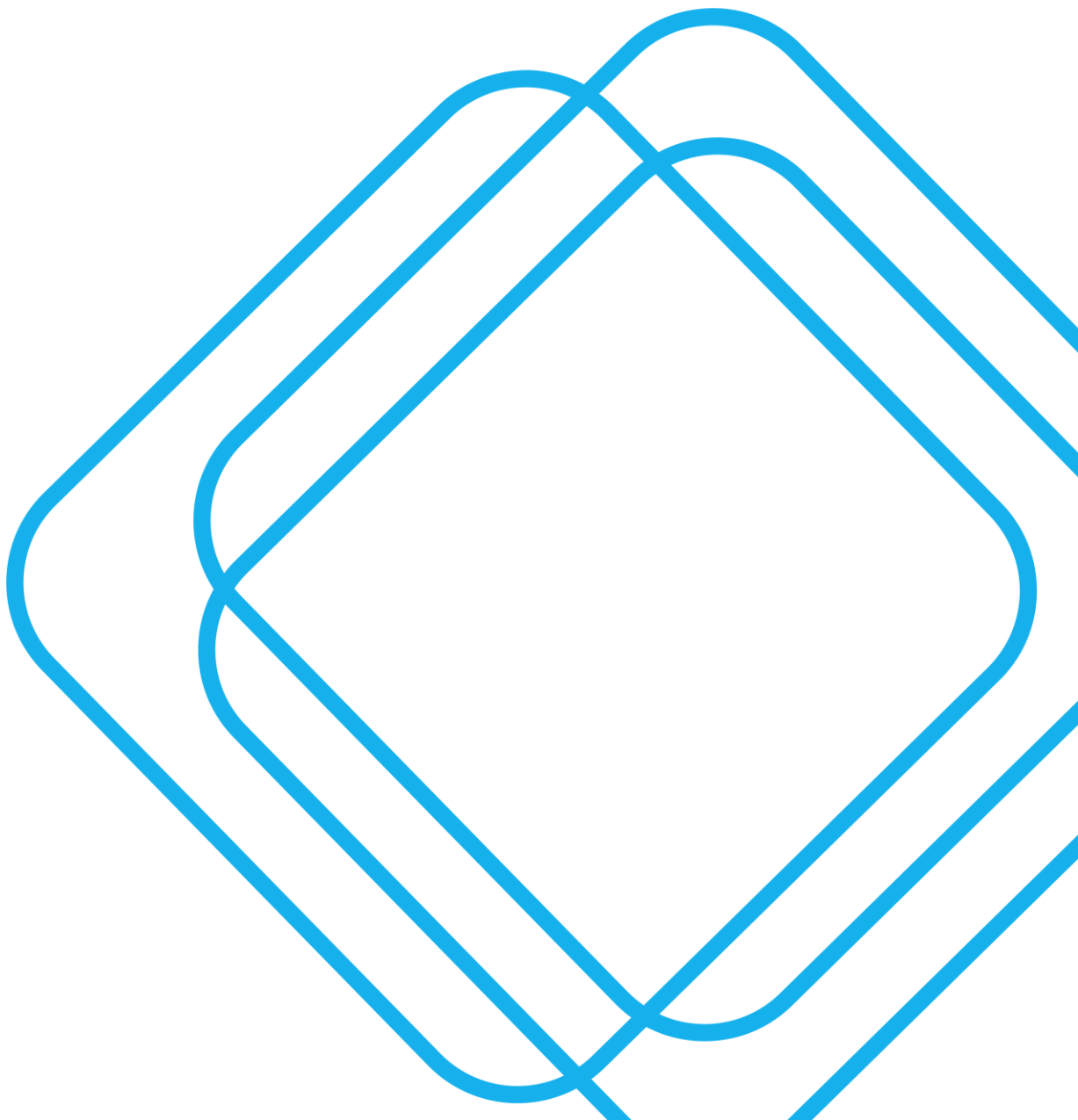


TRANSPORT IMPACT ASSESSMENT

Wyndella Road Lochinvar
Development Application

20 JUNE 2024



Quality Assurance

Project Name:	Wyndella Road Lochinvar Development Application		
Project Number:	SCT_00390		
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Executive Summary

The proposed development

ADW Johnson on behalf of CPG estates engaged SCT Consulting to conduct a transport impact assessment for a proposed development of 258 dwellings, located north of the New England Highway along Wyndella Road in Lochinvar.

The site comprises Lots 2, 3, 4, 5, 6 and 9 DP 747391, and Lots 12 and 13 DP1219648. The site is zoned R1 General Residential and covers an area of approximately 22ha. The site is proposed to be subdivided for residential development, with associated roads and services.

The subdivision would deliver 258 residential lots (an increase of 250 lots compared to the current 8 lots). Lots would be opening indicatively in 2025 and approximately 50 lots per year would be released, with completion by 2031.

Previous planning

The site is part of the Lochinvar Urban Renewal area and sits at one of the key connection points of the Anambah Precinct (Wyndella Road). Previous studies have developed a long-term intersection layout and contribution plan that applies to this site. A copy of this design is provided in **Appendix D**.

TfNSW has recently upgraded Wyndella Road / New England Highway / Springfield Drive to accommodate future growth in the area.

Impact assessment

Traffic modelling using SIDRA 9.1 software was used to assess the future impacts of this development on traffic conditions at the intersection of Wyndella Road, New England Highway and Springfield Drive. Future year traffic modelling was conducted to examine the impacts of the development in 2031 and 2041. The Wyndella Road / New England Highway / Springfield Drive intersection performs at a satisfactory level with background growth up to 2031 and the traffic from the full yield of the development (258 lots). The intersection in 2031 has a DOS of 0.86 in the future background growth and development scenario, indicating some spare capacity. The intersection operates at Level of Service B in the AM and PM peak, respectively, indicating that no upgrade would be required due to this proposal.

There is an existing driveway located on Wyndella Road, just north of the New England Highway on the eastern side, which provides access to Lot 223 DP246447. With increased traffic demands on Wyndella Road, TfNSW is concerned that this could result in a rear-end collision at the traffic signals. This could occur because of vehicles colliding with a stationary vehicle attempting to turn right into Lot 223 DP246447 or because of vehicles colliding with the back of queue on New England Highway (western approach), arising from the stationary vehicle attempting to turn right into Lot 223 DP246447.

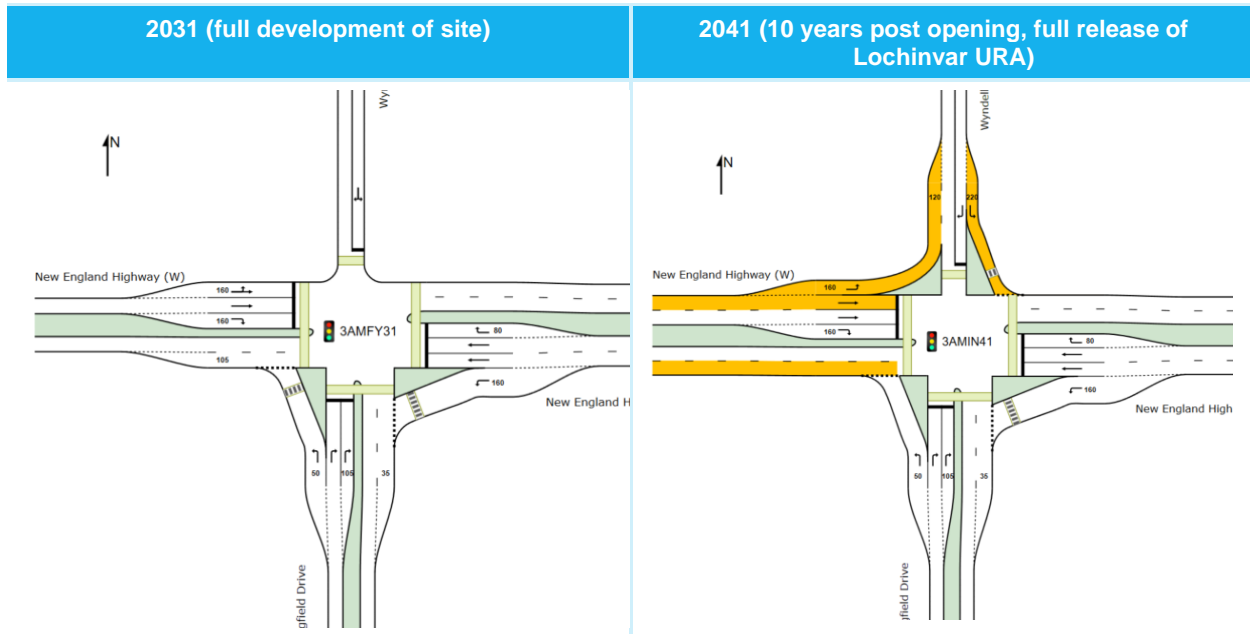
The proponent is proposing an interim treatment, which has a:

- Keep clear zone on Wyndella Road
- Change in signal phasing to reduce the probability of a rear end collision.

TfNSW provided written acceptance of the interim design (13 February 2024). However, TfNSW raised a concern about the longevity of this design based on the extent of mitigation of the rear end crash risk. TfNSW requested that if the western approach on New England Highway not exceed Level of Service C, otherwise removal of this hazard would be required. Traffic modelling indicates that the western approach remains Level of Service C or better in 2031. Therefore the full lot yield may be delivered with the interim treatment in place.

Modelling indicates that road upgrades would be required by 2041 due to growth on the road network and full release of the Lochinvar URA, irrespective of the proposed development (shown in **Table 1-1**). Additional development traffic in 2041, results in minor increases in delay and DOS, indicating that the development does trigger the need for further upgrades to the intersection in 2041.

Table 1-1 intersection layouts in 2031 and 2041 (yellow lanes are additional)



The upgrade proposed in 2041 sits within the footprint of the anticipated long term intersection layout (**Appendix D**). the intersection requires additional capacity:

- For westbound traffic on New England Highway, which has growth significantly due to background and Lochinvar URA growth. Hence an additional westbound lane is required. Drivers no longer avoid the kerbside lane on New England Highway westbound with this extension, improving capacity at the intersection.
- For traffic heading into and out of Wyndella Road, arising from the broader Lochinvar URA demands which access the state road network via Wyndella Road. The upgrades also allow for more green time to be dedicated to New England Highway, which has experienced a significant increase in traffic demands.

The proposed development does therefore not influence the need for upgrades for Wyndella Road / New England Highway / Springfield Drive in 2031 or 2041. The development would still contribute to the long-term upgrade of Wyndella Road / New England Highway / Springfield Drive at the rates outlined in the relevant contribution plan.

The Warrants assessments show a Level of Service of A and B result for each of the local streets intersecting Wyndella Road, without the need for a roundabout. Warrants show that there is no need for turn bays to be provided for full release of the Lochinvar URA.

1.0 Introduction

1.1 Purpose of this report

CPG Estates (the development arm of Clarendon Homes) is the proponent of a residential subdivision at 898 New England Highway, Lochinvar, NSW (the site), as shown in **Figure 1-1**.

The site comprises Lots 2, 3, 4, 5, 6 and 9 DP 747391, and Lots 12 and 13 DP1219648. The site is zoned R1 General Residential and covers an area of approximately 22ha. The site is proposed to be subdivided for residential development, with associated roads and services.

The subdivision would deliver 258 residential lots (an increase of 250 lots compared to the current 8 lots). Lots would be opening indicatively in 2025 and approximately 50 lots per year would be released, with full release being achieved by 2031.

Figure 1-1 Wyndella Road subdivision



Source: Nearmap & ADW Johnson, 2023

This Transport Impact Assessment accompanies the development application and provides Maitland City Council with an understanding of the transport impacts of the proposal.

1.2 Report structure

This report contains the following sections:

- **Section 1.0 Introduction:** an overview of the purpose of the report
- **Section 2.0 Strategic context:** a description of the strategic documents that apply to the site
- **Section 3.0 Existing conditions:** the existing transport context for the development
- **Section 4.0 Proposed development:** a description of the development proposal and how it complies with site-based controls
- **Section 5.0 Impact assessment:** details of the impacts of the development and proposed mitigations
- **Section 6.0 Conclusion:** summarises the key outcomes of the study.

2.0 Context

2.1 NSW Government

2.1.1 Future Transport Strategy

Future Transport Strategy is a 40-year strategy developed by Transport for NSW (TfNSW) which outlines the directions and principles for mobility and transport investment as a guiding document. Future Transport 2056 builds on the achievements of the Long-Term Transport Master Plan, which has delivered local and international investment in the NSW transport network and placed a focus on customer-oriented planning.

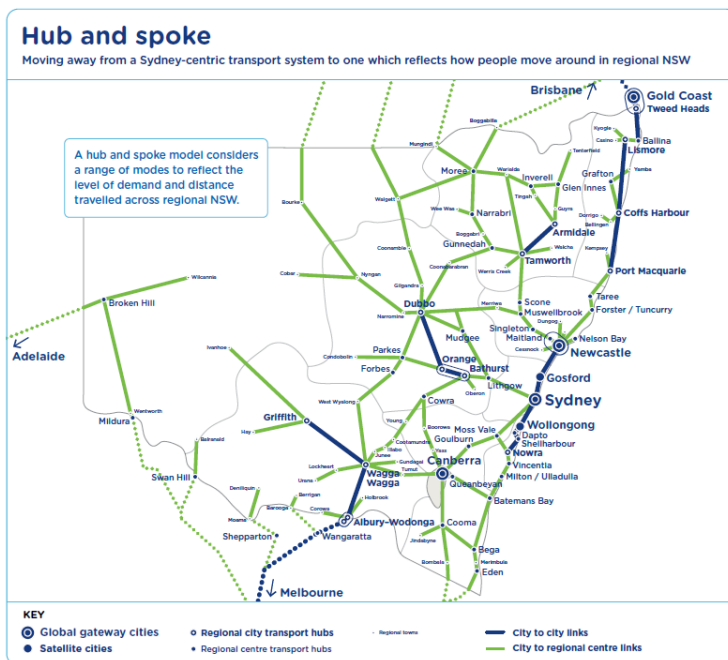
The strategy covers three aspects of vision, which are replicated in **Figure 2-1**.

Figure 2-1 Future Transport Strategy vision elements



The intended network functionality is explained in **Figure 2-2**. The concept is that there are key city to city links and city to regional centre links, which provide a lower order of connectivity. The plan puts forward a centre hierarchy with global gateway cities -Gold Coast, Newcastle, Sydney, and Canberra.

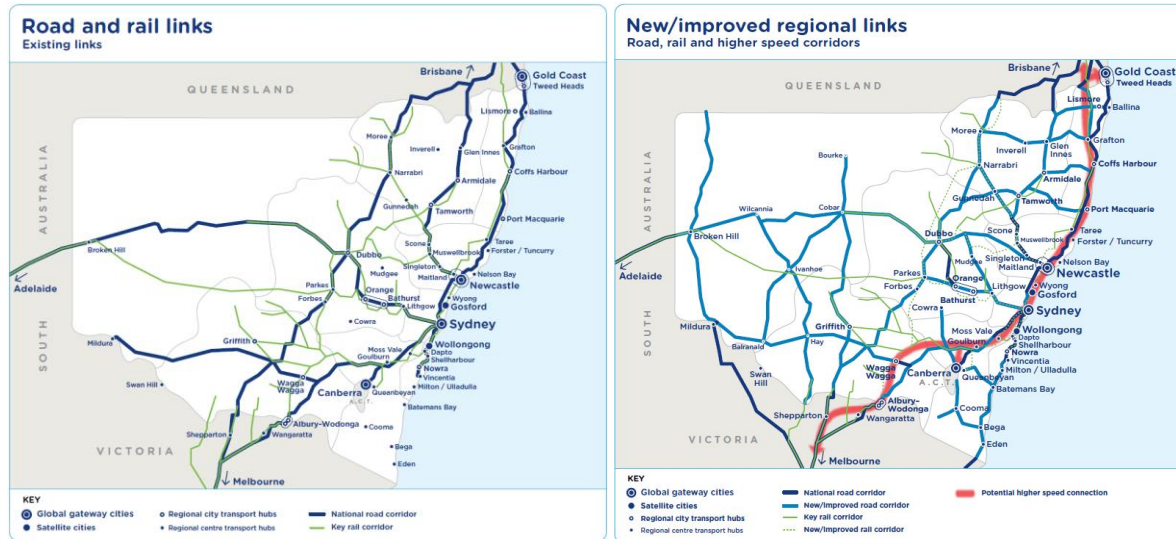
Figure 2-2 Hub and spoke network in Regional NSW



Source: Transport for NSW, 2018

Sydney is connected to the broader transport landscape of regional NSW as shown in **Figure 2-3**. The left side of the figure shows the existing links and the right side shows the future links.

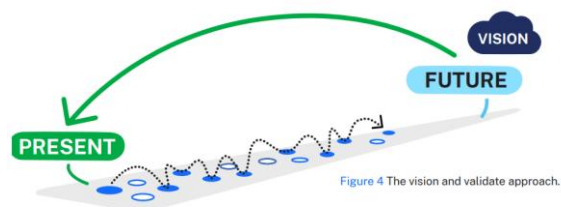
Figure 2-3 Regional NSW strategic transport corridors



Source: Transport for NSW, 2018

The strategy takes a vision and validate approach (**Figure 2-4**), which is about determining the desired end state and developing a plan to achieve the vision rather than taking 'predict and provide' planning (which takes a forecast of the future as the end state objective).

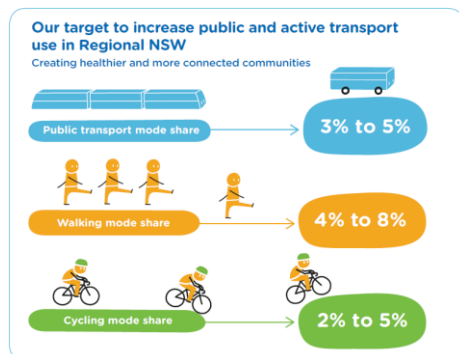
Figure 2-4 Vision and validate methodology



Source: Transport for NSW, 2022

The plan sets bold targets for walking, cycling and public transport (**Figure 2-5**).

Figure 2-5 Targets for walking, cycling and public transport



Source: Transport for NSW, 2018

Implications for this site: Future Transport outlines a visionary approach to planning, which incorporates not only connectivity objectives but also placemaking objectives. This site needs to consider the broader context that it sits in as part of the planning.

2.2 Lochinvar precinct

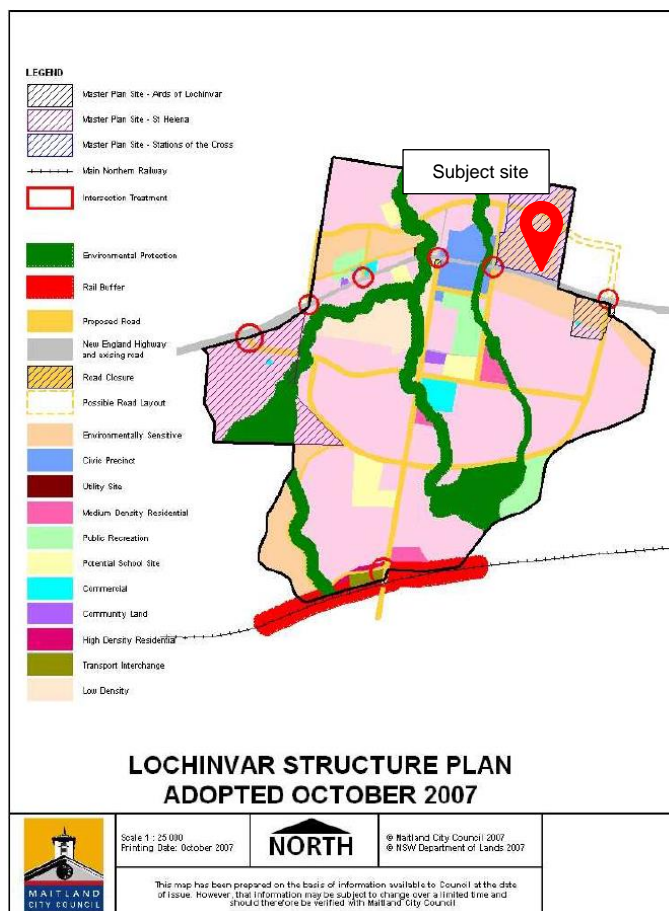
2.2.1 Lochinvar Structure Plan (Maitland Council, 2007)

Lochinvar is identified in the Lower Hunter Regional Strategy as a priority area to accommodate regional population growth. In October 2007, the Lochinvar Structure Plan (LSP) was approved by the Maitland City Council. The LSP provides a logical framework for the development and planning of the area with consideration of its natural elements, the needs of the community, and infrastructure requirements. The LSP aims to achieve an urban structure based on a walkable, mixed-use town, with a capacity for up to 5,000 residential dwellings. The subject site is located at the eastern end of the Structure Plan area.

The town centre precinct serves to provide a hub for the future town linking the existing established village with the new urban development fronts. Based on an expected population of around 12,000 people, the town centre will comprise a mix of uses including community, retail, commercial, and residential uses. There will be a wide range of retail outlets including a supermarket, speciality shops, a newsagent, a medical centre, and a service station. Sufficient car parking areas will be provided to encourage local shopping. It is envisaged that an area of at least 5-10 hectares is to be provided to cater for the provision of sufficient retail/commercial facilities within the central town precinct. An additional commercial area will be required to accommodate support services and business offices associated with such precincts. (URaP – TTW, 2012)

The structure plan is shown in **Figure 2-6**.

Figure 2-6 Lochinvar Structure Plan



Source: Maitland Council, 2007

The structure plan shows the site as the Master Plan site – Stations of the Cross.

The land use areas of the structure plan are outlined in **Table 2-1**.

Table 2-1 Lochinvar Structure Plan development areas

Land Use	Area (ha)
Commercial	6.4
Recreation	20.6
Medium Density	8.8
High Density	1.0
Transport Interchange	2.1
Community Land	1.6
Civic Precinct	17.3
Low Density	18.8
Environmentally Sensitive	72.6
Potential School Sites	16.6
Residential (single dwellings)	480.0
Total	645.8

Source: URap – TTW, 2012

The proposed road network is shown in **Figure 2-7**.

Figure 2-7 Lochinvar Structure Plan road network



Source: Maitland Council, 2007

The original road network concept shows a new southern link road that connects from a new intersection west of Windermere Road (now Terriere Drive) to a new intersection east of Wyndella Road (“Aird’s intersection upgrade”). Road upgrades are proposed at:

- New England Highway / Terriere Drive
- New England Highway / Windemere Road
- New England Highway / Cartwell Road
- New England Highway / Wyndella Road
- New England Highway / Airds intersection
- New England Highway / St Helena Close.

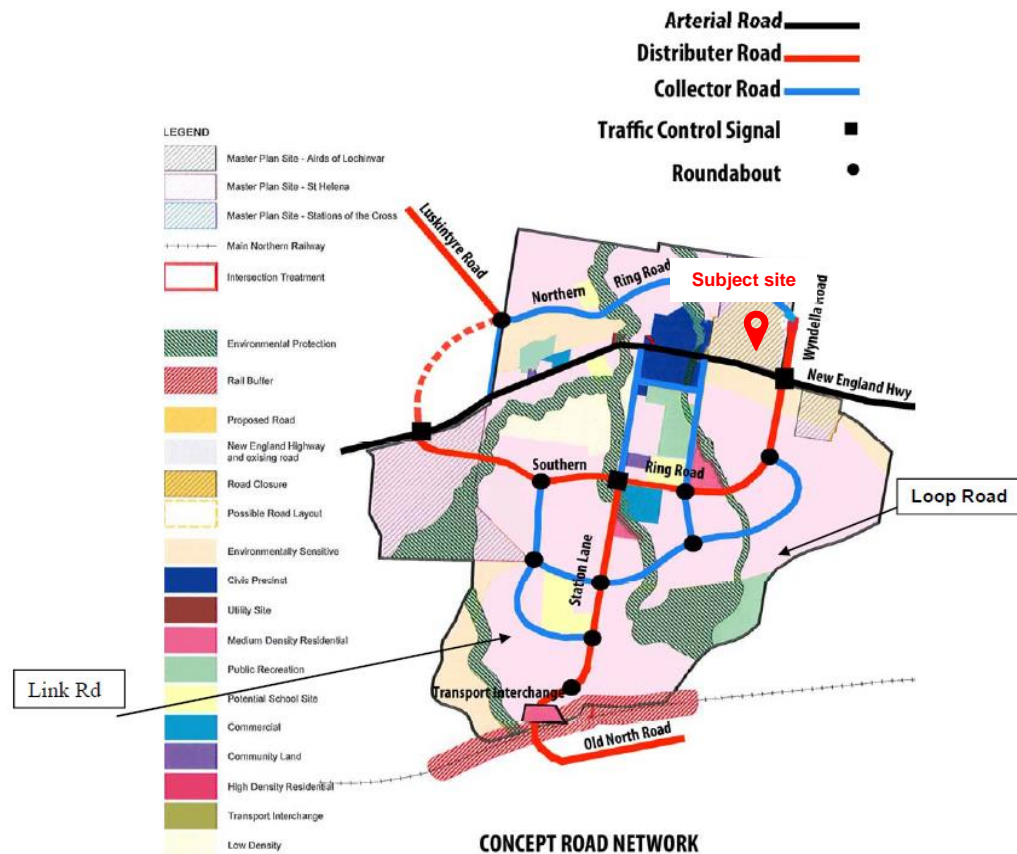
2.2.2 Lochinvar Urban Release Area traffic and transport study (URaP – TTW, 2012)

The study assumes a yield of 5,000 lots for the Lochinvar Urban Release Area, distributed as follows:

- **The area between New England Highway and the southern ring road: 2,976 lots**
- **The area north of New England Highway: 1,239 lots**
- **The area north of the railway line and south of the southern ring road: 785 lots**

URaP – TTW reviews the road network proposed under the structure plan and provides several refinements. The modified road network is shown in **Figure 2-8**.

Figure 2-8 Lochinvar Urban Release Area – updated road network



Source: URaP – TTW, 2012

The road network is based on the treatments identified in **Table 2-2**.

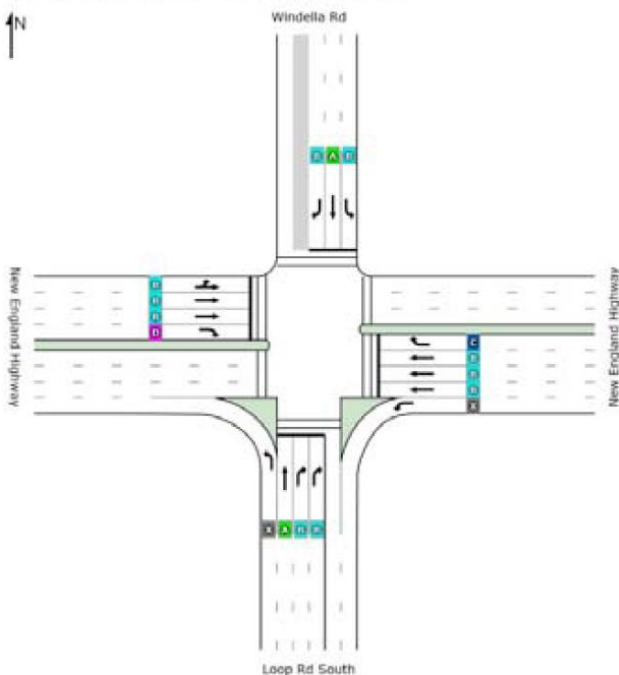
Table 2-2 Updated road network intersection treatments

Road	Intersection treatments
New England Highway	<ul style="list-style-type: none"> – Traffic control signals at the east intersection with Northern Ring Road (Wyndella Road) and Southern Ring Road. – Traffic control signals at the west intersection with Northern Ring Road and Southern Ring Road (St Helena Close).
Southern Ring Road	<ul style="list-style-type: none"> – Traffic control signals at the intersection with Station Lane. – Three roundabout intersections with un-named collector roads.
Station Lane	<ul style="list-style-type: none"> – Two roundabout intersections with un-named collector roads and a roundabout intersection at the east access to Lochinvar transport interchange/railway station.
Northern Ring Road	<ul style="list-style-type: none"> – Roundabout intersection at Luskintyre Road and Windermere Road.

Source: URaP – TTW, 2012

The URaP – TTW identifies that Wyndella Road (the section just north of New England Highway) is part of the Distributor Road network and it will form a signalised intersection with the New England Highway at the eastern end of the LSP area. **Wyndella Road becomes a road that no longer just carries local traffic but also strategic traffic.** The layout of New England Highway / Wyndella Road is shown in **Figure 2-9**.

Figure 2-9 Lochinvar Urban Release Area Wyndella Road layout



Source: URaP – TTW, 2012

2.2.3 Lochinvar Urban Release Area Traffic Modelling (Hyder, 2014)

Roads and Maritime Services commissioned a study of the Lochinvar Urban Release Area in 2014. The study assumed a total of 4,700 dwellings would be delivered, with a traffic generation rate of 0.66 peak hour trips per dwelling (Table 2-3).

Table 2-3 Lochinvar Urban Release Area

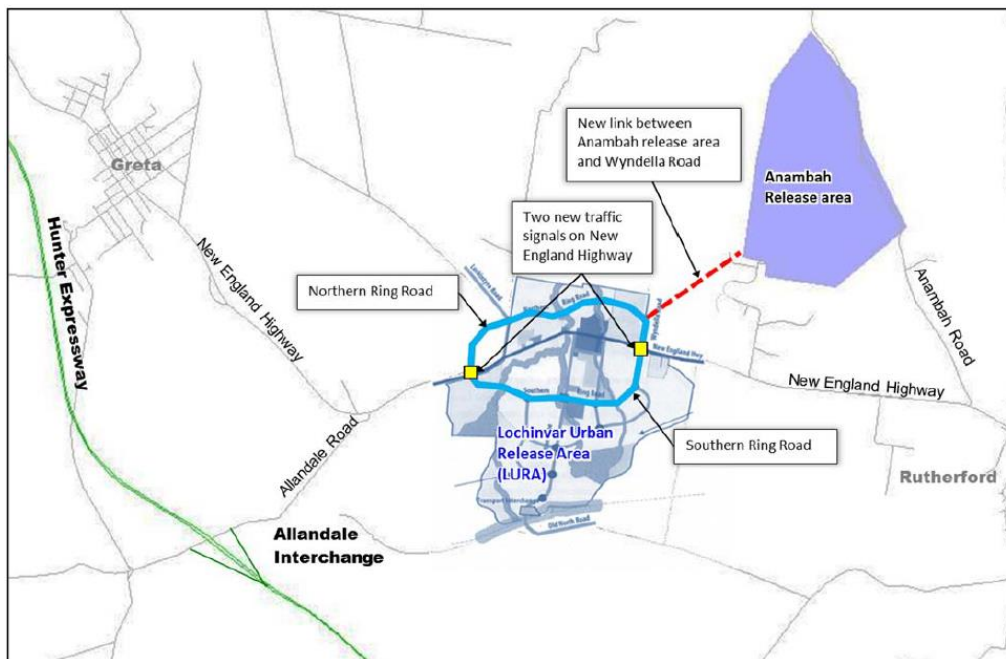
	Daily	AM Peak One Hour	PM Peak One Hour
Trip generation rates (vehicles per dwelling)	6.8	0.66	0.66
Total additional vehicle trips from LURA	31,800	3,100	3,100

Source: Hyder, 2014

The figure assumed of 4,700 dwellings is a reduction of 300 from the original 5,000 dwelling uplift forecast in the Lochinvar Structure Plan.

The future network in the vicinity of the Lochinvar Urban Release Area assumed is shown in Figure 2-10.

Figure 2-10 Broader network assumptions



Source: Hyder, 2014

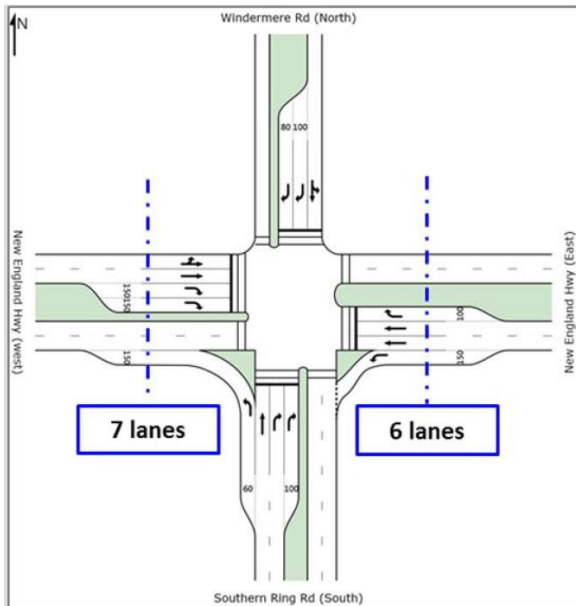
In addition to the function of Wyndella Road being a northern ring road, it also provides connectivity to the Anambah Release Area. This area was identified as having the potential for 3,300 dwellings uplift. Volume from Anambah Release Area on Wyndella Road was forecast to be approximately 440 vehicles per hour. This is an increase from approximately 1,000 vehicles per day as originally forecast in the 2012 Council traffic study (without this connection with the Anambah Release Area).

The forecasting undertaken in 2014 was before the introduction of Hunter Expressway (HEX). As a result, there are two different forecasts for the amount of traffic on New England Highway – one with a 60% reduction of traffic on New England Highway and one with a forecast reduction of 30%.

TfNSW directed that for the purposes of modelling state road upgrades, that Anambah was not imminent or certain and therefore, should not be included in the modelling scenarios

The proposed intersection layout for the intersection is shown in **Figure 2-11**.

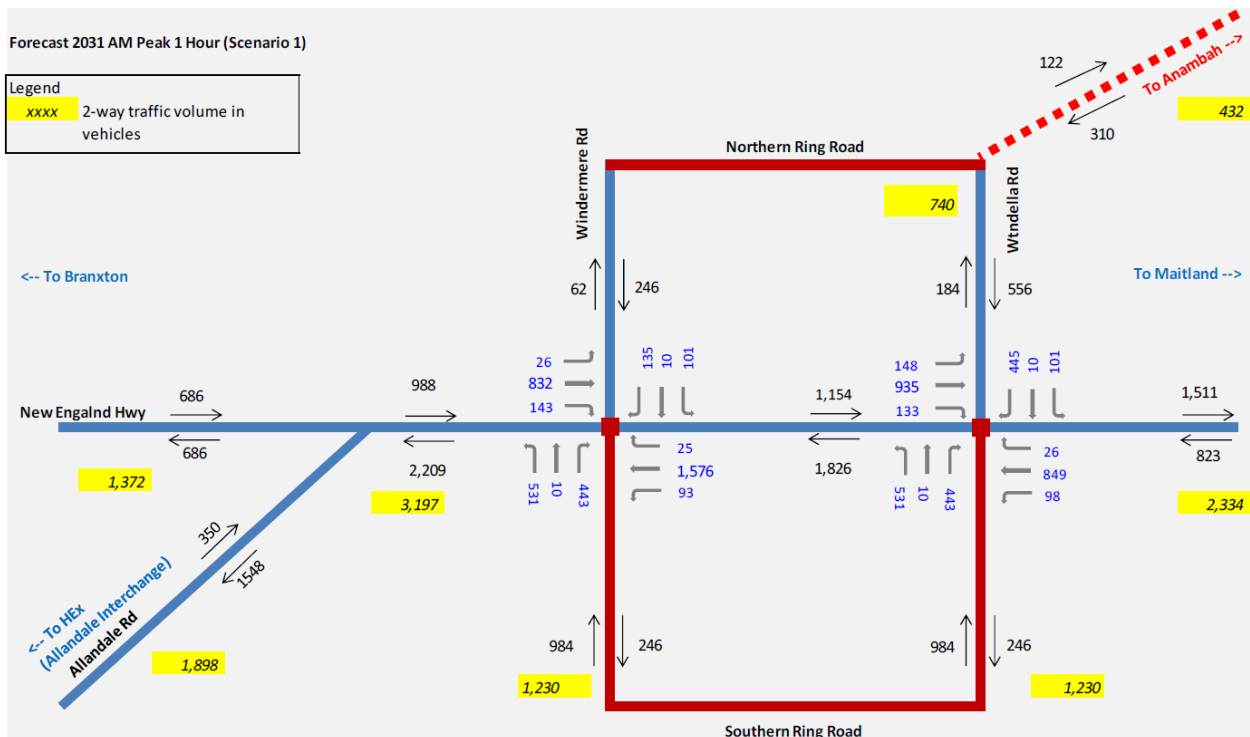
Figure 2-11 Layout of New England Highway / Wyndella Road



Source: Hyder, 2014

The study also included a network flow diagram, which is shown in **Figure 2-12**.

Figure 2-12 Network flow diagram – 2031 AM peak with 60% New England Highway demand reduction

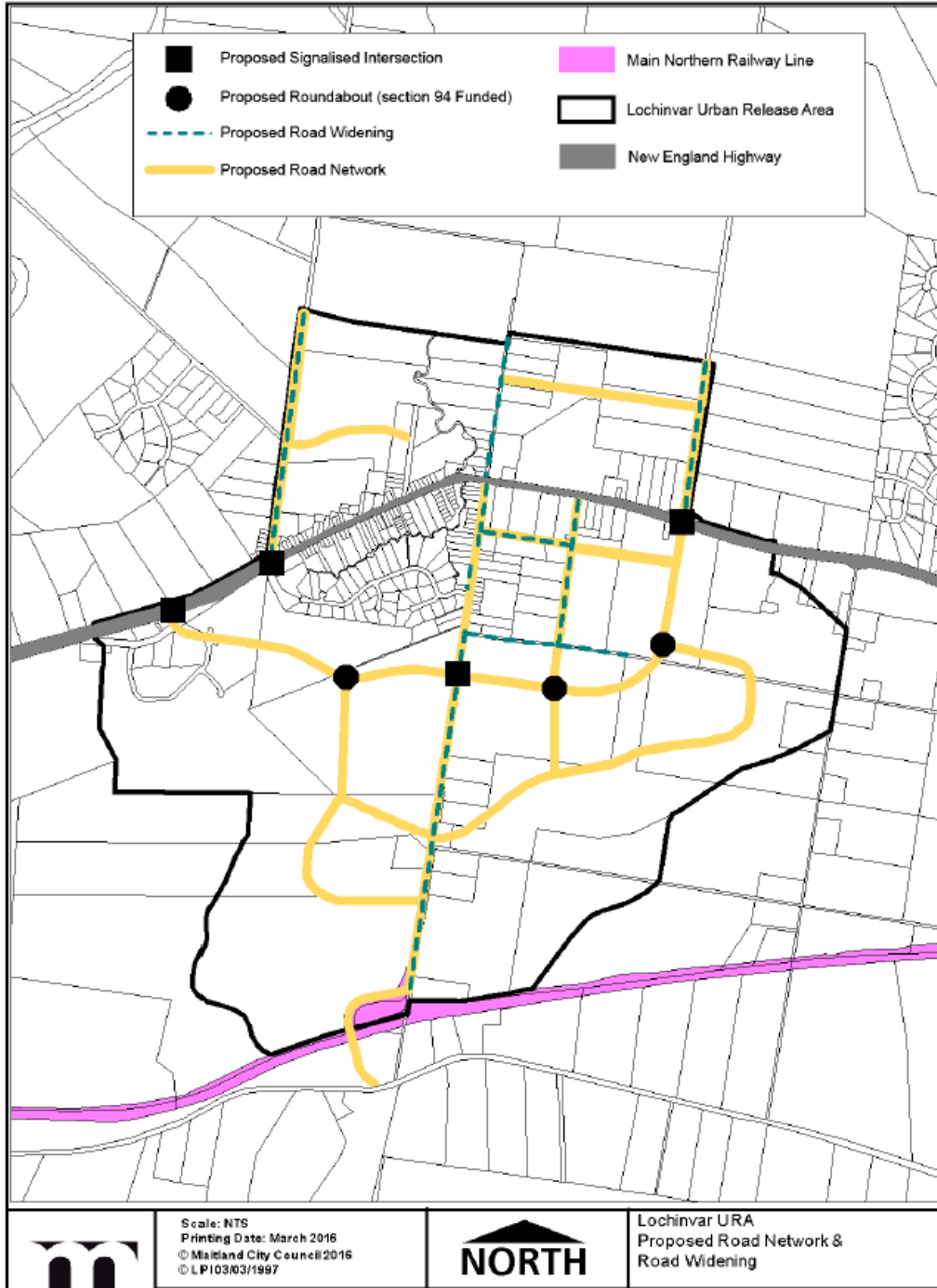


Source: Hyder, 2014

2.2.4 Maitland Development Control Plan updates (2016)

After the publication of the Lochinvar studies, Maitland City Council produced an update to their Development Control Plan with a proposed road network layout (Figure 2-13).

Figure 2-13 Lochinvar Urban Renewal Area Proposed Road Network and Road Widening



Source: Maitland Council, 2016

This plan shows that the northern road would no longer be a full bypass but only connect to Cantwell Road.

Further observations: The change in the northern bypass route to no longer provide a full connection would lower the amount of strategic traffic using this route compared with previous modelling.

2.2.5 SIDRA Report: Wyndella Stage 1 (TfNSW, 2017)

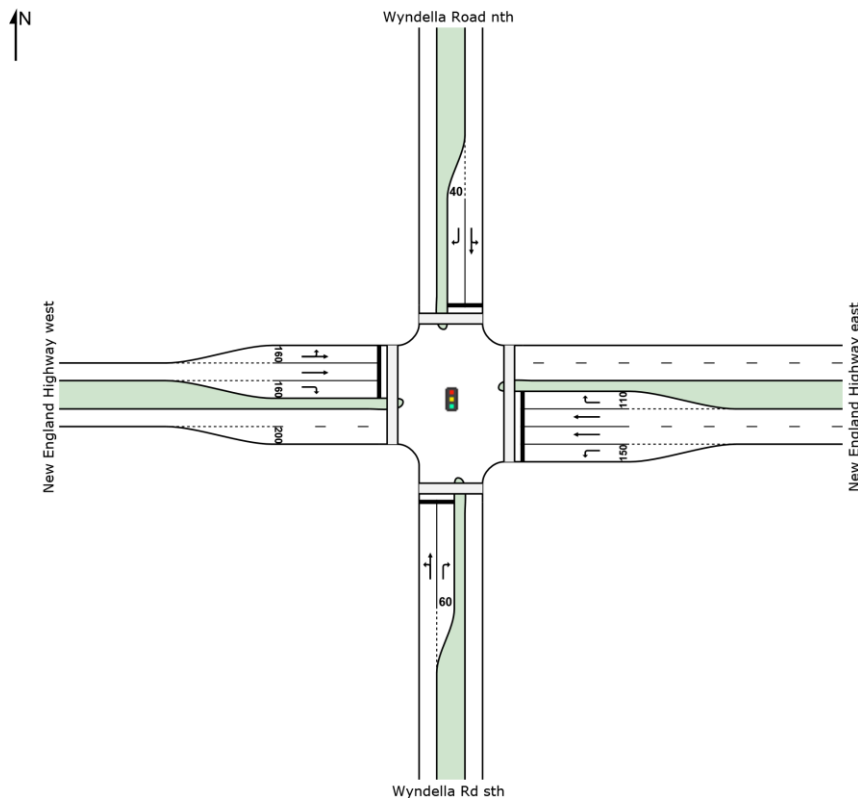
TfNSW separately prepared a standalone SIDRA study on the intersection form of New England Highway / Wyndella Road. The key assumptions were:

- Development to the south and north split 80%/20% respectively
- Growth on the highway is assumed to be a 1.9% p.a.
- Growth on the southern leg is assumed to be either 60 or 100 lots per year, with trip generation either 50% to the east or 70% to the east
- Cycle time is 100 sec.

The modelling work included two scenarios:

- **Scenario 1:** a test of a smaller intersection layout
- **Scenario 2:** sensitivity tests of various growth rates and the end of life with a larger intersection size.

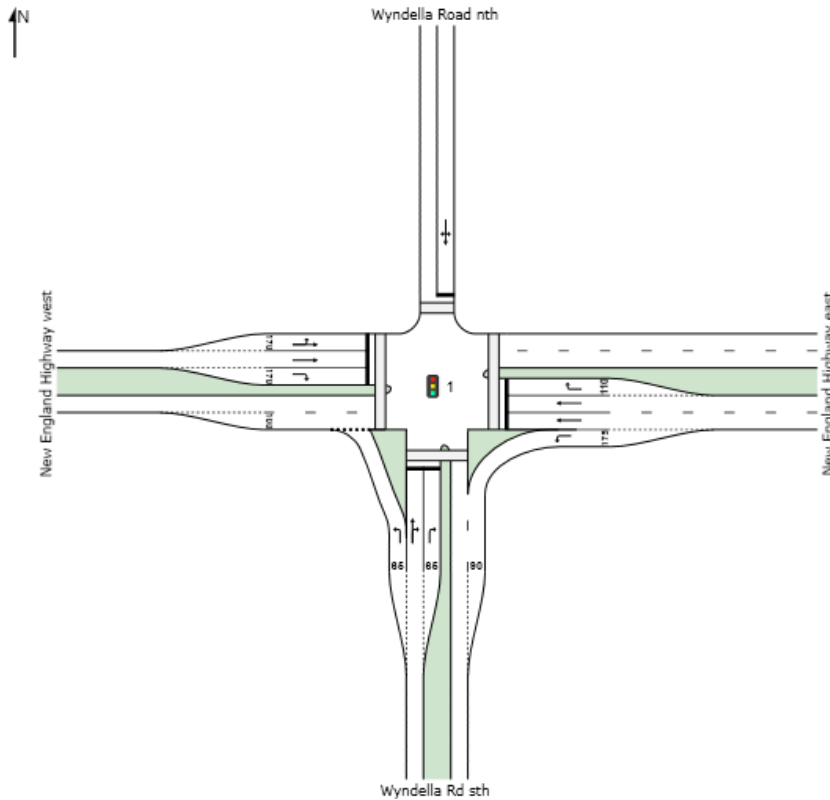
Figure 2-14 Scenario 1 intersection layout



Source: Transport for NSW, 2017

The intersection performed at Level of Service C in 2028 in Scenario 1.

Figure 2-15 Scenario 2 intersection layout



Source: Transport for NSW, 2017

The performance of the signal in various scenarios is shown in **Table 2-4** and **Table 2-5**.

Table 2-4 Scenario 2 differing lot release rates and trip distributions

Scenario 2 up to target year (2028)	DOS	Intersection delay	Worst Delay
AM Year 2028 - 60 lots per year - 70% trips to the east	0.735	23.6	41.9
AM Year 2028 - 60 lots per year - 50% trips to the east	0.657	21.8	42.0
AM Year 2028 - 100 lots per year - 70% trips to the east	0.821	28.1	42.0
AM Year 2028 - 100 lots per year - 50% trips to the east	0.747	24.4	43.2
PM Year 2028 - 60 lots per year - 70% trips to the east	0.793	22.1	43.7
PM Year 2028 - 60 lots per year - 50% trips to the east	0.901	28.0	44.2
PM Year 2028 - 100 lots per year - 70% trips to the east	0.901	26.1	44.2
PM Year 2028 - 100 lots per year - 50% trips to the east	0.828	29.3	52.3

Source: Transport for NSW, 2017

Table 2-5 Scenario 2 end of life

Scenario 2 up to end of life	DOS	Intersection delay	Worst Delay
PM Year 2033 - 100 lots per year - 50% trips to the east	0.965	40.0	69.3
PM Year 2034 - 100 lots per year - 50% trips to the east	0.996	44.4	77.7
PM Year 2035 - 100 lots per year - 50% trips to the east	1.034	49.2	85.5

Source: Transport for NSW, 2017

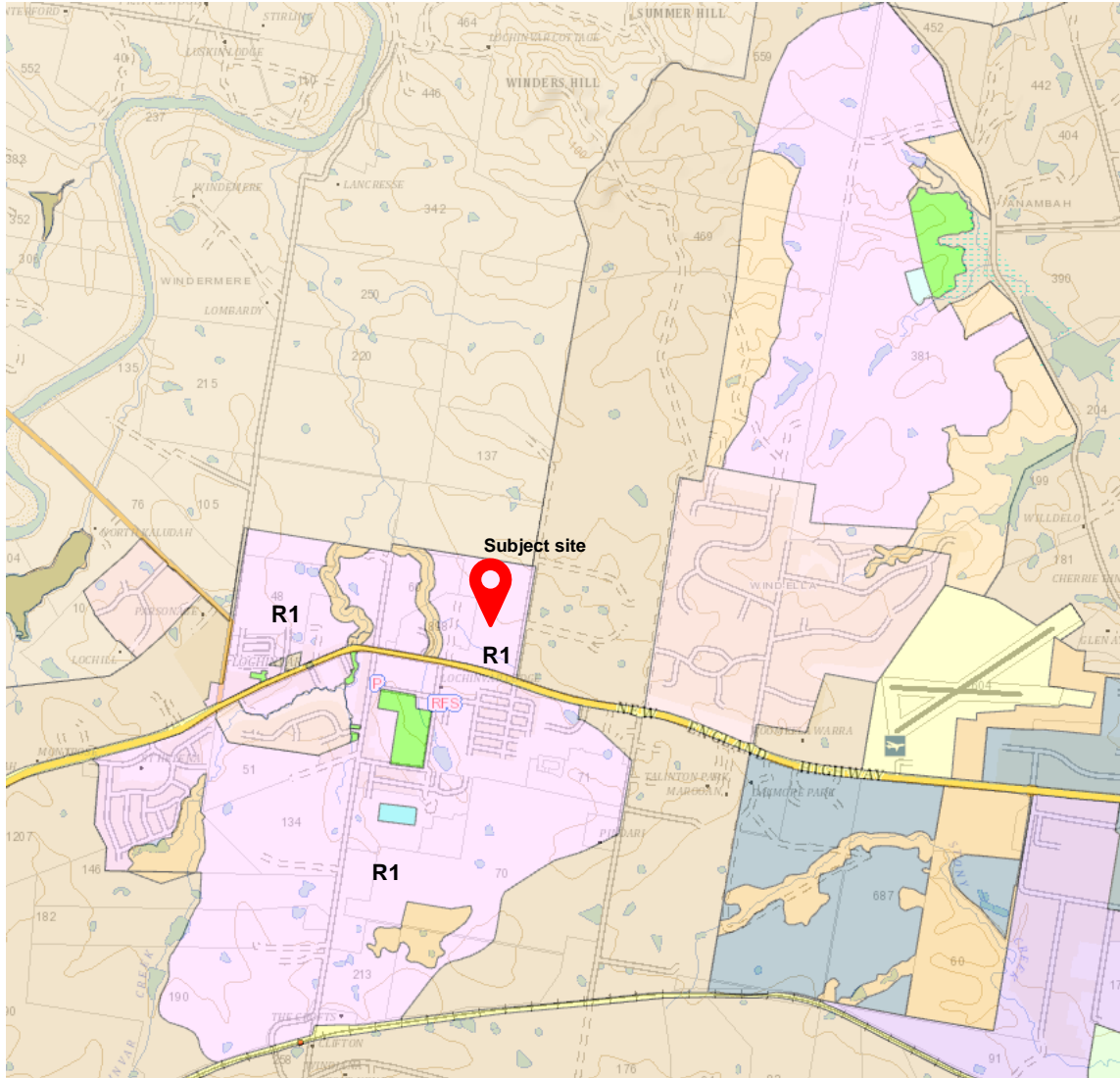
Further observations: the following conclusions were not stated in the report, but inferred from analysis of the contents:

- The base year model was 2017. No calibration data is provided
- There is no assumption about strategic traffic using the link beyond the traffic
- Growth to 2028 at 60 lots per year is 660 lots
- Growth to 2028 at 100 lots per year is 1,100 lots
- Growth to 2033 at 100 lots per year is 1,600 lots
- Based on the 2033 design year, the number of lots to the north is greater than the Wyndella Road subdivision application, but less than could come from Anamabah and Wyndella Road precincts combined.

2.3 Current planning status

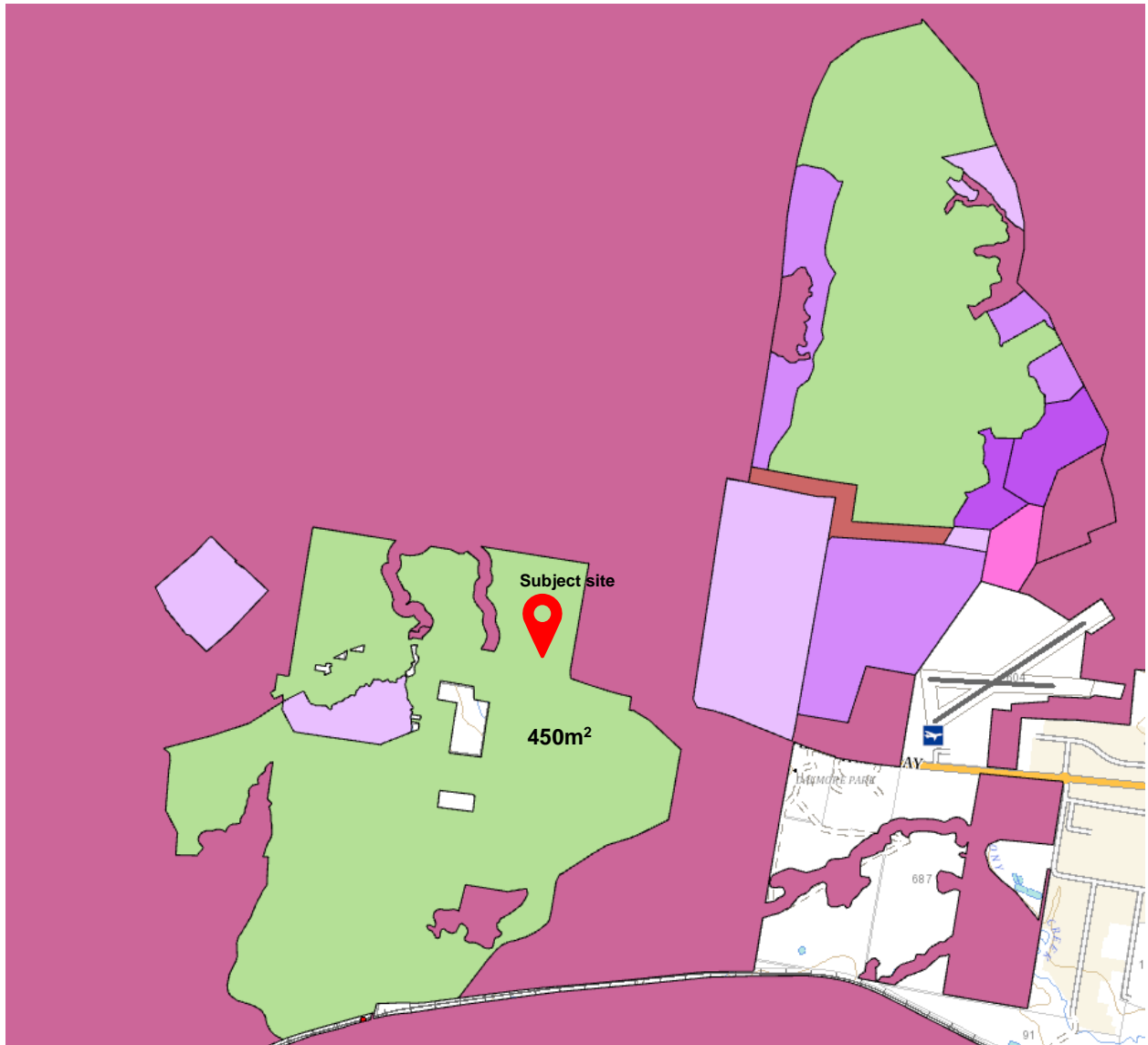
The land zoning and the minimum lot size have been updated to reflect the land uses previously proposed in the Lochinvar Structure Plan and the Anambah Release Area (**Figure 2-16** and **Figure 2-17**).

Figure 2-16 Local Environment Plan zoning



Source: Department of Planning & Environment, 2023

Figure 2-17 Lot size map



Source: Department of Planning & Environment, 2023

3.0 Existing conditions

3.1 Site

The site is bounded by New England Highway to the south, Wyndella Road to the east, residential lots to the north and St Joseph’s College Lochinvar/residential lots to the west (**Figure 3-1**).

Figure 3-1 Wyndella Road subdivision

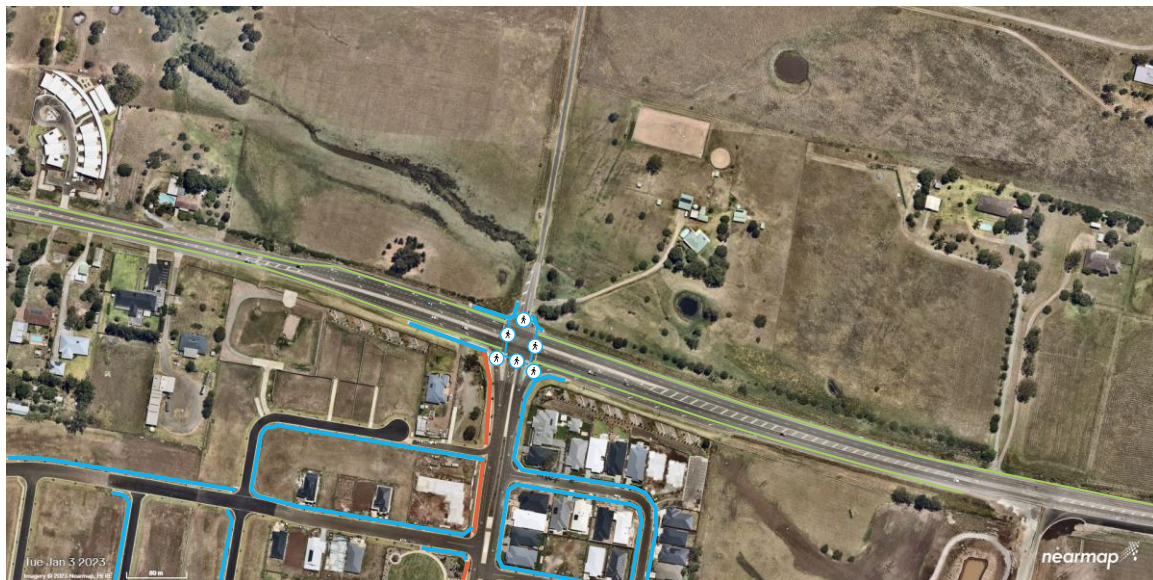


Source: Nearmap & ADW Johnson, 2023

3.2 Walking and cycling infrastructure

The walking and cycling infrastructure around the site is shown in **Figure 3-2**.

Figure 3-2 Walking and cycling infrastructure



- Pedestrian facility (footpath, signalised crossing, zebra)
- Cyclist facility (on road cycle lane/wide shoulder)
- Shared path



Source: Nearmap, SCT Consulting, 2023

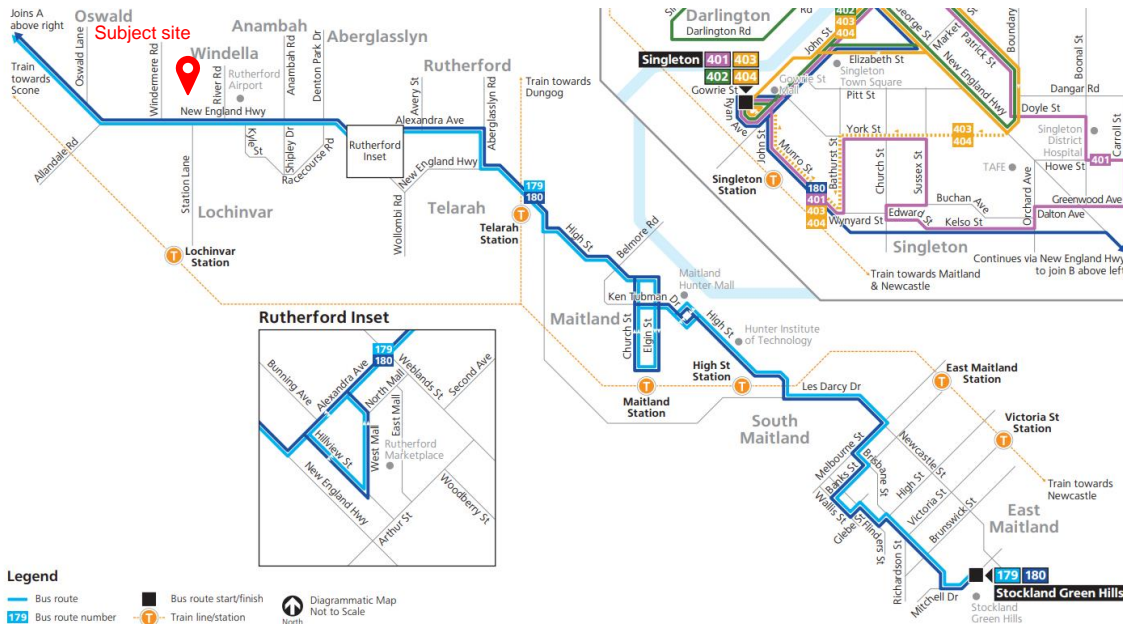
There is a footpath within the subdivision area to the south of the New England Highway with crossings on all legs of New England Highway / Wyndella Road.

There are on-road cycle lanes on the eastern, western and southern approaches to New England Highway / Wyndella Road. There are wide shoulders along New England Highway that would be suitable for experienced cyclists. A shared path runs along the western side of Springfield Drive south of New England Highway.

3.3 Public transport network

The site is located north of New England Highway, which carries bus services to Maitland and Stockland Green Hills, as shown in **Figure 3-3**. Bus routes 179 and 180 follow a similar route towards Maitland.

Figure 3-3 Public transport network



Source: Transport for NSW, 2023

The closest bus stops are 600m to the west of Wyndella Road outside St Joseph’s College (eastbound & westbound) and 400m to the east of Wyndella Road (westbound). The frequency of these services is approximately hourly from 8am to 6pm.

Lochinvar Station is 4.8km to the southwest of the intersection of New England Highway / Wyndella Road. There are no feeder bus routes to this station. Lochinvar Station is served by the Hunter Line, which has an approximately hourly frequency from 7am to 10am. The Hunter Line connects Lochinvar to Newcastle Interchange and Scome.

3.4 Road network

The site sits west of Wyndella Road and north of New England Highway. New England Highway is classified as a state road (per the Roads Act), shown in **Figure 3-4**, and connects to Maitland and through onto Newcastle to the east. To the west, it connects to Branxton. There are interchanges with M15 Hunter Expressway via Lovedale Road at Allandale.

Figure 3-4 Classified state and regional road network



Source: Transport for NSW, 2023

3.4.1 Traffic surveys

Intersection turning counts and queue length surveys were conducted for New England Highway / Wyndella Road / Springfield Drive on 8/03/2023 from 7am to 9am and 2.30pm to 5.30pm. These are typical periods as they cover the typical morning and evening peak in most contexts. The date of the survey was during the school term. The current intersection layout is shown in **Figure 3-5**.

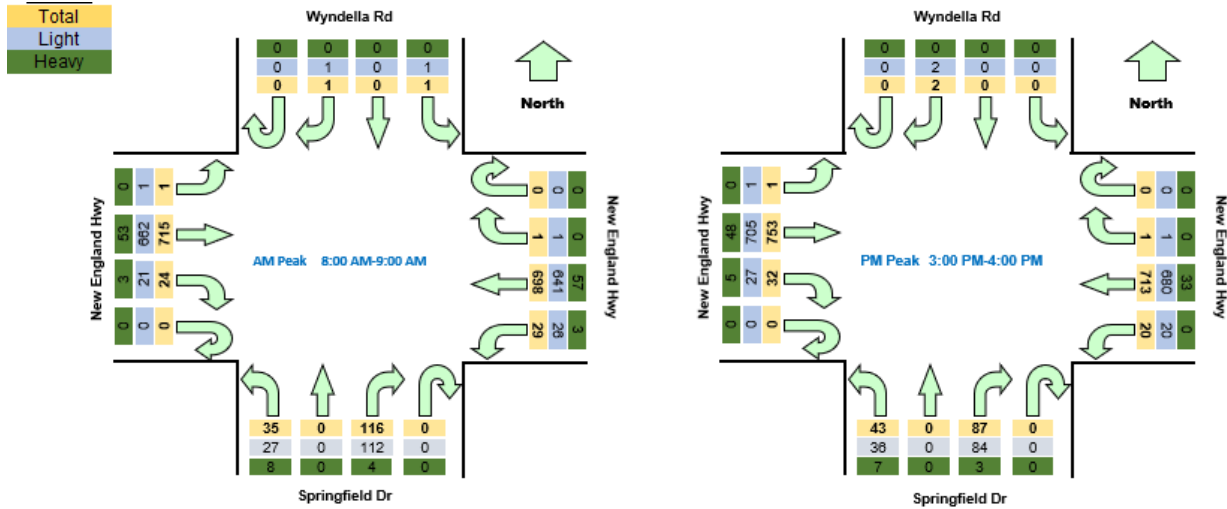
Figure 3-5 New England Highway / Wyndella Road / Springfield Drive intersection layout



Source: Nearmap, 2023

Intersection turning counts were collected in fifteen-minute intervals with classifications of light vehicles and heavy vehicles. Queue lengths were also collected during the same time period to inform the validation of the traffic models. The peak period traffic counts are shown for both peak periods in **Figure 3-6**. Raw outputs of the traffic surveys are attached in **Appendix A**.

Figure 3-6 Intersection turning counts for the AM and PM peak periods



Source: Trans Traffic Survey, 2023

3.4.2 Intersection modelling

The traffic modelling methodology was developed with TfNSW prior to the preparation of the development application.

The intersections were modelled in SIDRA 9.1, which is the most recent version of the software at the time of writing. SIDRA models the delays to road users (cars, trucks, buses, pedestrians, cyclists) based on the demands and geometry of intersections. It is a typical software used for a development application of this scale.

SIDRA is considered an appropriate tool for the following reasons:

- The actual potential bypass traffic will be derived from survey data and wholly reassigned to the bypass rather than using an assignment model. This takes a conservative view of the maximum traffic that could use the bypass.
- SIDRA provides an accurate estimation of capacity at the intersection level, which is typically the most constrained part of the traffic network in urban areas.
- SIDRA supports rapid turnaround of sensitivity tests, enabling stakeholders to evaluate alternatives quickly.

3.4.3 Calibration and validation

Signal timings were adjusted slightly to match the queue lengths observed on site.

SIDRA models are mainly calibrated based on queue comparisons of maximum observed approach queues and the modelled 95th percentile queues. However, as identified in the TfNSW Modelling Guidelines, observations / surveys of queues are subjective:

“Counting or calculating queue lengths is a subjective exercise since queued vehicles will often still be moving slowly and it will not always be clear what criteria should be used to constitute a queue. Also, since data is likely to be collected by a number of surveyors it is unlikely that consistent and accurate reporting will be possible across the study area. Additionally, software packages will each calculate queue lengths using different criteria and methodologies which add a further level of complexity. For this reason, RMS does not have mandatory statistical guideline criteria for queue length comparison.”

As such, precise exact replication of queues between observed and modelled is impractical, as the models would no longer represent the reported signal timings.

Queue length calibration results are shown in **Table 3-1** overleaf.

Table 3-1 Queue length calibration results (queue length in vehicles)

Approach	Model AM	Observed AM	Model PM	Observed PM	AM Difference	PM Difference
North	1	1	1	1	0	0
South	3	3	2	3	0	1
East	9	8	8	9	1	1
West	4	5	7	6	1	1

The queue lengths show a good degree of matching for a traffic model and are therefore appropriate to be used for this traffic impact assessment.

3.4.4 Intersection performance

Intersection Level of Service (LOS) is a tool to measure the level of congestion at an intersection as well as to identify locations requiring further investigations. The LOS as defined in the Traffic Modelling Guidelines is summarised in **Table 3-2**.

Table 3-2 Level of Service definitions

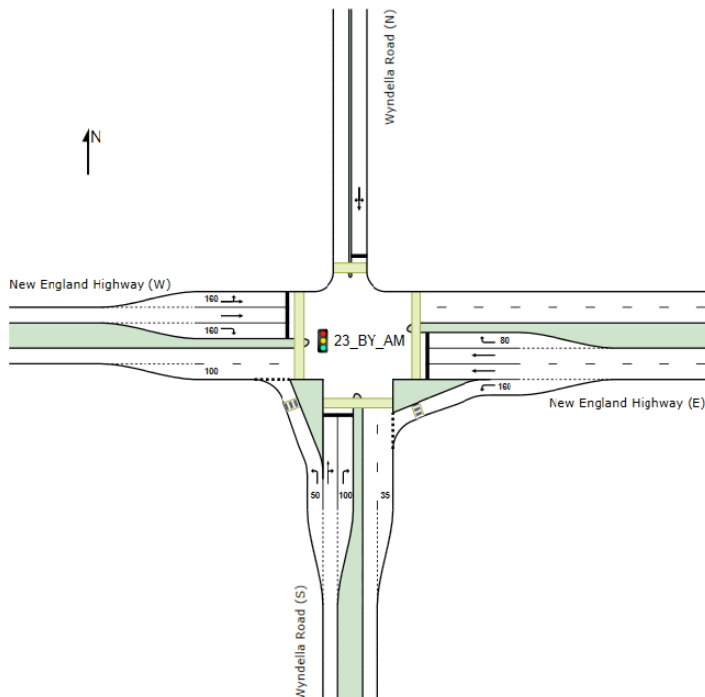
Level of Service	Average Delay per Vehicles (sec/h)	Performance explanation
A	Less than 14.5	Good operation
B	14.5 to 28.4	Good with acceptable delays and spare capacity
C	28.5 to 42.4	Satisfactory
D	42.5 to 56.4	Operating near capacity
E	56.5 to 70.4	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.
F	70.5 or greater	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.

Source: Roads and Maritime Services, 2002

Intersection Degree of Saturation is another metric to measure the performance of isolated intersections and approaches. DS is a ratio of traffic demand to capacity. For intersections controlled by traffic signals, both queue length and delays typically increase rapidly as DOS approaches 1.0.

Traffic modelling was undertaken using SIDRA 9.1 for the intersection of New England Highway, Wyndella Road and Springfield Drive using the traffic volumes collected on 8/03/2023. The current intersection geometry and configuration were used for base and future year analysis. The SIDRA 9.1 intersection layout for future year and base are shown in **Figure 3-7**.

Figure 3-7: SIDRA 9.1 Base year layout



Source: SCT Consulting, 2023

Table 3-3 Base am peak performance

Approach	Movement	Volume (veh/h)	Degree of Saturation	Average Delay	Level of Service	95 th Percentile Queue
Wyndella Road (north)	Left	1	0.1	53.2s	D	1m
	Through	1	0.1	53.2s	D	1m
	Right	1	0.10	53.2s	D	1m
New England Highway (east)	Left	29	0.02	7.9s	A	1m
	Through	698	0.40	6.6s	A	61m
	Right	1	0.05	56.9s	E	1m
Springfield Drive (south)	Left	35	0.05	8.6s	A	2m
	Through	1	0.25	35.1s	C	17m
	Right	116	0.25	40.7s	C	17m
New England Highway (west)	Left	1	0.28	10.3s	A	38m
	Through	715	0.28	4.2s	A	39m
	Right	24	0.40	53.9s	D	9m
Intersection		1,623	0.40	8.9s	A	61m

Table 3-4 Base pm peak performance

Approach	Movement	Volume (veh/h)	Degree of Saturation	Average Delay	Level of Service	95 th Percentile Queue
Wyndella Road (north)	Left	43	0.07	47.2s	D	2m
	Through	1	0.07	45.1s	D	2m
	Right	87	0.07	50.6s	D	2m
New England Highway (east)	Left	20	0.01	7.8s	A	1m
	Through	713	0.37	6.2s	A	58m
	Right	1	0.05	56.2s	D	1m
Springfield Drive (south)	Left	43	0.06	8.7s	A	3m
	Through	1	0.41	42.4s	C	14m
	Right	87	0.41	48.0s	D	14m
New England Highway (west)	Left	1	0.29	10.5s	A	46m
	Through	753	0.29	4.9s	A	46m
	Right	32	0.40	51.6s	D	12m
Intersection		1655	0.41	8.9s	A	58m

The intersection is performing at a LOS of A during both peaks. Results are similar, with an average delay of 8.9 seconds, DOS of 0.40 and 0.41 and 95th percentile queue lengths of 61m and 58m for the AM and PM peaks respectively. These results show additional intersection capacity.

4.0 Proposed development

4.1 Proposal

The site comprises Lots 2, 3, 4, 5, 6 and 9 DP 747391, and Lots 12 and 13 DP1219648. The site is zoned R1 General Residential and covers an area of approximately 22ha. The site is proposed to be subdivided for residential development, with associated roads and services.

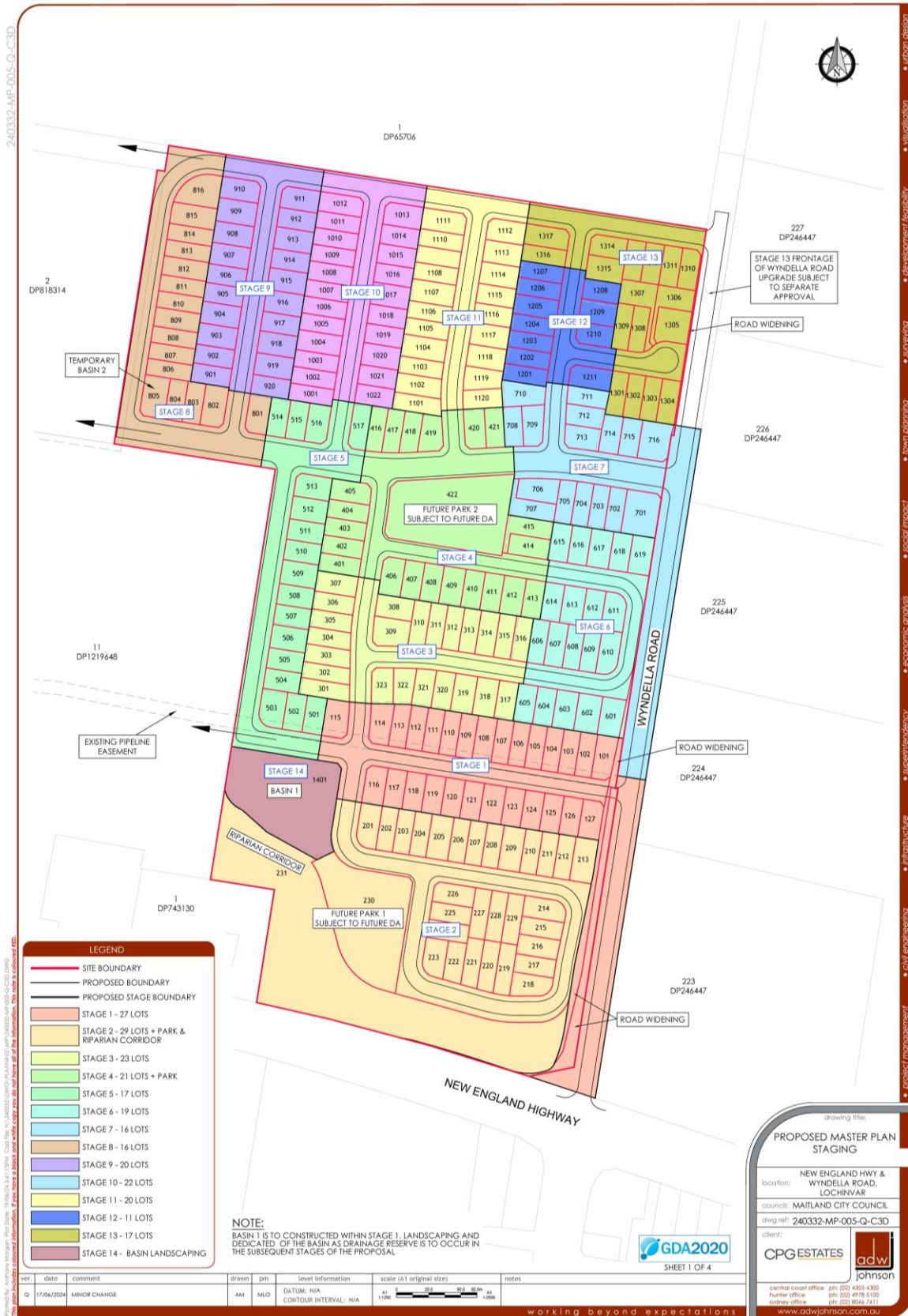
The subdivision would deliver 258 residential lots (an increase of 250 lots compared to the current 8 lots). Lots would be opening indicatively in 2025 and approximately 50 lots per year would be released.

The layout plan is based on a grid road network. Wyndella Road and a new east-west link form the higher order roads in the subdivision.

Access to the state road network would be via Wyndella Road to New England Highway, which permits all movements in and out.

The subdivision layout plan is provided overleaf in **Figure 4-1**.

Figure 4-1 Subdivision plan layout



Source: ADW Johnson, 2024

4.2 Street cross section requirements

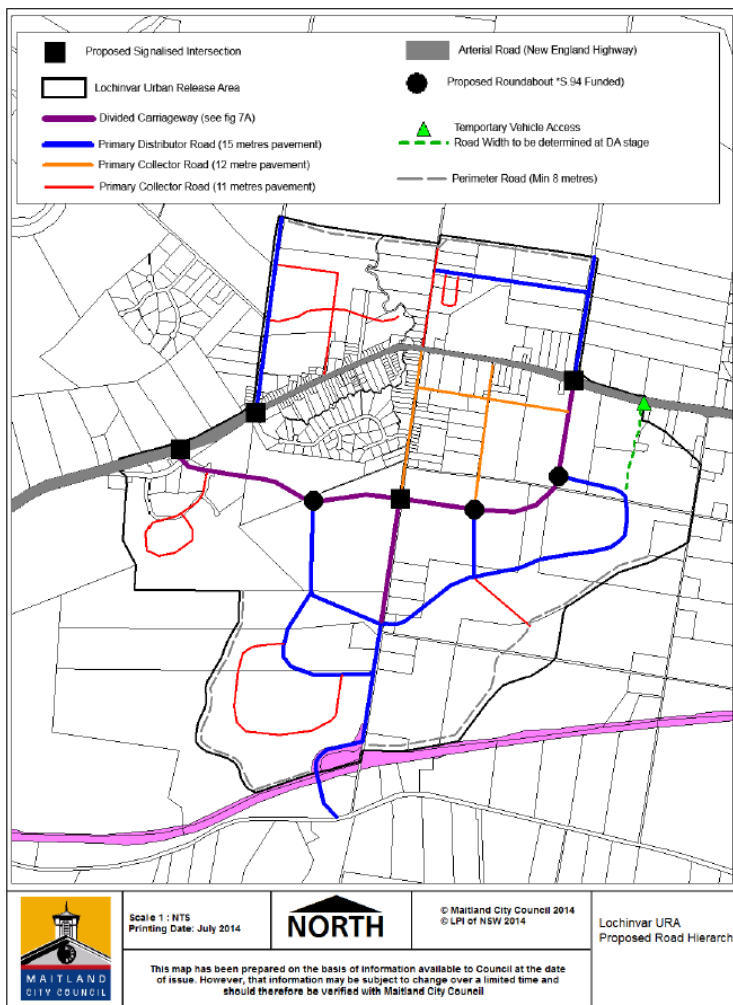
The Maitland City Council | Manual of Engineering Standards – Road Design defines the requirements for street cross sections (**Figure 4-2**). The higher order roads are defined by **Figure 4-3**. Lochinvar URA Proposed Road Hierarchy and Bus Routes of Part F – Urban Release Areas.

Figure 4-2 Street cross sections for different road types

ROAD TYPE	MAX NO. LOTS	RESERVE WIDTH (m) ^a	CARRIAGEWAY / KERB-KERB (m) ^b	ON-ROAD BICYCLE FACILITY	FOOTWAY VERGE (m) ^c	KERB ^d	FOOTPATH (1.5m WIDE) ^e	DESIGN ESA ^f
Local – Place ⁱ	10	17	8	Mixed	4.5	Rolled	As Required	1 x10 ⁵
Local – Access ⁱ	20	17	8	Mixed	4.5	Rolled	One side	1 x10 ⁵
Local – Secondary ⁱ	50	17	8	Mixed	4.5	Rolled	One side	2 x10 ⁵
Local - Primary ⁱ	100	17	8	Mixed	4.5	Rolled	One side	5 x10 ⁵
Collector - Secondary ⁱ	200	17	8	Mixed (Parking)	4.5	Upright	One side	1 x10 ⁶
Collector - Primary ^{iv}	300	20	11	Mixed (Parking) ^p	4.5	Upright	One side	1.5 x10 ⁶
Distributor –Secondary ^v	400	23	14	Mixed (Parking) ^p	4.5	Upright	Both sides	2 x10 ⁶
Distributor - Primary ^{m,v}	500	24	15 ^q	1.5m Lane	4.5	Upright	Both sides	5 x10 ⁶
Sub-Arterial ⁿ	3500	24.4	15.4 ^r	1.7m Lane ^s	4.5	Upright	Both sides	1 x10 ⁷ min
Industrial - Secondary	10 ^b	22	13	Mixed	4.5	Upright	As Required	5 x10 ⁶
Industrial - Primary	> 10	22	13	Mixed	4.5	Upright	As Required	1x10 ⁷
School Bus/Public Route ^o			9min / 12min					2/5 x10 ⁶ min
Business / School Precinct			15.4	1.7m Lane	5.5 min ^h	Upright		1 x10 ⁷ min

Source: Maitland City Council

Figure 4-3 Cross section requirements



Source: Maitland City Council, 2014

The above documents indicate that the following street cross-sections are required for the following key roads:

- Wyndella Road is a Primary Distributor Road, which needs to have a kerb – kerb carriageway width of 15 metres and a reserve width of 24m on the development side. Council has advised that on-street parking lanes are not required, reducing the minimum width to 20m.
- A new northern bypass road runs east-west through the subdivision area, which is also classified as a Primary Distributor Road, and needs to have a kerb – kerb carriageway width of 15 metres and a reserve width of 24m.
- The northern road along the edge of the development needs to have a kerb – kerb carriageway width of at least 8m.

Table 4-1 below summarises the road width requirements outlined above, and the road widths proposed under this development application.

Table 4-1 Road requirements and widths

Road	Required carriageway width (kerb – kerb)	Provided carriageway width (kerb – kerb)	Required reserve width	Provided reserve width
Wyndella Road	10.95m	10.95m	20m	21.21m
New east-west link	15m	15m	25m	25m
Northern perimeter road	8m	10.5m	17m	14.5m
Typical street	8m	8m	17m	17m

Source: Maitland City Council, SCT Consulting, ADW Johnson, 2023

As demonstrated in **Table 4-1** the carriageway and road reserve widths for the new east-west link and typical streets have been met.

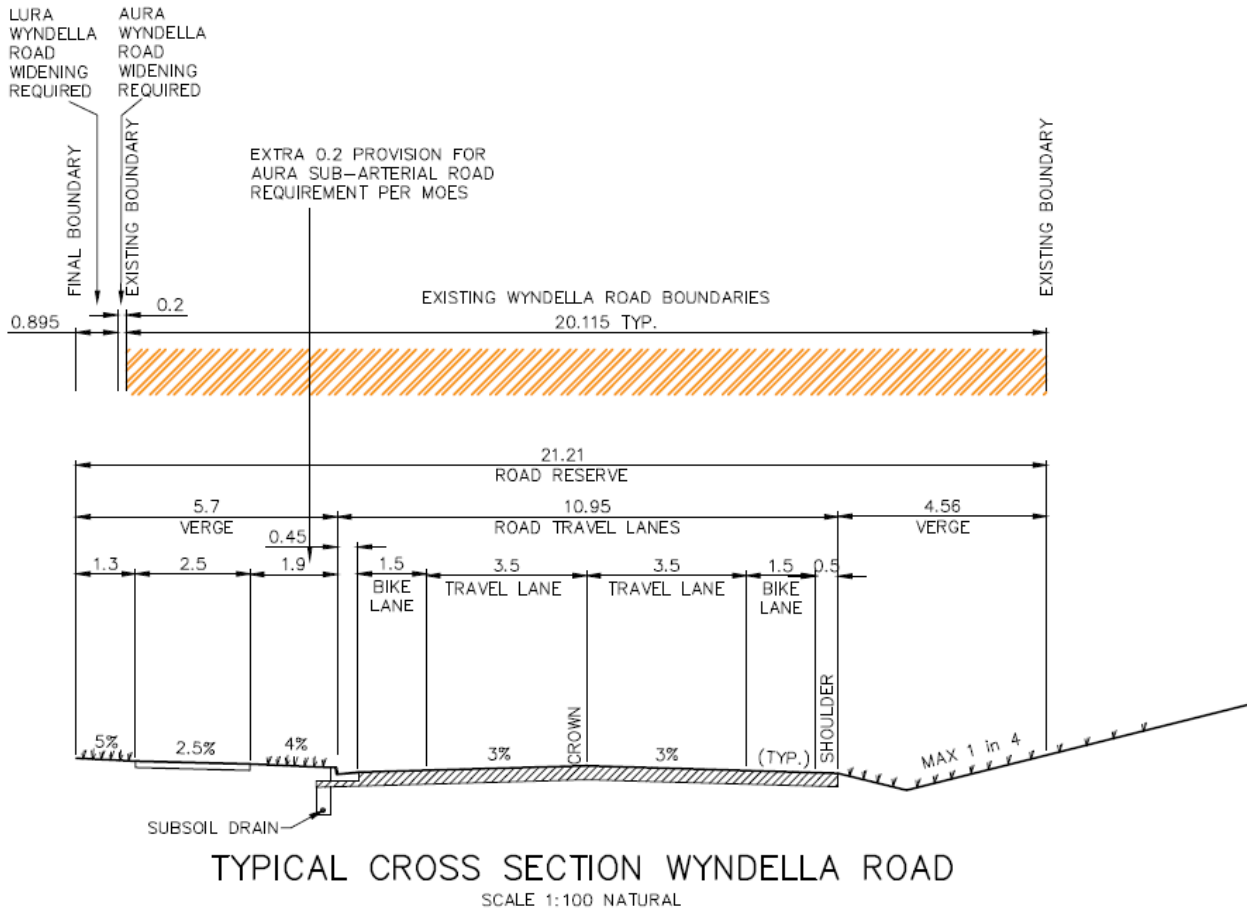
The northern perimeter road does not require a footpath on the northern side nor a setback from the adjoining property to the north.

It is also noted that the works associated with Wyndella Road do not comply with the requirements outlined in **Figure 4-2** and **Figure 4-3**, which nominate Wyndella Road as a Distributor Primary Road.

This development application proposes to upgrade Wyndella Road to a Primary Distributor Road without parking on either the western or eastern sides. The proposed configuration is shown in **Figure 4-4**. It is noted that the proposed road does not include the provision of a parking lane on the eastern side of Wyndella Road, as there is no nexus for parking on the side of the road abutting the rural zoned land.

Maitland City Council's Request for Information specifies that no lots from the development site are permitted to have direct access from Wyndella Road. All lots from the development site are proposed to have access from internal roads with associated on-street parking within the internal roads and therefore parking is not required within Wyndella Road and access should not be encouraged with parking from Wyndella Road.

Figure 4-4 Typical cross section of Wyndella Road



Source: ADW Johnson, 2023

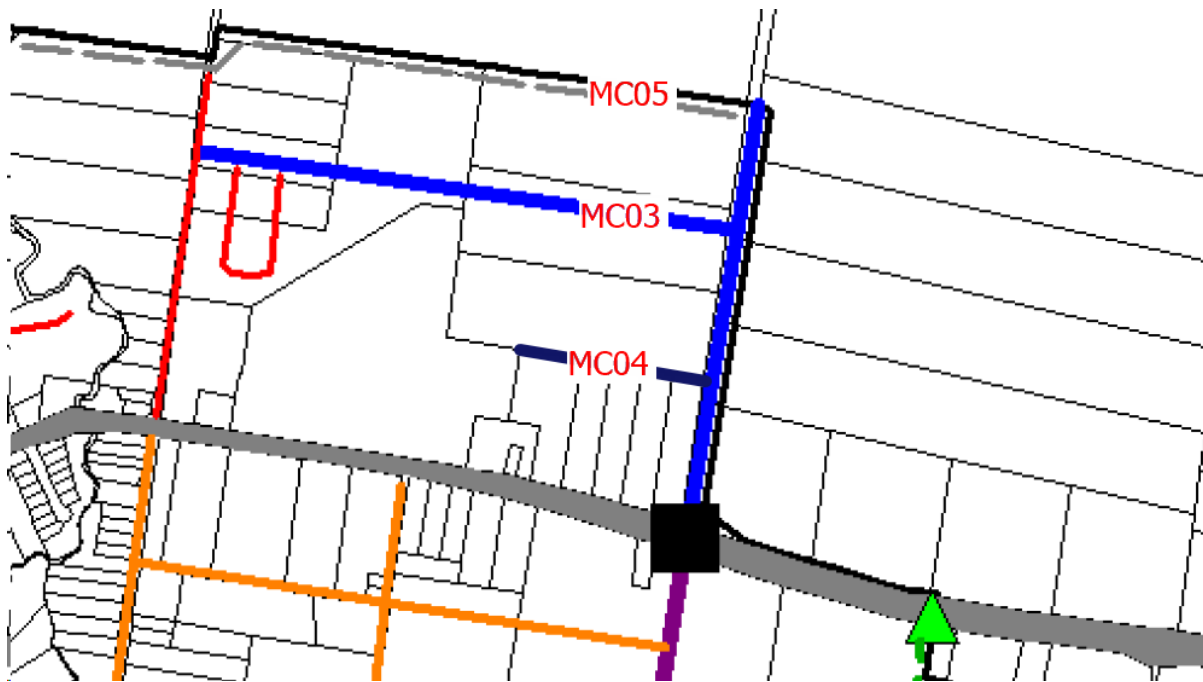
4.3 Local street access from Wyndella Road

Council has requested consideration of the intersection forms along Wyndella Road due to the expected future traffic coming from Anambah Urban Renewal Area (URA) along Wyndella Road.

An assessment was carried out to evaluate the intersection performance and turning bay warrants assessment per Austroads Guide to Road Design Part 4, A.8 Warrants for BA, AU and CH Turn Treatments.

There are three accesses proposed from the Lochinvar DCP, shown in **Figure 4-1** and labelled MC03, MC04 and MC05 in **Figure 4-5**.

Figure 4-5 Site access excerpt from Lochinvar DCP



Source: Lochinvar DCP

MC03 has a collector-type function, which draws traffic from the broader northern portion of the Lochinvar URA. MC04 and MC05 are local roads.

The intersections are proposed to be all movements permitted.

As Anambah URA is delivered, Wyndella Road would carry a significant increase in traffic, which was assessed (**Section 5.4**) for suitability. Based on the traffic volumes, some turn restrictions may become necessary. **Table 4-2** articulates the proposed access arrangements and how these may change after the full Anambah URA is delivered. Due to the uncertainty associated with the access strategy for Wyndella Road, these arrangements should be reviewed and updated by others in future.

Table 4-2 Access strategy for new connections onto Wyndella Road

Intersection with Wyndella Rd	Proposed access arrangement	Possible future arrangement should Anambah URA be fully delivered
MC03	All movements permitted	All movements permitted
MC04	All movements permitted	Left in left out only
MC05	All movements permitted	Left in, left out and right out only (right turn in banned).

5.0 Impact assessment

5.1 Walking and cycling

All lots are set back by 4.5m, which is sufficient for walking paths. Where shared cycle paths are proposed, verges have been widened to 5.5m.

The proposed park 1 is located to provide connectivity along the activated watercourse. The proposed park 2 is centrally located on MC03 with good connectivity to the active transport network.

The intersection of New England Highway / Wyndella Road has crossings on all approaches, which supports pedestrian and cyclist accessibility.

5.2 Public transport

The site is within a walkable distance of the bus stops on New England Highway, which provides connectivity to Maitland and Stockland Green Hills as well as other centres along the New England Highway.

Lochinvar Station has parking which enables residents to park and ride to Newcastle CBD.

5.3 New England Highway & Wyndella Road

5.3.1 Traffic generation

Traffic generation rates for lots north of the New England Highway (NEH), inclusive of the 250 proposed additional lots, were adopted for the 'Low Density dwellings in regional areas' category. For lots south of the New England Highway, a trip generation of the 'Low Density' category was implemented, differentiated from the dwellings north of the New England Highway by being consistent across both peaks. The traffic generation rates adopted are consistent with previous studies and confirmed by TfNSW. Trip generation rates and peak hour traffic volumes at full release of all remaining lots to be developed within the LURA are shown in Table 5-1.

Table 5-1 Trip generation for proposed and surrounding developments within LURA

Yield	Traffic generation rate		Total traffic	
	Day	Peak (am/pm)	Day	Peak (am/pm)
250 dwellings (subject site)	7.4 veh/dwg	0.71/0.78 veh/dwg	1850 veh/day	178 / 195 veh/h
987 dwellings (remaining dwellings north of NEH)	7.4 veh/dwg	0.71/0.78 veh/dwg	7304 veh/day	701 / 770 veh/h
3337 dwellings (all remaining dwellings south of NEH)	6.8 veh/dwg	0.66/0.66 veh/dwg	22692 veh/day	2203 / 2203 veh/h

5.3.2 Traffic modelling assumptions

Assumptions used as part of this assessment are:

- A 3% annual background growth rate was applied for traffic on the New England Highway as per advice from Regional Planning and Transport for New South Wales. This is in addition to development traffic from the Lochinvar URA
- A split of 70% of trips to/from the west and 30% of trips to/from the east was used to inform future development trip distribution based on advice from TfNSW
- A 20/80 Inbound and outbound directional split was used for the AM peak period which was reversed for the PM peak
- Completion of the proposed 258 lots as part of the development is assumed to be by 2031, with a lot release rate for the LURA of 300 dwellings per year beginning in 2025
- Anambah URA is not considered as imminent and certain for modelling on the State Road network

- Trip generation rates were applied as per **Table 5-1**.

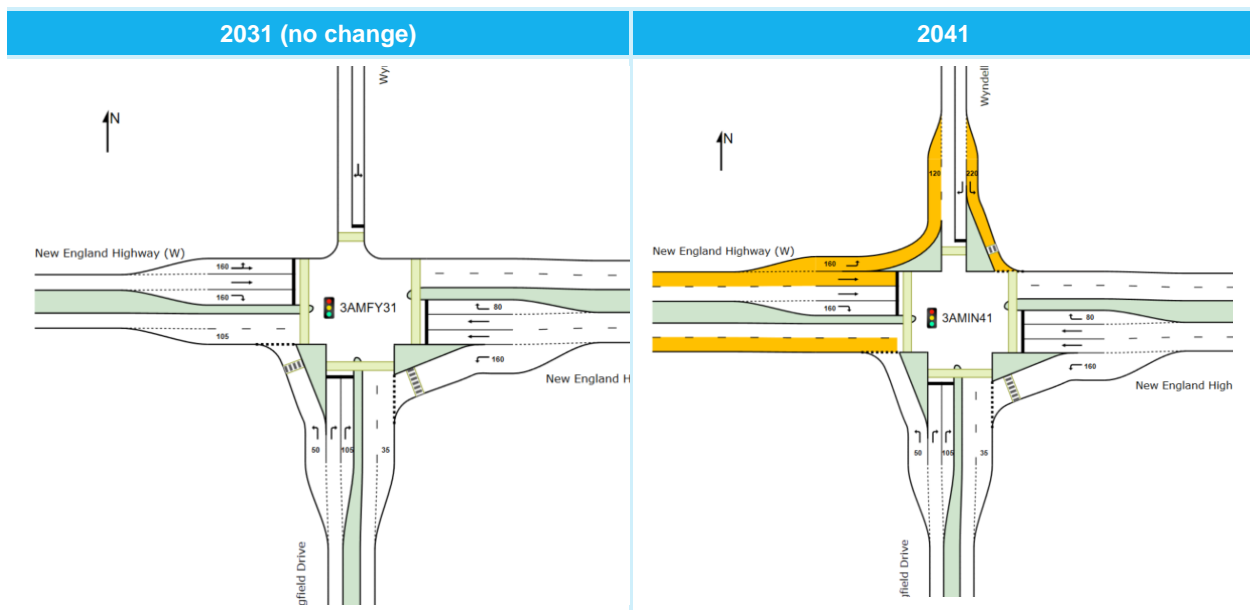
5.3.3 Road mitigation measures

With the Lochinvar URA expected to accommodate up to 5,000 dwellings, coupled with general growth along the New England Highway and possible future developments within the region, mitigation measures to the network in the form of road and intersection upgrades will be necessary. An 'end state' intersection layout for New England Highway / Wyndella Road is provided in **Appendix D**. Potential upgrades and intersection reconfigurations needed because of future growth, lot releases in the URA, and the proposed development were selected based on options presented in **Appendix D**.

By 2041, additional infrastructure at the intersection is required to facilitate background growth along the New England Highway 2041 as well as the growth from the Lochinvar URA. **Table 5-2** shows the intersection layouts for 2031 and 2041 modelling scenarios. The upgrades required to facilitate background growth by 2041 are described below:

- Continuous Slip Lane for left turners on the eastbound approach of the New England Highway
- High angle slip lane for left turners on the southbound approach of Wyndella Road
- Additional exit lane on the westbound approach of New England Highway.

Table 5-2 Mitigation and upgrades to intersection layouts in 2031 and 2041 (yellow lanes are additional)



The upgrade proposed in 2041 sits within the footprint of the anticipated long term intersection layout (**Appendix D**). the intersection requires additional capacity:

- For westbound traffic on New England Highway, which has growth significantly due to background and Lochinvar URA growth. Hence an additional westbound lane is required. Drivers no longer avoid the kerbside lane on New England Highway westbound with this extension, improving capacity at the intersection.
- For traffic heading into and out of Wyndella Road, arising from the broader Lochinvar URA demands which access the state road network via Wyndella Road. The upgrades also allow for more green time to be dedicated to New England Highway, which has experienced a significant increase in traffic demands.

5.3.4 Scenarios

The following scenarios were tested:

- **Future 2031 with background growth only:** a 3% growth rate was applied to movements on the New England Highway and a release rate of 300 lots per year up to 2031

- **Future 2031 with background growth and development traffic:** development traffic was added to the network without any mitigations to determine the upper limit of the impacts of the subject development application
- **Future 2041 with background growth only:** As per the ‘2031 background growth only’ scenario, but with growth and lot release rates applied till 2041. Full release of the Lochinvar URA is anticipated to be completed by 2041. Mitigations in the form of reconfigurations or upgrades to the road layout were added in this scenario in accordance with **Appendix D**.
- **Future 2041 with background growth and development traffic:** development traffic was added to the network to determine the impacts of the development and whether any further mitigations from the 2041 background growth only scenario are required

The year 2031 is considered appropriate because it allows for the full completion of the site. With the relatively small yield of an additional 252 dwellings, this is considered feasible. 2041 represents the full completion of the Lochinvar URA.

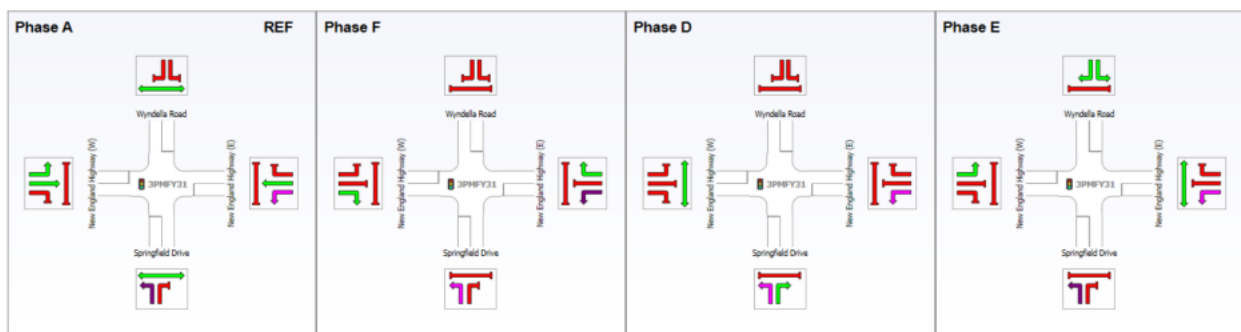
5.3.5 2031 Interim Treatment

There is an existing driveway located on Wyndella Road, just north of the New England Highway on the eastern side, which provides access to Lot 223 DP246447. This is a safety deficiency in the road network that exists at present, independent of the proposed development. With increased traffic demands on Wyndella Road, TfNSW is concerned that this could result in a rear-end collision at the traffic signals. This could occur because of vehicles colliding with a stationary vehicle attempting to turn right into Lot 223 DP246447 or because of vehicles colliding with the back of queue on New England Highway (western approach), arising from the stationary vehicle attempting to turn right into Lot 223 DP246447.

The proponent is proposing an interim treatment, which has a:

- Keep clear zone on Wyndella Road
- Change in signal phasing to reduce the probability of a rear end collision. Specifically, moving phase F to run immediately after A, with no turning movements permitted from Wyndella Road during phase F (**Figure 5-1**) allowing right turners from the New England Highway to safely enter the property.

Figure 5-1 2031 interim treatment phasing arrangement



Source: SCT Consulting, 2024

TfNSW provided written acceptance of the interim design (13 February 2024). However, TfNSW raised a concern about the longevity of this design based on the extent of mitigation of the rear end crash risk. TfNSW requested that if the western approach on New England Highway not exceed Level of Service C, otherwise removal of this hazard would be required.

The proposed interim treatments and LOS threshold were incorporated into the 2031 SIDRA modelling scenarios.

At 2031, the full road subdivision road network would be completed. In 2031, drivers may use the internal roads to make a U-turn (turn left into the estate, head north, then turn right out). The access could therefore be converted into a left in left out after 2031.

5.3.6 Future 2031

Results for the 2031 scenarios are presented in **Table 5-3**.

Table 5-3 Future 2031 scenarios – intersection performance

Volume	Degree of Saturation	Average Delay	Level of Service	95 th Percentile Queue
Future 2031 with background growth only - am Peak				
2721veh/h	0.62	13.4s	A	97m (Westbound through)
Future 2031 with background growth only - pm Peak				
2741veh/h	0.91	21.3s	B	162m (Westbound through)
Future 2031 with background growth & development traffic - am Peak				
2812veh/h	0.73	24.0s	B	155m (Westbound through)
Future 2031 with background growth & development traffic - pm Peak				
2847veh/h	0.86	22.2s	B	157m (Westbound through)

Table 5-4 2031 west approach – left turn lane intersection performance

Approach	Degree of Saturation	Average Delay	Level of Service	95 th Percentile Queue
Future 2031 with background growth only - am Peak				
West: Left turn	0.57	13.6s	A	84m
Future 2031 with background growth only - pm Peak				
West: Left turn	0.56	13.5s	A	103m
Future 2031 with background growth & development traffic - am Peak				
West: Left turn	0.67	15.1s	B	135m
Future 2031 with background growth & development traffic - pm Peak				
West: Left turn	0.61	15.5s	B	127m

LOS for the 2031 growth only scenario is A and B for the am and pm peaks respectively. With the inclusion of the development LOS during the am peak goes to B with an increase in delay of approximately 11 seconds. For the pm peak, the LOS remains at B, with an insignificant increase in delay of less than one second. 95th percentile queues increase with the additional development traffic, however, this does not significantly impact delay, with development traffic turning onto Wyndella Road contained within the turning bays and lanes on the New England Highway. The degree of saturation indicates that the current layout of the intersection is appropriate to manage demand because of the development as well as background on the New England Highway.

Table 5-4 and **Table 5-3** indicates a LOS of B and a maximum 95th percentile queue length of 135m when adopting the phasing plan in **Figure 5-1**, which satisfies TfNSW's requirement of LOS B or higher performance and containment of queues within the existing 160m left turn and through lane on the west approach (**Table 5-4**).

It is therefore proposed that the full yield of the proposed development can be achieved in 2031 without the need for mitigation.

5.3.7 Future 2041

Results for the 2041 scenarios are presented in **Table 5-5**.

Table 5-5 Future 2041 scenarios – intersection performance

Volume	Degree of Saturation	Average Delay	Level of Service	95 th Percentile Queue
Future 2041 with background growth only - am Peak				
3988veh/h	0.86	27.6s	B	239m (eastbound through)
Future 2041 with background growth only - pm Peak				
3994veh/h	0.96	34.9s	C	306m (westbound through)
Future 2041 with background growth & development traffic - am Peak				
4155veh/h	0.88	28.7s	C	238m (eastbound through)
Future 2041 with background growth & development traffic - pm Peak				
4176veh/h	0.98	39.8s	C	366m (westbound through)

LOS for the am and pm peaks for the background growth only scenario, are B and C respectively. For the am peak, the average delay is 27.6 seconds, 0.4 seconds shorter than the criteria for LOS C. Delay in the pm peak is 34.9 seconds.

The inclusion of development traffic has a minor impact on intersection performance. The am peak sees an increase in delay of less than one second and goes from LOS B to C. pm peak delay increases by just under five seconds and remains at LOS C. DOS is less than one for both peaks, with minor increases in DOS of 0.02. This indicates that the intersection configuration in **Table 5-2**, can accommodate the addition of development traffic in 2041.

5.4 Warrant assessment for intersections from Wyndella Road

5.4.1 Traffic demands

25 Wyndella Road, Lochinvar is located north of New England Highway, within the Lochinvar Urban Release Area, with no residential zoned land to the north except for Anambah URA. There are no accesses for the Lochinvar URA proposed north of the site. The volumes on Wyndella Road are currently very low (<5 vehicles per hour).

Two scenarios are considered – one with no development in Anambah URA and one with full development of the Anambah URA, per the request of Council. This differs from the approach adopted by TfNSW for the New England Highway intersection modelling assessment.

As Anambah URA is delivered, Wyndella Road would carry a significant increase in traffic. Based on the traffic volumes, some turn restrictions may become necessary. The purpose of this assessment is to:

1. Demonstrate the suitability of the current intersection arrangements
2. Provide Maitland City Council with confidence that should Anambah URA progress, the intersections could operate safely.

The second objective requires intersection changes which should not be the responsibility of the proponent as they arise from traffic generated by Anambah URA.

The traffic volumes estimated at each of the three accesses for the two scenarios are shown in **Table 5-6** and **Table 5-7** based on the above assumptions.

Table 5-6 Traffic demands by intersection – Full Lochinvar URA, No Anambah URA

Intersection	Full Lochinvar URA, No Anambah (AM)	Full Lochinvar URA, No Anambah (PM)
MC05 / Wyndella Rd		
MC03 / Wyndella Rd		
MC04 / Wyndella Rd		

Table 5-7 Traffic demands by intersection – Full Lochinvar URA, Full Anambah URA

Intersection	Full Lochinvar URA, Full Anambah (AM)	Full Lochinvar URA, Full Anambah (PM)																																																		
MC05 / Wyndella Rd	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>T1</td></tr> <tr><td>Tot 635</td></tr> <tr><td>LV 98%</td></tr> <tr><td>HV 2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>T1</td></tr> <tr><td>Tot 197</td></tr> <tr><td>LV 98%</td></tr> <tr><td>HV 2%</td></tr> </table> <p>Road 8 (Eastbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>17</td></tr> </table>	T1	Tot 635	LV 98%	HV 2%	T1	Tot 197	LV 98%	HV 2%	HV	LV	Tot	2%	98%	1	2%	98%	17	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>T1</td></tr> <tr><td>Tot 181</td></tr> <tr><td>LV 98%</td></tr> <tr><td>HV 2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>L2</td><td>T1</td></tr> <tr><td>Tot 10</td><td>954</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>MC05 (Westbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> </table>	T1	Tot 181	LV 98%	HV 2%	L2	T1	Tot 10	954	LV 98%	98%	HV 2%	2%	HV	LV	Tot	2%	98%	1	2%	98%	1												
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MC03 / Wyndella Rd	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>R2</td><td>T1</td></tr> <tr><td>Tot 1</td><td>652</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>L2</td><td>T1</td></tr> <tr><td>Tot 32</td><td>196</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>Road 7 (Eastbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>187</td></tr> </table>	R2	T1	Tot 1	652	LV 98%	98%	HV 2%	2%	L2	T1	Tot 32	196	LV 98%	98%	HV 2%	2%	HV	LV	Tot	2%	98%	1	2%	98%	187	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>R2</td><td>T1</td></tr> <tr><td>Tot 1</td><td>188</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>L2</td><td>T1</td></tr> <tr><td>Tot 138</td><td>963</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>MC03 (Westbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>53</td></tr> </table>	R2	T1	Tot 1	188	LV 98%	98%	HV 2%	2%	L2	T1	Tot 138	963	LV 98%	98%	HV 2%	2%	HV	LV	Tot	2%	98%	1	2%	98%	53
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MC04 / Wyndella Rd	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>T1</td></tr> <tr><td>Tot 840</td></tr> <tr><td>LV 98%</td></tr> <tr><td>HV 2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>L2</td><td>T1</td></tr> <tr><td>Tot 21</td><td>229</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>Road 6 (Eastbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> </table>	T1	Tot 840	LV 98%	HV 2%	L2	T1	Tot 21	229	LV 98%	98%	HV 2%	2%	HV	LV	Tot	2%	98%	1	2%	98%	1	<p>Wyndella Road (Northbound)</p> <table border="1"> <tr><td>T1</td></tr> <tr><td>Tot 181</td></tr> <tr><td>LV 98%</td></tr> <tr><td>HV 2%</td></tr> </table> <p>Wyndella Road (Southbound)</p> <table border="1"> <tr><td>L2</td><td>T1</td></tr> <tr><td>Tot 10</td><td>954</td></tr> <tr><td>LV 98%</td><td>98%</td></tr> <tr><td>HV 2%</td><td>2%</td></tr> </table> <p>MC05 (Westbound)</p> <table border="1"> <tr><td>HV</td><td>LV</td><td>Tot</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> <tr><td>2%</td><td>98%</td><td>1</td></tr> </table>	T1	Tot 181	LV 98%	HV 2%	L2	T1	Tot 10	954	LV 98%	98%	HV 2%	2%	HV	LV	Tot	2%	98%	1	2%	98%	1								
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The site and the Lochinvar URA generate relatively minor traffic volumes at Wyndella Road, which by themselves would not justify any turning bays, roundabout or any higher order intersections along Wyndella Road. The main reasons that higher order intersections are required is because of expected traffic not generated by this development or the Lochinvar URA.

Any intervention more than a basic priority intersection has nexus not to the proposed development or the Lochinvar URA but to Anambah URA, and should therefore be an item within the Anambah URA Section 7.11 plan.

5.4.2 Intersection assessments

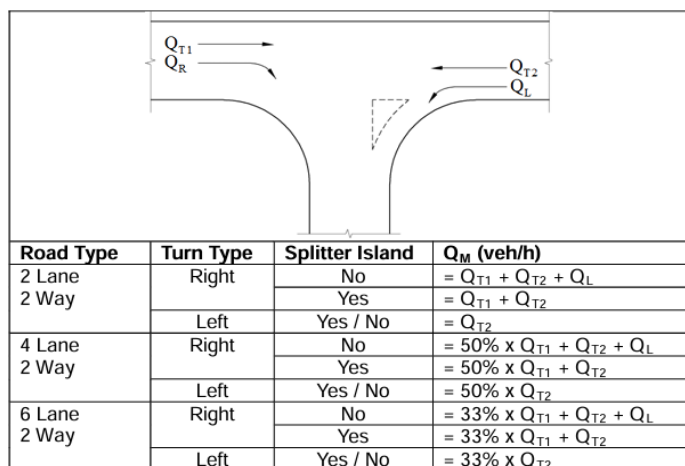
Based on the turning volumes, a turn warrant assessment was conducted per Austroads Guide to Road Design Part 4 A.8 Warrants for BA, AU and CH Turn Treatments. This assumed a design life of 10 years and a posted speed of 60km/h. The results are provided in **Table 5-8**. The volumes are based on **Figure 5-2**.

Table 5-8 Turn warrant assessment

Scenario	Intersection	Peak	QR	QL	QT1	QT2	Right turn treatment	Left turn treatment
No Anambah	MC05	AM	0	1	1	1	BAR	BAL
	MC03		1	33	30	1		
	MC04		0	22	201	33		
	MC05	PM	0	1	1	1	BAR	BAL
	MC03		1	137	11	1		
	MC04		0	87	61	137		
Full Anambah	MC05	AM	0	1	635	197	BAR	BAL
	MC03		1	32	652	196		
	MC04		0	21	840	229		
	MC05	PM	0	10	181	954	BAR	AUL
	MC03		1	138	186	963	BAR*	CHL
	MC04		0	10	181	954	BAR	AUL

*if volume were increased to 3 vehicles per hour, the intersection would need a CHR(S).

Figure 5-2 Volume categorisation



Source: Austroads Guide to Road Design

The results demonstrate that if there is no Anambah development, there is no need for turn bays to be provided.

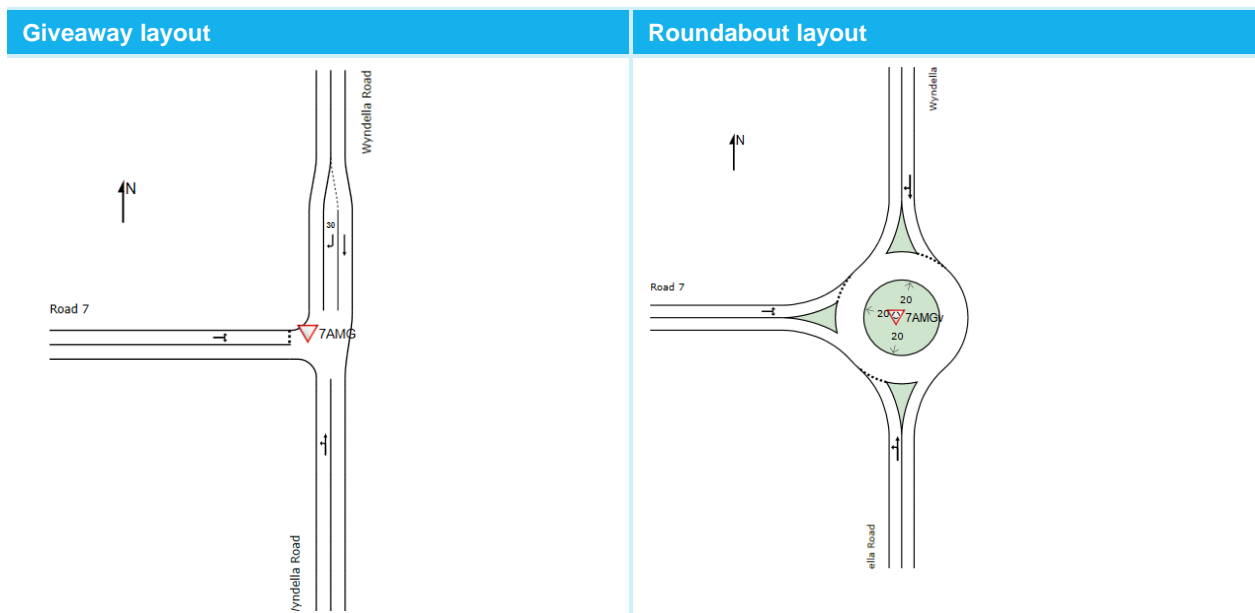
Traffic modelling undertaken (**Table 5-9**) shows the treatment required for the proposed intersections with Wyndella Road when the development traffic and traffic generated by Anambah URA. The intersection geometries exclude the left turn bay for the 'Development traffic with full Lochinvar URA and with full development of Anambah URA' scenario, as these have an insignificant delay benefit.

Table 5-9 Intersection performance results

Intersection	Weekday AM peak			Weekday PM peak		
	Volume	LoS	Delay	Volume	LoS	Delay
Development traffic with full Lochinvar URA and <u>without</u> Anambah URA						
MC05 / Wyndella Rd	36 veh/h	A	5.6s	15 veh/h	A	5.6s
MC03 / Wyndella Rd	250 veh/h	A	5.6s	210 veh/h	A	5.8s
MC04 / Wyndella Rd	271 veh/h	A	5.6s	302 veh/h	A	5.8s
Development traffic with full Lochinvar URA and <u>with full development</u> of Anambah URA – give way at MC03						
MC05 / Wyndella Rd	896 veh/h	A	7.3s	1,212 veh/h	A	10.5s
MC03 / Wyndella Rd	1,126 veh/h	A	11.3s	1,412 veh/h	B	15.9s
MC04 / Wyndella Rd	1,148 veh/h	A	5.6s	1,504 veh/h	A	12.7s
Development traffic with full Lochinvar URA and <u>with full development</u> of Anambah URA – <u>roundabout at MC03.</u>						
MC05 / Wyndella Rd	No change from give way at MC04 scenario					
MC03 / Wyndella Rd	1,126 veh/h	A	10.7s	1,412 veh/h	B	18.4s
MC04 / Wyndella Rd	No change from give way at MC04 scenario					

The intersection layouts are shown in **Table 5-10**

Table 5-10 MC03 / Wyndella Road layouts



The intersection assessment with Wyndella Road can be summarised in **Table 4-2**, which outlines the access strategy for each intersection

The intersection of MC03 performs at a more than acceptable level of service without the need of a roundabout and hence, the roundabout remains an unnecessary requirement for this development which has not been catered for this traffic requirement. All reduced turning movements have been catered form within the lot boundaries and provided within the engineering sketches shown within this development application. All civil works are to be undertaken by the resultant responsible for the reduced turning movements being the Anambah URA.

6.0 Conclusion

This transport impact assessment shows:

- The cross-section requirements per Maitland Development Control Plan *Lochinvar URA Proposed Road Hierarchy and Bus Routes of Part F – Urban Release Areas* are all met
- The intersection of Wyndella Road / New England Highway / Springfield Drive performs at a satisfactory level, with background traffic growth up to 2031 and full yield of the development. The intersection operates at Level of Service B and B in the AM and PM peak, respectively, indicating that no upgrade would be required due to this proposal. The intersection has a DOS of 0.86 in the future 2031 background growth and development scenario, indicating some spare capacity
- SIDRA modelling indicates that road upgrades would be required in 2041, due to growth on the road network and full release of the Lochinvar URA, independent of the proposed development
- Additional development traffic in 2041, results in minor increases in delay and DOS, indicating that the development does trigger the need for further upgrades to the intersection in 2041
- No upgrade is therefore required for Wyndella Road / New England Highway / Springfield Drive for the development to proceed. The development would still contribute to the long-term upgrade of Wyndella Road / New England Highway / Springfield Drive at the rates outlined in the relevant contribution plan.
- The Warrants assessments show Level of Service of A and B for each of the local streets intersecting Wyndella Road, without the need for a roundabout
- Warrants show that there is no need for turn bays to be provided for full release of the Lochinvar URA, however, turn bays are required due to the delivery of Anambah URA.

APPENDIX A

Raw traffic surveys

APPENDIX B

SIDRA movement summaries

MOVEMENT SUMMARY

Site: 3AM [NEW_WYN_23_AM_X (Site Folder: Base Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 61 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV]		Arrival Flows [Total HV]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh. Dist]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Springfield Drive															
1	L2	All MCs	37	22.9	37	22.9	0.058	6.6	LOS A	0.2	2.0	0.34	0.58	0.34	47.9
2	T1	All MCs	2	50.0	2	50.0	*0.234	26.0	LOS B	1.7	12.6	0.92	0.73	0.92	35.5
3	R2	All MCs	122	3.4	122	3.4	0.234	30.5	LOS C	1.7	12.6	0.92	0.73	0.92	38.8
Approach			161	8.5	161	8.5	0.234	25.0	LOS B	1.7	12.6	0.79	0.70	0.79	40.5
East: New England Highway (E)															
4	L2	All MCs	31	10.3	31	10.3	0.035	8.2	LOS A	0.1	1.1	0.17	0.63	0.17	53.1
5	T1	All MCs	735	8.2	735	8.2	*0.448	5.5	LOS A	5.6	42.2	0.41	0.36	0.41	72.2
6	R2	All MCs	2	50.0	2	50.0	0.007	14.1	LOS A	0.0	0.3	0.50	0.62	0.50	48.4
Approach			767	8.4	767	8.4	0.448	5.6	LOS A	5.6	42.2	0.40	0.37	0.40	71.1
North: Wyndella Road															
7	L2	All MCs	3	66.7	3	66.7	0.089	37.9	LOS C	0.2	1.6	0.98	0.64	0.98	30.4
8	T1	All MCs	1	0.0	1	0.0	0.089	36.2	LOS C	0.2	1.6	0.98	0.64	0.98	33.2
9	R2	All MCs	1	0.0	1	0.0	0.089	40.8	LOS C	0.2	1.6	0.98	0.64	0.98	36.4
Approach			5	40.0	5	40.0	0.089	38.1	LOS C	0.2	1.6	0.98	0.64	0.98	32.0
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	*0.369	11.2	LOS A	4.7	35.2	0.39	0.34	0.39	54.2
11	T1	All MCs	753	7.4	753	7.4	0.369	5.7	LOS A	4.7	35.2	0.40	0.35	0.40	71.1
12	R2	All MCs	25	12.5	25	12.5	*0.064	14.2	LOS A	0.4	2.7	0.55	0.67	0.55	48.9
Approach			779	7.6	779	7.6	0.369	6.0	LOS A	4.7	35.2	0.40	0.36	0.40	70.1
All Vehicles			1713	8.1	1713	8.1	0.448	7.7	LOS A	5.6	42.2	0.44	0.40	0.44	65.7

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Springfield Drive												
P1	Full	10	11	24.8	LOS C	0.0	0.0	0.90	0.90	191.5	200.0	1.04

East: New England Highway (E)												
P2	Full	10	11	24.8	LOS C	0.0	0.0	0.90	0.90	191.5	200.0	1.04
North: Wyndella Road												
P3	Full	10	11	24.8	LOS C	0.0	0.0	0.90	0.90	191.5	200.0	1.04
West: New England Highway (W)												
P4	Full	10	11	24.8	LOS C	0.0	0.0	0.90	0.90	191.5	200.0	1.04
All	Pedestrians	40	42	24.8	LOS C	0.0	0.0	0.90	0.90	191.5	200.0	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: SCT CONSULTING PTY LTD | Licence: NETWORK / 1PC | Processed: Friday, 7 June 2024 3:10:46 PM

Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3PM [NEW_WYN_23_PM_X (Site Folder: Base Year)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 78 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Springfield Drive															
1	L2	All MCs	45	16.3	45	16.3	0.072	5.7	LOS A	0.2	1.7	0.23	0.55	0.23	49.7
3	R2	All MCs	92	3.4	92	3.4	*0.283	42.5	LOS C	1.8	12.6	0.97	0.73	0.97	34.5
Approach			137	7.7	137	7.7	0.283	30.3	LOS C	1.8	12.6	0.72	0.67	0.72	38.3
East: New England Highway (E)															
4	L2	All MCs	21	0.0	21	0.0	0.023	7.4	LOS A	0.1	0.4	0.04	0.62	0.04	53.8
5	T1	All MCs	751	4.6	751	4.6	*0.371	2.6	LOS A	3.3	24.2	0.19	0.17	0.19	76.6
6	R2	All MCs	1	0.0	1	0.0	0.002	10.6	LOS A	0.0	0.1	0.34	0.62	0.34	50.9
Approach			773	4.5	773	4.5	0.371	2.7	LOS A	3.3	24.2	0.19	0.18	0.19	75.7
North: Wyndella Road															
9	R2	All MCs	2	0.0	2	0.0	0.045	49.1	LOS D	0.1	0.6	0.99	0.60	0.99	32.5
Approach			2	0.0	2	0.0	0.045	49.1	LOS D	0.1	0.6	0.99	0.60	0.99	32.5
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	*0.319	8.4	LOS A	2.6	19.5	0.17	0.16	0.17	57.6
11	T1	All MCs	793	6.4	793	6.4	0.319	2.3	LOS A	2.7	19.6	0.18	0.16	0.18	76.2
12	R2	All MCs	34	15.6	34	15.6	*0.074	11.6	LOS A	0.4	3.3	0.37	0.65	0.37	50.6
Approach			827	6.7	827	6.7	0.319	2.7	LOS A	2.7	19.6	0.19	0.18	0.19	74.6
All Vehicles			1739	5.8	1739	5.8	0.371	4.9	LOS A	3.3	24.2	0.23	0.22	0.23	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.

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* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec	
					ped	m						
South: Springfield Drive												
P1	Full	10	11	33.2	LOS D	0.0	0.0	0.92	0.92	199.9	200.0	1.00
East: New England Highway (E)												
P2	Full	10	11	33.2	LOS D	0.0	0.0	0.92	0.92	199.9	200.0	1.00
North: Wyndella Road												

P3 Full	10	11	33.2	LOS D	0.0	0.0	0.92	0.92	199.9	200.0	1.00
West: New England Highway (W)											
P4 Full	10	11	33.2	LOS D	0.0	0.0	0.92	0.92	199.9	200.0	1.00
All Pedestrians	40	42	33.2	LOS D	0.0	0.0	0.92	0.92	199.9	200.0	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3AMFY31 [NEW_WYN_31_AM_FY_PH (Site Folder: Scenario 6.1: 2031 Growth_WITH 25 Wyndella Road_New phasing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive
TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Springfield Drive															
1	L2	All MCs	310	2.7	310	2.7	0.489	14.4	LOS A	7.9	56.3	0.64	0.74	0.64	46.6
3	R2	All MCs	291	1.4	291	1.4	* 0.725	54.7	LOS D	7.5	53.1	1.00	0.89	1.13	31.1
Approach			602	2.1	602	2.1	0.725	34.0	LOS C	7.9	56.3	0.81	0.81	0.88	37.5
East: New England Highway (E)															
4	L2	All MCs	87	3.6	87	3.6	0.096	9.0	LOS A	0.7	5.0	0.25	0.66	0.25	52.6
5	T1	All MCs	942	7.9	942	7.9	* 0.725	20.7	LOS B	20.7	154.9	0.72	0.64	0.72	58.2
6	R2	All MCs	14	0.0	14	0.0	0.052	31.8	LOS C	0.5	3.2	0.74	0.70	0.74	40.1
Approach			1043	7.4	1043	7.4	0.725	19.8	LOS B	20.7	154.9	0.68	0.64	0.68	56.5
North: Wyndella Road															
7	L2	All MCs	45	0.0	45	0.0	0.664	53.5	LOS D	7.0	48.9	1.00	0.84	1.07	31.5
9	R2	All MCs	96	0.0	96	0.0	* 0.664	52.4	LOS D	7.0	48.9	1.00	0.84	1.07	31.5
Approach			141	0.0	141	0.0	0.664	52.8	LOS D	7.0	48.9	1.00	0.84	1.07	31.5
West: New England Highway (W)															
10	L2	All MCs	25	0.0	25	0.0	0.669	15.1	LOS B	18.4	135.4	0.74	0.67	0.74	46.3
11	T1	All MCs	1069	6.5	1069	6.5	0.669	18.0	LOS B	18.4	136.2	0.74	0.66	0.74	57.6
12	R2	All MCs	81	3.9	81	3.9	* 0.311	36.1	LOS C	3.2	22.9	0.86	0.78	0.86	37.9
Approach			1174	6.2	1174	6.2	0.669	19.2	LOS B	18.4	136.2	0.75	0.67	0.75	55.3
All Vehicles			2960	5.5	2960	5.5	0.725	24.0	LOS B	20.7	154.9	0.75	0.70	0.77	49.2

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped]	[Dist]					
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Springfield Drive												

P1 Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	210.9	200.0	0.95
East: New England Highway (E)											
P2 Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	210.9	200.0	0.95
North: Wyndella Road											
P3 Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	210.9	200.0	0.95
West: New England Highway (W)											
P4 Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	210.9	200.0	0.95
All Pedestrians	40	42	44.2	LOS E	0.0	0.0	0.94	0.94	210.9	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3PMFY31 [NEW_WYN_31_PM_FY_PH (Site Folder: Scenario 6.1: 2031 Growth_WITH 25 Wyndella Road_New phasing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive
TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 106 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				km/h
			veh/h		veh/h					veh	m				
South: Springfield Drive															
1	L2	All MCs	116	8.1	116	8.1	0.172	9.0	LOS A	1.8	13.4	0.35	0.61	0.35	49.0
3	R2	All MCs	140	2.8	140	2.8	*0.411	55.5	LOS D	3.6	26.0	0.98	0.76	0.98	30.8
Approach			256	5.2	256	5.2	0.411	34.5	LOS C	3.6	26.0	0.70	0.69	0.70	37.0
East: New England Highway (E)															
4	L2	All MCs	217	0.0	217	0.0	0.235	10.4	LOS A	3.0	20.7	0.31	0.68	0.31	51.5
5	T1	All MCs	1047	4.1	1047	4.1	*0.704	16.4	LOS B	21.7	157.3	0.64	0.57	0.64	61.2
6	R2	All MCs	49	0.0	49	0.0	0.165	50.5	LOS D	2.2	15.7	0.90	0.74	0.90	33.3
Approach			1313	3.3	1313	3.3	0.704	16.7	LOS B	21.7	157.3	0.59	0.60	0.59	56.9
North: Wyndella Road															
7	L2	All MCs	14	0.0	14	0.0	0.303	58.1	LOS E	2.1	14.5	0.98	0.73	0.98	30.3
9	R2	All MCs	26	0.0	26	0.0	*0.303	57.0	LOS E	2.1	14.5	0.98	0.73	0.98	30.3
Approach			40	0.0	40	0.0	0.303	57.4	LOS E	2.1	14.5	0.98	0.73	0.98	30.3
West: New England Highway (W)															
10	L2	All MCs	106	0.0	106	0.0	0.614	15.5	LOS B	17.4	127.3	0.65	0.62	0.65	47.5
11	T1	All MCs	1024	6.1	1024	6.1	0.614	15.0	LOS B	17.4	127.3	0.64	0.59	0.64	60.3
12	R2	All MCs	257	2.0	257	2.0	*0.863	63.1	LOS E	14.8	105.2	1.00	0.96	1.26	29.7
Approach			1387	4.9	1387	4.9	0.863	24.0	LOS B	17.4	127.3	0.71	0.66	0.76	49.8
All Vehicles			2996	4.1	2996	4.1	0.863	22.2	LOS B	21.7	157.3	0.66	0.64	0.68	50.6

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

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
		ped/h	sec		[Ped ped	Dist]			sec	m	m/sec	
					ped	m						
South: Springfield Drive												
P1	Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
East: New England Highway (E)												

P2 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
North: Wyndella Road											
P3 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
West: New England Highway (W)											
P4 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
All Pedestrians	40	42	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3AMFB31 [NEW_WYN_31_AM_FB_PH (Site Folder: Scenario 7.1: 2031 Growth_NO 25 Wyndella Road_New phasing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive
TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 81 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV] veh/h	%	[Total HV] veh/h	%				[Veh.] veh	[Dist] m				
South: Springfield Drive															
1	L2	All MCs	330	2.5	330	2.5	0.483	8.8	LOS A	5.1	36.2	0.52	0.69	0.52	50.2
3	R2	All MCs	304	1.4	304	1.4	*0.560	40.5	LOS C	5.9	41.7	0.98	0.80	0.98	35.3
Approach			634	2.0	634	2.0	0.560	24.0	LOS B	5.9	41.7	0.74	0.74	0.74	41.7
East: New England Highway (E)															
4	L2	All MCs	91	3.5	91	3.5	0.100	8.4	LOS A	0.4	3.2	0.23	0.66	0.23	53.0
5	T1	All MCs	951	7.8	951	7.8	*0.618	11.0	LOS A	13.0	97.3	0.55	0.49	0.55	66.9
6	R2	All MCs	1	0.0	1	0.0	0.003	18.1	LOS B	0.0	0.1	0.59	0.63	0.59	46.2
Approach			1042	7.4	1042	7.4	0.618	10.7	LOS A	13.0	97.3	0.52	0.50	0.52	65.4
North: Wyndella Road															
7	L2	All MCs	1	0.0	1	0.0	0.031	48.4	LOS D	0.1	0.6	0.98	0.60	0.98	32.7
9	R2	All MCs	1	0.0	1	0.0	*0.031	48.4	LOS D	0.1	0.6	0.98	0.60	0.98	32.7
Approach			2	0.0	2	0.0	0.031	48.4	LOS D	0.1	0.6	0.98	0.60	0.98	32.7
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	0.571	13.6	LOS A	11.4	84.0	0.56	0.50	0.56	52.2
11	T1	All MCs	1099	6.3	1099	6.3	0.571	9.2	LOS A	11.5	84.8	0.57	0.50	0.57	66.7
12	R2	All MCs	85	3.7	85	3.7	*0.257	22.1	LOS B	2.1	15.5	0.72	0.76	0.72	44.3
Approach			1185	6.1	1185	6.1	0.571	10.1	LOS A	11.5	84.8	0.58	0.52	0.58	64.4
All Vehicles			2864	5.7	2864	5.7	0.618	13.4	LOS A	13.0	97.3	0.59	0.56	0.59	57.7

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
					[Ped] ped	[Dist] m						
South: Springfield Drive												
P1	Full	10	11	34.7	LOS D	0.0	0.0	0.93	0.93	201.4	200.0	0.99
East: New England Highway (E)												

P2 Full	10	11	34.7	LOS D	0.0	0.0	0.93	0.93	201.4	200.0	0.99
North: Wyndella Road											
P3 Full	10	11	34.7	LOS D	0.0	0.0	0.93	0.93	201.4	200.0	0.99
West: New England Highway (W)											
P4 Full	10	11	34.7	LOS D	0.0	0.0	0.93	0.93	201.4	200.0	0.99
All Pedestrians	40	42	34.7	LOS D	0.0	0.0	0.93	0.93	201.4	200.0	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3PMFB31 [NEW_WYN_31_PM_FB_PH (Site Folder: Scenario 7.1: 2031 Growth_NO 25 Wyndella Road_New phasing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive
TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 105 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV] veh/h	%	[Total HV] veh/h	%				[Veh.] veh	[Dist] m				
South: Springfield Drive															
1	L2	All MCs	121	7.7	121	7.7	0.180	8.8	LOS A	1.8	13.5	0.34	0.61	0.34	49.2
3	R2	All MCs	144	2.8	144	2.8	*0.464	56.4	LOS D	3.7	26.8	0.99	0.76	0.99	30.6
Approach			265	5.0	265	5.0	0.464	34.7	LOS C	3.7	26.8	0.70	0.69	0.70	36.9
East: New England Highway (E)															
4	L2	All MCs	231	0.0	231	0.0	0.250	10.8	LOS A	3.4	23.5	0.33	0.69	0.33	51.3
5	T1	All MCs	1078	4.0	1078	4.0	*0.714	16.3	LOS B	22.3	161.5	0.64	0.57	0.64	61.6
6	R2	All MCs	1	0.0	1	0.0	0.003	48.2	LOS D	0.0	0.3	0.85	0.60	0.85	34.1
Approach			1310	3.3	1310	3.3	0.714	15.4	LOS B	22.3	161.5	0.58	0.59	0.58	58.5
North: Wyndella Road															
9	R2	All MCs	2	0.0	2	0.0	*0.015	53.9	LOS D	0.1	0.7	0.94	0.61	0.94	31.2
Approach			2	0.0	2	0.0	0.015	53.9	LOS D	0.1	0.7	0.94	0.61	0.94	31.2
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	0.559	13.5	LOS A	14.0	103.0	0.57	0.51	0.57	49.9
11	T1	All MCs	1034	6.1	1034	6.1	0.559	12.8	LOS A	14.5	107.0	0.58	0.52	0.58	62.6
12	R2	All MCs	274	1.9	274	1.9	*0.909	68.4	LOS E	16.6	117.9	1.00	1.01	1.37	28.5
Approach			1309	5.2	1309	5.2	0.909	24.4	LOS B	16.6	117.9	0.67	0.62	0.75	50.0
All Vehicles			2886	4.3	2886	4.3	0.909	21.3	LOS B	22.3	161.5	0.63	0.61	0.67	51.7

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped] ped	[Dist] m					
South: Springfield Drive												
P1	Full	10	11	46.7	LOS E	0.0	0.0	0.94	0.94	213.4	200.0	0.94
East: New England Highway (E)												
P2	Full	10	11	46.7	LOS E	0.0	0.0	0.94	0.94	213.4	200.0	0.94

North: Wyndella Road												
P3	Full	10	11	46.7	LOS E	0.0	0.0	0.94	0.94	213.4	200.0	0.94
West: New England Highway (W)												
P4	Full	10	11	46.7	LOS E	0.0	0.0	0.94	0.94	213.4	200.0	0.94
All	Pedestrians	40	42	46.7	LOS E	0.0	0.0	0.94	0.94	213.4	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3AMIN41 [NEW_WYN_41_AM_FY_IN (Site Folder: Scenario 9: 2041 Growth_WITH 25 Wyndella Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 96 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			km/h
South: Springfield Drive															
1	L2	All MCs	677	1.2	677	1.2	0.878	46.4	LOS D	31.0	219.2	1.00	1.08	1.17	36.4
3	R2	All MCs	509	0.8	509	0.8	*0.739	51.9	LOS D	12.1	85.2	1.00	0.89	1.09	33.3
Approach			1186	1.1	1186	1.1	0.878	48.8	LOS D	31.0	219.2	1.00	1.00	1.14	32.7
East: New England Highway (E)															
4	L2	All MCs	164	1.9	164	1.9	0.179	9.1	LOS A	1.4	9.9	0.26	0.67	0.26	52.5
5	T1	All MCs	1206	7.7	1206	7.7	0.718	16.6	LOS B	20.0	148.9	0.76	0.68	0.76	59.2
6	R2	All MCs	14	0.0	14	0.0	0.071	27.0	LOS B	0.3	2.1	0.86	0.69	0.86	42.0
Approach			1383	6.9	1383	6.9	0.718	15.8	LOS B	20.0	148.9	0.70	0.68	0.70	57.7
North: Wyndella Road															
7	L2	All MCs	45	0.0	45	0.0	0.092	19.4	LOS B	1.2	8.2	0.64	0.67	0.64	44.1
9	R2	All MCs	96	0.0	96	0.0	*0.637	54.0	LOS D	4.7	32.9	1.00	0.82	1.08	31.3
Approach			141	0.0	141	0.0	0.637	43.0	LOS D	4.7	32.9	0.89	0.78	0.94	34.5
West: New England Highway (W)															
10	L2	All MCs	25	0.0	25	0.0	0.013	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	64.6
11	T1	All MCs	1482	5.8	1482	5.8	*0.867	23.9	LOS B	32.3	237.6	0.90	0.88	1.00	52.6
12	R2	All MCs	156	2.0	156	2.0	*0.670	27.2	LOS B	4.1	29.3	0.90	0.82	0.99	41.8
Approach			1663	5.4	1663	5.4	0.867	24.0	LOS B	32.3	237.6	0.89	0.87	0.98	51.5
All Vehicles			4373	4.5	4373	4.5	0.878	28.7	LOS C	32.3	237.6	0.86	0.84	0.93	45.2

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped]	[Dist]					
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Springfield Drive												
P1	Full	10	11	42.2	LOS E	0.0	0.0	0.94	0.94	208.9	200.0	0.96
East: New England Highway (E)												

P2 Full	10	11	42.2	LOS E	0.0	0.0	0.94	0.94	208.9	200.0	0.96
North: Wyndella Road											
P3 Full	10	11	42.2	LOS E	0.0	0.0	0.94	0.94	208.9	200.0	0.96
West: New England Highway (W)											
P4 Full	10	11	42.2	LOS E	0.0	0.0	0.94	0.94	208.9	200.0	0.96
All Pedestrians	40	42	42.2	LOS E	0.0	0.0	0.94	0.94	208.9	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3PMIN41 [NEW_WYN_41_PM_FY_IN (Site Folder: Scenario 9: 2041 Growth_WITH 25 Wyndella Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 108 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
South: Springfield Drive															
1	L2	All MCs	210	6.0	210	6.0	0.234	16.2	LOS B	5.3	39.0	0.54	0.68	0.54	45.0
3	R2	All MCs	206	2.6	206	2.6	*0.765	63.2	LOS E	5.9	42.3	1.00	0.90	1.22	28.9
Approach			416	4.3	416	4.3	0.765	39.4	LOS C	5.9	42.3	0.77	0.79	0.88	35.3
East: New England Highway (E)															
4	L2	All MCs	477	0.0	477	0.0	0.517	17.6	LOS B	11.0	76.8	0.72	0.81	0.72	46.9
5	T1	All MCs	1427	3.7	1427	3.7	0.976	60.6	LOS E	50.7	366.3	1.00	1.16	1.34	36.4
6	R2	All MCs	49	0.0	49	0.0	0.100	30.3	LOS C	0.9	6.3	0.67	0.73	0.67	45.7
Approach			1954	2.7	1954	2.7	0.976	49.4	LOS D	50.7	366.3	0.92	1.06	1.17	37.1
North: Wyndella Road															
7	L2	All MCs	14	0.0	14	0.0	0.024	11.5	LOS A	0.3	1.8	0.40	0.59	0.40	48.8
9	R2	All MCs	28	0.0	28	0.0	*0.211	57.7	LOS E	1.5	10.3	0.97	0.71	0.97	30.3
Approach			42	0.0	42	0.0	0.211	42.4	LOS C	1.5	10.3	0.78	0.67	0.78	34.7
West: New England Highway (W)															
10	L2	All MCs	106	0.0	106	0.0	0.056	7.7	LOS A	0.0	0.0	0.00	0.60	0.00	64.6
11	T1	All MCs	1321	5.9	1321	5.9	*0.692	13.7	LOS A	21.4	157.2	0.67	0.60	0.67	61.6
12	R2	All MCs	557	0.9	557	0.9	*0.977	74.6	LOS F	31.2	219.9	1.00	1.13	1.45	27.2
Approach			1984	4.2	1984	4.2	0.977	30.5	LOS C	31.2	219.9	0.73	0.75	0.85	45.5
All Vehicles			4396	3.5	4396	3.5	0.977	39.8	LOS C	50.7	366.3	0.82	0.89	1.00	40.2

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist]					
South: Springfield Drive												
P1	Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
East: New England Highway (E)												

P2 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
North: Wyndella Road											
P3 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
West: New England Highway (W)											
P4 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
All Pedestrians	40	42	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3AMIN41 [NEW_WYN_41_AM_FB_IN (Site Folder: Scenario 10: 2041 Growth_NO 25 Wyndella Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 106 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			km/h
South: Springfield Drive															
1	L2	All MCs	677	1.2	677	1.2	0.864	40.2	LOS C	32.9	232.9	0.99	1.03	1.11	38.3
3	R2	All MCs	504	0.8	504	0.8	*0.815	60.0	LOS E	13.8	97.1	1.00	0.95	1.18	30.8
Approach			1181	1.1	1181	1.1	0.864	48.7	LOS D	32.9	232.9	1.00	1.00	1.14	32.7
East: New England Highway (E)															
4	L2	All MCs	165	1.9	165	1.9	0.180	9.5	LOS A	1.7	11.9	0.27	0.67	0.27	52.2
5	T1	All MCs	1206	7.7	1206	7.7	0.695	17.3	LOS B	20.9	156.2	0.72	0.65	0.72	59.0
6	R2	All MCs	1	0.0	1	0.0	0.004	25.4	LOS B	0.0	0.1	0.77	0.61	0.77	43.2
Approach			1372	7.0	1372	7.0	0.695	16.3	LOS B	20.9	156.2	0.67	0.65	0.67	57.4
North: Wyndella Road															
7	L2	All MCs	1	0.0	1	0.0	0.002	19.7	LOS B	0.0	0.2	0.59	0.57	0.59	44.0
9	R2	All MCs	1	0.0	1	0.0	0.008	54.1	LOS D	0.1	0.4	0.94	0.59	0.94	31.2
Approach			2	0.0	2	0.0	0.008	36.9	LOS C	0.1	0.4	0.77	0.58	0.77	36.5
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	0.001	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	64.6
11	T1	All MCs	1486	5.8	1486	5.8	*0.842	21.8	LOS B	32.6	239.3	0.86	0.82	0.91	54.3
12	R2	All MCs	156	2.0	156	2.0	*0.531	23.8	LOS B	3.6	25.8	0.85	0.80	0.85	43.4
Approach			1643	5.4	1643	5.4	0.842	22.0	LOS B	32.6	239.3	0.86	0.82	0.91	53.1
All Vehicles			4198	4.7	4198	4.7	0.864	27.6	LOS B	32.9	239.3	0.84	0.81	0.89	46.1

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

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped]	[Dist]					
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Springfield Drive												
P1	Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
East: New England Highway (E)												

P2 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
North: Wyndella Road											
P3 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
West: New England Highway (W)											
P4 Full	10	11	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94
All Pedestrians	40	42	47.2	LOS E	0.0	0.0	0.94	0.94	213.9	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559

Wholistic traffic model_2031_Scenario v0.8.sip9

MOVEMENT SUMMARY

Site: 3PMIN41 [NEW_WYN_41_PM_FB_IN (Site Folder: Scenario 10: 2041 Growth_NO 25 Wyndella Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New England Highway / Wyndella Road / Springfield Drive

TCS 4907

7:45-8:45AM

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 108 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			km/h
South: Springfield Drive															
1	L2	All MCs	210	6.0	210	6.0	0.230	13.8	LOS A	4.8	35.1	0.49	0.66	0.49	46.3
3	R2	All MCs	205	2.6	205	2.6	*0.764	63.1	LOS E	5.9	42.2	1.00	0.90	1.21	29.0
Approach			416	4.3	416	4.3	0.764	38.2	LOS C	5.9	42.2	0.74	0.78	0.85	35.7
East: New England Highway (E)															
4	L2	All MCs	476	0.0	476	0.0	0.516	17.9	LOS B	10.4	73.1	0.74	0.81	0.74	46.8
5	T1	All MCs	1427	3.8	1427	3.8	0.932	47.3	LOS D	42.4	306.1	1.00	1.04	1.20	42.4
6	R2	All MCs	1	0.0	1	0.0	0.002	30.9	LOS C	0.0	0.1	0.62	0.62	0.62	46.3
Approach			1904	2.8	1904	2.8	0.932	39.9	LOS C	42.4	306.1	0.93	0.98	1.09	41.1
North: Wyndella Road															
7	L2	All MCs	1	0.0	1	0.0	0.002	11.2	LOS A	0.0	0.1	0.38	0.55	0.38	49.0
9	R2	All MCs	2	0.0	2	0.0	*0.016	55.5	LOS D	0.1	0.7	0.95	0.61	0.95	30.9
Approach			3	0.0	3	0.0	0.016	40.8	LOS C	0.1	0.7	0.76	0.59	0.76	35.2
West: New England Highway (W)															
10	L2	All MCs	1	0.0	1	0.0	0.001	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	64.6
11	T1	All MCs	1323	5.9	1323	5.9	*0.693	13.7	LOS A	21.4	157.6	0.67	0.60	0.67	61.6
12	R2	All MCs	557	0.9	557	0.9	*0.956	65.6	LOS E	28.4	200.7	1.00	1.10	1.38	29.1
Approach			1881	4.4	1881	4.4	0.956	29.1	LOS C	28.4	200.7	0.77	0.75	0.88	46.3
All Vehicles			4204	3.7	4204	3.7	0.956	34.9	LOS C	42.4	306.1	0.84	0.86	0.97	42.6

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

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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 Green.

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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped]	[Dist]					
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Springfield Drive												
P1	Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
East: New England Highway (E)												

P2 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
North: Wyndella Road											
P3 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
West: New England Highway (W)											
P4 Full	10	11	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93
All Pedestrians	40	42	48.2	LOS E	0.0	0.0	0.94	0.94	214.9	200.0	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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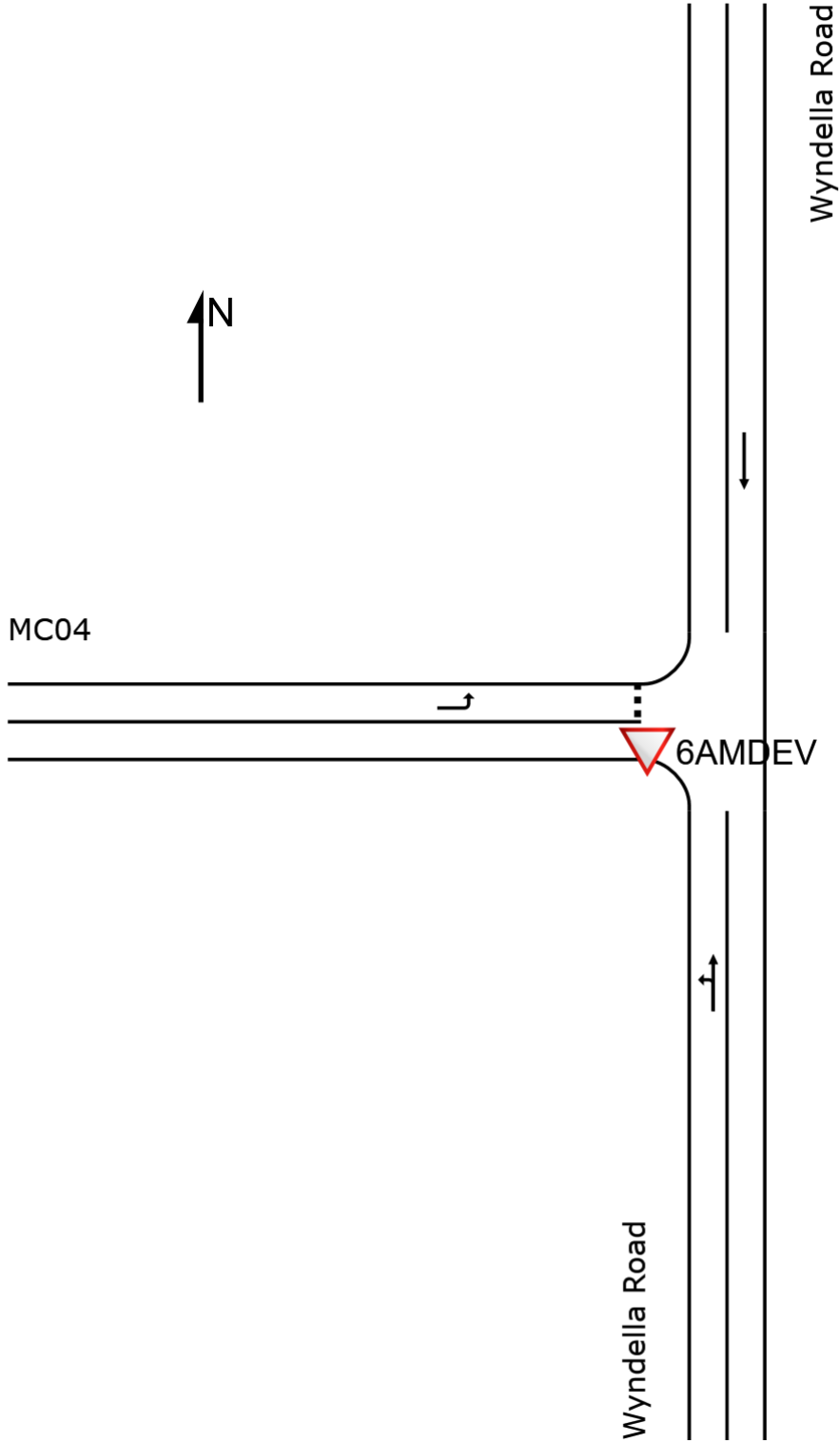
Project: S:\Projects\SCT_00390 Wyndella Rd Lochinvar\3. Technical Work Area\1. Network Optimisation\20240605_Variation 3\SCT_00390_559 Wholistic traffic model_2031_Scenario v0.8.sip9

SITE LAYOUT

▼ Site: 6AMDEV [WYN_ROAD6_FY_AM (Site Folder: No Anambah)]

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

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

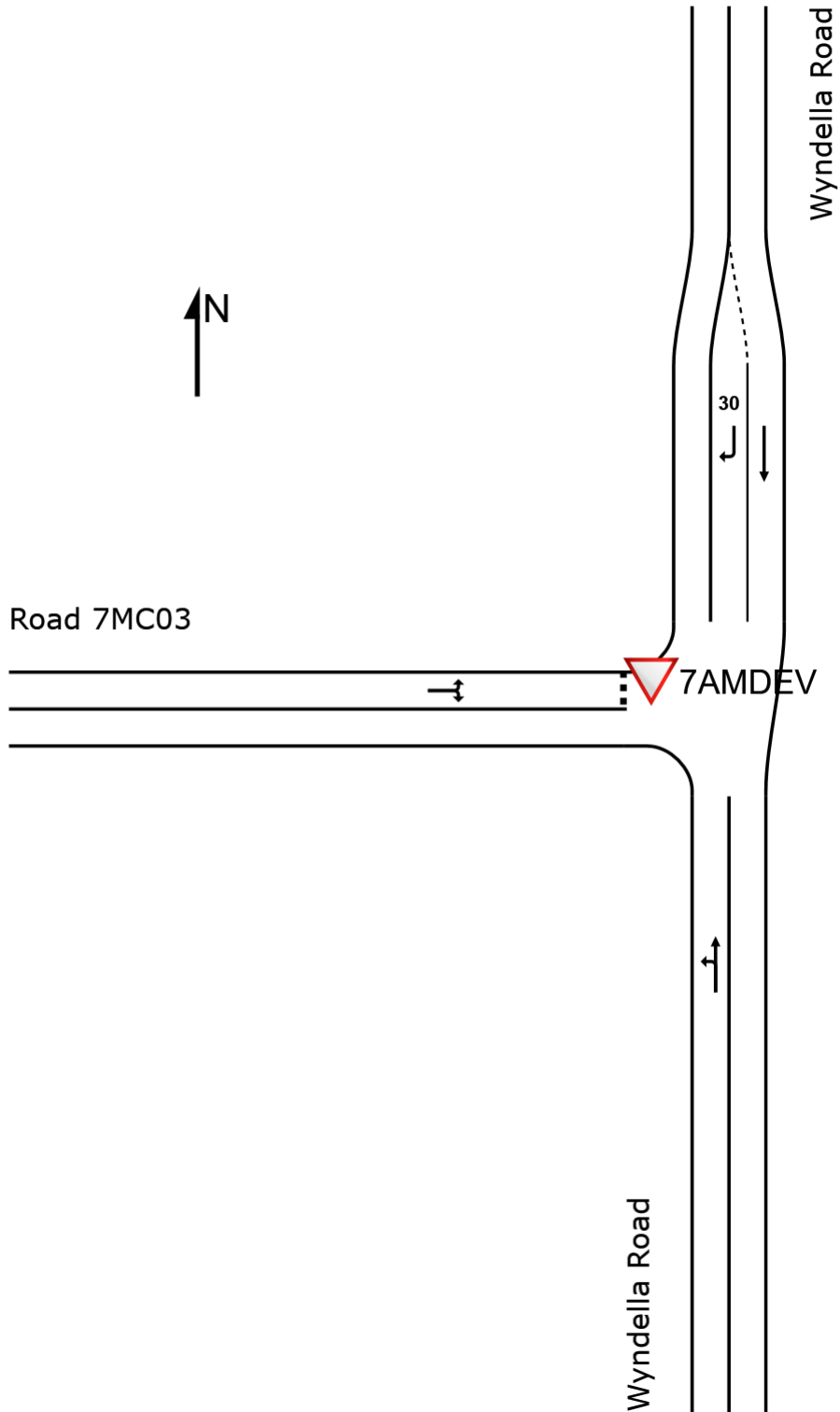


SITE LAYOUT

▼ Site: 7AMDEV [WYN_ROAD7_FY_AM (Site Folder: No Anambah)]

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

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

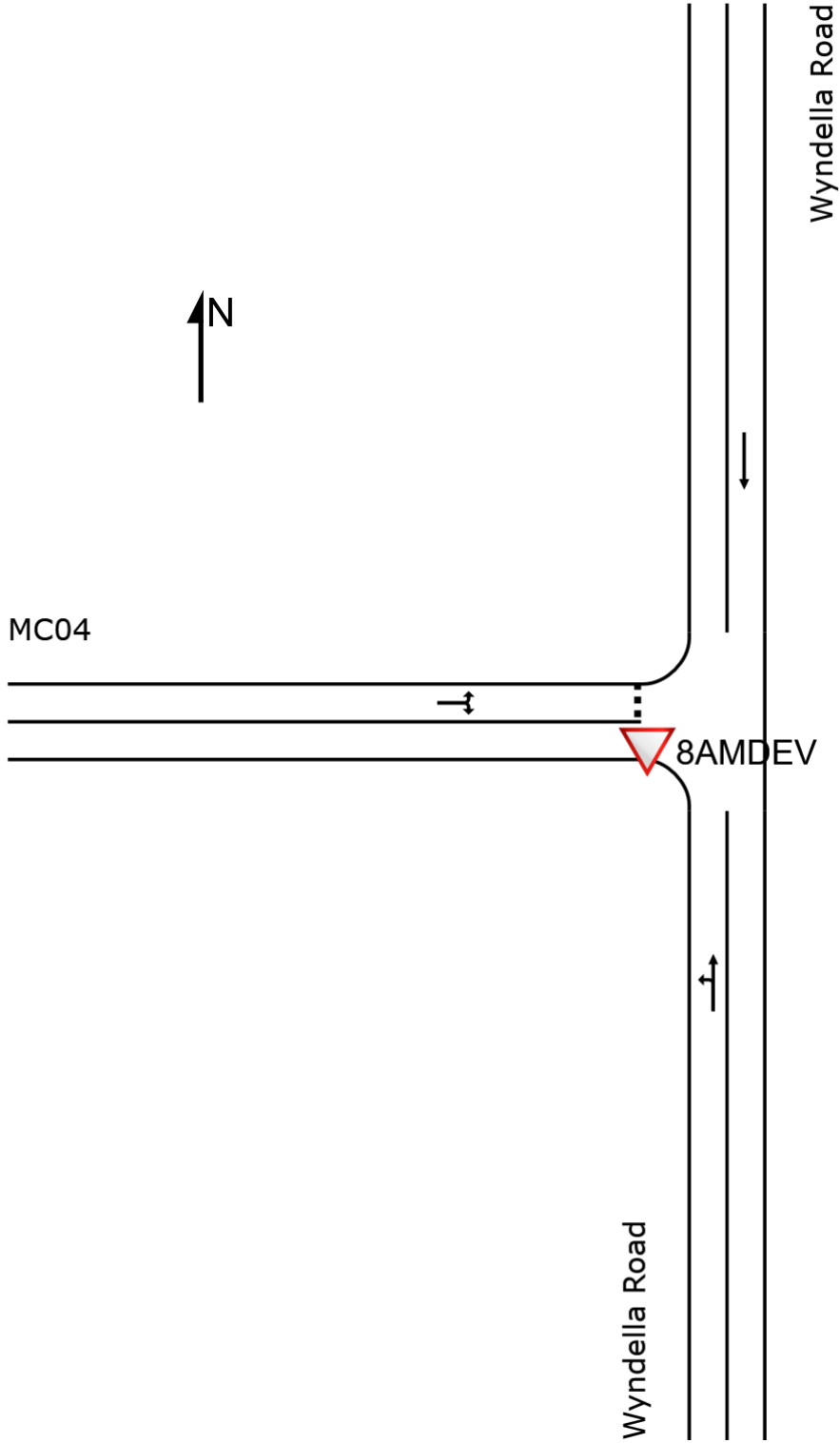


SITE LAYOUT

▼ Site: 8AMDEV [WYN_ROAD8_FY_AM (Site Folder: No Anambah)]

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

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

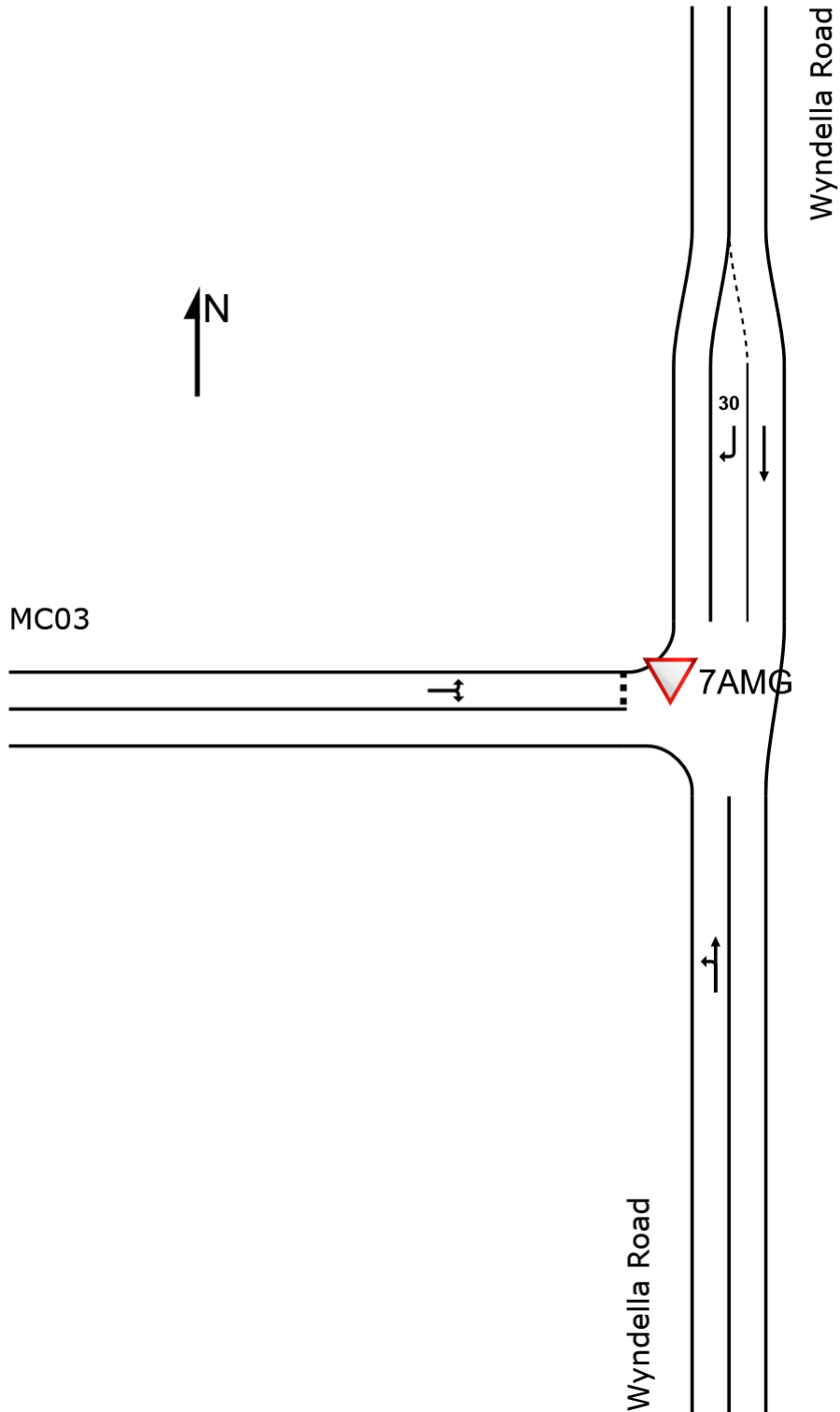


SITE LAYOUT

▼ Site: 7AMG [WYN_ROAD7_GIVEWAY_FY_AM (Site Folder: Anambah Giveways)]

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

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

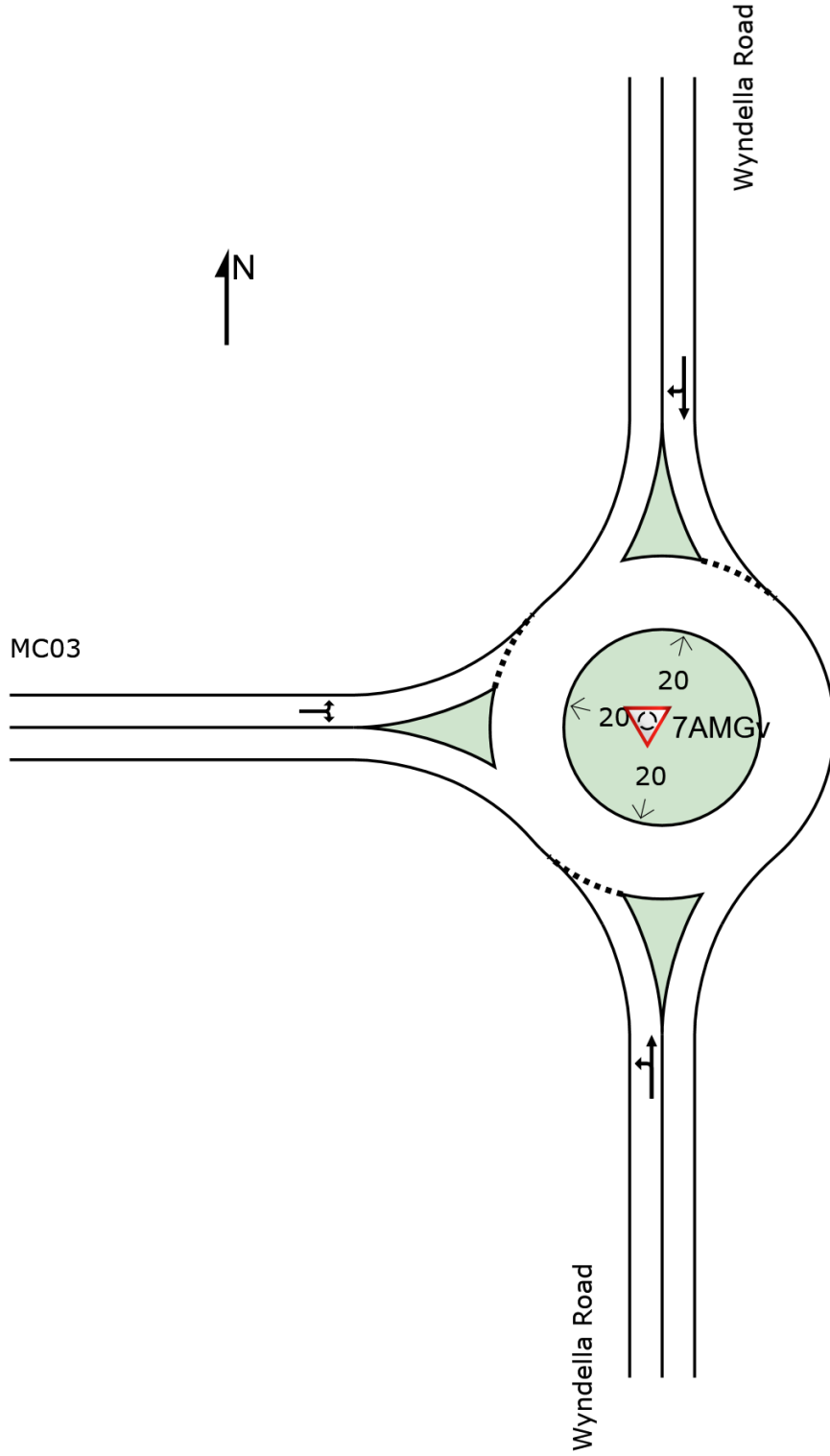


SITE LAYOUT

Site: 7AMGv [WYN_ROAD7_GIVEWAY_FY_AM - Conversion
(Site Folder: Roundabout)]

New Site
Site Category: (None)
Roundabout

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MOVEMENT SUMMARY

Site: 6AMDEV [WYN_ROAD6_FY_AM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	23	2.0	23	2.0	0.031	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	54.0
2	T1	All MCs	35	2.0	35	2.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	55.8
Approach			58	2.0	58	2.0	0.031	2.2	NA	0.0	0.0	0.00	0.24	0.00	54.9
North: Wyndella Road															
8	T1	All MCs	212	2.0	212	2.0	0.110	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			212	2.0	212	2.0	0.110	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: MC04															
10	L2	All MCs	1	2.0	1	2.0	0.001	5.7	LOS A	0.0	0.0	0.10	0.54	0.10	50.2
Approach			1	2.0	1	2.0	0.001	5.7	LOS A	0.0	0.0	0.10	0.54	0.10	50.2
All Vehicles			271	2.0	271	2.0	0.110	0.5	NA	0.0	0.0	0.00	0.05	0.00	58.5

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.

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MOVEMENT SUMMARY

Site: 7AMDEV [WYN_ROAD7_FY_AM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	35	2.0	35	2.0	0.020	5.6	LOS A	0.0	0.0	0.00	0.56	0.00	50.9
2	T1	All MCs	1	2.0	1	2.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.56	0.00	50.1
Approach			36	2.0	36	2.0	0.020	5.4	NA	0.0	0.0	0.00	0.56	0.00	50.9
North: Wyndella Road															
8	T1	All MCs	32	2.0	32	2.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	1	2.0	1	2.0	0.000	5.5	LOS A	0.0	0.0	0.11	0.55	0.11	49.6
Approach			33	2.0	33	2.0	0.016	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.4
West: Road 7MC03															
10	L2	All MCs	1	2.0	1	2.0	0.132	5.6	LOS A	0.5	3.2	0.10	0.57	0.10	49.8
12	R2	All MCs	180	2.0	180	2.0	0.132	5.6	LOS A	0.5	3.2	0.10	0.57	0.10	49.9
Approach			181	2.0	181	2.0	0.132	5.6	LOS A	0.5	3.2	0.10	0.57	0.10	49.9
All Vehicles			250	2.0	250	2.0	0.132	4.9	NA	0.5	3.2	0.07	0.50	0.07	50.7

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.

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MOVEMENT SUMMARY

Site: 8AMDEV [WYN_ROAD8_FY_AM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	1	2.0	1	2.0	0.001	5.6	LOSA	0.0	0.0	0.00	0.30	0.00	53.1
2	T1	All MCs	1	2.0	1	2.0	0.001	0.0	LOSA	0.0	0.0	0.00	0.30	0.00	56.3
Approach			2	2.0	2	2.0	0.001	2.8	NA	0.0	0.0	0.00	0.30	0.00	54.7
North: Wyndella Road															
8	T1	All MCs	1	2.0	1	2.0	0.001	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach			1	2.0	1	2.0	0.001	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: MC04															
10	L2	All MCs	1	2.0	1	2.0	0.021	5.6	LOSA	0.0	0.3	0.01	0.60	0.01	52.8
12	R2	All MCs	32	2.0	32	2.0	0.021	5.5	LOSA	0.0	0.3	0.01	0.60	0.01	49.8
Approach			33	2.0	33	2.0	0.021	5.5	LOSA	0.0	0.3	0.01	0.60	0.01	49.9
All Vehicles			36	2.0	36	2.0	0.021	5.2	NA	0.0	0.3	0.01	0.56	0.01	50.4

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 6PMDEV [WYN_ROAD6_FY_PM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	92	2.0	92	2.0	0.125	5.6	LOSA	0.0	0.0	0.00	0.23	0.00	54.0
2	T1	All MCs	144	2.0	144	2.0	0.125	0.0	LOSA	0.0	0.0	0.00	0.23	0.00	55.8
Approach			235	2.0	235	2.0	0.125	2.2	NA	0.0	0.0	0.00	0.23	0.00	54.9
North: Wyndella Road															
8	T1	All MCs	64	2.0	64	2.0	0.034	0.0	LOSA	0.0	0.1	0.01	0.01	0.01	59.7
9	R2	All MCs	1	2.0	1	2.0	0.034	5.8	LOSA	0.0	0.1	0.01	0.01	0.01	55.9
Approach			65	2.0	65	2.0	0.034	0.1	NA	0.0	0.1	0.01	0.01	0.01	59.6
West: MC04															
10	L2	All MCs	1	2.0	1	2.0	0.001	6.0	LOSA	0.0	0.0	0.23	0.51	0.23	49.7
Approach			1	2.0	1	2.0	0.001	6.0	LOSA	0.0	0.0	0.23	0.51	0.23	49.7
All Vehicles			302	2.0	302	2.0	0.125	1.7	NA	0.0	0.1	0.00	0.18	0.00	55.7

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.

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MOVEMENT SUMMARY

Site: 7PMDEV [WYN_ROAD7_FY_PM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	144	2.0	144	2.0	0.079	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	50.7
2	T1	All MCs	1	2.0	1	2.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.57	0.00	49.9
Approach			145	2.0	145	2.0	0.079	5.5	NA	0.0	0.0	0.00	0.57	0.00	50.7
North: Wyndella Road															
8	T1	All MCs	11	2.0	11	2.0	0.006	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	1	2.0	1	2.0	0.000	5.8	LOS A	0.0	0.0	0.25	0.51	0.25	49.1
Approach			12	2.0	12	2.0	0.006	0.5	NA	0.0	0.0	0.02	0.04	0.02	58.3
West: MC03															
10	L2	All MCs	1	2.0	1	2.0	0.040	5.6	LOS A	0.1	0.9	0.09	0.57	0.09	49.9
12	R2	All MCs	52	2.0	52	2.0	0.040	5.7	LOS A	0.1	0.9	0.09	0.57	0.09	49.9
Approach			53	2.0	53	2.0	0.040	5.7	LOS A	0.1	0.9	0.09	0.57	0.09	49.9
All Vehicles			210	2.0	210	2.0	0.079	5.3	NA	0.1	0.9	0.02	0.54	0.02	50.8

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 8PMDEV [WYN_ROAD8_FY_PM (Site Folder: No Anambah)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	1	2.0	1	2.0	0.001	5.6	LOSA	0.0	0.0	0.00	0.30	0.00	53.1
2	T1	All MCs	1	2.0	1	2.0	0.001	0.0	LOSA	0.0	0.0	0.00	0.30	0.00	56.3
Approach			2	2.0	2	2.0	0.001	2.8	NA	0.0	0.0	0.00	0.30	0.00	54.7
North: Wyndella Road															
8	T1	All MCs	1	2.0	1	2.0	0.001	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach			1	2.0	1	2.0	0.001	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: MC05															
10	L2	All MCs	1	2.0	1	2.0	0.008	5.6	LOSA	0.0	0.1	0.01	0.59	0.01	52.8
12	R2	All MCs	11	2.0	11	2.0	0.008	5.5	LOSA	0.0	0.1	0.01	0.59	0.01	49.8
Approach			12	2.0	12	2.0	0.008	5.5	LOSA	0.0	0.1	0.01	0.59	0.01	50.1
All Vehicles			15	2.0	15	2.0	0.008	4.7	NA	0.0	0.1	0.01	0.51	0.01	51.3

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.

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MOVEMENT SUMMARY

Site: 6AMG [WYN_ROAD6_GIVEWAY_FY_AM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	22	2.0	22	2.0	0.137	5.6	LOSA	0.0	0.0	0.00	0.05	0.00	55.9
2	T1	All MCs	241	2.0	241	2.0	0.137	0.0	LOSA	0.0	0.0	0.00	0.05	0.00	59.0
Approach			263	2.0	263	2.0	0.137	0.5	NA	0.0	0.0	0.00	0.05	0.00	58.6
North: Wyndella Road															
8	T1	All MCs	884	2.0	884	2.0	0.459	0.1	LOSA	0.0	0.0	0.00	0.00	0.00	59.7
Approach			884	2.0	884	2.0	0.459	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.7
West: MC04															
10	L2	All MCs	1	2.0	1	2.0	0.001	6.3	LOSA	0.0	0.0	0.31	0.52	0.31	49.4
Approach			1	2.0	1	2.0	0.001	6.3	LOSA	0.0	0.0	0.31	0.52	0.31	49.4
All Vehicles			1148	2.0	1148	2.0	0.459	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.4

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 7AMG [WYN_ROAD7_GIVEWAY_FY_AM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	34	2.0	34	2.0	0.126	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	55.6
2	T1	All MCs	207	2.0	207	2.0	0.126	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	58.3
Approach			241	2.0	241	2.0	0.126	0.8	NA	0.0	0.0	0.00	0.08	0.00	57.7
North: Wyndella Road															
8	T1	All MCs	686	2.0	686	2.0	0.356	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	1	2.0	1	2.0	0.001	6.0	LOS A	0.0	0.0	0.34	0.51	0.34	48.8
Approach			687	2.0	687	2.0	0.356	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.7
West: MC03															
10	L2	All MCs	1	2.0	1	2.0	0.338	6.8	LOS A	1.3	9.4	0.68	0.92	0.85	45.1
12	R2	All MCs	197	2.0	197	2.0	0.338	11.3	LOS A	1.3	9.4	0.68	0.92	0.85	45.4
Approach			198	2.0	198	2.0	0.338	11.2	LOS A	1.3	9.4	0.68	0.92	0.85	45.4
All Vehicles			1126	2.0	1126	2.0	0.356	2.2	NA	1.3	9.4	0.12	0.18	0.15	54.9

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 8AMG [WYN_ROAD8_GIVEWAY_FY_AM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	1	2.0	1	2.0	0.108	5.6	LOSA	0.0	0.0	0.00	0.00	0.00	56.3
2	T1	All MCs	207	2.0	207	2.0	0.108	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	59.9
Approach			208	2.0	208	2.0	0.108	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Wyndella Road															
8	T1	All MCs	668	2.0	668	2.0	0.347	0.1	LOSA	0.0	0.0	0.00	0.00	0.00	59.8
Approach			668	2.0	668	2.0	0.347	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
West: MC05															
10	L2	All MCs	1	2.0	1	2.0	0.021	6.0	LOSA	0.1	0.4	0.40	0.69	0.40	51.5
12	R2	All MCs	18	2.0	18	2.0	0.021	7.3	LOSA	0.1	0.4	0.40	0.69	0.40	48.2
Approach			19	2.0	19	2.0	0.021	7.3	LOSA	0.1	0.4	0.40	0.69	0.40	48.4
All Vehicles			896	2.0	896	2.0	0.347	0.2	NA	0.1	0.4	0.01	0.02	0.01	59.5

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.

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MOVEMENT SUMMARY

Site: 6PMG [WYN_ROAD6_GIVEWAY_FY_PM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	93	2.0	93	2.0	0.653	5.7	LOS A	0.0	0.0	0.00	0.04	0.00	55.5
2	T1	All MCs	1159	2.0	1159	2.0	0.653	0.2	LOS A	0.0	0.0	0.00	0.04	0.00	58.4
Approach			1252	2.0	1252	2.0	0.653	0.6	NA	0.0	0.0	0.00	0.04	0.00	58.1
North: Wyndella Road															
8	T1	All MCs	252	2.0	252	2.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			252	2.0	252	2.0	0.131	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: MC04															
10	L2	All MCs	1	2.0	1	2.0	0.012	16.9	LOS B	0.0	0.2	0.87	0.95	0.87	38.0
12	R2	All MCs	1	2.0	1	2.0	0.012	29.4	LOS C	0.0	0.2	0.87	0.95	0.87	37.8
Approach			2	2.0	2	2.0	0.012	23.2	LOS B	0.0	0.2	0.87	0.95	0.87	37.9
All Vehicles			1505	2.0	1505	2.0	0.653	0.5	NA	0.0	0.2	0.00	0.04	0.00	58.3

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.

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MOVEMENT SUMMARY

Site: 7PMG [WYN_ROAD7_GIVEWAY_FY_PM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h		veh/h					veh	m				
South: Wyndella Road															
1	L2	All MCs	145	2.0	145	2.0	0.606	5.7	LOS A	0.0	0.0	0.00	0.07	0.00	55.3
2	T1	All MCs	1014	2.0	1014	2.0	0.606	0.2	LOS A	0.0	0.0	0.00	0.07	0.00	57.9
Approach			1159	2.0	1159	2.0	0.606	0.8	NA	0.0	0.0	0.00	0.07	0.00	57.4
North: Wyndella Road															
8	T1	All MCs	196	2.0	196	2.0	0.102	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	1	2.0	1	2.0	0.002	12.6	LOS A	0.0	0.1	0.79	0.71	0.79	43.8
Approach			197	2.0	197	2.0	0.102	0.1	NA	0.0	0.1	0.00	0.00	0.00	59.8
West: MC03															
10	L2	All MCs	1	2.0	1	2.0	0.179	11.3	LOS A	0.5	3.7	0.81	0.93	0.83	41.7
12	R2	All MCs	55	2.0	55	2.0	0.179	15.9	LOS B	0.5	3.7	0.81	0.93	0.83	42.1
Approach			57	2.0	57	2.0	0.179	15.8	LOS B	0.5	3.7	0.81	0.93	0.83	42.1
All Vehicles			1412	2.0	1412	2.0	0.606	1.3	NA	0.5	3.7	0.03	0.10	0.03	56.4

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 8PMG [WYN_ROAD8_GIVEWAY_FY_PM (Site Folder: Anambah Giveways)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	11	2.0	11	2.0	0.527	5.6	LOSA	0.0	0.0	0.00	0.01	0.00	55.9
2	T1	All MCs	1004	2.0	1004	2.0	0.527	0.1	LOSA	0.0	0.0	0.00	0.01	0.00	59.5
Approach			1015	2.0	1015	2.0	0.527	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.4
North: Wyndella Road															
8	T1	All MCs	191	2.0	191	2.0	0.099	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	60.0
Approach			191	2.0	191	2.0	0.099	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: MC05															
10	L2	All MCs	1	2.0	1	2.0	0.010	10.5	LOSA	0.0	0.2	0.62	0.80	0.62	50.2
12	R2	All MCs	5	2.0	5	2.0	0.010	8.9	LOSA	0.0	0.2	0.62	0.80	0.62	46.5
Approach			6	2.0	6	2.0	0.010	9.1	LOSA	0.0	0.2	0.62	0.80	0.62	47.3
All Vehicles			1212	2.0	1212	2.0	0.527	0.2	NA	0.0	0.2	0.00	0.01	0.00	59.4

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

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

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

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

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 7PMGv [WYN_ROAD7_GIVEWAY_FY_PM - Conversion
(Site Folder: Roundabout)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	145	2.0	145	2.0	0.673	3.8	LOS A	9.3	66.4	0.04	0.40	0.04	53.1
2	T1	All MCs	1014	2.0	1014	2.0	0.673	4.1	LOS A	9.3	66.4	0.04	0.40	0.04	49.9
Approach			1159	2.0	1159	2.0	0.673	4.0	LOS A	9.3	66.4	0.04	0.40	0.04	50.5
North: Wyndella Road															
8	T1	All MCs	196	2.0	196	2.0	0.144	4.4	LOS A	1.0	7.3	0.25	0.39	0.25	48.0
9	R2	All MCs	1	2.0	1	2.0	0.144	9.0	LOS A	1.0	7.3	0.25	0.39	0.25	50.7
Approach			197	2.0	197	2.0	0.144	4.4	LOS A	1.0	7.3	0.25	0.39	0.25	48.0
West: MC03															
10	L2	All MCs	1	2.0	1	2.0	0.102	13.5	LOS A	0.6	4.6	0.83	0.79	0.83	41.4
12	R2	All MCs	55	2.0	55	2.0	0.102	18.4	LOS B	0.6	4.6	0.83	0.79	0.83	41.6
Approach			57	2.0	57	2.0	0.102	18.3	LOS B	0.6	4.6	0.83	0.79	0.83	41.6
All Vehicles			1412	2.0	1412	2.0	0.673	4.7	LOS A	9.3	66.4	0.10	0.42	0.10	49.5

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.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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MOVEMENT SUMMARY

Site: 7AMGv [WYN_ROAD7_GIVEWAY_FY_AM - Conversion
(Site Folder: Roundabout)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Wyndella Road															
1	L2	All MCs	34	2.0	34	2.0	0.140	3.8	LOSA	1.0	7.2	0.02	0.41	0.02	53.2
2	T1	All MCs	207	2.0	207	2.0	0.140	4.1	LOSA	1.0	7.2	0.02	0.41	0.02	50.0
Approach			241	2.0	241	2.0	0.140	4.0	LOSA	1.0	7.2	0.02	0.41	0.02	50.7
North: Wyndella Road															
8	T1	All MCs	686	2.0	686	2.0	0.582	6.0	LOSA	5.6	40.0	0.66	0.53	0.66	45.0
9	R2	All MCs	1	2.0	1	2.0	0.582	10.7	LOSA	5.6	40.0	0.66	0.53	0.66	48.5
Approach			687	2.0	687	2.0	0.582	6.1	LOSA	5.6	40.0	0.66	0.53	0.66	45.0
West: MC03															
10	L2	All MCs	1	2.0	1	2.0	0.177	5.2	LOSA	1.0	7.4	0.43	0.62	0.43	47.0
12	R2	All MCs	197	2.0	197	2.0	0.177	10.1	LOSA	1.0	7.4	0.43	0.62	0.43	46.9
Approach			198	2.0	198	2.0	0.177	10.1	LOSA	1.0	7.4	0.43	0.62	0.43	46.9
All Vehicles			1126	2.0	1126	2.0	0.582	6.3	LOSA	5.6	40.0	0.48	0.52	0.48	46.6

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

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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APPENDIX C

Model scoping memo

From: [Masa Kimura](#)
To: [Jonathan Busch](#); [Mathew London](#)
Subject: RE: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates
Date: Thursday, 16 May 2024 1:06:22 PM
Attachments: [image003.png](#)
[image004.png](#)

Hi Jonathan,

I confirm that following significant internally discussions, a background growth rate of 3% along the New England Highway is to be applied for this development.

Apologies for the delay.

Regards,

Masa Kimura

Development Services Case Officer
Regional and Outer Metropolitan
Development Services
Transport for NSW

T 1300 207 783 **M** 0407 707 999 **E** masa.kimura@transport.nsw.gov.au

transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
Locked Bag 2030, Newcastle NSW 2302

Working days Monday to Friday, 8:00am – 3:30pm



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From: Jonathan Busch <jonathan.busch@sctconsulting.com.au>
Sent: Thursday, May 16, 2024 1:05 PM
To: Mathew London <mathewl@adwjohanson.com.au>; Masa Kimura <Masa.Kimura@transport.nsw.gov.au>
Subject: RE: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates

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Hi Masa,

Can you please provide an update on the below email chain? Is there a background growth assumption we should be using?

Regards,

Jonathan Busch

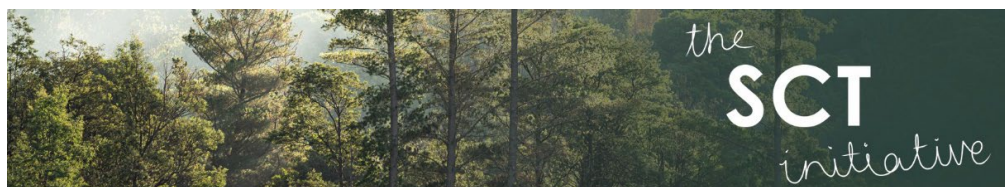
ASSOCIATE DIRECTOR

jonathan.busch@sctconsulting.com.au | 0481 818 776

Suite 4.03, Level 4, 157 Walker Street, North Sydney NSW 2060



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OFFICIAL

From: Mathew London <mathewl@adwjohnson.com.au>

Sent: Monday, April 15, 2024 4:47 PM

To: Masa Kimura <Masa.Kimura@transport.nsw.gov.au>

Cc: Jonathan Busch <jonathan.busch@sctconsulting.com.au>

Subject: RE: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates

Hi Masa, thanks for your time the other week. good to have some clarity on this project.

When do you expect to have the background growth information closed out with regional planning?

Regards,

Mathew London

Registered Surveyor

Hunter Office

Ph: 02 4978 5100

Mobile: 0403 589 419

Email: mathewl@adwjohnson.com.au

Website: www.adwjohnson.com.au

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From: Liz Smith <Liz.Smith@transport.nsw.gov.au>

Sent: Friday, April 5, 2024 3:09 PM

To: Jonathan Busch <jonathan.busch@sctconsulting.com.au>; Masa Kimura <Masa.Kimura@transport.nsw.gov.au>

Cc: Brian Gibson <Brian.Gibson@maitland.nsw.gov.au>; Scott Page

<Scott.Page@maitland.nsw.gov.au>; cameron.evans@maitland.nsw.gov.au; Mathew London
<mathewl@adwjohanson.com.au>

Subject: RE: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates

Thanks Jonathon, please see comments in red below.

Masa, could you please progress a discussion with Regional Planning re background growth assumption.

Thanks Liz

Liz Smith
Manager Development Services North
M 0411149655

OFFICIAL

From: Jonathan Busch <jonathan.busch@sctconsulting.com.au>

Sent: Friday, April 5, 2024 2:22 PM

To: Masa Kimura <Masa.Kimura@transport.nsw.gov.au>; Brian Gibson

<Brian.Gibson@maitland.nsw.gov.au>; Scott Page

<Scott.Page@maitland.nsw.gov.au>; cameron.evans@maitland.nsw.gov.au; Liz Smith

<Liz.Smith@transport.nsw.gov.au>; mathewl@adwjohanson.com.au

Subject: RE: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates

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Hi All,

Thanks for the discussion this morning. Please see my notes below. Let me know if I have misunderstood or misinterpreted anything.

Modelling assumptions:

- 300 total lots per year, being 300 in Lochinvar and 0 in Anambah (agreed)
- Completion year of 2031 and sensitivity test of 2041 (agreed)
- 50% east and 50% west & 70% west and 30% east (Anambah assumption) (agreed)
- Adopt 0.71/0.78 veh/h traffic generation rate for dwellings. 0.66/0.66 veh/h for remainder of the URA (agreed)
- STFM used for background growth (minus growth associated with Lochinvar) (TfNSW to consider as a proposal) – TfNSW will review and come back to you in due course.

Upgrade of Wyndella Road / New England Highway:

- TfNSW's highest concern is the safe operation of the intersection. The concern about delays on New England Highway are a focus because of the risk of queues propagating into the intersection.
- The 'interim treatment' is a compromise and would not be an idea outcome long term, but could be accepted for a limited period, provided the performance is Level of Service C or better.

If the safety concerns were no longer in place, the concerns about congestion would be less significant – e.g. in the case that a median is provided preventing access from Wyndella Road to the existing driveway. This would have access implications to the landowner which would need resolution. **Council median suggestion could be a viable option to address the safety concerns provided a purpose built turning facility is provided in Wyndella Road for the property owner.**

Actions:

- TfNSW to take back proposed STFM assumptions to regional planning team for review
- CPG Estates team to update modelling based on revised assumptions
- CPG Estates team to consider TfNSW safety concerns at Wyndella Road / New England Highway or otherwise justify the approach.

Regards,

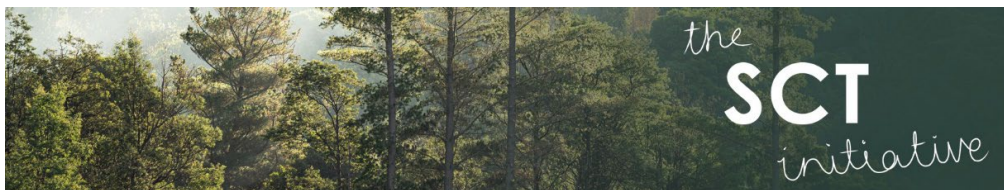
Jonathan Busch

ASSOCIATE DIRECTOR

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-----Original Appointment-----

From: Masa Kimura <Masa.Kimura@transport.nsw.gov.au>

Sent: Tuesday, April 2, 2024 9:43 AM

To: Masa Kimura; Brian Gibson; Scott Page; cameron.evans@maitland.nsw.gov.au; Liz Smith; Jonathan Busch; mathewl@adwjohanson.com.au

Subject: Stakeholder Engagement - 25 Wyndella Road Lochinvar - CPG Estates

When: Friday, 5 April 2024 11:00 AM-11:45 AM (UTC+10:00) Canberra, Melbourne, Sydney.

Where: Microsoft Teams Meeting

@ Mathew London – hope you can attend whilst on the road.

RE: Agenda...

Growth Rates – 10 min

Intersection Layout – 20 min

Other (if required) – 15 min

Microsoft Teams [Need help?](#)

[Join the meeting now](#)

Meeting ID: 424 712 459 935

Passcode: LQMR4K

Dial-in by phone

[+61 2 9161 1290,,770373049#](#) Australia, Sydney

[Find a local number](#)

Phone conference ID: 770 373 049#

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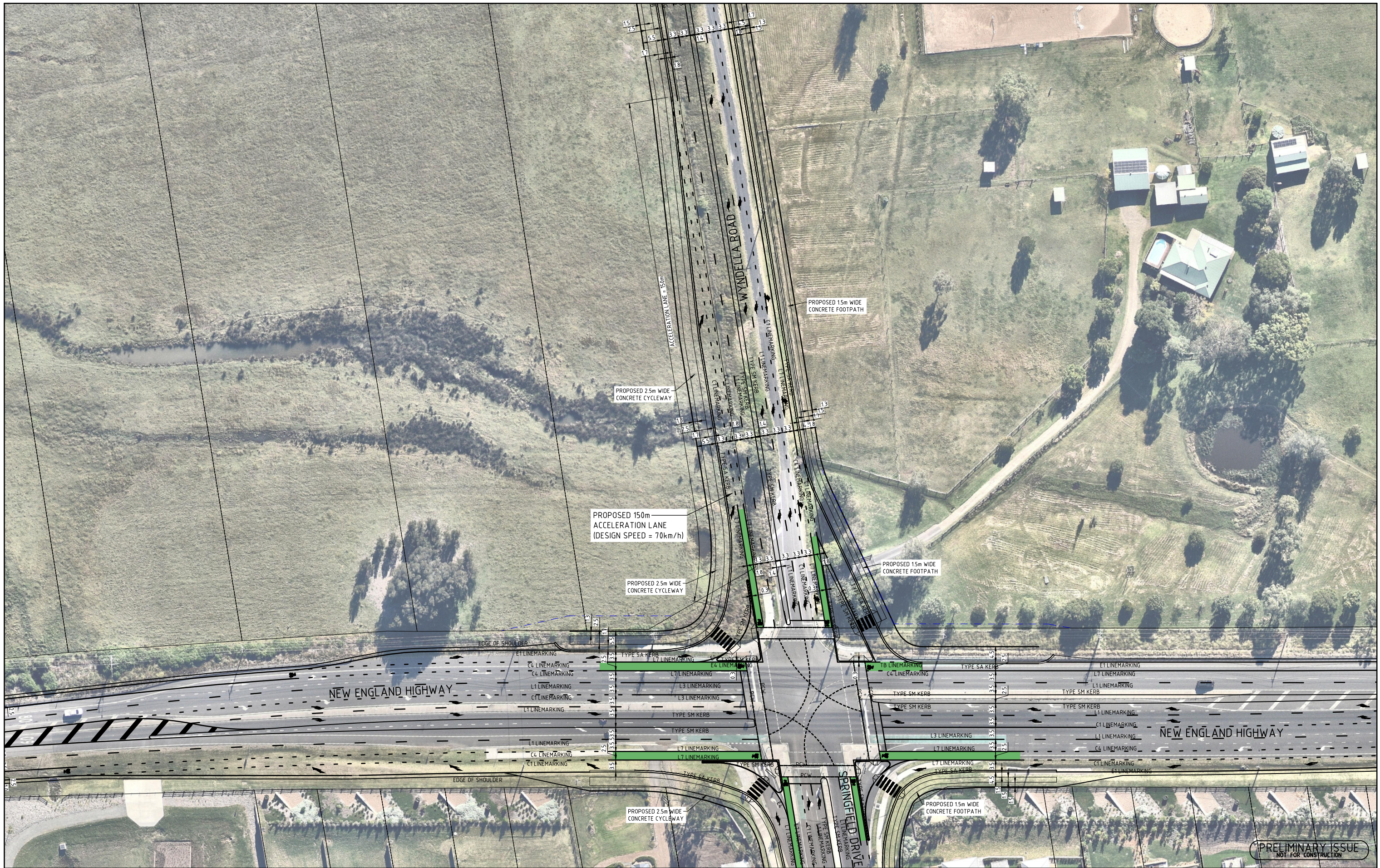
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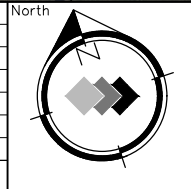
APPENDIX D

Wyndella Road/New England Highway future year intersection concept design



PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

Amendment	Description	Drawn	App'd	Date
1	ORIGINAL ISSUE	A.M	I.H	10.07.23



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A.M
Scale
1:500
Project Approval
IAN HILL (B.E)
Consulting Civil Engineer

Cad Reference
22311C dSK201 r1
A1 SHEET

Client



**PROPOSED ULTIMATE INTERSECTION
WYNDELLA ROAD
ANAMBAB**
WYNDELLA ROAD PLAN

Project No
22311C
Drawing No
SK201
Revision
1

