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Traffic Impact Analysis Report

New England Highway & Christopher Road, Lochinvar

5 November 2021

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1 Introduction

Barker Ryan Stewart have been engaged to prepare a traffic impact assessment report in accordance with the requirements of the Maitland DCP 2011 and TfNSW "*Guide to Traffic Generating Developments*" to accompany a Development Application to Maitland City Council for 304 lot subdivision at Lots 2 &3 DP 1256730 - Stages 8 to 14. The development also includes a super lot subdivision and a local park within the DA.

The purpose of this report is to assess and analyse the impact of the traffic generated by the proposed subdivision (304 lots) through the New England Highway / Wyndella Road intersection and any impacts on the proposed New England Highway / Sanctuary Road intersection. This can be briefly outlined as follows:

- The expected traffic generation to/from the proposed development.
- The impact of the proposed development on the road network.
- Intersection analysis based on traffic counts.
- Access design requirements.
- Availability of public transport.

This assessment has been based on information provided in the following documents:

- Traffic Analysis report prepared by Barker Ryan Stewart dated 21 July 2021.
- Traffic Analysis report prepared by Barker Ryan Stewart dated 28 January 2021.
- Correspondence from Intersect Traffic to Pulver Cooper Blackley dated 18 October 2018.
- Correspondence from the former Roads and Maritime Services to Maitland City Council dated 14 September 2018.
- Traffic Impact Assessment Addendum 1– Residential Subdivision Stages 1 to 6 – Lots 1 & 2 DP 718712 & Lot 32 DP 1132263 New England Highway, Lochinvar prepared by Intersect Traffic dated 20 July 2018.
- Traffic Impact Assessment for the proposed residential subdivision (DA/2017/1401:2) prepared by Intersect Traffic dated June 2017.

2 Existing Conditions

2.1 Site Location

The subject site is located at 799 New England Highway and 70 Christopher Road (Lots 2 & 3 DP 1256730), Lochinvar. The site is zoned R1 General Residential and RU2 Rural Landscape pursuant to the Maitland LEP (2011). Existing access to the site is via the intersection of New England Highway / Sanctuary Drive which is 1.68km east of Lochinvar Public School and 335 metres west of Winders Lane, as shown in Figure 2.1 below:

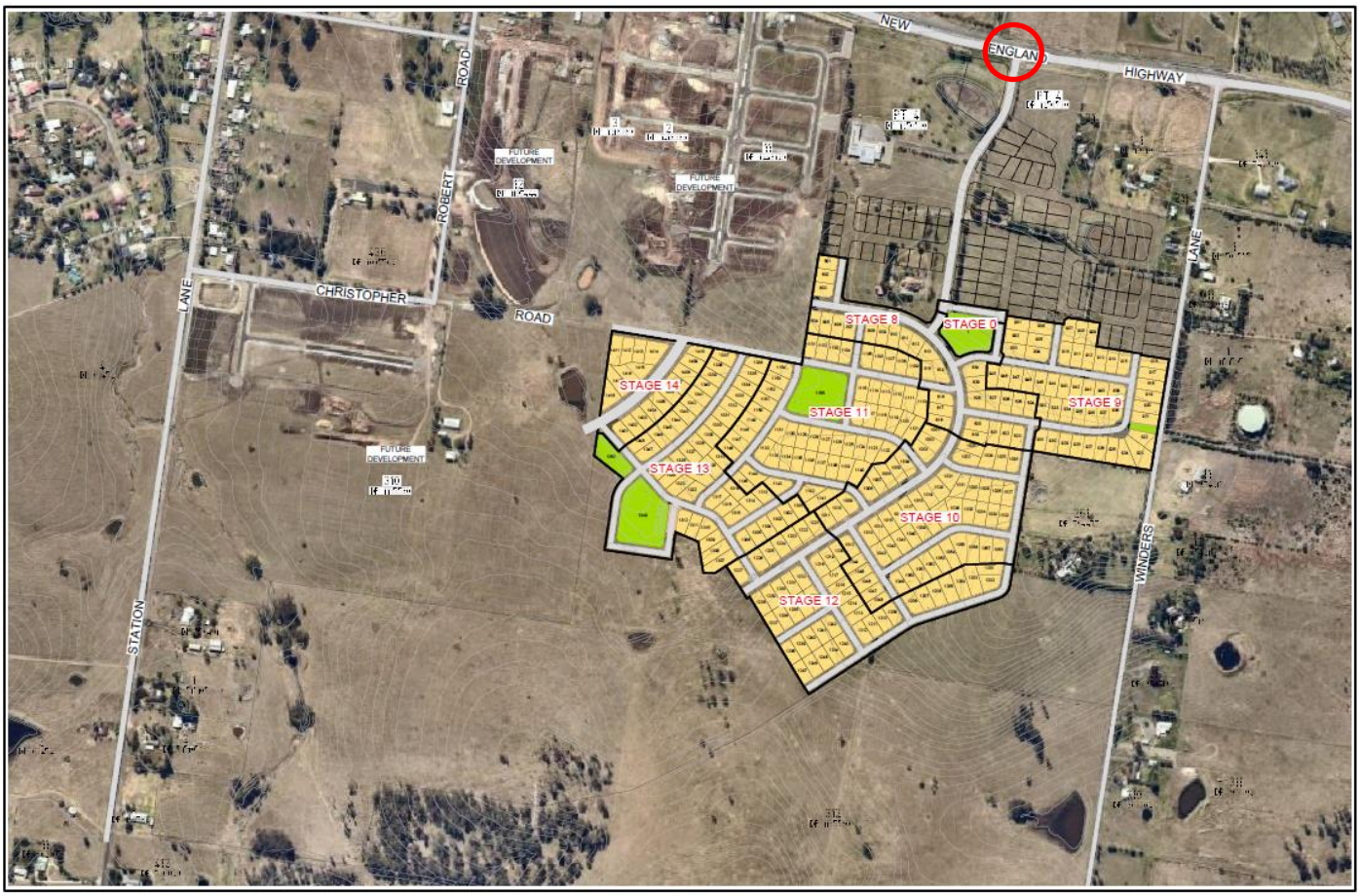


Figure 2.1: Site Location (Overall Master Plan)

2.2 Site Context

Figure 2.2 below shows the location of the subject site in the context of the Lochinvar Area Masterplan (Eastern Precinct). The masterplan indicates that the Sanctuary Drive intersection is intended to provide a minor connection to and from the New England Highway. An internal link road through the area being the southern extension of Wyndella Road will be constructed and connected to the New England Highway/ Wyndella Road signalised intersection.

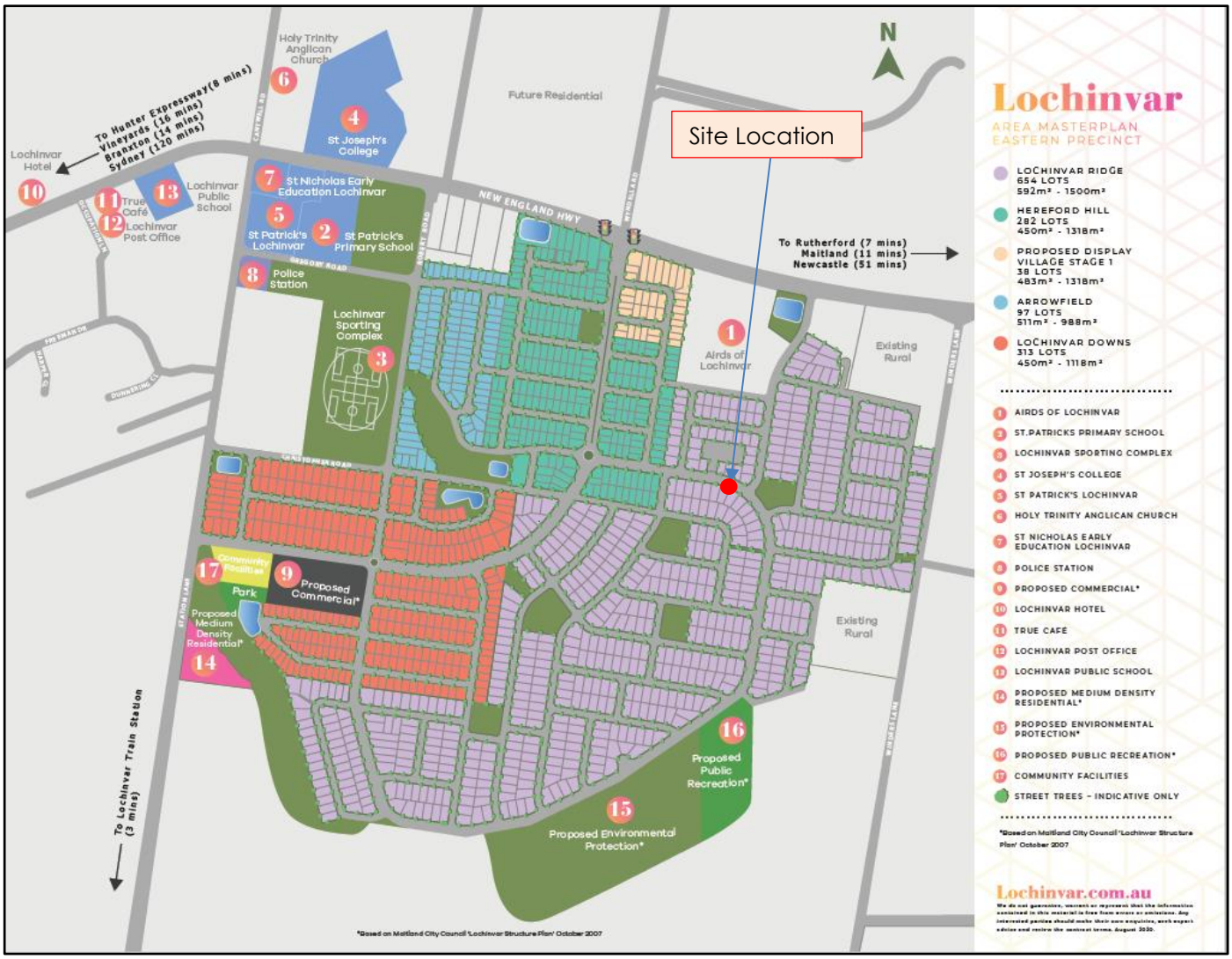


Figure 2.2: Lochinvar Area Masterplan (Eastern precinct)

2.3 Existing Road Network

New England Highway

The New England Highway is part of the classified state highway network (SH9) and is a major arterial road in the region. It is currently under the care and control of Transport for NSW. With the opening of the Hunter Expressway, it now performs the function of a sub-arterial road connecting Maitland to the rural areas of Lochinvar, Greta, and Branxton.

Near the site the New England Highway is a 4-lane, two-way sealed rural road constructed to highway standards with 3.5 metre wide lanes and wide sealed shoulders. An 80 km/h speed limit applies to this section of road.

Winders Lane

Winders Lane near the site is a local rural access road under the care and control of Maitland City Council with its primary function providing access to properties along its length. Near the site, it is a two-lane two-way sealed rural road with grass verges / table drains. The total sealed carriageway width is approximately 5 to 6 metres wide. A posted speed limit Winders Lane is 60 km/h.

Station Lane

Station Lane near the site is a local rural access road under the care and control of Maitland City Council with its primary function providing access to properties along its length. Near the site, it is a two-lane two-way sealed rural road with grass verges / table drains. The total sealed carriageway width is approximately 5 to 6 metres wide. A 50 km/h speed limit would apply to this section of the road.

Christpher Road

Christopher Road near the site is a local rural access road under the care and control of Maitland City Council with its primary function providing access to properties along its length. It is constructed and being upgraded recently only between Robert Road and Station Lane. The Road is unformed east of Robert Road. Near the site, it is a two-lane two-way sealed rural road. The total sealed carriageway width is approximately 5 to 6 metres wide. A 50 km/h speed limit would apply to this section of road.

2.4 Existing Intersections

New England Highway / Station Lane

The New England Highway / Station Lane intersection was a give way controlled intersection with Cantwell Road being the northern leg of the intersection. The intersection is currently being upgraded to let in left out only to facilitate the safe movement of turning traffic at the intersection.

New England Highway / Winders Lane

The New England Highway / Winders Lane intersection is a give way controlled T- intersection constructed to a rural CHR/AUL (Channelised Right Turn / Auxiliary Left Turn) standard. Protected right and left turn deceleration lanes are provided at the intersection to facilitate the safe movement of turning traffic at the intersection.

New England Highway / Sanctuary Drive

The existing intersection of the New England Highway / Sanctuary Drive is an Austroads CHR type intersection with an exclusive 90 metre right turn lane for eastbound vehicles. All turning movements are currently permitted at the intersection.

2.5 Road Network Improvements

The Lochinvar Urban Release Area (LURA) will house up to 5000 new lots. The subject site is within the Lochinvar Urban Release Area (LURA) and as part of the planning process a structure plan for the LURA was adopted in 2007. The structure plan includes an indicative road network layout which is likely to result in several road upgrades in the area.

Of most relevance to this development is the upgrade of the New England Highway / Wyndella Road intersection to signalised intersection which is located 450 metres west of the subject intersection.

The New England Highway / Wyndella Road signalised intersection is now complete and operational. This intersection will become the main access to the New England Highway for lots within the Lochinvar East Precinct subdivisions and will accommodate future traffic growth along the New England Highway generated by the LURA and other developments within the Maitland local government area. Upgraded New England Highway / Wyndella Road intersection layout is as shown in the Figure 2.6 below:

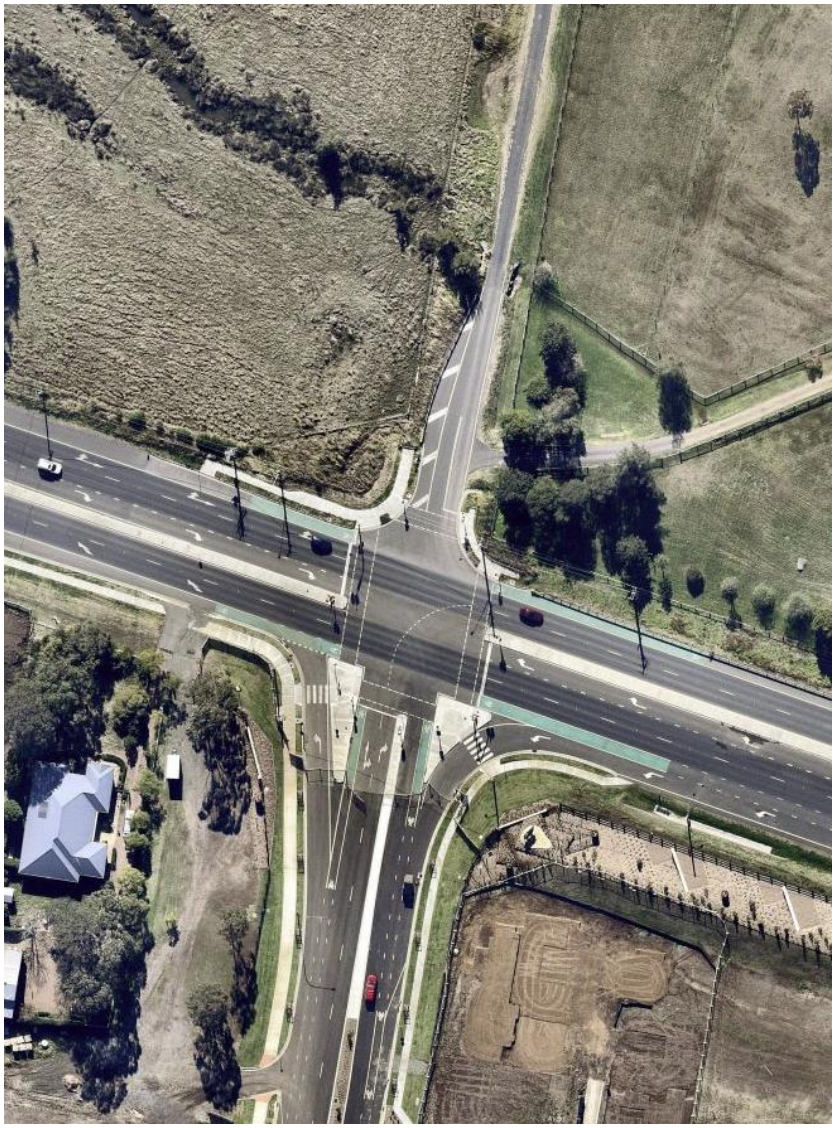


Figure 2.3: Upgraded intersection of NEH / Wyndella Road

In addition, Maitland City Council and Transport for NSW are considering the closure of the New England Highway / Winders Lane intersection in the future while considering conversion of the New England Highway/Sanctuary Road intersection to left in and left out turning movements only.

2.6 Existing Traffic Volumes and Road Capacity

As part of the investigations for the Traffic Impact Assessment for the proposed residential subdivision (DA/2017/1401:2) traffic counts at the New England Highway / Winders Lane intersection were undertaken on Thursday 9th March 2017 from 8.00am to 9.00am and 3.00pm to 4.00pm (expected AM & PM peak traffic periods) to determine mid-block traffic volumes on the New England Highway during peak periods near New England Highway/Sanctuary Drive intersection.

The resulting 2017 AM and PM peak hour traffic volumes on the New England Highway were found to be:

- New England Highway AM peak hour traffic – 1,296 vehicles per hour.
- New England Highway PM peak hour traffic – 1,332 vehicles per hour.

Table 4.3 and 4.4 of the NSW "Guide to Traffic Generating Developments" below provides some guidance on mid-block capacities for urban roads and levels of service.

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

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

Based on the tables above it was considered that the New England Highway would have a two-way midblock capacity of up to 2,200 vehicles per hour with a level of service D being acceptable on sub-arterial roads.

Based on the Traffic volumes data obtained from TfNSW STFM model, background traffic growth in the area has been assumed as 2 % per annum and on the basis that a significant proportion of the new traffic in the area will be generated by the development in the precinct itself. Based on the assumed Growth rate the AM and PM peak hour traffic volumes in New England d Highway for year 2022 and 2032 will be as shown in Table 2.1 below:

Table 2.1 – AM & PM Traffic Volumes

Peak Hour	Traffic Volumes on New England Highway		
	2017	2022	2032
AM	1296	1426	1685
PM	1332	1465	1732

As the 2017, 2022 & 2032 traffic volumes above are less than the determined road capacity of 2,200 vehicles per hour for New England Highway, it is evident that the road network in the vicinity of the subject site has spare capacity available to cater for additional traffic generated by proposed development in the area.

3 Public Transport, Pedestrians and Active transport

There are no existing bus stops within 400 metres of the proposed development site on the New England Highway. An existing bus service operated by Hunter Valley Buses uses the New England Highway to provide connecting service from Maitland to Branxton, North Rothbury & Singleton (Routes 179 and 180). This service provides a frequent public transport service to all major retail, commercial and medical facilities in both the Maitland and Singleton CBD's as well as connecting to the CityRail train service at Maitland Station which provides connection to Newcastle, the Central Coast and Sydney via the regular CityRail services. The nearest bus stop located on the New England Highway is near Robert Road.

There are no existing bicycle and/or pedestrian pathways near the site except for a small on-road bicycle lane provided at the New England Highway / Winders Lane intersection to facilitate safe passage for cyclists through this intersection. Pedestrians and cyclists in the area are generally required to use the existing grass verges or share the travel lanes / shoulders on the local road network.

4 Traffic Generation and Impact

The NSW "Guide to Traffic Generating Developments" provides specific advice on the traffic generation potential of various land uses. However, TfNSW has released a Technical Direction (TDT 2013/4) with the results of updated traffic surveys and amended land use traffic generation rates.

Regarding low density residential dwellings, the following amended advice is provided within the Technical Direction.

- Daily vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas.
- Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90).
- Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85).

Existing Site – Stages 1 to 7 (ULHPL)

The ULHPL site currently has an approval for 146 Lot subdivision. Though no development has occurred on the site as yet, traffic likely to be generated by the approved development needs to be included when assessing the impact of the proposed subdivision.

The existing trip generation for 146 Lot subdivision is therefore:

- 146 x 7.4 daily vehicle trips = 1080 trips; and peak hour trips are as shown in table 3.1 below

Table 3.1 – Traffic Generation - AM and PM Peak

Period	TfNSW TG Rate Trips / Dwelling	Total Lots	Traffic Generation Veh / Hour
AM	0.85	146	124
PM	0.90	146	131

The site currently has direct access to and from New England Highway via the existing intersection of New England Highway / Sanctuary Drive.

Neighbouring site (Hereford Hill)

It is understood that Neighbouring site already have 273 lots approved under two separate development applications DA/2017/1781 (136 Lots - Stages 1 to 5) and DA/2017/2585 (137 Lots – Stages 11 to 19). The development is likely to have stage four (4) completed within 12 months (mid 2022) that will see the local road connection with subject site (ULHPL) being constructed within their property. It is understood that at the completion of stage 4, 103 Lots will be released and therefore should be included in assessing the impact of the proposed subdivision. These lots will have direct access via the intersection of New England Highway / Wyndella Road.

The trip generation for 103 Lot subdivision (Stages 1 to 4) is therefore:

- 103 x 7.4 daily vehicle trips = 762 trips; and peak hour trips are as shown in table 3.2 below:

Table 3.2 – Traffic Generation - AM and PM Peak

Period	TfNSW TG Rate Trips / Dwelling	Total Lots	Traffic Generation Veh / Hour
AM	0.85	103	88
PM	0.90	103	93

The trip generation for remaining 170 Lots subdivision (Stage 5 and Stages 11 to 19) is therefore:

- 170 x 7.4 daily vehicle trips = 1258 trips; and peak hour trips are as shown in table 3.3 below:

Table 3.3 – Traffic Generation - AM and PM Peak

Period	TfNSW TG Rate Trips / Dwelling	Total Lots	Traffic Generation Veh / Hour
AM	0.85	170	145
PM	0.90	170	153

It is assumed for the purpose of this study that 170 lots (Stage 5 and Stages 11 to 19) will be completed by year 2032 and therefore included when assessing the impact of the proposed subdivision in year 2032.

The neighbouring site currently has direct access to and from New England Highway via the recently completed signalised intersection of New England Highway / Wyndella Road.

Proposed Development – Stages 8 to 14 (ULHPL)

The expected trip generation for the proposed 304 lot subdivision (Stages 8 to14) along New England Highway will be:

- 304 x 7.4 daily vehicle trips = 2250 trips; and peak hour trips are as shown in table 3.3 below:

Table 3.4 – Traffic Generation - AM and PM Peak

Period	TfNSW TG Rate Trips / Dwelling	Total Dwelling	Traffic Generation Veh / Hour
AM	0.85	304	258
PM	0.90	304	274

The summary of total peak hour traffic generation in AM peak and PM peak from all the Lots (approved and proposed) on the subject site and the neighbouring site is as shown in table 3.5 below:

Table 3.5 – Summary of Total Traffic Generation from all sites- AM and PM Peak

Site	Period	TfNSW TG Rate Trips / Dwelling	Total Lots	Total Traffic Generation Veh / hour
ULHPL (Already Approved)	AM	0.85	146	124
	PM	0.90	146	131

Site	Period	TfNSW TG Rate Trips / Dwelling	Total Lots	Total Traffic Generation Veh / hour
ULHPL (Proposed Stage 8 to 14)	AM	0.85	304	258
	PM	0.90	304	274
Neighbouring Site (Stage 1 to 4)	AM	0.85	103	88
	PM	0.90	103	93
Neighbouring Site (Stage 5 and Stage 11 to 19)	AM	0.85	170	145
	PM	0.90	170	153

Based on table 3.5 above estimated total traffic generation in year 2022 and 2032 in AM peak is as shown in Table 3.6 below:

Table 3.6 – Total Traffic Generation

Year	Lots	Total Traffic Generation	
		AM	PM
2022	553	470	498
2032	723	615	651

It is anticipated that the local road connection between the subject site and the neighbouring site will be constructed by mid-2022 and the majority of the traffic entering and exiting via the signalised intersection of England Highway / Windella Road.

4.1 Trip Distribution and Assignment

The following assumptions and considerations have been made regarding the distribution and assignment of traffic to and from the subject site and the neighbouring site for the purpose of traffic modelling:

- Traffic from the residential subdivision has been distributed as 80% outbound and 20% inbound in the AM peak and 70% inbound and 30% outbound in the PM peak.
- Origin / destinations for traffic accessing the development has been split as 50% to the east (Maitland) and 50% to the west (Branxton) respectively.
- The New England Highway / Wyndella Road signalised intersection is now complete and operational. Traffic from the proposed subdivision will use this intersection to travel either east or west.
- Intersection of New England Highway / Sanctuary Drive will be restricted to left in left out (LILO) movements only. Some of the vehicles travelling to the west and from the east will still be using this intersection as an access point to and from the already approved subdivision.
- It is anticipated that 90% of traffic from the approved and proposed development upon the site (450 Lots) will enter and exit via New England Highway / Wyndella Road intersection and 10% will enter and exit via New England Highway / Sanctuary Drive Intersection.

- All the traffic from the neighbouring site will use New England Highway / Wyndella Road to travel either east or west.
- It is assumed that remaining 170 Lots in Stages 11 to 19 at the neighbouring site development will be released by year 2032.

The distribution and assignment of traffic to and from the subject site and the neighbouring site onto New England Highway is illustrated below in Table 3.7, 3.8, 3.9 and 3.10.

Table 3.7: Traffic Distribution NEH / Wyndella Road – Year 2022

Peak	DA traffic (90% Via NEH / Wyndella Rd)	Inbound	Outbound	Peak Hour (In)	Peak Hour (Out)	Peak Hour Traffic Distribution (In)			Peak Hour Traffic Distribution (Out)		
						From East	From West	From North	To East	To West	To North
						50%	50%	0%	50%	50%	0%
AM	432	20%	80%	86	345	43	43	0	173	173	0
PM	457	70%	30%	320	137	160	160	0	69	69	0

Table 3.8: Traffic Distribution NEH / Wyndella Road – Year 2032

Peak	DA traffic (90% Via NEH / Wyndella Rd)	Inbound	Outbound	Peak Hour (In)	Peak Hour (Out)	Peak Hour Traffic Distribution (In)			Peak Hour Traffic Distribution (Out)		
						From East	From West	From North	To East	To West	To North
						50%	50%	0%	50%	50%	0%
AM	576	20%	80%	115	461	58	58	0	231	231	0
PM	610	70%	30%	427	183	214	214	0	92	92	0

Table 3.9: Traffic Distribution NEH / Sanctuary Drive – Year 2022

Peak	DA traffic (10 % Traffic of 450 Lots)	Inbound	Outbound	Peak Hour (In)	Peak Hour (Out)	Peak Hour Traffic Distribution (In)			Peak Hour Traffic Distribution (Out)		
						From East	From West	From North	To East	To West	To North
						50%	50%	0%	0%	100%	0%
AM	38	20%	80%	8	31	4	4	0	0	31	0
PM	41	70%	30%	28	12	14	14	0	0	12	0

Table 3.10: Traffic Distribution NEH / Sanctuary Drive – Year 2032

Peak	DA traffic (10 % Traffic of 450 Lots)	Inbound	Outbound	Peak Hour (In)	Peak Hour (Out)	Peak Hour Traffic Distribution (In)			Peak Hour Traffic Distribution (Out)		
						From East	From West	From North	To East	To West	To North
						50%	50%	0%	0%	100%	0%
AM	46	20%	80%	9	37	5	5	0	0	37	0
PM	49	70%	30%	34	15	17	17	0	0	15	0

4.2 Impact of Generated Traffic

4.2.1 Road Network Capacity

As stated in ***Section 2*** of this report that the road network is currently operating well within its technical mid-block capacity.

Based on the Traffic volumes data obtained from TfNSW STFM model, background traffic growth in the area has been confirmed and adopted as 2 % per annum. Background growth factor of 2% has been used to estimate 2022 and 2032 traffic volumes on New England Highway using 2017 traffic volume survey.

Based on the assumed Growth rate the AM and PM peak hour traffic volumes in New England d Highway for year 2022 and 2032 will be as shown in Table 3.11 below:

Table 3.11 – AM & PM Traffic Volumes

Peak Hour	Traffic Volumes on New England Highway		
	2017	2022	2032
AM	1296	1426	1685
PM	1332	1465	1732

As the 2017, 2022 & 2032 traffic volumes above are less than the determined road capacity of 2,200 vehicles per hour for New England Highway, it is evident that the road network in the vicinity of the subject site has spare capacity available to cater for additional traffic generated by proposed development in the area.

This is consistent with the findings of the Lochinvar Traffic Study (URaP-TTW 2012) which assessed the traffic impacts of the full Lochinvar Urban Release Area. Similarly, with all internal roads being constructed to the requirements of the Structure Plan and URaP Traffic Study (2012), the internal road network will also have sufficient capacity to cater for this development.

4.2.2 Intersection Capacity

The future operational performance of the New England Highway / Wyndella Road and the New England Highway / Sanctuary Drive intersection has been assessed using SIDRA 9 modeling software which uses the level of service (delay) model adopted by Transport for NSW to assess intersection performance. Average delay is used to determine the level of service (LOS) based on the following table sourced from the TfNSW 'Traffic Modelling Guidelines.'

LoS	Average Delay / Vehicle (Sec)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	< 15	Good	Good
B	15 - 28	Good, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 - 42	Satisfactory	Satisfactory, but requires accident study
D	42 - 56	Operating near capacity	Near capacity and requires accident study
E	56 - 70	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	>70	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

Figure 3.1: Level of service criteria for intersections

For assessment purposes a LOS D or higher is considered satisfactory intersection operation.

The results of this analysis are provided in Table 3.12 and 3.13 below. Detailed SIDRA Movement Summary report is attached in **Appendix A** of this report.

Table 3.12: New England Hwy / Wyndella Road - Sidra Results

Intersection	Scenario	Approach	Degree of Saturation (DoS)		Average Delay (Sec)		Level of Service (LoS)		95% Queue (m)	
			AM	PM	AM	PM	AM	PM	AM	PM
New England Highway / Wyndella Road	**Existing (2021)**	Wyndella Road (South)	0.01	0.01	19	21	B	C	0	0
		New England Highway (East)	0.78	0.80	24	25	C	C	87	93
		Wyndella Road (North)	0.01	0.01	28	28	C	C	1	1
		New England Highway (West)	0.81	0.82	29	29	C	C	95	98
		Intersection	**0.81**	**0.82**	**26**	**27**	**C**	**C**	**95**	**98**
	553 Lots (2022)	Wyndella Road (South)	0.51	0.21	22	21	C	C	20	8

Intersection	Scenario	Approach	Degree of Saturation (DoS)		Average Delay (Sec)		Level of Service (LoS)		95% Queue (m)	
			AM	PM	AM	PM	AM	PM	AM	PM
		New England Highway (East)	0.83	0.83	25	22	C	C	99	100
		Wyndella Road (North)	0.03	0.01	28	29	C	C	1	1
		New England Highway (West)	0.82	0.86	30	33	C	C	98	103
		Intersection	**0.83**	**0.86**	**26**	**27**	**C**	**C**	**99**	**103**
	723 Lots (2032)	Wyndella Road (South)	0.68	0.32	26	25	C	C	31	12
		New England Highway (East)	0.74	0.88	21	26	C	C	117	148
		Wyndella Road (North)	0.04	0.03	34	34	C	C	2	1
		New England Highway (West)	0.74	0.89	25	39	C	D	115	154
		Intersection	**0.74**	**0.89**	**24**	**33**	**C**	**C**	**117**	**154**

Table 3.13: New England Hwy / Sanctuary Drive - Sidra Results

Intersection	Scenario	Approach	Degree of Saturation (DoS)		Worst Average Delay (Sec)		Level of Service (LoS)		95% Queue (m)		Worst Approach Movement	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
New England Highway / Sanctuary Drive	Existing (2021)	Sanctuary Drive (South) (South)	0.01	0.01	41	44	C	D	0	0	Right	Right
		New England Highway (East)	0.17	0.18	6	6	A	A	0	0	Left	Left
		New England Highway (West)	0.21	0.21	9	9	A	A	0	0	Right	Right
		Intersection	**0.21**	**0.21**	**41**	**44**	**C**	**D**	**0**	**0**	**NA**	**NA**
	10% of 450 Lots Traffic (2022)	Sanctuary Drive (South) (South)	0.03	0.01	7	7	A	A	1	0	Left	Left
		New England Highway (East)	0.18	0.19	6	6	A	A	0	0	Left	Left
		New England Highway (West)	0.24	0.22	0	0	A	A	0	0	NA	NA
		Intersection	**0.27**	**0.24**	**7**	**7**	**A**	**A**	**1**	**0**	**NA**	**NA**
	10% Traffic + 2% GR (2032)	Sanctuary Drive (South) (South)	0.05	0.02	8	8	A	A	1	0	Left	Left
		New England Highway (East)	0.23	0.23	6	6	A	A	0	0	Left	Left
		New England Highway (West)	0.33	0.29	0	0	A	A	0	0	NA	NA
		Intersection	**0.33**	**0.29**	**8**	**8**	**A**	**A**	**0**	**0**	**NA**	**NA**

The results in Table 3.12 and 3.13 indicates that both the intersections, New England Highway /Wyndella Road and New England Highway / Sanctuary Drive are currently operating with satisfactory Level of Service (LoS) AM and PM peak.

With the proposed subdivision of 304 lots (Stages 8 to14) at the subject site and 103 lots at the neighbouring site (Stages 1 to 4) in year 2022 the intersection of New England Highway /Wyndella Road will operate at satisfactory Level of Service (LoS) of "C" in both AM and PM peak.

The intersection and New England Highway / Sanctuary Drive with proposed left in and left out arrangement will operate at satisfactory Level of Service (LoS) of "A" in both AM and PM peak.

In future year 2032 with the subdivision of additional 170 lots (Stages 11 to 19) at the neighbouring site the intersection of New England Highway /Wyndella Road will continue to operate at satisfactory Level of Service (LoS) of "C" in both AM and PM peak and the intersection and New England Highway / Sanctuary Drive will also continue to operate at satisfactory Level of Service (LoS) of "A" in both AM and PM peak.

5 Conclusion/Recommendations

Barker Ryan Stewart have been engaged to prepare a traffic impact assessment report in accordance with the requirements of the Maitland DCP 2011 and TfNSW "*Guide to Traffic Generating Developments*" to accompany a Development Application to Maitland City Council for 304 Lot subdivision at lots 2 &3 DP 1256730 (Stages 8 to 14).

The purpose of this report is to assess and analyse the impact of the traffic generated by the proposed subdivision (304 Lots) and subdivision at the neighbouring property (103 Lots, Stages 1 to 4) on New England Highway / Sanctuary Road and New England Highway / Wyndella Road intersection.

SIDRA intersection analysis indicates that both the intersections, New England Highway / Wyndella Road and New England Highway / Sanctuary Drive are currently operating with satisfactory Level of Service (LoS) AM and PM peak.

With the proposed subdivision of 304 lots (Stages 8 to14) at the subject site and 103 lot at the neighbouring site (stage 1 to 4) in year 2022 the intersection of New England Highway / Wyndella Road will operate at satisfactory Level of Service (LoS) of "C" in both AM and PM peak.

The intersection and New England Highway / Sanctuary Drive with proposed left in and left out arrangement will operate at satisfactory Level of Service (LoS) of "A" in both AM and PM peak.

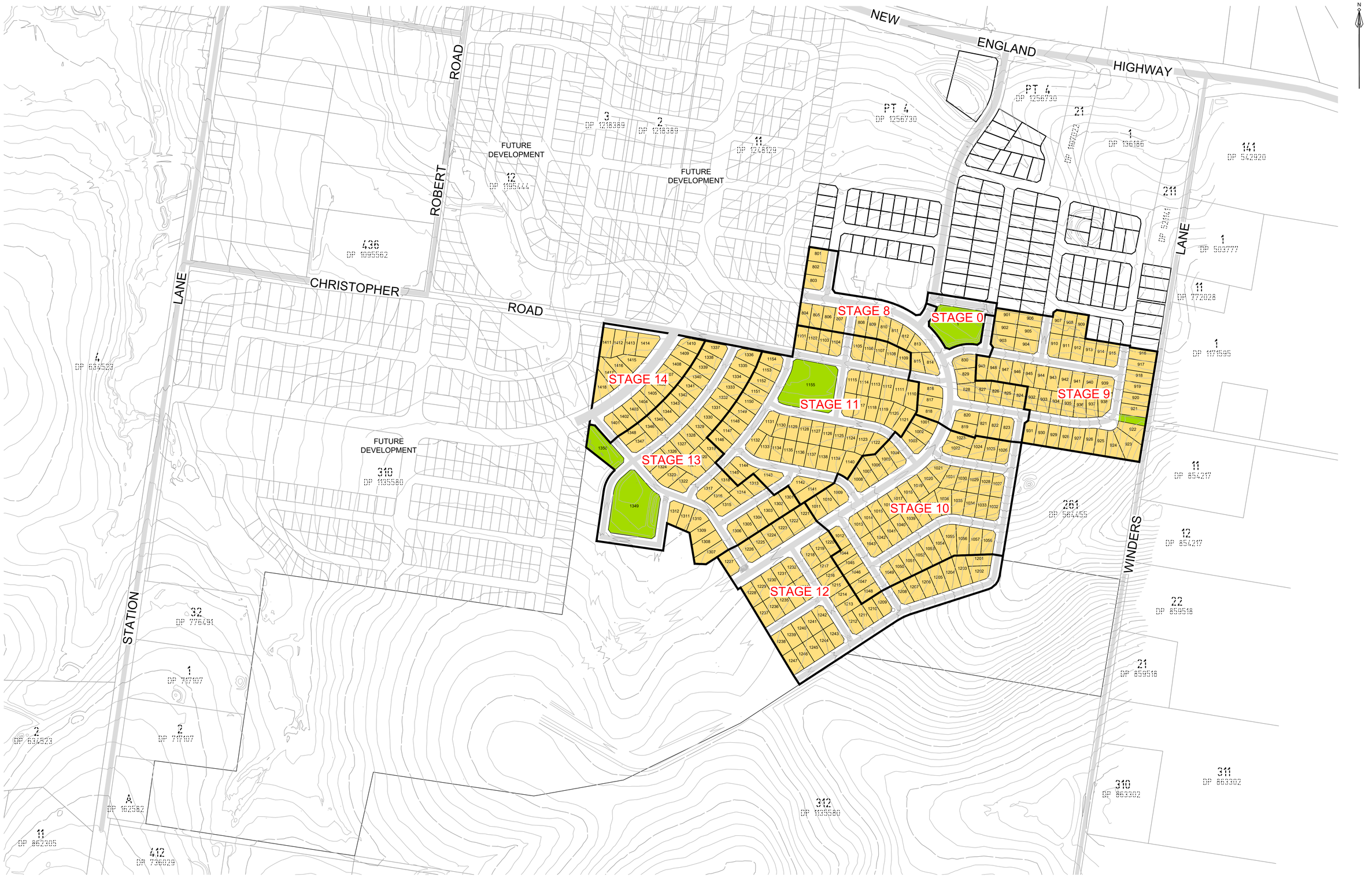
In future year 2032 with the subdivision of additional 170 lots (Stages 11 to 19) at the neighbouring site the intersection of New England Highway /Wyndella Road will continue to operate at satisfactory Level of Service (LoS) of "C" in both AM and PM peak and the intersection and New England Highway / Sanctuary Drive will also continue to operate at satisfactory Level of Service (LoS) of "A" in both AM and PM peak.

The 2017, 2022 & 2032 mid-block traffic volumes are less than the determined road capacity of 2,200 vehicles per hour for New England Highway, it is therefore evident that the road network in the vicinity of the subject site has spare capacity available to cater for additional traffic generated by the proposed development in the area.

This is consistent with the findings of the Lochinvar Traffic Study (URaP-TTW 2012) which assessed the traffic impacts of the full Lochinvar Urban Release Area. Similarly, with all internal roads being constructed to the requirements of the Structure Plan and URaP Traffic Study (2012), the internal road network will also have sufficient capacity to cater for this development.

The Traffic Impact Assessment concludes that the subject site is suitable for the proposed development in relation to the impact of traffic and vehicle access. The development is considered to have negligible impact on the safety and operating efficiency of the surrounding Road network.

Appendix A
Site Plan



REV	AMENDMENT	ISSUED	DATE
M	ADDED STAGES 0 & 14	MAC	18/10/21

BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS
ENGINEERING | PLANNING | PROJECT MANAGEMENT | SURVEYING | CERTIFICATION

SYDNEY P: 02 9659 0005
CENTRAL COAST P: 02 4325 5255
HUNTER P: 02 4966 8388
S.E. QLD P: 07 5582 6555
www.brs.com.au
mail@brs.com.au
ABN: 26 134 067 842

Client:

URBAN LAND & HOUSING PTY LTD

OVERALL MASTER PLAN
LOTS 2 & 3 DP 1256730
NEW ENGLAND HIGHWAY & CHRISTOPHER ROAD
LOCHINVAR

Designed: DE
Drawn: RJG
Checked: DE

Scales: Plan 1:3000

Datum: N/A

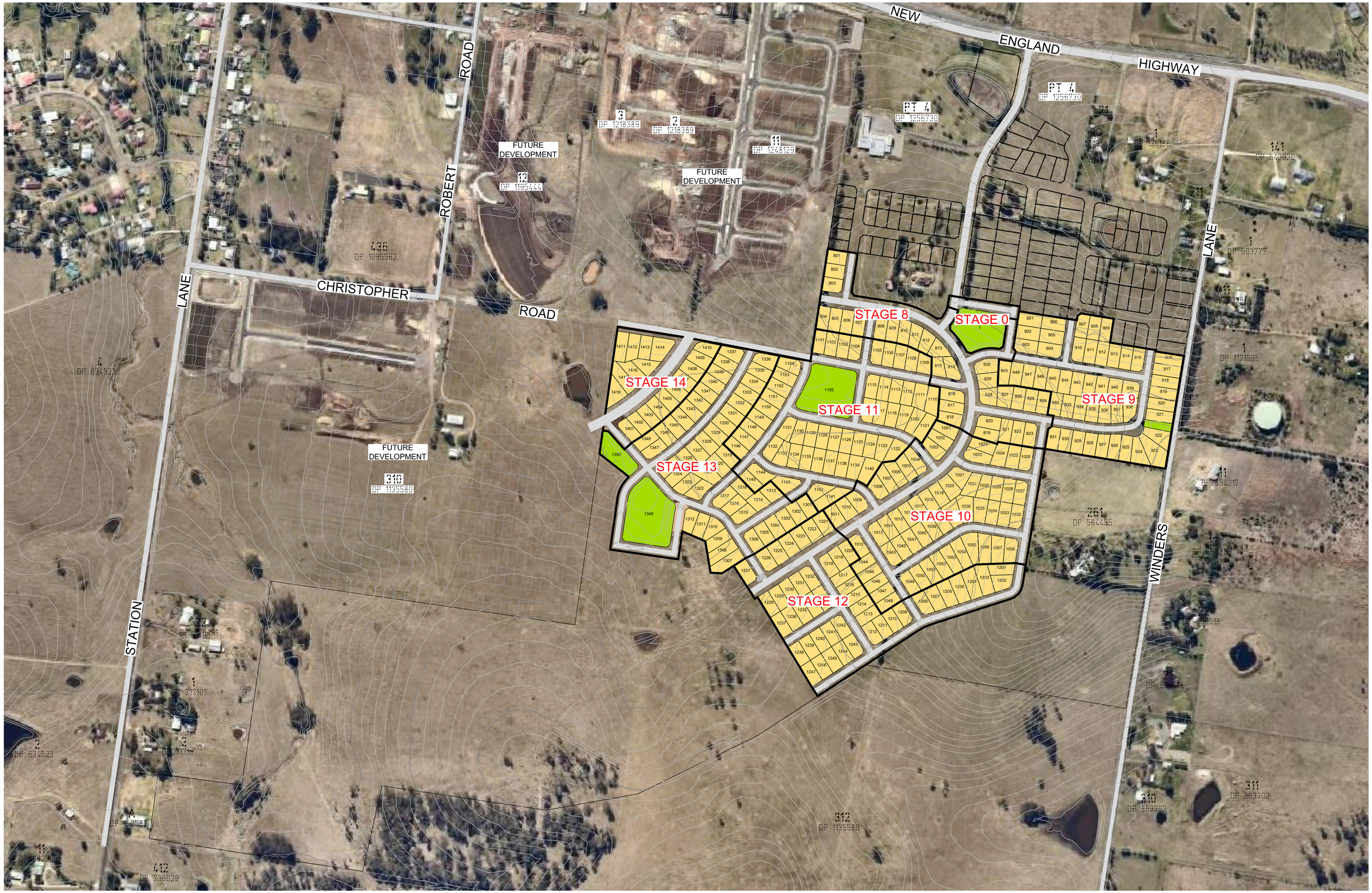
Plan No. ID196344

Sheet No. 1

File Ref. 14/46

REV. M

Plot Date: 18/10/2021 Cad File: 14_46 – Subdivision Plan MASTER PLAN (ID 121214)



REV	AMENDMENT	ISSUED	DATE
M	ADDED STAGES 0 & 14	MAC	18/10/21

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Designed: DE
Drawn: RJG
Checked: DE

Scales: Plan 1:3000

Datum: N/A

Plan No. ID196344
Sheet No. 2
File Ref. 14/46
REV. M

Plot Date: 18/10/2021 Cad File: 14_46 – Subdivision Plan MASTER PLAN (ID 121214)

STAGE	8	9	10	11	12	13	14	Total
700-799	10	5	8	7	19	14	6	69
800-899	19	40	41	40	23	30	7	200
900-999	1	1	5	5	2	1	1	16
1000-1499	0	2	4	2	3	3	4	18
1500+	0	1	0	0	0	0	0	1
Total	30	49	58	54	47	48	18	304

REV	AMENDMENT	ISSUED	DATE
M	ADDED STAGES 0 & 14	MAC	18/10/21

BARKER RYAN STEWART
TOTAL PROJECT SOLUTIONS
ENGINEERING | PLANNING | PROJECT MANAGEMENT | SURVEYING | CERTIFICATION

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OVERALL MASTER PLAN
LOTS 2 & 3 DP 1256730
NEW ENGLAND HIGHWAY & CHRISTOPHER ROAD
LOCHINVAR

Designed: DE
Drawn: RJG
Checked: DE

Scales: Plan 1:1500

Datum: N/A

Plan No. ID196344

Sheet No. 3

File Ref. 14/46

REV. M

Plot Date: 18/10/2021 Cad File: 14_46 – Subdivision Plan MASTER PLAN (ID 121214)

Appendix B
SIDRA Movement Summaries

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - AM - 2021 (Site Folder: NEH / Wyndella Existing (2017 Counts+GR 2%))]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	2	0	2	0.0		0.002	8.4	LOS A	0.0	0.1	0.41	0.55	0.41	52.3
2	T1	1	0	1	0.0		0.006	26.9	LOS C	0.0	0.2	0.92	0.54	0.92	39.5
3	R2	1	0	1	0.0		0.006	31.3	LOS C	0.0	0.2	0.92	0.58	0.92	39.1
Approach		4	0	4	0.0		0.006	18.8	LOS B	0.0	0.2	0.66	0.55	0.66	44.9
East: New England Highway east															
4	L2	3	0	3	0.0		0.002	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	630	32	663	5.1		0.775	24.0	LOS C	12.0	87.4	0.95	0.85	1.05	52.8
6	R2	1	0	1	0.0		0.003	17.9	LOS B	0.0	0.1	0.81	0.60	0.81	46.8
Approach		634	32	667	5.0		0.775	23.9	LOS C	12.0	87.4	0.95	0.85	1.04	52.9
North: Wyndella Road nth															
7	L2	1	0	1	0.0		0.013	29.5	LOS C	0.1	0.6	0.89	0.60	0.89	40.3
8	T1	1	0	1	0.0		0.013	24.9	LOS C	0.1	0.6	0.89	0.60	0.89	39.0
9	R2	1	0	1	0.0		0.013	29.5	LOS C	0.1	0.6	0.89	0.60	0.89	40.3
Approach		3	0	3	0.0		0.013	27.9	LOS C	0.1	0.6	0.89	0.60	0.89	39.9
West: New England Highway west															
10	L2	2	0	2	0.0	*	0.807	36.7	LOS D	13.0	94.8	0.99	0.95	1.21	40.9
11	T1	767	38	807	5.0	*	0.807	28.5	LOS C	13.0	94.8	0.99	0.95	1.21	49.4
12	R2	8	0	8	0.0	*	0.046	34.9	LOS C	0.2	1.6	0.93	0.66	0.93	38.9
Approach		777	38	818	4.9		0.807	28.5	LOS C	13.0	94.8	0.99	0.95	1.20	49.2
All Vehicles		1418	70	1493	4.9		0.807	26.5	LOS C	13.0	94.8	0.97	0.90	1.13	50.8

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

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - PM - 2021 (Site Folder: NEH / Wyndella Existing (2017 Counts+GR 2%))]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	3	0	3	0.0		0.003	8.5	LOS A	0.0	0.2	0.41	0.56	0.41	52.3
2	T1	1	0	1	0.0	*	0.012	27.2	LOS C	0.1	0.4	0.92	0.59	0.92	38.5
3	R2	3	0	3	0.0		0.012	31.7	LOS C	0.1	0.4	0.92	0.60	0.92	39.3
Approach		7	0	7	0.0		0.012	21.1	LOS C	0.1	0.4	0.70	0.58	0.70	43.8
East: New England Highway east															
4	L2	1	0	1	0.0		0.001	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	650	32	684	4.9		0.799	24.7	LOS C	12.7	92.5	0.96	0.87	1.07	52.3
6	R2	2	0	2	0.0		0.006	18.0	LOS B	0.0	0.2	0.82	0.62	0.82	46.7
Approach		653	32	687	4.9		0.799	24.7	LOS C	12.7	92.5	0.96	0.87	1.07	52.3
North: Wyndella Road nth															
7	L2	1	0	1	0.0		0.013	29.5	LOS C	0.1	0.6	0.89	0.60	0.89	40.3
8	T1	1	0	1	0.0		0.013	24.9	LOS C	0.1	0.6	0.89	0.60	0.89	39.0
9	R2	1	0	1	0.0		0.013	29.5	LOS C	0.1	0.6	0.89	0.60	0.89	40.3
Approach		3	0	3	0.0		0.013	27.9	LOS C	0.1	0.6	0.89	0.60	0.89	39.9
West: New England Highway west															
10	L2	2	0	2	0.0	*	0.822	37.6	LOS D	13.5	98.4	1.00	0.97	1.24	40.5
11	T1	781	39	822	5.0	*	0.822	29.3	LOS C	13.5	98.4	1.00	0.97	1.24	48.8
12	R2	2	0	2	0.0	*	0.012	34.3	LOS C	0.1	0.4	0.92	0.61	0.92	39.1
Approach		785	39	826	5.0		0.822	29.3	LOS C	13.5	98.4	1.00	0.97	1.24	48.8
All Vehicles		1448	71	1524	4.9		0.822	27.2	LOS C	13.5	98.4	0.98	0.92	1.16	50.3

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

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - AM - 2022_553 LOTS (Site Folder: NEH / Wyndella Rd_2022)]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	173	0	182	0.0		0.177	9.6	LOS A	1.8	12.7	0.49	0.65	0.49	51.7
2	T1	1	0	1	0.0	*	0.512	30.0	LOS C	2.8	19.6	0.99	0.77	1.00	36.5
3	R2	173	0	182	0.0		0.512	34.6	LOS C	2.8	19.6	0.99	0.77	1.00	37.8
Approach		347	0	365	0.0		0.512	22.1	LOS C	2.8	19.6	0.74	0.71	0.75	43.7
East: New England Highway east															
4	L2	43	0	45	0.0		0.022	7.6	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	672	34	707	5.1	*	0.827	25.8	LOS C	13.6	99.1	0.97	0.89	1.11	51.6
6	R2	1	0	1	0.0		0.003	17.9	LOS B	0.0	0.1	0.81	0.60	0.81	46.8
Approach		716	34	754	4.7		0.827	24.7	LOS C	13.6	99.1	0.91	0.87	1.04	52.3
North: Wyndella Road nth															
7	L2	3	0	3	0.0		0.028	28.7	LOS C	0.2	1.3	0.88	0.64	0.88	40.2
8	T1	1	0	1	0.0		0.028	24.2	LOS C	0.2	1.3	0.88	0.64	0.88	39.0
9	R2	3	0	3	0.0		0.028	28.7	LOS C	0.2	1.3	0.88	0.64	0.88	40.3
Approach		7	0	7	0.0		0.028	28.1	LOS C	0.2	1.3	0.88	0.64	0.88	40.0
West: New England Highway west															
10	L2	1	0	1	0.0	*	0.821	37.5	LOS D	13.5	98.2	1.00	0.97	1.23	40.5
11	T1	781	39	822	5.0		0.821	29.2	LOS C	13.5	98.2	1.00	0.97	1.24	48.9
12	R2	47	0	49	0.0	*	0.272	36.1	LOS D	1.4	10.1	0.96	0.74	0.96	38.4
Approach		829	39	873	4.7		0.821	29.7	LOS C	13.5	98.2	1.00	0.95	1.22	48.1
All Vehicles		1899	73	1999	3.8		0.827	26.4	LOS C	13.6	99.1	0.92	0.88	1.07	48.6

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

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - PM - 2022_553 LOTS (Site Folder: NEH / Wyndella Rd_2022)]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	69	0	73	0.0		0.068	9.1	LOS A	0.7	4.7	0.45	0.62	0.45	51.9
2	T1	1	0	1	0.0	*	0.206	28.7	LOS C	1.1	7.5	0.95	0.72	0.95	37.1
3	R2	69	0	73	0.0		0.206	33.2	LOS C	1.1	7.5	0.95	0.72	0.95	38.4
Approach		139	0	146	0.0		0.206	21.2	LOS C	1.1	7.5	0.70	0.67	0.70	44.1
East: New England Highway east															
4	L2	160	0	168	0.0		0.083	7.9	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	674	34	709	5.0		0.829	25.8	LOS C	13.7	99.7	0.97	0.89	1.11	51.6
6	R2	2	0	2	0.0		0.005	17.6	LOS B	0.0	0.2	0.80	0.62	0.80	46.9
Approach		836	34	880	4.1		0.829	22.3	LOS C	13.7	99.7	0.78	0.83	0.90	53.8
North: Wyndella Road nth															
7	L2	1	0	1	0.0		0.014	30.6	LOS C	0.1	0.6	0.90	0.60	0.90	39.8
8	T1	1	0	1	0.0		0.014	26.0	LOS C	0.1	0.6	0.90	0.60	0.90	38.6
9	R2	1	0	1	0.0		0.014	30.6	LOS C	0.1	0.6	0.90	0.60	0.90	39.8
Approach		3	0	3	0.0		0.014	29.1	LOS C	0.1	0.6	0.90	0.60	0.90	39.4
West: New England Highway west															
10	L2	3	0	3	0.0	*	0.838	38.6	LOS D	14.1	102.6	1.00	0.99	1.27	40.0
11	T1	795	40	837	5.0	*	0.838	30.3	LOS C	14.1	102.6	1.00	0.98	1.27	48.2
12	R2	174	0	183	0.0	*	0.863	43.2	LOS D	6.4	44.5	1.00	0.95	1.48	35.7
Approach		972	40	1023	4.1		0.863	32.6	LOS C	14.1	102.6	1.00	0.98	1.31	45.3
All Vehicles		1950	74	2053	3.8		0.863	27.4	LOS C	14.1	102.6	0.88	0.89	1.09	48.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - PM - 2022_553 LOTS (Site Folder: NEH / Wyndella Rd_2022)]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	69	0	73	0.0		0.068	9.1	LOS A	0.7	4.7	0.45	0.62	0.45	51.9
2	T1	1	0	1	0.0	*	0.206	28.7	LOS C	1.1	7.5	0.95	0.72	0.95	37.1
3	R2	69	0	73	0.0		0.206	33.2	LOS C	1.1	7.5	0.95	0.72	0.95	38.4
Approach		139	0	146	0.0		0.206	21.2	LOS C	1.1	7.5	0.70	0.67	0.70	44.1
East: New England Highway east															
4	L2	160	0	168	0.0		0.083	7.9	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	674	34	709	5.0		0.829	25.8	LOS C	13.7	99.7	0.97	0.89	1.11	51.6
6	R2	2	0	2	0.0		0.005	17.6	LOS B	0.0	0.2	0.80	0.62	0.80	46.9
Approach		836	34	880	4.1		0.829	22.3	LOS C	13.7	99.7	0.78	0.83	0.90	53.8
North: Wyndella Road nth															
7	L2	1	0	1	0.0		0.014	30.6	LOS C	0.1	0.6	0.90	0.60	0.90	39.8
8	T1	1	0	1	0.0		0.014	26.0	LOS C	0.1	0.6	0.90	0.60	0.90	38.6
9	R2	1	0	1	0.0		0.014	30.6	LOS C	0.1	0.6	0.90	0.60	0.90	39.8
Approach		3	0	3	0.0		0.014	29.1	LOS C	0.1	0.6	0.90	0.60	0.90	39.4
West: New England Highway west															
10	L2	3	0	3	0.0	*	0.838	38.6	LOS D	14.1	102.6	1.00	0.99	1.27	40.0
11	T1	795	40	837	5.0	*	0.838	30.3	LOS C	14.1	102.6	1.00	0.98	1.27	48.2
12	R2	174	0	183	0.0	*	0.863	43.2	LOS D	6.4	44.5	1.00	0.95	1.48	35.7
Approach		972	40	1023	4.1		0.863	32.6	LOS C	14.1	102.6	1.00	0.98	1.31	45.3
All Vehicles		1950	74	2053	3.8		0.863	27.4	LOS C	14.1	102.6	0.88	0.89	1.09	48.5

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

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - AM - 2032_723 LOTS (Site Folder: NEH / Wyndella Rd_2032)]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	231	0	243	0.0		0.258	11.5	LOS B	3.2	22.1	0.52	0.67	0.52	50.9
2	T1	1	0	1	0.0	*	0.683	36.4	LOS D	4.5	31.4	1.00	0.86	1.16	34.4
3	R2	231	0	243	0.0		0.683	40.9	LOS D	4.5	31.4	1.00	0.86	1.16	35.5
Approach		463	0	487	0.0		0.683	26.3	LOS C	4.5	31.4	0.76	0.77	0.84	41.8
East: New England Highway east															
4	L2	58	0	61	0.0		0.030	7.7	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	806	40	848	5.0	*	0.740	22.3	LOS C	16.0	116.6	0.89	0.79	0.93	54.5
6	R2	1	0	1	0.0		0.003	21.0	LOS C	0.0	0.1	0.83	0.60	0.83	45.0
Approach		865	40	911	4.6		0.740	21.3	LOS C	16.0	116.6	0.83	0.78	0.87	55.2
North: Wyndella Road nth															
7	L2	4	0	4	0.0		0.042	34.3	LOS C	0.3	2.1	0.90	0.66	0.90	37.8
8	T1	1	0	1	0.0		0.042	29.7	LOS C	0.3	2.1	0.90	0.66	0.90	36.7
9	R2	4	0	4	0.0		0.042	34.3	LOS C	0.3	2.1	0.90	0.66	0.90	37.9
Approach		9	0	9	0.0		0.042	33.8	LOS C	0.3	2.1	0.90	0.66	0.90	37.7
West: New England Highway west															
10	L2	1	0	1	0.0	*	0.735	32.3	LOS C	15.8	115.3	0.93	0.85	0.99	43.0
11	T1	937	47	986	5.0		0.735	24.1	LOS C	15.8	115.3	0.93	0.85	0.99	52.4
12	R2	66	0	69	0.0	*	0.445	42.6	LOS D	2.4	17.1	0.99	0.75	0.99	35.9
Approach		1004	47	1057	4.7		0.735	25.4	LOS C	15.8	115.3	0.94	0.84	0.99	50.9
All Vehicles		2341	87	2464	3.7		0.740	24.1	LOS C	16.0	116.6	0.86	0.80	0.91	50.1

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

MOVEMENT SUMMARY

Site: 1 [NEH / Wyndella - PM - 2032_723 LOTS (Site Folder: NEH / Wyndella Rd_2032)]

New England Hwy & Wyndella Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wyndella Rd sth															
1	L2	92	0	97	0.0		0.095	10.9	LOS B	1.2	8.1	0.48	0.64	0.48	51.0
2	T1	1	0	1	0.0	*	0.319	34.9	LOS C	1.7	12.0	0.98	0.74	0.98	34.9
3	R2	92	0	97	0.0		0.319	39.4	LOS D	1.7	12.0	0.98	0.74	0.98	36.0
Approach		185	0	195	0.0		0.319	25.2	LOS C	1.7	12.0	0.73	0.69	0.73	42.2
East: New England Highway east															
4	L2	214	0	225	0.0		0.111	8.1	LOS A	0.0	0.0	0.00	0.60	0.00	66.2
5	T1	809	40	852	4.9		0.884	31.1	LOS C	20.3	148.2	0.96	0.92	1.14	48.1
6	R2	4	0	4	0.0		0.009	18.6	LOS B	0.1	0.5	0.76	0.64	0.76	46.4
Approach		1027	40	1081	3.9		0.884	26.2	LOS C	20.3	148.2	0.76	0.86	0.90	51.1
North: Wyndella Road nth															
7	L2	2	0	2	0.0		0.027	35.3	LOS D	0.2	1.2	0.91	0.63	0.91	37.6
8	T1	1	0	1	0.0		0.027	30.7	LOS C	0.2	1.2	0.91	0.63	0.91	36.5
9	R2	2	0	2	0.0		0.027	35.3	LOS D	0.2	1.2	0.91	0.63	0.91	37.7
Approach		5	0	5	0.0		0.027	34.4	LOS C	0.2	1.2	0.91	0.63	0.91	37.4
West: New England Highway west															
10	L2	4	0	4	0.0	*	0.894	46.2	LOS D	21.1	153.7	1.00	1.05	1.32	36.9
11	T1	954	48	1004	5.0	*	0.894	38.1	LOS D	21.1	153.7	1.00	1.04	1.33	43.7
12	R2	245	0	258	0.0	*	0.827	43.7	LOS D	9.8	68.8	1.00	0.93	1.29	35.6
Approach		1203	48	1266	4.0		0.894	39.3	LOS D	21.1	153.7	1.00	1.02	1.32	41.8
All Vehicles		2420	88	2547	3.6		0.894	32.6	LOS C	21.1	153.7	0.88	0.92	1.10	45.3

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive AM 2021 (Site Folder: NEH / Sanctuary Drive_(2017 Counts+GR 2%))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	1	0	1	0.0	0.001	6.8	LOS A	0.0	0.0	0.37	0.54	0.37	52.5
3	R2	1	0	1	0.0	0.011	40.8	LOS C	0.0	0.2	0.90	0.96	0.90	35.2
Approach		2	0	2	0.0	0.011	23.8	LOS B	0.0	0.2	0.64	0.75	0.64	42.1
East: New England Hwy														
4	L2	1	0	1	0.0	0.170	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	58.3
5	T1	630	0	663	0.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		631	0	664	0.0	0.170	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: New England Hwy														
11	T1	767	0	807	0.0	0.207	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0	1	0.0	0.001	8.7	LOS A	0.0	0.0	0.51	0.59	0.51	51.2
Approach		768	0	808	0.0	0.207	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1401	0	1475	0.0	0.207	0.1	NA	0.0	0.2	0.00	0.00	0.00	59.9

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive PM 2021 (Site Folder: NEH / Sanctuary Drive_(2017 Counts+GR 2%))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	1	0	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.38	0.54	0.38	52.4
3	R2	1	0	1	0.0	0.012	43.5	LOS D	0.0	0.2	0.91	0.96	0.91	34.3
Approach		2	0	2	0.0	0.012	25.2	LOS B	0.0	0.2	0.64	0.75	0.64	41.5
East: New England Hwy														
4	L2	1	0	1	0.0	0.176	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	58.3
5	T1	650	0	684	0.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		651	0	685	0.0	0.176	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: New England Hwy														
11	T1	781	0	822	0.0	0.211	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0	1	0.0	0.002	8.9	LOS A	0.0	0.0	0.52	0.60	0.52	51.1
Approach		782	0	823	0.0	0.211	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1435	0	1511	0.0	0.211	0.1	NA	0.0	0.2	0.00	0.00	0.00	59.9

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive AM 2022 (10% of Total Traffic) (Site Folder: NEH / Sanctuary Drive_2022_(LILO))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	31	0	33	0.0	0.034	7.0	LOS A	0.1	0.8	0.38	0.61	0.38	52.4
Approach		31	0	33	0.0	0.034	7.0	LOS A	0.1	0.8	0.38	0.61	0.38	52.4
East: New England Hwy														
4	L2	9	0	9	0.0	0.177	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.1
5	T1	642	4	676	0.6	0.177	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		651	4	685	0.6	0.177	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
West: New England Hwy														
11	T1	957	48	1007	5.0	0.267	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		957	48	1007	5.0	0.267	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1639	52	1725	3.2	0.267	0.2	NA	0.1	0.8	0.01	0.01	0.01	59.7

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive PM 2022 (10% of Total Traffic) (Site Folder: NEH / Sanctuary Drive_2022_(LILO))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	12	0	13	0.0	0.013	6.9	LOS A	0.0	0.3	0.37	0.59	0.37	52.5
Approach		12	0	13	0.0	0.013	6.9	LOS A	0.0	0.3	0.37	0.59	0.37	52.5
East: New England Hwy														
4	L2	35	0	37	0.0	0.189	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.8
5	T1	654	14	688	2.1	0.189	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.6
Approach		689	14	725	2.0	0.189	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: New England Hwy														
11	T1	865	43	911	5.0	0.241	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		865	43	911	5.0	0.241	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1566	57	1648	3.6	0.241	0.2	NA	0.0	0.3	0.00	0.02	0.00	59.7

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive AM 2032 (10% of Total Traffic) (Site Folder: NEH / Sanctuary Drive_2032_(LILO))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	37	0	39	0.0	0.046	7.6	LOS A	0.2	1.1	0.44	0.66	0.44	52.1
Approach		37	0	39	0.0	0.046	7.6	LOS A	0.2	1.1	0.44	0.66	0.44	52.1
East: New England Hwy														
4	L2	5	0	5	0.0	0.226	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
5	T1	806	40	848	5.0	0.226	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		811	40	854	4.9	0.226	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
West: New England Hwy														
11	T1	1171	59	1233	5.0	0.326	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1171	59	1233	5.0	0.326	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		2019	99	2125	4.9	0.326	0.2	NA	0.2	1.1	0.01	0.01	0.01	59.6

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

MOVEMENT SUMMARY

Site: 101 [NEH / Sanctuary Drive PM 2032 (10% of Total Traffic) (Site Folder: NEH / Sanctuary Drive_2032_(LILO))]

NEH / Sanctuary Drive
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Sanctuary Drive														
1	L2	14	0	15	0.0	0.017	7.5	LOS A	0.1	0.4	0.43	0.63	0.43	52.2
Approach		14	0	15	0.0	0.017	7.5	LOS A	0.1	0.4	0.43	0.63	0.43	52.2
East: New England Hwy														
4	L2	17	0	18	0.0	0.230	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.0
5	T1	809	40	852	4.9	0.230	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		826	40	869	4.8	0.230	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
West: New England Hwy														
11	T1	1047	52	1102	5.0	0.292	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1047	52	1102	5.0	0.292	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1887	92	1986	4.9	0.292	0.2	NA	0.1	0.4	0.00	0.01	0.00	59.7

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