Ref. No: 14286
Sheet No: 01 of 01
Revision No: