



ALDA | ROSE | URBAN VILLAGER

Intersection Options Analysis Report

285-325 Pacific Highway, Lake Munmorah

18 February 2022

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Project No.	CC180099
Author	RD
Checked	IS
Approved	IS

Rev No.	Status	Date	Comments
1	Draft	23/08/2021	
2	Draft	24/08/2021	
3	Draft	25/08/2021	
4	Final	31/08/2021	
5	Draft	24/02/2022	Amended to address Council and TfNSW requirements
6	Final	24/03/2022	SIDRA modelling revised

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Executive Summary

Barker Ryan Stewart has been engaged to prepare a Traffic and Parking Impact Assessment Report in accordance with the requirements of Central Coast Council's Wyong Development Control Plan (WDGP) 2013 and *Transport for NSW TfNSW 'Guide to Traffic Generating Developments'* to accompany a Planning Proposal to rezone the land located at 285-325 Pacific Highway, Lake Munmorah to R2 Low Density.

The planning proposal involves the rezoning of land at 285 – 325 Pacific Highway, Lake Munmorah to permit a residential development. The proposal is likely to yield in the order of 300 low density residential lots.

Primary vehicular access is proposed from the west and east via existing access points from the Pacific Highway.

The concept Master Plan proposes access from the west via Pacific Highway, Tall Timbers Road and Chisolm Avenue.

Access from the east will be via Pacific Highway, Kangaroo Avenue, Wallaby Road, Kookaburra Avenue and Possum Street.

Background Reports

Previously Intersect Traffic undertook a traffic impact analysis for the planning proposal which was submitted to Council with the Planning Proposal (RZ/2/2019).

Barker Ryan Stewart (BRS) expanded on the previous work completed by Intersect Traffic and undertook additional traffic analysis as requested by TfNSW to assess and address traffic and access impacts generated by the proposed development (v4 dated 31/08/2021).

Further correspondence was received from TfNSW dated 02/02/2022. BRS responded to TfNSW in correspondence dated 11/02/2022.

This report has now been updated to have regard for previous studies and TfNSW comments.

Accordingly, based on the current and past traffic analysis undertaken for the planning proposal, the following option has been assessed and recommended for adoption.

Split traffic movements from the development site 50/50 between Tall Timbers Road and Kangaroo Avenue and restrict Kangaroo Avenue to Left in and Left out only.

SIDRA modelling results show that both the Pacific Highway / Tall Timbers Road and the Pacific Hwy / Kangaroo Ave / Boronia Road intersections operate satisfactorily in 2021 during both AM and PM peak periods even with development traffic and would continue to do so in 2028 and 2033 post development.

Additional analysis undertaken in this study to assess the impact of the distribution of traffic between Tall Timbers Road and Kangaroo Avenue shows that both the Pacific Highway / Tall Timbers Road and Pacific Highway / Kangaroo Avenue / Boronia Road intersections would operate satisfactorily in the AM peak until 2033 without any need of upgrades during early stages of the development. The modelling has been based on the Pacific Highway / Kangaroo Avenue / Boronia Road intersection being restricted to left in / left out movements only (LLO).

However, in year 2028 and 2033 the Pacific Highway / Tall Timbers Road intersection is likely to reach capacity in the PM peak. The existing right turn lane on the Pacific Highway is 140 metres long and the modelling indicates that the 95% back of queue lengths will likely reach 179 metres in 2028 and 234 metres in 2033. This indicates that in the later stages of the development the right turn lane will either need to be extended depending on the actual traffic generation from the site and rate of development or an additional right turn lane provided.

Whilst these works are not required in the short term, it is recommended that a Planning Agreement have suitable provisions in place to ensure these works are undertaken at the DA stage to ensure that the operational performance of the Pacific Highway / Tall Timbers Road intersection is maintained at a satisfactory level over the long term.

The SIDRA modelling results also show that the Pacific Hwy / Kangaroo Ave / Boronia Road intersection will operate satisfactorily with LIFO arrangements in 2021 during both the AM and PM peak periods with development traffic and would continue to do so in 2028 and 2033 post development. The average delay, LoS and 95% back of queue length for the intersection remain at acceptable levels based on the TfNSW assessment criteria. No upgrade work will be required at this intersection as a result of the planning proposal.

The SIDRA modelling also shows that no intersection upgrades or traffic control devices are required for the Tall Timbers Road / Chisolm Road intersection as a result of the proposed development. It will continue to operate at Level of Service A into the future with minimal delays and queue lengths.

1 Introduction

Barker Ryan Stewart has been engaged to prepare a Traffic and Parking Impact Assessment - Intersection Option Analysis Report in accordance with the requirements of Central Coast Council's Wyong Development Control Plan (WDCP) 2013 and TfNSW 'Guide to Traffic Generating Developments' to accompany a Planning Proposal to rezone the land located at 285-335 Pacific Highway, Lake Munmorah to R2 Low Density which includes following parcels of land as detailed below:

- Lot 1 DP 626787.
- Lot 437 DP 755266; and
- Lot 438 DP 755266.
- Lot 27 DP 755266.
- Lot 2 DP 626787.
- Lot 12 DP 771284; and
- Lot 83 DP 650114.

The subject land is currently zoned RU6 Transition under the Wyong Local Environmental Plan (LEP) 2013, and this Planning Proposal seeks to rezone the subject sites to R2 Low Density Residential and C2 Conservation.

The purpose of this report is to undertake additional traffic analysis to assess and address traffic and access, impacts generated by the proposed development. 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.

2 Site Details

2.1 Site Description

The subject land is in Lake Munmorah within the Central Coast Council local government area. The property addresses are 285-305, 315, 325 and 335 Pacific Highway, Lake Munmorah and include the following lots:

- Lot 1 DP 626787.
- Lot 2 DP 626787.
- Lot 437 DP 755266.
- Lot 438 DP 755266.
- Lot 27 DP 755266.
- Lot 12 DP 771284; and
- Lot 83 DP 650114.

The total area of the subject sites is approximately 27.2 ha (subject to confirmation from a registered surveyor) and is shown in Figure 2.1 below.

Existing improvements to the sites comprising 285-305 Pacific Highway include a commercial boarding kennel facility, three rural residential dwellings and associated outbuildings as shown in Figure 2.1.

Existing improvements to the sites comprising 315-335 Pacific Highway include one residential property, two commercial buildings and a BP Service Station. These three sites also include associated outbuildings and car parking.

The topography of the site is generally level and suitable for low density residential development. Gentle slopes in the range of 2° to 4° exist throughout No's 285- 305. Vegetation is scattered throughout the sites as shown in Figure 3 below. A large portion of the sites are cleared although remnant vegetation is more heavily concentrated in the northwestern corner of the subject lands. Four dams are also located within the site. Existing sites are all currently accessed predominantly via vehicular crossings from the Pacific Highway.

The subject sites have traditionally been utilised for a range of different commercial, rural, and residential uses. Past and current uses include a small commercial orchard, commercial landscaping yard, a commercial kennel currently used for the purposes of a pet resort, a BP service station, and bus depot / hire.

At present, the greater site area is largely underutilised with the rear portion of the site vacant of buildings or infrastructure. The commercial orchard and landscaping yard have been decommissioned and residential dwellings exist on several sites.



Figure 2.1: Aerial View of Sites (Six Maps)

2.2 Site Location

Surrounding land uses include:

- To the east – Residential development zoned R2 Low Density and beyond to rural lands and Lake Munmorah schools (public and Catholic campuses).
- To the north – Public recreation land which is vegetated.
- To the west – Lake Munmorah Shopping Centre, environmental management, and public recreation land and further to a residential area zoned R2 Low Density Residential; and
- To the south – Pacific Highway, mixed commercial and residential land uses, Lakeside Leisure Village (mobile home estate) and Lake Munmorah beyond.



Figure 2.2: Aerial View of Site Location and surrounding Land Uses (Six Maps)

2.3 Existing Access Location

The primary vehicular access to and from the development site off Pacific Highway is the Tall Timbers Road intersection shown below in Figure 2.3:



Figure 2.3: Primary access location to and from the site - Intersection of the Pacific Hwy / Tall Timbers Rd

The secondary vehicular access to and from the development site off Pacific Highway is the Kangaroo Avenue / Boronia Road intersection shown below in Figures 2.4 and 2.5:



Figure 2.4: Secondary access to and from Development Site - Intersection of Pacific Highway / Kangaroo Avenue / Boronia Road



Figure 2.5: View of the Pacific Highway / Kangaroo Avenue / Boronia Road looking south from Kangaroo Avenue

3 Existing Road Network

Pacific Highway

The Pacific Highway is a classified State Road and part of the State highway network. It is under the care and control of TfNSW. The Pacific Highway is a major transport route that connects the southern suburbs of Newcastle and Lake Macquarie with the Central Coast.

Near the site, it's a dual carriageway with two lanes in each direction. The lane widths are approximately 3.7 metres with break down / shoulder sealed widths of 4.0 metres (approx.).

U-turn facilities are provided for access from the north to the southbound carriageways and vice versa through the median island of the Pacific Highway / Kangaroo Avenue / Boronia Road 4-way intersection and through the median island of the Pacific Highway / Colongra Bay Road T intersection. This section the Pacific highway has posted speed limit of 80 km/h.

Tall Timbers Road

Tall Timbers Road is a local collector road which provides access to properties along its length including the Woolworths supermarket complex. As a local collector road, it has a posted speed limit of 60 km/h and is under the care and control of Central Coast Council.

It is a two lane two way sealed urban road with kerb and gutter. Additional turning and merge lanes are provided at its signalised intersection with the Pacific Highway. Lane widths are in the order of approx. 3.0 to 3.5 metres wide.

Kangaroo Road

Kangaroo Road is a local urban road which provides access to properties along its length. As a local road it has posted speed limit of 50 km/h and is under the care and control of Central Coast Council.

It is a two lane two way sealed urban road with kerb and gutter along the first 50m of the road, and it connects to the Pacific Highway as give way intersection and operates as an urban seagull type intersection due to the median on Pacific Highway which allows at least 2 vehicles to store while waiting to merge into the westbound traffic flow on the highway. It has a pavement width of approximately 9 metres.

3.1 Road Network Improvements

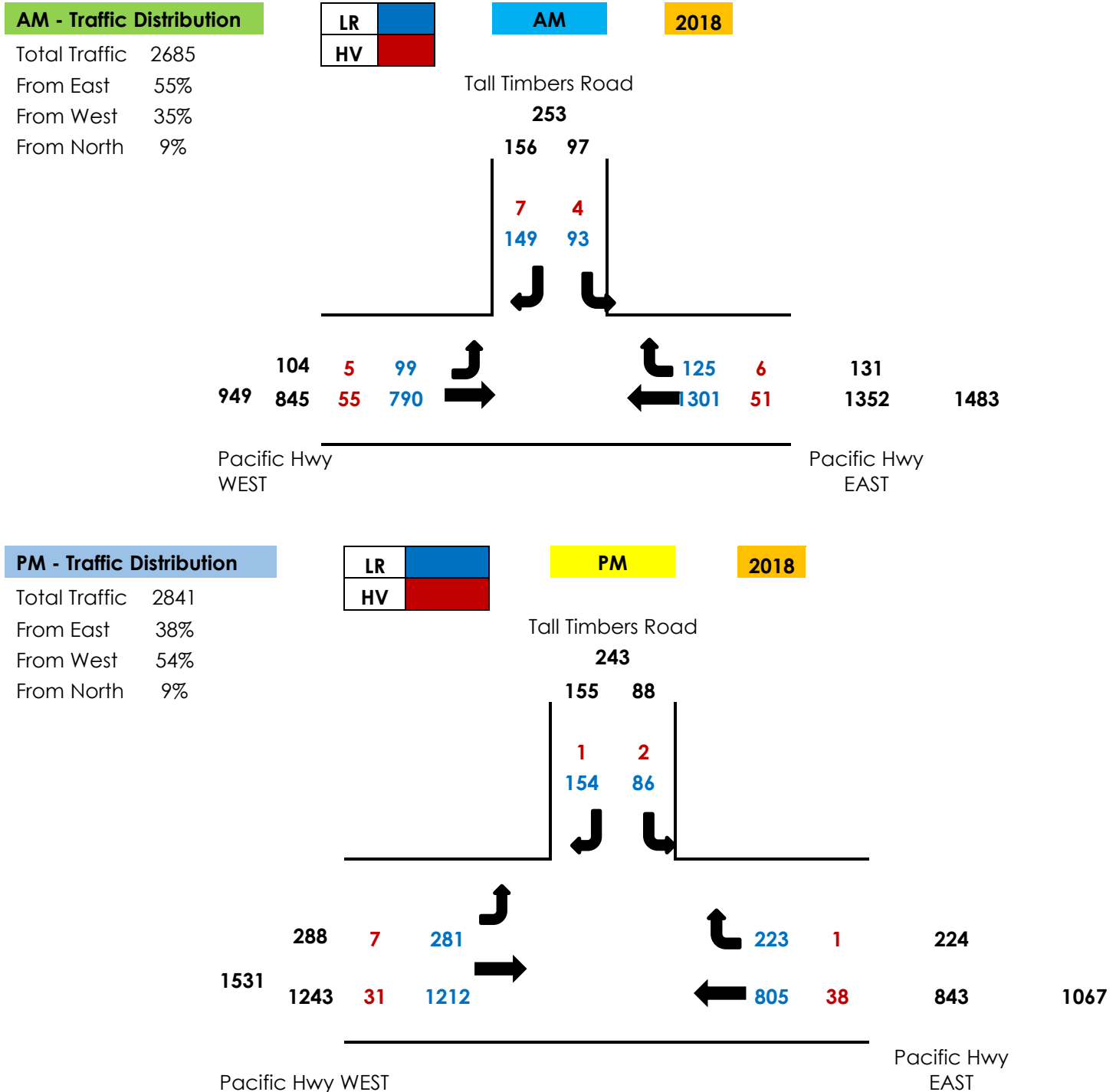
No road network improvements are proposed by TfNSW in the vicinity of the site that would increase the capacity of the road network. Central Coast Council recently completed a shared concrete pathway along the full frontage of the proposed development site, duplicating the existing shared pathway on the eastern side of the Pacific Highway. Other upgrading works as part of Central Coast Council's and TfNSW forward works programs may occur in the future.

4 Traffic Volumes

4.1 Existing Traffic Volumes

4.1.1 Pacific Highway / Tall Timbers Road

As part of the investigations for the previous Traffic Impact Assessment for the Planning Proposal Intersect Traffic engaged Northern Transport Planning and Engineering (NTPE) to undertake traffic counts to determine daily and Peak (AM and PM) hour traffic at the Pacific Highway / Tall Timbers Road intersection on 24 and 25 October 2018. It was determined that the likely peak hour periods were 7:30am to 8:30am, and 4:00pm to 5:00pm respectively. The peak hour traffic volumes are shown below.



The resulting 2018 AM and PM peak hour one way eastbound and westbound traffic volumes on the Pacific Highway were found to be:

- Pacific Highway AM peak hour traffic (West Approach) – 949 vehicles per hour.
- Pacific Highway AM peak hour traffic (East Approach) – 1,483 vehicles per hour
- Pacific Highway PM peak hour traffic (West Approach) – 1,531 vehicles per hour.
- Pacific Highway PM peak hour traffic (East Approach) – 1,067 vehicles per hour

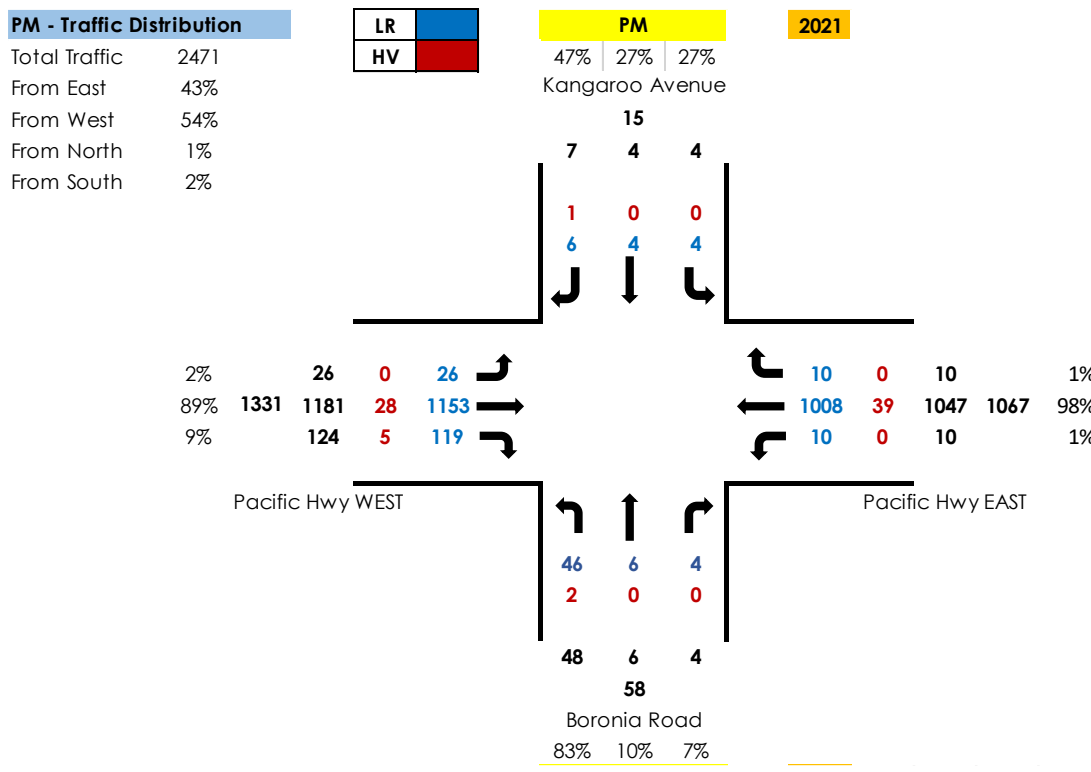
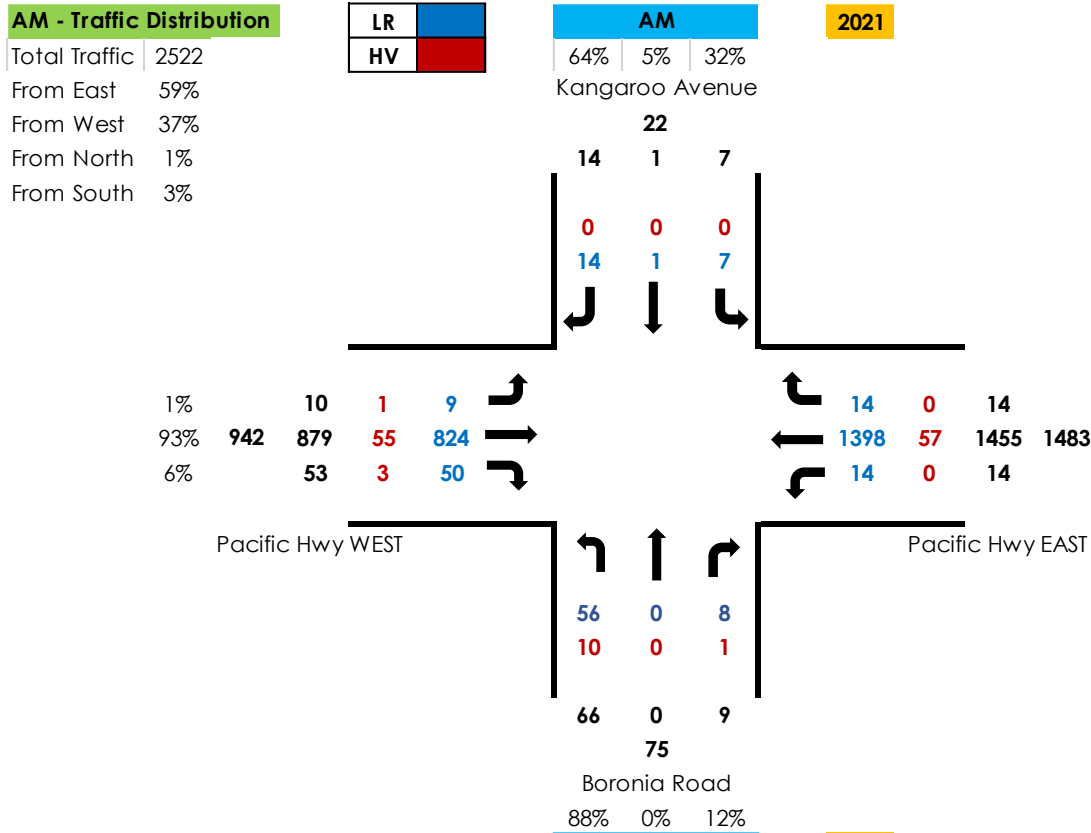
The 2018 peak hour traffic count volumes have been increased by 1.5% per annum to derive traffic volumes for year 2021, 2028 and 2033 to estimate likely peak hour traffic volumes. The 2021 and projected 2028 and 2033 peak hour traffic volumes adopted in this report for the road network capacity assessment are as shown below in **Table 4.1** below. The traffic counts are presented as the one way east or west of Pacific Highway.

Table 4.1: One-way Traffic Volumes Pacific Highway

Location	2018 AM (Veh/hr)	2018 PM (Veh/hr)	2021 AM (Veh/hr)	2021 PM (Veh/hr)	2028 AM (Veh/hr)	2028 PM (Veh/hr)	2033 AM (Veh/hr)	2033 PM (Veh/hr)
Pacific Highway (West Approach)	949	1531	992	1600	1091	1761	1163	1875
Pacific Highway (East Approach)	1483	1067	1550	1115	1705	1227	1817	1307

4.1.2 Pacific Highway / Kangaroo Ave / Boronia Road

Traffic volumes for the Pacific Highway / Kangaroo Avenue / Boronia Road intersection were collected by NTPE for Barker Ryan Stewart on 5th August 2021. The peak hour traffic volumes are shown below.



4.2 Road Capacity

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

A desirable level of service on an urban rural road is generally considered to be a level of service (LoS) C or better however on an arterial road such as the Pacific Highway a LoS D is still considered acceptable. Based on the tables below it was considered that the Pacific Highway would have a one-way midblock capacity of up to 2,200 vehicles per hour (at LoS D).

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

As the 2021 traffic volumes above are less than the determined one-way road capacity of 2,200 vehicles per hour for the Pacific Highway, it is evident that the Pacific Highway in the vicinity of the subject site has spare capacity available to cater for additional traffic generated by development in the area.

5 Public Transport

5.1 Bus Service

Busways Central Coast operates bus services in the area. Buses on route 95 (Lake Haven to Morisset via Gwandalan and Mannering Park), route 95X (Lake Haven to Wyee via Gwandalan and Lake Munmorah), route 98 (Lake Haven to Blue Haven via Chain Valley Bay), and route 99 (Lake Haven to Charlestown via Swansea, Blue Haven and Gwandalan) travel past the site.

Routes 98 and 99 provide frequent bus route services at 30 to 60-minute intervals in AM and PM peak hours on weekdays and infrequently on Saturdays, Sundays, and Public Holidays. The bus services provide transport to various nearby local suburbs and railway stations as well as connections to other bus and train service routes for further destinations. Busways also operate school bus services adjacent to and past the existing site, catering for the needs of the residential communities.

The nearest eastbound bus stop is located on the Pacific Highway fronting the development and the nearest westbound bus stops are approximately 600 metres west of the site. The local bus route map (extract) is provided below in **Figure 5.1** and the eastbound bus stop is shown in **Figure 5.2** below.



Figure 5.1: Bus Route Map



Figure 5.2: Bus stop at the northern end of the site fronting the subject site.

5.2 Pedestrian and Bicycle Facilities

A 2.5-metre-wide off-road concrete shared pathway on the northern side of the Pacific Highway runs along the full frontage of the site and continues east of the site as shown in **Figure 5.3** below extending approximately 1 kilometre to Elizabeth Bay Drive where an existing shared path overpass aids the safe crossing of the Pacific Highway for pedestrians and cyclists.



Figure 5.3: A 2.5-metre-wide off-road concrete shared path on the northern side of the Pacific Highway (Source: Six Maps)

An off-road shared path also exists on the southern side of the Pacific Highway opposite the site. Pedestrians and cyclists can also utilise the signalised and marked pedestrian crossing at the Pacific Highway / Tall Timbers Road Signalised T-intersection approx. 300 metres west of the western boundary of

the development site. The cycleway on the southern side of the Pacific Highway and the signalised pedestrian crossing of the Pacific Highway at its intersection with Tall Timbers Road are shown in **Figure 5.4** below.

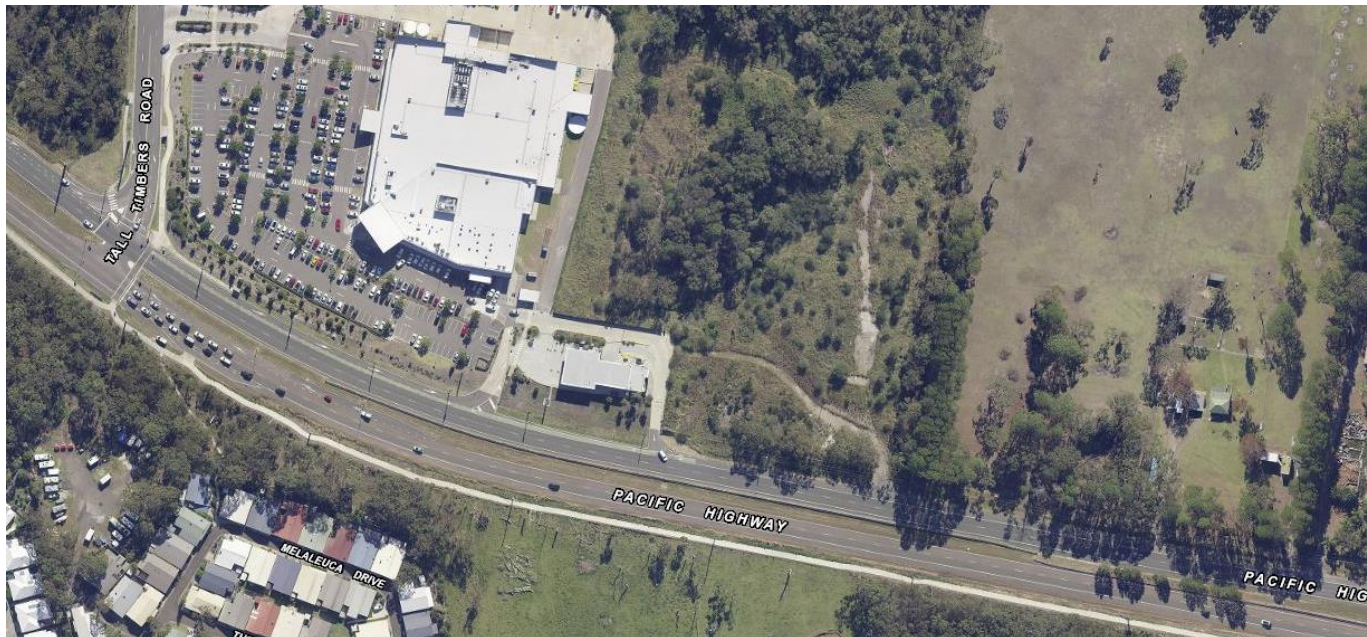


Figure 5.4: An off-road shared path on the southern side of the Pacific Highway opposite the site (Source Six Maps)

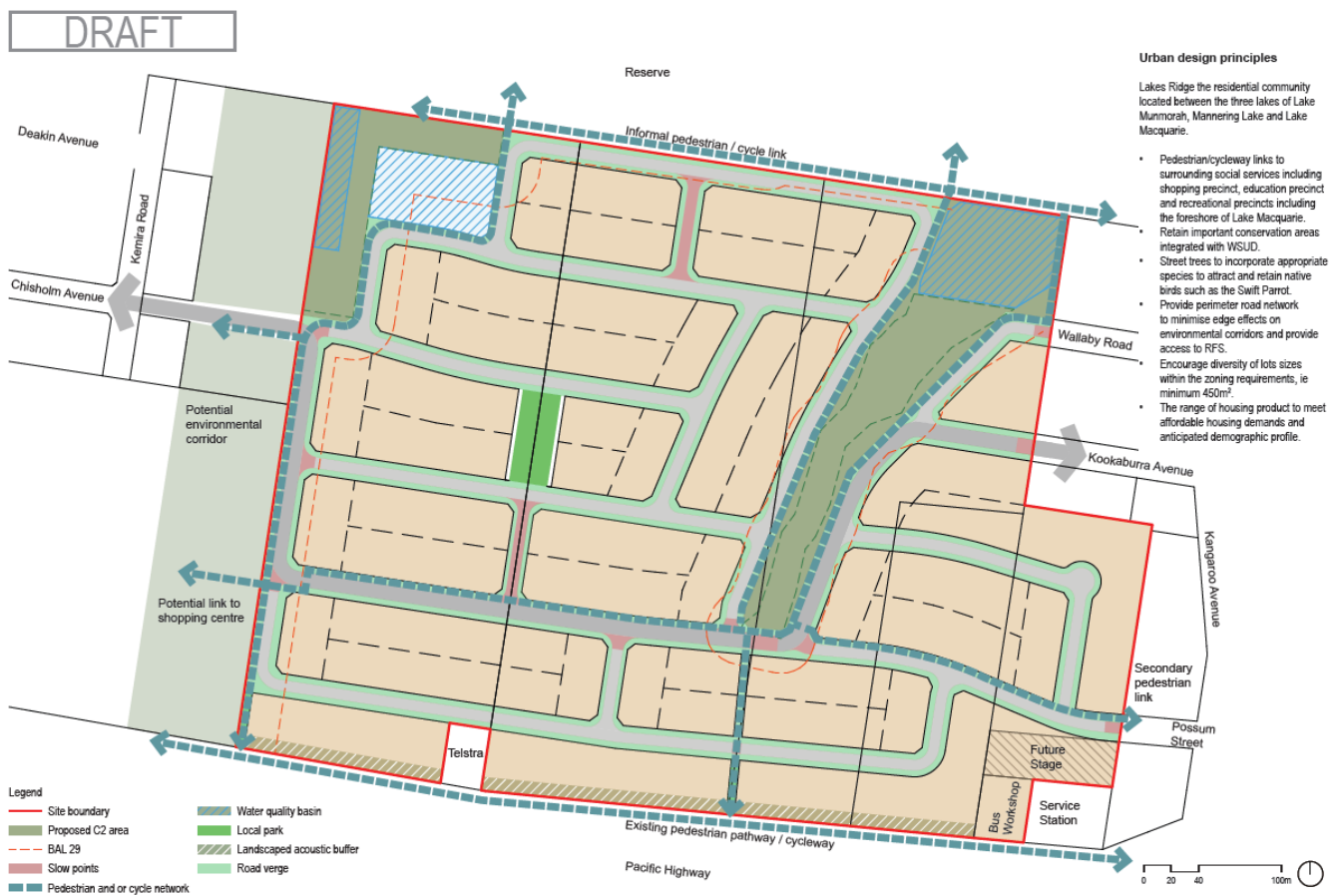
6 Development Proposal

The planning proposal involves the rezoning of land at 285 – 335 Pacific Highway, Lake Munmorah to permit a residential development. The proposal is likely to yield in the order of 300 low density residential lots. The planning proposal includes public road connections to Chisholm Avenue and Wallaby Road as well as to Kookaburra Avenue.

The proposal for the site is for a low-density residential precinct incorporating lots with a minimum lot size of 450m². A concept master plan for the site is included in **Appendix A** and in **Figure 6.1** below.

Primary vehicular access is proposed from the west and east via existing access points from the Pacific Highway.

Note: the concept master plan is subject to review from Council, however the fundamental road connections to the east and west shown in Figure 6.1 are not proposed to be altered.



7 Traffic Generation and Impact

The NSW "Guide to Traffic Generating Developments" provides specific advice on the traffic generation potential of various land uses. However, the 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).

The additional traffic generated by the proposed 300 residential lots during the weekday peak period using the average rate values is as follows and shown in Table 7.1 below:

Daily vehicle trips = 300 dwellings x 7.4 trips per dwelling = 2220 trips per day

Weekday AM peak hour = 300 dwellings x 0.71 trips per dwelling = **213** trips per hour

Weekday PM peak hour = 300 dwellings x 0.78 trips per dwelling = **234** trips per hour.

Table 7.1: Traffic Generation AM and PM Peak – 300 Lots

Period	TfNSW TG Rate Trips / Dwelling	Total Dwelling	Traffic Generation Veh / hour
AM	0.85	300	213
PM	0.90	300	234

7.1 Trip Distribution and Assignment

AS requested by TfNSW the traffic generated by the proposed development has been assigned 00% distributed to Pacific Highway / Tall Timbers Road intersection.

The following assumptions have been made regarding the distribution and assignment of traffic to and from the Pacific Highway / Tall Timbers Road and the Pacific Highway / Kangaroo Avenue / Boronia Road intersection 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.
- Restrict Pacific Highway / Kangaroo Avenue Intersection to Left in and Left out only and distribute existing traffic at his intersection to Pacific Highway / Tall Timbers Road.

Three scenarios were tested for year 2021, 2028, 2033 in this study at Pacific Highway / Tall Timbers Road and Pacific Highway / Kangaroo Ave / Boronia Road intersection:

1. Existing plus Background Growth (1.5%) and no development.
2. Existing + Background Growth (1.5%) + 50% northbound traffic exiting the site via Chisholm Avenue and Tall Timbers Road and 50% northbound traffic exiting at Pacific Highway / Kangaroo Avenue restricted to Left in and Left Out (LILO).

The distribution and assignment of traffic to and from the Pacific Highway are illustrated below in Table 7.2.

Table 7.2: Traffic Distribution – 300 Lots

Peak	DA traffic	Inbound	Outbound	Peak Hour (In)	Peak Hour (Out)	Peak Hour Traffic Distribution (In)		Peak Hour Traffic Distribution (Out)	
						From East	From West	To East	To West
						50%	50%	50%	50%
AM	213	20%	80%	43	170	21	22	85	85
PM	234	70%	30%	164	70	82	82	35	35

7.2 Development Traffic

The proposed AM and PM peak trip distribution is based on the following:

- All turning movements permitted at the Pacific Highway / Tall timbers Road intersection;
- 50 % westbound traffic exiting the site via Chisholm Avenue and Pacific Highway / Tall Timbers Road;
- 50% westbound traffic exiting the site via Wallaby Road and Pacific Highway / Kangaroo Avenue, restricted to Left in and Left Out (LILO).

The proposed AM and PM peak trip distribution is shown below in Figures 7.1 and 7.2:

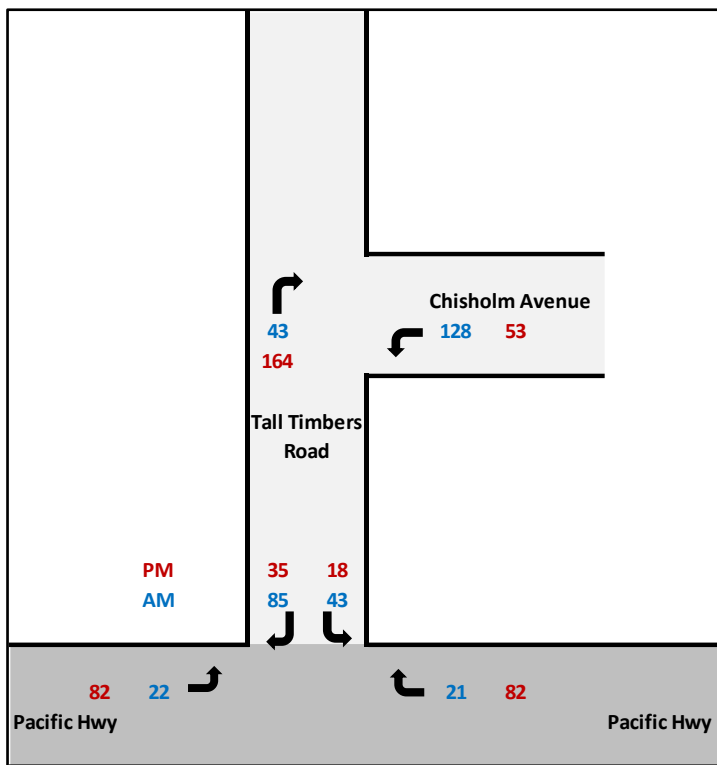


Figure 7.1: Pacific Highway / Tall timbers Road

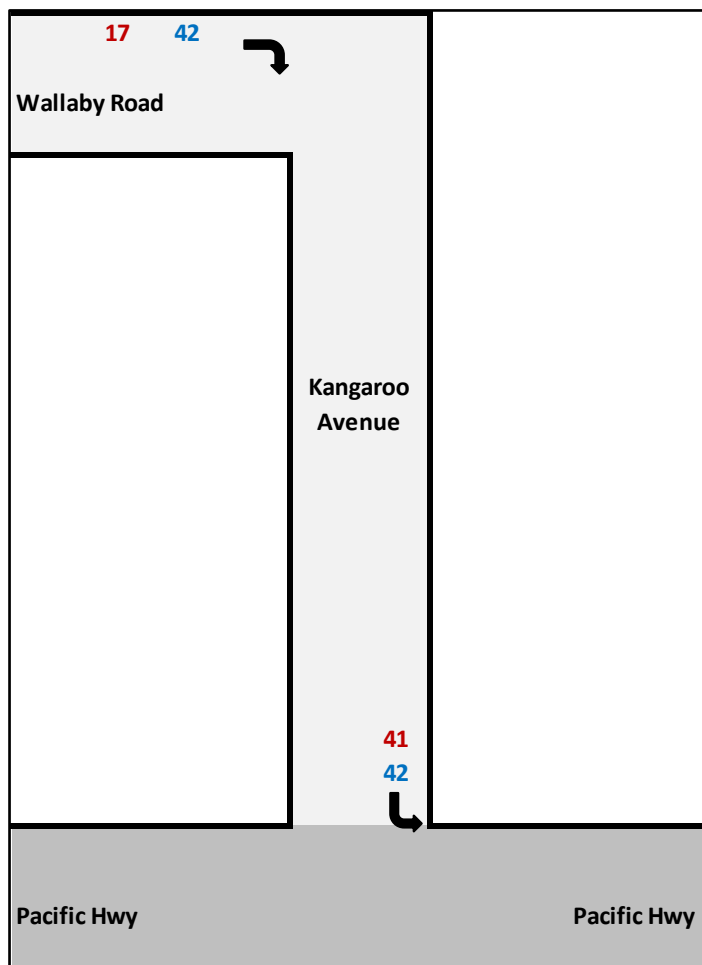


Figure 7.2: Pacific Highway / Kangaroo Ave

7.3 Impact of Generated Traffic

7.3.1 Intersection Capacity

The capacity of urban and rural roads is generally determined by the capacity of intersections. The current and future operational performance of the Pacific Highway / Tall Timbers Road intersection and Pacific Highway / Kangaroo Avenue / Boronia Road has been assessed based on 300 Lots subdivision 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 7.4: Level of service criteria for intersections

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

The following assumptions were adopted in this modelling (as per the previous traffic study):

- The layout of Pacific Highway / Tall Timbers Road and Pacific Highway / Kangaroo Avenue / Boronia Road intersection remain as per current conditions.
- SIDRA modelling for Pacific Highway / Tall Timbers Road intersection is based on the traffic volumes collected by NTPE for Intersect Traffic on 22nd October 2018 to 28th October 2018.
- SIDRA modelling for Pacific Highway / Kangaroo Avenue / Boronia Road intersection is based on the traffic volumes collected by NTPE for Barker Ryan Stewart on 5th August 2022.
- It was noted that the traffic volumes at Pacific Highway / Kangaroo Avenue / Boronia Road intersection were affected by recent lockdown due to Covid 19 pandemic. As a result, 20% more volumes were added to survey volumes on Pacific Highway and 10% more volumes were added to survey volumes on Kangaroo Avenue and Boronia Avenue.
- 2028 and 2033 traffic volumes have been predicted using a 1.5% per annum background traffic growth rate.
- Traffic generated by the planning proposal is distributed as per **Figure 7.1** and **7.2** above.

The results of the modelling for each intersection are summarized in **Table 7.3 to 7.7** below. Detailed SIDRA Movement Summary reports are attached in **Appendix B** of this report.

Pacific Hwy / Tall Timbers Road

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
Pacific Highway / Tall Timbers Road	Existing (2021)	Pacific Highway (East)	0.67	0.80	9	11	A	A	83	56
		Tall Timbers Road (North)	0.68	0.79	25	31	B	C	32	39
		Pacific Highway (West)	0.65	0.87	14	23	A	B	72	166
		Intersection	0.68	0.87	12	19	A	B	83	166
	Existing + Background Growth (2028)	Pacific Highway (East)	0.74	0.86	9	11	A	A	98	75
		Tall Timbers Road (North)	0.75	0.89	26	54	B	C	37	54
		Pacific Highway (West)	0.72	0.91	15	34	B	C	86	240
		Intersection	0.75	0.91	13	34	A	B	98	240
	Existing + Background Growth (2033)	Pacific Highway (East)	0.79	0.87	11	16	A	B	115	111
		Tall Timbers Road (North)	0.80	0.91	27	52	B	D	41	81
		Pacific Highway (West)	0.77	0.89	17	29	B	C	97	325
		Intersection	0.80	0.91	14	26	A	B	115	325

Table 7.3: Existing + Background Growth Pacific Hwy / Tall Timbers Road - SIDRA Results

The results in Table 7.3 above shows the Pacific Highway / Tall Timbers Road intersection currently operating at satisfactory level of service A and B during both AM and PM peak in 2021. This level of service is expected to continue in the future scenarios of 2028 and 2033 (10 and 15 years after the 2018 traffic counts) based on a projected growth in background traffic of 1.5% per annum. However, the intersection Degree of Saturation (0.91) in the PM peak indicates that additional capacity will be required to cater for any increased growth in traffic volumes beyond 2033.

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
Pacific Highway / Tall Timbers Road	50% Northbound Traffic via Kangaroo Ave (2021)	Pacific Highway (East)	0.80	0.88	12	17	A	B	97	111
		Tall Timbers Road (North)	0.80	0.87	27	42	B	C	57	70
		Pacific Highway (West)	0.78	0.90	19	31	B	C	87	247
		Intersection	0.80	0.90	16	27	B	B	97	247
	50% Northbound Traffic via Kangaroo Ave (2028)	Pacific Highway (East)	0.84	0.89	12	23	A	B	114	179
		Tall Timbers Road (North)	0.85	0.88	27	60	B	E	58	111
		Pacific Highway (West)	0.80	0.90	19	34	B	C	99	400
		Intersection	0.85	0.90	17	33	B	C	114	400
	50% Northbound Traffic via Kangaroo Ave (2033)	Pacific Highway (East)	0.88	0.95	15	28	B	B	137	234
		Tall Timbers Road (North)	0.89	0.91	30	72	C	F	66	140
		Pacific Highway (West)	0.86	0.94	23	45	B	D	116	543
		Intersection	0.89	0.95	19	41	B	C	137	543

Table 7.4: Existing + Background Growth + 50% Northbound DA Traffic via Pacific Hwy / Kangaroo Ave - SIDRA Results

The SIDRA modelling results above indicate that the Pacific Highway / Tall Timbers Road intersection will operate at satisfactory levels of service in 2021 during both the AM and PM peak periods even with the additional traffic generated by the proposed development.

However, by 2028, the intersection will reach capacity (DoS=0.90) in the PM Peak as a result of the additional development traffic. The Tall Timbers Road approach will operate at LoS E, the 95% queue in the right turn lane on the Pacific Highway will exceed its current length by around 40 metres and the 95% queue in the Pacific Highway West approach (eastbound) will be 400 metres. The operational performance in 2033 will have even more unacceptable levels of service (LoS F), average delays (72 Seconds) and 95% queue lengths 234 metres and 543 metres).

The results above for 2028 and 2033 indicate that additional capacity will be required at this intersection. Consequently, it is proposed that an additional right turn lane 120 metres long be provided for southbound (westbound) traffic on the Pacific Highway. There is sufficient width in the existing central median to provide this additional right turn lane and there are currently two exit lanes in Tall Timbers Road to cater for the vehicles in the two right turn lanes.

The results of the SIDRA modelling at the Pacific Highway / Tall Timbers Road intersection with 2 right turn lanes on the Pacific Highway are shown below in Table 7.5.

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
Pacific Hwy / Tall Timbers Road (2 Right Turn Lanes)	50% Northbound Traffic via Kangaroo Ave (2028)	Pacific Highway (East)	0.74	0.86	12	16	A	B	114	80
		Tall Timbers Road (North)	0.85	0.88	27	42	B	C	58	73
		Pacific Highway (West)	0.80	0.90	19	29	B	C	99	269
		Intersection	0.85	0.90	16	25	B	C	114	269
	50% Northbound Traffic via Kangaroo Ave (2033)	Pacific Highway (East)	0.79	0.89	14	20	A	B	137	117
		Tall Timbers Road (North)	0.90	0.88	30	54	C	D	66	101
		Pacific Highway (West)	0.86	0.90	23	32	B	C	116	376
		Intersection	0.90	0.90	19	30	B	C	137	376

Table 7.5: Existing + Background Growth Pacific Hwy / Tall Timbers Road with 2 Right Turns on the Pacific Highway - SIDRA Results.

The provision of this additional right turn lane will increase the capacity of the intersection and ensure that the average delay, LoS and 95 % back of queue lengths for the intersection remain at acceptable levels based on the TfNSW assessment criteria.

Pacific Hwy / Kangaroo Ave / Boronia Rd

SIDRA modelling for the Pacific Highway / Kangaroo Avenue / Boronia Road was also undertaken to assess the impact of a proposed left in Left out (LILo) restriction on the intersection operation.

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
Pacific Highway / Kangaroo Avenue / Boronia Road	Existing + DA (2021) LILo	Intersection	0.21	0.26	10	10	A	A	3	2	Left (North)	Left (North)
	Existing + Background Growth + DA LILo (2028)	Intersection	0.23	0.28	10	10	A	A	4	2	Left (North)	Left (North)
	Existing + Background Growth + DA LILo (2033)	Intersection	0.25	0.30	10	11	A	A	4	2	Left (North)	Left (North)

Table 7.6: Existing + Background Growth Pacific Hwy / Kangaroo Ave / Boronia Road - SIDRA Results.

The results of the modelling are shown above in **Table 7.6** SIDRA Movement Summary report is attached in **Appendix B** of this report.

The SIDRA modelling results above show that the Pacific Hwy / Kangaroo Ave / Boronia Road intersection will operate satisfactorily with LILo arrangements in 2021 during both the AM and PM peak periods with development traffic and would continue to do so in 2028 and 2033 post development.

Tall Timbers Road / Chisolm Avenue

As requested by Central Coast Council, additional SIDRA modelling for the Tall Timbers Road / Chisolm Avenue intersection was undertaken to assess the impact of the proposed development.

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
Tall Timbers Rd /Chisolm Ave	Existing + 100% DA (2022) + Kangaroo Ave LLO	Intersection	0.18	0.24	6	8	A	A	6	3	Right (East)	Right (East)
	Existing + Background Growth + 100% DA + Kangaroo Ave LLO (2028)	Intersection	0.18	0.25	7	8	A	A	6	3	Right (East)	Right (East)
	Existing + Background Growth + 100% DA + Kangaroo Ave LLO (2032)	Intersection	0.19	0.26	7	8	A	A	6	3	Right (East)	Right (East)

Table 7.7: Existing + Background Growth Tall Timbers Road / Chisolm Avenue – SIDRA Results

The results of the modelling are shown above in **Table 7.7** and the SIDRA Movement Summary report is attached in **Appendix B** of this report. The SIDRA modelling confirms that no intersection upgrades or traffic control devices are required for this intersection as a result of the proposed development. It will continue to operate at Level of Service A into the future with minimal delays and queue lengths.

8 Conclusion and Recommendations

Barker Ryan Stewart has been engaged to prepare a Traffic and Parking Impact Assessment Report in accordance with the requirements of Central Coast Council's Wyong Development Control Plan (WDCP) 2013 and TfNSW 'Guide to Traffic Generating Developments' to accompany a Planning Proposal to rezone the land located at 285-325 Pacific Highway, Lake Munmorah to R2 Low Density.

The planning proposal involves the rezoning of land at 285 – 335 Pacific Highway, Lake Munmorah to permit a residential development. The proposal is likely to yield in the order of 300 low density residential lots.

The concept master Plan proposes access from the west via Pacific Highway, Tall Timbers Road and Chisolm Avenue. Access from the east will be via Pacific Highway, Kangaroo Avenue, Wallaby Road, Kookaburra Avenue and Possum Street.

Additional analysis undertaken in this study to assess the impact of the distribution of traffic between Tall Timbers Road and Kangaroo Avenue shows that both the Pacific Highway / Tall Timbers Road and Pacific Highway / Kangaroo Avenue / Boronia Road intersections would operate satisfactorily in the AM peak until 2033 without any need of upgrades during early stages of the development. The modelling has been based on the Pacific Highway / Kangaroo Avenue / Boronia Road intersection being restricted to left in / left out movements only (LLO).

However, in year 2028 and 2033 the Pacific Highway / Tall Timbers Road intersection is likely to reach capacity in the PM peak. The existing right turn lane on the Pacific Highway is 140 metres long and the modelling indicates that the 95% back of queue lengths will likely reach 179 metres in 2028 and 234 metres in 2033. This indicates that in the later stages of the development the right turn lane will either need to be extended depending on the actual traffic generation from the site and rate of development or an additional right turn lane provided.

Whilst these works are not required in the short term, it is recommended that a Planning Agreement have suitable provisions in place to ensure these works are undertaken at the DA stage to ensure that the operational performance of the Pacific Highway / Tall Timbers Road intersection is maintained at a satisfactory level over the long term.

The SIDRA modelling results also show that the Pacific Hwy / Kangaroo Ave / Boronia Road intersection will operate satisfactorily with Left in / Left out arrangements in 2021 during both the AM and PM peak periods with development traffic and would continue to do so in 2028 and 2033 post development. The average delay, LoS and 95% back of queue length for the intersection remain at acceptable levels based on the TfNSW assessment criteria. No upgrade work will be required at this intersection as a result of the planning proposal.

The SIDRA modelling also shows that no intersection upgrades or traffic control devices are required for the Tall Timbers Road / Chisolm Road intersection as a result of the proposed development. It will continue to operate at Level of Service A into the future with minimal delays and queue lengths.

There are a variety of factors that may affect the future traffic generation rates, including population growth and future developments on adjacent parcels of land which may impact on the operation of these intersections.

To promote sustainable transport, it is recommended that pedestrian access be provided at several locations to and from the existing off-road shared path along the northern side of the Pacific Highway. These accesses will provide opportunities for walking and cycling as well as provide access to and from the existing bus stop on the Pacific Highway.

Pedestrians and cyclists can also utilise the signalised and marked pedestrian crossing at the Pacific Highway / Tall Timbers Road intersection for access to and from the existing off-road shared path and bus stop on the southern side of the Pacific Highway opposite the site.

Appendix A Concept Master Plan

DRAFT



- Urban design principles**
- Lakes Ridge the residential community located between the three lakes of Lake Munmorrah, Manning Lake and Lake Macquarie.
- Pedestrian/cycleway links to surrounding social services including shopping precinct, education precinct and recreational precincts including the foreshore of Lake Macquarie. Retain important conservation areas integrated with WSUD.
 - Street trees to incorporate appropriate species to attract and retain native birds such as the Swift Parrot.
 - Provide perimeter road network to minimise edge effects on environmental corridors and provide access to RFS.
 - Encourage diversity of lots sizes within the zoning requirements, ie minimum 450m².
 - The range of housing product to meet affordable housing demands and anticipated demographic profile.

Appendix B

SIDRA Movement Summaries

The Pacific Highway / Tall Timbers Road

MOVEMENT SUMMARY

 **Site: 101 [Pacific Hwy / Tall Timbers Road_2021 AM (Site Folder: Base)]**

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.]	95% BACK OF QUEUE [Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %									
East: Pacific Highway														
22	T1	1413	53	1487	3.8	0.630	6.5	LOS A	11.5	82.8	0.67	0.60	0.67	72.2
23	R2	137	6	144	4.4	* 0.341	19.0	LOS B	2.6	18.8	0.83	0.78	0.83	55.8
Approach		1550	59	1632	3.8	0.630	7.6	LOS A	11.5	82.8	0.69	0.62	0.69	69.7
North: Tall Timbers Road														
24	L2	101	4	106	4.0	0.155	16.8	LOS B	1.7	12.6	0.69	0.73	0.69	54.3
26	R2	163	7	172	4.3	* 0.680	30.5	LOS C	4.5	32.4	1.00	0.87	1.17	46.7
Approach		264	11	278	4.2	0.680	25.3	LOS B	4.5	32.4	0.88	0.81	0.99	49.5
West: Pacific Highway														
27	L2	108	5	114	4.6	0.095	9.0	LOS A	0.6	4.4	0.36	0.68	0.36	58.6
28	T1	883	57	929	6.5	* 0.653	14.4	LOS A	9.8	72.1	0.88	0.77	0.90	63.1
Approach		991	62	1043	6.3	0.653	13.8	LOS A	9.8	72.1	0.82	0.76	0.84	62.5
All Vehicles		2805	132	2953	4.7	0.680	11.4	LOS A	11.5	82.8	0.75	0.69	0.77	64.3

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

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

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 [Pacific Hwy / Tall Timbers Road_2021 PM (Site Folder: Base)]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h	[HV] veh/h	[Total veh/h	[HV] %	v/c	sec		veh m				km/h	
East: Pacific Highway														
22	T1	881	40	927	4.5	0.358	4.3	LOS A	5.7	41.3	0.45	0.40	0.45	74.6
23	R2	234	1	246	0.4	* 0.546	26.3	LOS B	6.0	42.0	0.92	0.85	0.92	52.8
Approach		1115	41	1174	3.7	0.546	8.9	LOS A	6.0	42.0	0.55	0.49	0.55	67.0
North: Tall Timbers Road														
24	L2	92	2	97	2.2	0.138	18.7	LOS B	1.9	13.3	0.68	0.72	0.68	53.7
26	R2	162	1	171	0.6	* 0.791	38.5	LOS C	5.6	39.4	1.00	0.94	1.34	44.2
Approach		254	3	267	1.2	0.791	31.3	LOS C	5.6	39.4	0.89	0.86	1.10	47.5
West: Pacific Highway														
27	L2	301	7	317	2.3	0.267	9.7	LOS A	2.3	16.1	0.43	0.71	0.43	58.3
28	T1	1299	32	1367	2.5	* 0.868	26.2	LOS B	23.5	167.8	0.97	1.02	1.24	53.9
Approach		1600	39	1684	2.4	0.868	23.1	LOS B	23.5	167.8	0.87	0.96	1.09	54.9
All Vehicles		2969	83	3125	2.8	0.868	18.5	LOS B	23.5	167.8	0.75	0.77	0.89	58.1

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

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

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 [Pacific Hwy / Tall Timbers Road_2028 AM (Site Folder: Base)]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %	v/c	sec		[Veh. m]				km/h	
East: Pacific Highway														
22	T1	1555	59	1637	3.8	0.694	6.9	LOS A	13.5	97.5	0.72	0.65	0.72	71.7
23	R2	151	7	159	4.6	* 0.393	20.0	LOS B	3.0	21.9	0.87	0.79	0.87	55.4
Approach		1706	66	1796	3.9	0.694	8.1	LOS A	13.5	97.5	0.73	0.66	0.73	69.2
North: Tall Timbers Road														
24	L2	112	5	118	4.5	0.172	16.9	LOS B	1.9	14.2	0.70	0.73	0.70	54.2
26	R2	179	8	188	4.5	* 0.748	31.7	LOS C	5.1	36.8	1.00	0.92	1.27	46.3
Approach		291	13	306	4.5	0.748	26.0	LOS B	5.1	36.8	0.88	0.84	1.05	49.2
West: Pacific Highway														
27	L2	120	6	126	5.0	0.107	9.0	LOS A	0.7	5.0	0.36	0.68	0.36	58.6
28	T1	972	63	1023	6.5	* 0.719	16.0	LOS B	11.6	85.7	0.91	0.83	0.99	61.7
Approach		1092	69	1149	6.3	0.719	15.2	LOS B	11.6	85.7	0.85	0.82	0.92	61.2
All Vehicles		3089	148	3252	4.8	0.748	12.3	LOS A	13.5	97.5	0.79	0.73	0.83	63.5

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

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

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 [Pacific Hwy / Tall Timbers Road_2028 PM (Site Folder: Base)]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		veh m				km/h	
East: Pacific Highway														
22	T1	970	44	1021	4.5	0.377	4.2	LOS A	6.8	49.2	0.42	0.37	0.42	74.8
23	R2	257	1	271	0.4	* 0.656	33.7	LOS C	8.1	56.9	0.96	0.92	1.00	50.0
Approach		1227	45	1292	3.7	0.656	10.4	LOS A	8.1	56.9	0.53	0.49	0.54	65.8
North: Tall Timbers Road														
24	L2	101	2	106	2.0	0.163	22.2	LOS B	2.5	17.8	0.72	0.74	0.72	52.2
26	R2	178	1	187	0.6	* 0.886	48.9	LOS D	7.7	54.2	1.00	1.04	1.57	41.0
Approach		279	3	294	1.1	0.886	39.2	LOS C	7.7	54.2	0.90	0.93	1.26	44.7
West: Pacific Highway														
27	L2	331	8	348	2.4	0.291	10.0	LOS A	2.7	19.4	0.44	0.72	0.44	58.2
28	T1	1430	36	1505	2.5	* 0.883	28.6	LOS C	31.3	223.6	0.94	1.00	1.19	52.3
Approach		1761	44	1854	2.5	0.883	25.1	LOS B	31.3	223.6	0.85	0.94	1.05	53.6
All Vehicles		3267	92	3439	2.8	0.886	20.8	LOS B	31.3	223.6	0.73	0.77	0.88	56.6

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

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

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

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 [Pacific Hwy / Tall Timbers Road_2033 AM (Site Folder: Base)]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %	v/c	sec		[Veh. m]				km/h	
East: Pacific Highway														
22	T1	1656	62	1743	3.7	0.738	8.2	LOS A	15.9	114.6	0.76	0.71	0.79	70.3
23	R2	160	7	168	4.4	* 0.427	20.9	LOS B	3.3	23.9	0.89	0.79	0.89	55.0
Approach		1816	69	1912	3.8	0.738	9.3	LOS A	15.9	114.6	0.77	0.71	0.80	68.0
North: Tall Timbers Road														
24	L2	119	5	125	4.2	0.183	16.9	LOS B	2.1	15.1	0.70	0.73	0.70	54.2
26	R2	192	9	202	4.7	* 0.803	33.3	LOS C	5.7	41.1	1.00	0.97	1.40	45.7
Approach		311	14	327	4.5	0.803	27.0	LOS B	5.7	41.1	0.89	0.88	1.13	48.8
West: Pacific Highway														
27	L2	127	6	134	4.7	0.112	9.0	LOS A	0.7	5.3	0.36	0.68	0.36	58.6
28	T1	1035	67	1089	6.5	* 0.766	17.6	LOS B	13.2	97.3	0.93	0.89	1.07	60.3
Approach		1162	73	1223	6.3	0.766	16.7	LOS B	13.2	97.3	0.87	0.86	0.99	60.1
All Vehicles		3289	156	3462	4.7	0.803	13.6	LOS A	15.9	114.6	0.82	0.78	0.90	62.5

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

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

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 [Pacific Hwy / Tall Timbers Road_2033 PM (Site Folder: Base)]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh. Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		veh m				km/h	
East: Pacific Highway														
22	T1	1033	47	1087	4.5	0.378	4.3	LOS A	8.8	63.7	0.36	0.33	0.36	74.7
23	R2	274	1	288	0.4	* 0.713	48.6	LOS D	12.7	89.5	0.98	0.98	1.03	45.1
Approach		1307	48	1376	3.7	0.713	13.6	LOS A	12.7	89.5	0.49	0.46	0.50	63.2
North: Tall Timbers Road														
24	L2	107	2	113	1.9	0.176	29.7	LOS C	3.8	27.0	0.73	0.74	0.73	49.2
26	R2	190	1	200	0.5	* 0.901	65.6	LOS E	11.5	80.9	1.00	1.01	1.46	36.6
Approach		297	3	313	1.0	0.901	52.7	LOS D	11.5	80.9	0.90	0.92	1.20	40.6
West: Pacific Highway														
27	L2	353	9	372	2.5	0.314	11.2	LOS A	4.0	28.9	0.45	0.73	0.45	57.5
28	T1	1523	38	1603	2.5	* 0.884	31.5	LOS C	45.3	323.7	0.89	0.92	1.04	50.6
Approach		1876	47	1975	2.5	0.884	27.7	LOS B	45.3	323.7	0.81	0.88	0.93	52.0
All Vehicles		3480	98	3663	2.8	0.901	24.5	LOS B	45.3	323.7	0.70	0.73	0.79	54.3

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

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

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)

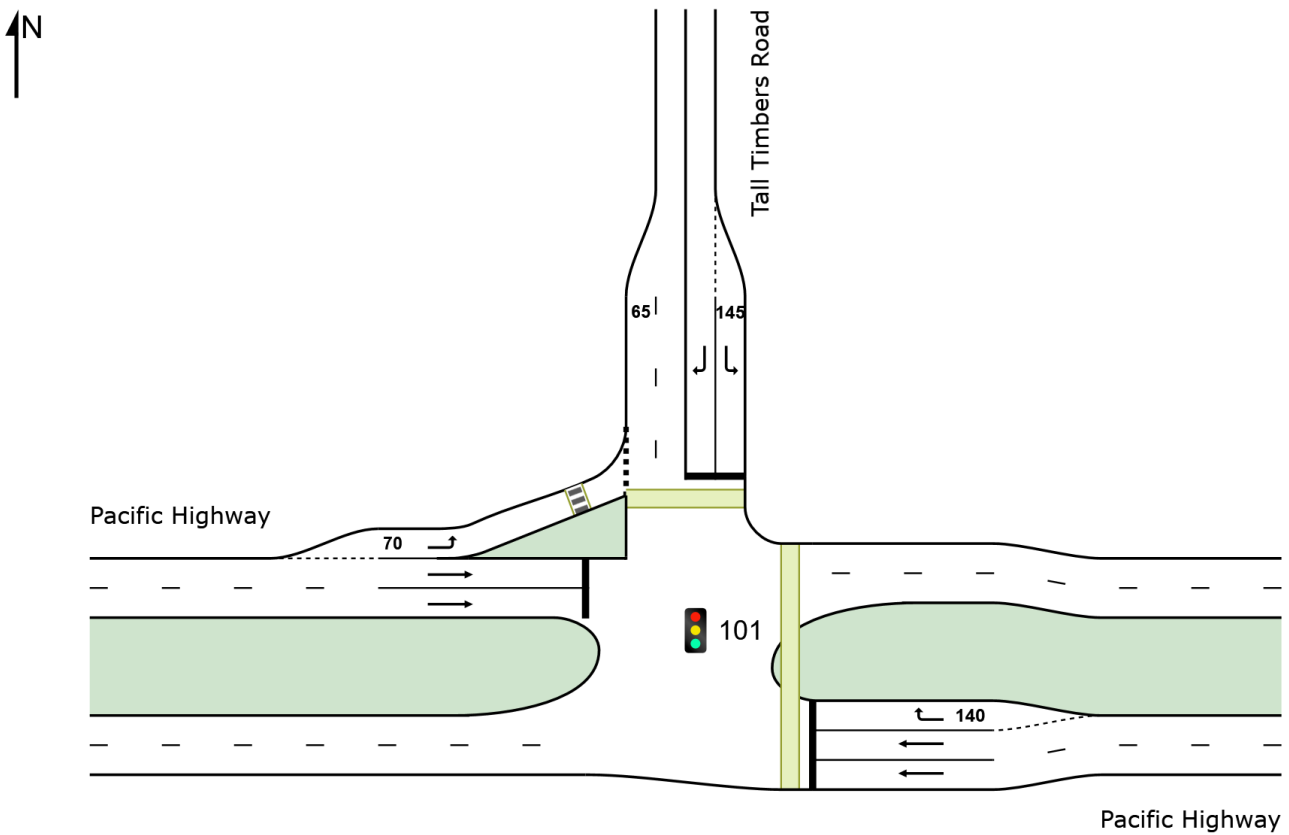
The Pacific Highway / Tall Timbers Road (50% Development Traffic)

SITE LAYOUT

Site: 101 [Pacific Hwy / Tall Timbers Road_2018 AM+DA+ Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timer Road
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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Project: C:\Users\robert\Documents\Lake Munmorah\Lake Munmorah SIDRA Ver 2 (1).sip9

MOVEMENT SUMMARY

Site: 101 [Pacific Hwy / Tall Timbers Road_2021 AM + DA (Site Folder: Base+ DA (50%))]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %				[Veh. veh]	[Dist] m				
East: Pacific Highway														
22	T1	1413	53	1487	3.8	0.698	8.9	LOS A	13.5	97.4	0.78	0.70	0.79	69.6
23	R2	137	6	144	4.4	* 0.372	21.8	LOS B	2.8	20.6	0.89	0.77	0.89	54.6
Approach		1550	59	1632	3.8	0.698	10.1	LOS A	13.5	97.4	0.79	0.71	0.80	67.3
North: Tall Timbers Road														
24	L2	101	4	106	4.0	0.134	14.7	LOS B	1.6	11.3	0.63	0.71	0.63	55.3
26	R2	265	7	279	2.6	* 0.765	29.8	LOS C	7.4	52.8	1.00	0.93	1.24	47.2
Approach		366	11	385	3.0	0.765	25.6	LOS B	7.4	52.8	0.90	0.87	1.07	49.3
West: Pacific Highway														
27	L2	134	5	141	3.7	0.113	8.8	LOS A	0.7	5.0	0.34	0.68	0.34	58.7
28	T1	883	57	929	6.5	* 0.776	20.2	LOS B	11.8	86.9	0.96	0.91	1.14	58.3
Approach		1017	62	1071	6.1	0.776	18.7	LOS B	11.8	86.9	0.88	0.88	1.04	58.4
All Vehicles		2933	132	3087	4.5	0.776	15.0	LOS B	13.5	97.4	0.83	0.79	0.91	61.0

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

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

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

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 [Pacific Hwy / Tall Timbers Road_2021 PM + DA (Site Folder: Base+ DA (50%))]

Pacific Hwy / Tall Timbers Road

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
East: Pacific Highway														
22	T1	881	40	927	4.5	0.367	4.7	LOS A	6.0	43.6	0.47	0.42	0.47	74.1
23	R2	234	1	246	0.4	* 0.590	27.6	LOS B	6.1	43.1	0.94	0.86	0.94	52.3
Approach		1115	41	1174	3.7	0.590	9.5	LOS A	6.1	43.6	0.57	0.51	0.57	66.4
North: Tall Timbers Road														
24	L2	92	2	97	2.2	0.138	18.7	LOS B	1.9	13.3	0.68	0.72	0.68	53.7
26	R2	203	1	214	0.5	* 0.866	41.5	LOS C	7.5	52.5	1.00	1.03	1.52	43.3
Approach		295	3	311	1.0	0.866	34.4	LOS C	7.5	52.5	0.90	0.94	1.26	46.3
West: Pacific Highway														
27	L2	396	7	417	1.8	0.349	9.9	LOS A	3.2	22.4	0.46	0.73	0.46	58.2
28	T1	1299	32	1367	2.5	* 0.869	26.3	LOS B	23.5	168.3	0.97	1.02	1.25	53.8
Approach		1695	39	1784	2.3	0.869	22.5	LOS B	23.5	168.3	0.85	0.95	1.06	55.0
All Vehicles		3105	83	3268	2.7	0.869	19.0	LOS B	23.5	168.3	0.76	0.79	0.91	57.5

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

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

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.

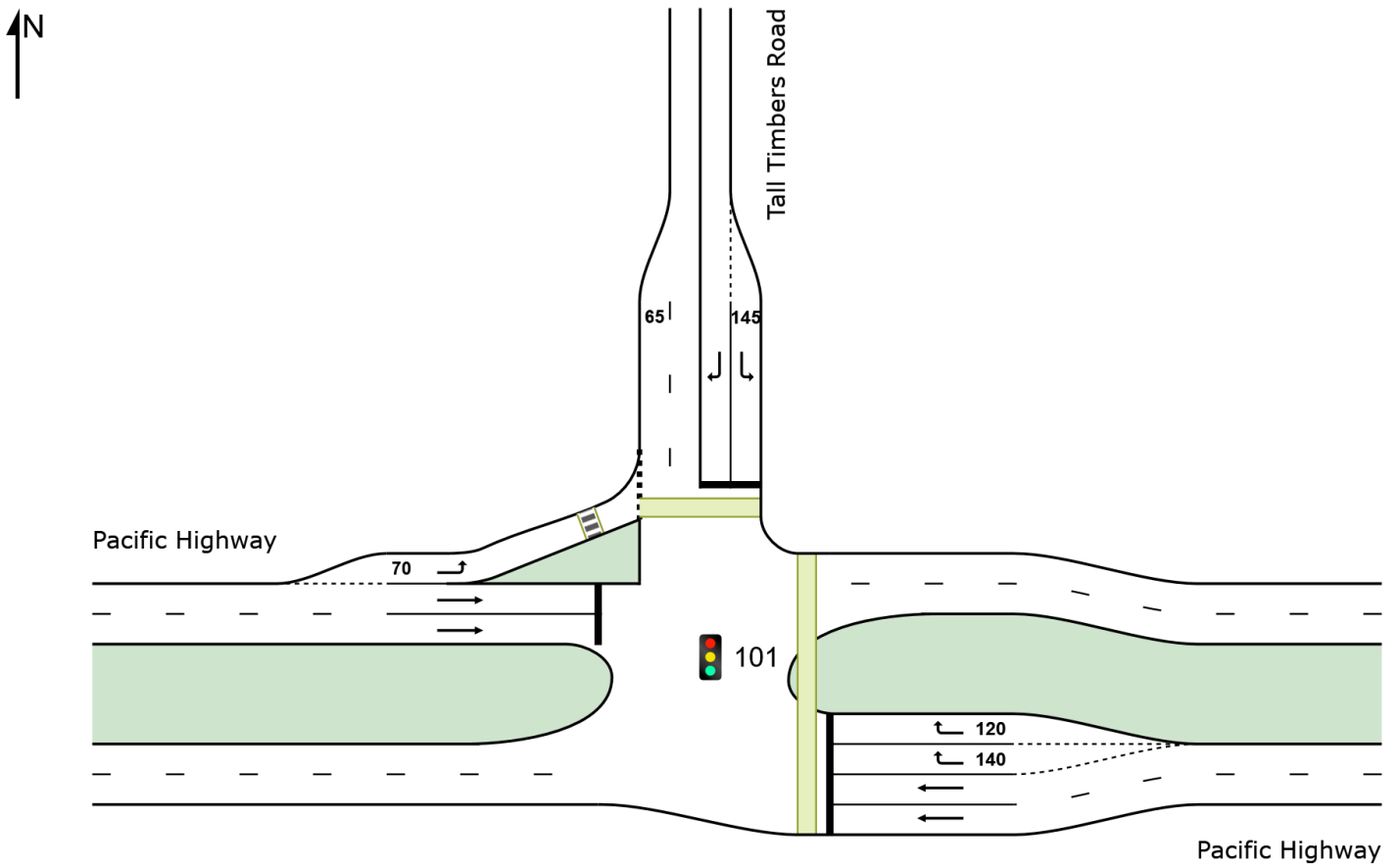
* Critical Movement (Signal Timing)

SITE LAYOUT

Site: 101 [Pacific Hwy / Tall Timbers Road_2028 AM + DA + Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timbers Road
Site Category: Future Design – 2 Right Turn Lanes
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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MOVEMENT SUMMARY

Site: 101 [Pacific Hwy / Tall Timbers Road_2028 AM+DA + Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timbers Road

Site Category: Future Design – 2 Right Turn Lanes

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %				[Veh. veh]	[Dist] m				
East: Pacific Highway														
22	T1	1555	59	1637	3.8	0.741	9.6	LOS A	15.8	114.4	0.79	0.74	0.84	68.9
23	R2	172	7	181	4.1	* 0.603	31.5	LOS C	3.4	24.3	0.98	0.79	1.05	50.7
Approach		1727	66	1818	3.8	0.741	11.8	LOS A	15.8	114.4	0.81	0.75	0.86	65.6
North: Tall Timbers Road														
24	L2	155	5	163	3.2	0.214	15.7	LOS B	2.6	18.6	0.67	0.74	0.67	54.9
26	R2	264	8	278	3.0	* 0.849	34.2	LOS C	8.1	58.1	1.00	1.03	1.47	45.5
Approach		419	13	441	3.1	0.849	27.3	LOS B	8.1	58.1	0.88	0.92	1.18	48.8
West: Pacific Highway														
27	L2	141	6	148	4.3	0.116	8.8	LOS A	0.7	5.4	0.34	0.68	0.34	58.7
28	T1	972	63	1023	6.5	* 0.804	20.8	LOS B	13.4	98.9	0.97	0.95	1.19	57.8
Approach		1113	69	1172	6.2	0.804	19.3	LOS B	13.4	98.9	0.89	0.91	1.08	57.9
All Vehicles		3259	148	3431	4.5	0.849	16.4	LOS B	15.8	114.4	0.85	0.83	0.98	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.

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)

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Project: C:\Users\robert\Documents\Lake Munmorah\Lake Munmorah SIDRA Ver 2 (1).sip9

MOVEMENT SUMMARY

Site: 101 [Pacific Hwy / Tall Timbers Road_2028 PM + DA + Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timbers Road

Site Category: Future Design – 2 Right Turn Lanes

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
East: Pacific Highway														
22	T1	970	44	1021	4.5	0.378	4.8	LOS A	7.8	56.4	0.42	0.38	0.42	74.0
23	R2	339	1	357	0.3	* 0.855	47.6	LOS D	11.4	80.2	0.98	0.90	1.23	45.4
Approach		1309	45	1378	3.4	0.855	15.9	LOS B	11.4	80.2	0.57	0.51	0.63	61.1
North: Tall Timbers Road														
24	L2	119	2	125	1.7	0.182	23.6	LOS B	3.3	23.3	0.71	0.74	0.71	51.7
26	R2	213	1	224	0.5	* 0.881	52.5	LOS D	10.3	72.5	1.00	1.02	1.46	39.9
Approach		332	3	349	0.9	0.881	42.2	LOS C	10.3	72.5	0.89	0.92	1.19	43.7
West: Pacific Highway														
27	L2	426	8	448	1.9	0.340	10.2	LOS A	5.0	35.8	0.40	0.72	0.40	58.0
28	T1	1430	36	1505	2.5	* 0.900	34.0	LOS C	37.6	268.7	0.94	1.01	1.20	49.1
Approach		1856	44	1954	2.4	0.900	28.6	LOS C	37.6	268.7	0.82	0.95	1.02	51.3
All Vehicles		3497	92	3681	2.6	0.900	25.1	LOS B	37.6	268.7	0.73	0.78	0.89	53.7

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.

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)

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MOVEMENT SUMMARY

Site: 101 [Pacific Hwy / Tall Timbers Road_2033 AM+DA + Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timbers Road

Site Category: Future Design – 2 Right Turn Lanes

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %				[Veh. veh]	[Dist] m				
East: Pacific Highway														
22	T1	1656	62	1743	3.7	0.789	11.8	LOS A	18.9	136.9	0.84	0.82	0.94	66.7
23	R2	181	7	191	3.9	* 0.634	31.7	LOS C	3.6	25.8	0.98	0.80	1.08	50.6
Approach		1837	69	1934	3.8	0.789	13.8	LOS A	18.9	136.9	0.85	0.82	0.95	64.0
North: Tall Timbers Road														
24	L2	162	5	171	3.1	0.223	15.8	LOS B	2.7	19.5	0.68	0.74	0.68	54.9
26	R2	277	9	292	3.2	* 0.892	37.8	LOS C	9.1	65.6	1.00	1.11	1.64	44.2
Approach		439	14	462	3.2	0.892	29.7	LOS C	9.1	65.6	0.88	0.97	1.29	47.9
West: Pacific Highway														
27	L2	148	6	156	4.1	0.122	8.8	LOS A	0.8	5.6	0.35	0.68	0.35	58.7
28	T1	1035	67	1089	6.5	* 0.856	24.5	LOS B	15.7	116.1	0.99	1.03	1.33	55.1
Approach		1183	73	1245	6.2	0.856	22.5	LOS B	15.7	116.1	0.91	0.98	1.21	55.6
All Vehicles		3459	156	3641	4.5	0.892	18.8	LOS B	18.9	136.9	0.88	0.89	1.08	58.2

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

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

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

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)

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MOVEMENT SUMMARY

Site: 101 [Pacific Hwy / Tall Timbers Road_2033 PM + DA + Kangaroo Ave LILO (Site Folder: Base+ DA (50%) + Kangaroo Ave LILO)]

Pacific Hwy / Tall Timbers Road

Site Category: Future Design – 2 Right Turn Lanes

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV] veh/h	[Total veh/h]	[HV] %				[Veh. veh]	[Dist] m				
East: Pacific Highway														
22	T1	1033	47	1087	4.5	0.385	5.3	LOS A	10.2	74.2	0.39	0.35	0.39	73.5
23	R2	356	1	375	0.3	* 0.891	63.6	LOS E	16.7	117.1	0.98	0.90	1.23	41.1
Approach		1389	48	1462	3.5	0.891	20.2	LOS B	16.7	117.1	0.54	0.49	0.60	58.2
North: Tall Timbers Road														
24	L2	125	2	132	1.6	0.197	31.2	LOS C	4.8	34.1	0.72	0.75	0.72	48.7
26	R2	225	1	237	0.4	* 0.880	66.3	LOS E	14.4	101.3	1.00	0.97	1.34	36.5
Approach		350	3	368	0.9	0.880	53.7	LOS D	14.4	101.3	0.90	0.89	1.12	40.3
West: Pacific Highway														
27	L2	435	9	458	2.1	0.337	10.8	LOS A	6.8	48.3	0.36	0.71	0.36	57.7
28	T1	1523	38	1603	2.5	* 0.904	37.4	LOS C	52.6	376.4	0.90	0.95	1.07	47.3
Approach		1958	47	2061	2.4	0.904	31.5	LOS C	52.6	376.4	0.78	0.89	0.91	49.7
All Vehicles		3697	98	3892	2.7	0.904	29.4	LOS C	52.6	376.4	0.70	0.74	0.82	51.4

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

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

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)

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Appendix C

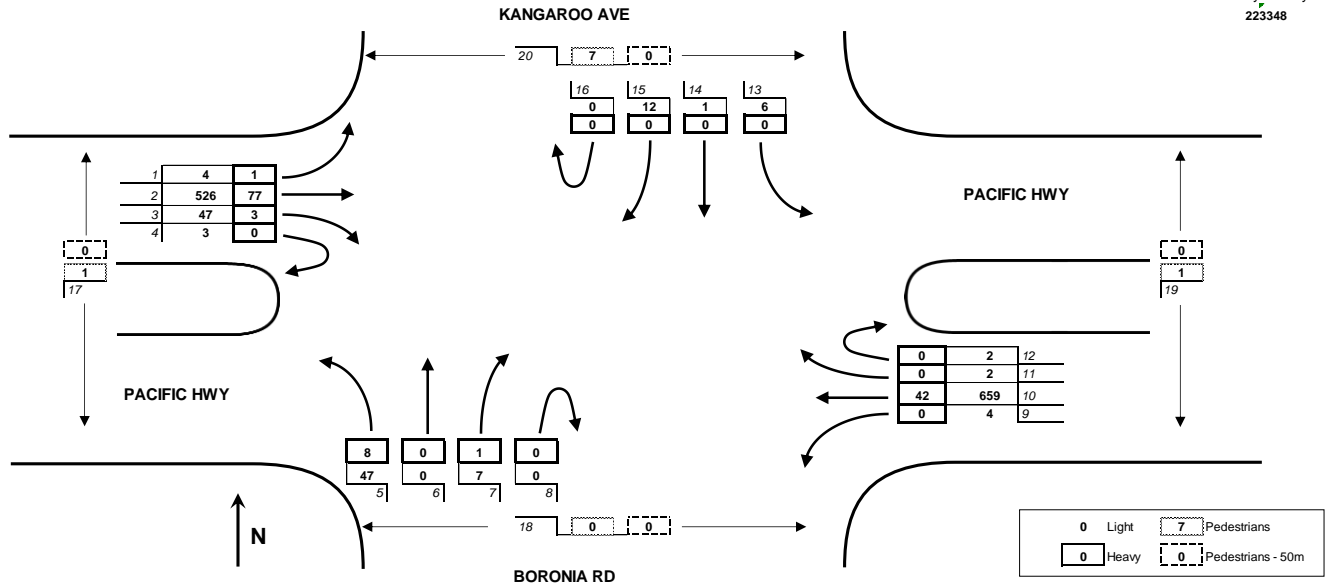
Traffic Survey Counts

5/8/2021 - KANGAROO AVE / PACIFIC HWY, LAKE MUNMORAH

8:15 <<< HOUR ENDING

Thursday

Summary: KANGAROO AVE / PACIFIC HWY	
1320	Total Light Vehicles
132	Total Heavy Vehicles
9	Total Pedestrians



5/8/2021 - KANGAROO AVE / PACIFIC HWY, LAKE MUNMORAH

Light Vehicles																Total Vehicles		Pedestrians				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	1 HOUR	17	18	19	20	
06:15	1	105	2	1	3	0	1	0	0	157	0	0	1	0	9	0	280		0	0	0	0
06:30	1	147	0	0	9	1	1	0	0	162	0	0	0	0	3	0	324		0	0	0	1
06:45	1	128	2	0	9	1	0	0	0	169	0	0	2	0	0	0	312		0	0	0	2
07:00	0	136	3	1	9	0	0	0	0	132	0	0	0	0	1	0	282	1198	0	0	0	0
07:15	0	110	9	2	11	0	1	0	4	135	0	0	2	0	2	0	276	1194	1	0	0	1
07:30	2	129	8	1	11	0	2	0	0	158	0	0	1	0	2	0	314	1184	0	0	0	0
07:45	0	132	11	1	12	0	2	0	0	176	0	0	1	1	3	0	339	1211	0	0	0	3
08:00	0	145	14	1	17	0	3	0	1	165	0	2	3	0	3	0	354	1283	1	0	1	0
08:15	2	120	14	0	7	0	0	0	3	160	2	0	1	0	4	0	313	1320	0	0	0	4
08:30	1	140	9	1	10	0	3	0	0	146	1	0	1	1	3	0	316	1322	0	0	0	0
08:45	0	112	13	1	12	0	0	0	2	158	1	0	0	1	2	0	302	1285	0	0	0	0
09:00	2	98	18	1	11	0	0	0	1	123	2	0	1	0	1	0	258	1189	0	0	0	0
Heavy Vehicles																Total Vehicles		Pedestrians - 50m				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	1 HOUR	17	18	19	20	
06:15	0	13	0	1	1	0	0	0	0	9	0	0	0	0	0	0	24		0	0	0	0
06:30	0	13	0	0	1	0	0	0	0	7	0	0	0	0	0	0	21		0	0	0	0
06:45	1	14	1	0	0	0	0	0	0	10	0	0	0	0	0	0	26		0	0	0	0
07:00	1	19	0	0	0	0	0	0	0	8	0	1	0	1	0	0	30	101	0	0	0	0
07:15	0	17	0	0	0	1	0	0	0	4	0	0	0	0	0	0	22	99	0	0	0	0
07:30	1	16	2	0	2	0	0	0	0	15	0	0	0	0	0	0	36	114	0	0	0	0
07:45	0	19	1	0	3	0	0	0	0	9	0	0	0	0	0	0	32	120	0	0	0	0
08:00	0	20	0	0	0	0	1	0	0	10	0	0	0	0	0	0	31	121	0	0	0	0
08:15	0	22	0	0	3	0	0	0	0	8	0	0	0	0	0	0	33	132	0	0	0	0
08:30	0	16	1	0	0	0	0	0	0	12	0	0	0	0	0	0	29	125	0	0	0	0
08:45	0	8	0	0	0	0	0	0	0	15	0	0	0	0	0	0	23	116	0	0	0	0
09:00	0	13	0	0	1	0	0	0	1	22	0	0	0	0	1	0	38	123	0	0	0	0
All Vehicles																Total Vehicles						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	1 HOUR					
06:15	1	118	2	2	4	0	1	0	0	166	0	0	1	0	9	0	304					
06:30	1	160	0	0	10	1	1	0	0	169	0	0	0	0	3	0	345					
06:45	2	142	3	0	9	1	0	0	0	179	0	0	2	0	0	0	338					
07:00	1	155	3	1	9	0	0	0	0	140	0	1	0	1	1	0	312	1299				
07:15	0	127	9	2	11	1	0	4	139	0	0	2	0	2	0	0	298	1293				
07:30	3	145	10	1	13	0	2	0	0	173	0	0	1	0	2	0	350	1298				
07:45	0	151	12	1	15	0	2	0	0	185	0	0	1	1	3	0	371	1331				
08:00	0	165	14	1	17	0	4	0	1	175	0	2	3	0	3	0	385	1404				
08:15	2	142	14	0	10	0	0	0	3	168	2	0	1	0	4	0	346	1452				
08:30	1	156	10	1	10	0	3	0	0	158	1	0	0	1	3	0	345	1447				
08:45	0	120	13	1	12	0	0	0	2	173	1	0	0	1	2	0	325	1401				
09:00	2	111	18	1	12	0	0	0	2	145	2	0	1	0	2	0	296	1312				

Note: Arrows "<" indicate the end time for the peak hour for each turning movement.

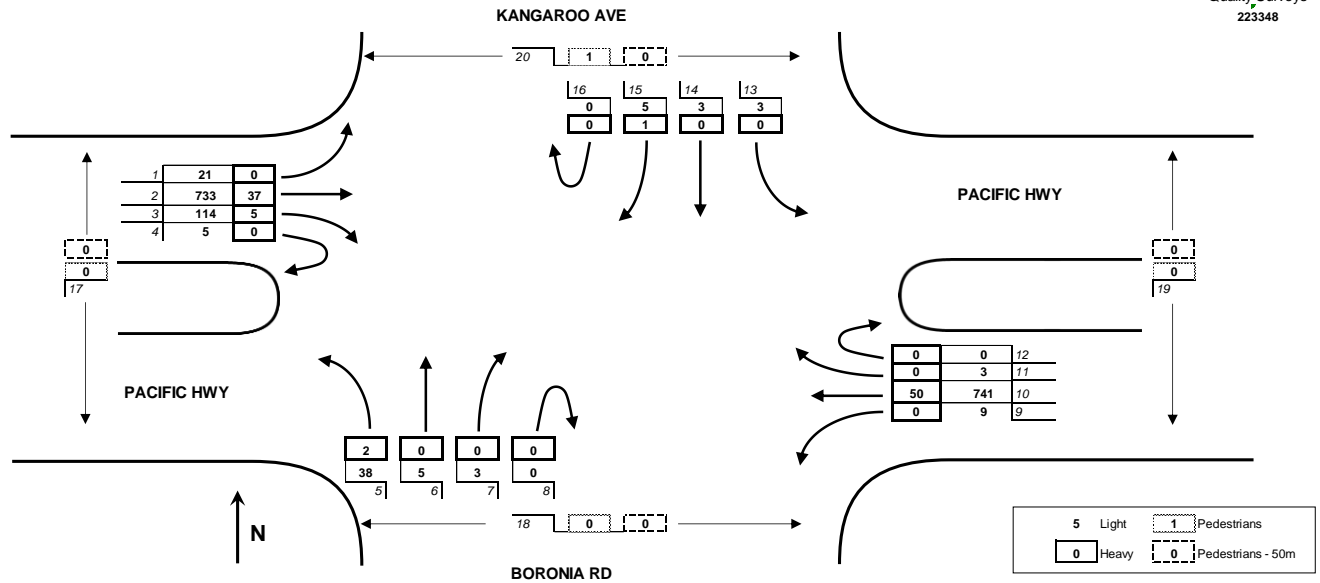
5/8/2021 - KANGAROO AVE / PACIFIC HWY, LAKE MUNMORAH

16:30 <<< HOUR ENDING

Thursday

Summary: KANGAROO AVE / PACIFIC HWY

1683 Total Light Vehicles
95 Total Heavy Vehicles
1 Total Pedestrians



5/8/2021 - KANGAROO AVE / PACIFIC HWY, LAKE MUNMORAH

Light Vehicles

	Light Vehicles																Total Vehicles		Pedestrians			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	HOURLY	17	18	19	20
15:15	2	178	24	1	9	0	0	0	1	168	0	0	0	0	1	0	384		0	0	0	1
15:30	4	200	25	1	6	1	0	0	3	171	1	1	1	0	0	0	414		0	0	0	0
15:45	5	191	19	0	10	1	1	0	2	204	1	0	2	3	3	0	442		0	0	0	0
16:00	7	187 <	27	3	10	1	0	0	2	165	1	0	1 <	0 <	0	0	404	1644	0	0	0	0
16:15	4	157	27	1	11	0	0	0	3 <	204 <	1	0	0 <	0 <	1	0	409	1669	0	0	0	1
16:30	5 <	198	41	1	7	3 <	2 <	0	2	168	0	0	0	0 <	1	0	428	1683 <	0	0	0	0
16:45	3	186	22	2 <	11 <	0	0	0	0	183	3	0	0	0	4	0	414	1655	0	0	0	3
17:00	2	175	30	1	9	0	0	0	1	158	0	0	2	0	2	0	380	1631	0	0	0	2 <
17:15	5	173	28 <	1	9	1	0	0	4	170	3 <	0	0	0	0	0	394	1616	0	0	0	1 <
17:30	4	159	34	1	9	0	1	0	1	156	0 <	0	1	1	3 <	0	370	1558	0	0	0	0 <
17:45	4	146	26	2	3	1	0	0	2	146	2	0	1 <	0	1	0	334	1478	1 <	0	0	1
18:00	1	110	20	0	4	0	0	0	2	121	1 <	2 <	1	0	2	0	264	1362	0 <	0	0	0

Heavy Vehicles

	Heavy Vehicles																Total Vehicles		Pedestrians - 50m			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	HOURLY	17	18	19	20
15:15	0	8	1	0	0	0	0	0	0	11	1	0	0	0	0	0	21		0	0	0	0
15:30	0	7	0	0	0	0	0	0	0	8	0	0	0	0	0	0	15		0	0	0	0
15:45	0	15	0	0	0	0	0	0	0	11	0	0	0	0	0	0	26		0	0	0	0
16:00	0	8	2	0	1	0	0	0	0	14	0 <	0	0	0	0	0	25	87	0	0	0	0
16:15	0	9 <	2	0	0	0	0	0	0	15	0	0	0	0	1 <	0	27	93	0	0	0	0
16:30	0	5	1 <	0	1 <	0	0	0	0	10 <	0	0	0	0	0 <	0	17	95 <	0	0	0	0
16:45	0	10	0 <	0	0 <	0	0	0	0	3	0	0	0	0	0 <	0	13	82	0	0	0	0
17:00	0	3	1	0	1 <	0	0	0	0	9	0	0	0	0	0 <	0	14	71	0	0	0	0
17:15	0	4	1	0	0 <	0	0	0	0	10	0	0	0	0	0	0	15	59	0	0	0	0
17:30	0	3	1	0	1 <	0	0	0	0	7	0	0	0	0	0	0	12	54	0	0	0	0
17:45	0	6	2 <	0	0 <	0	0	0	0	7	0	0	0	0	0	0	15	56	0	0	0	0
18:00	0	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7	49	0	0	0	0

All Vehicles

	All Vehicles																Total Vehicles		Pedestrians - 50m			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	15 MIN	HOURLY	17	18	19	20
15:15	2	186	25	1	9	0	0	0	1	179	1	0	0	0	1	0	405					
15:30	4	207	25	1	6	1	0	0	3	179	1	1	1	0	0	0	429					
15:45	5	206	19	0	10	1	1	0	2	215	1	0	2	3	3	0	468					
16:00	7	195 <	29	3	11	1	0	0	2	179	1	0	1 <	0 <	0	0	429	1731				
16:15	4	166	29	1	11	0	0	0	3 <	219 <	1	0	0 <	0 <	2	0	436	1762				
16:30	5 <	203	42	1	8	3 <	2 <	0	2	178	0	0	0	0 <	1	0	445	1778 <				
16:45	3	196	22	2 <	11 <	0	0	0	0	186	3	0	0	0	4	0	427	1737				
17:00	2	178	31 <	1	10	0	0	0	1	167	0	0	2	0	2 <	0	394	1702				
17:15	5	177	29 <	1	9	1	0	0	4	180	3 <	0	0	0	0	0	409	1675				
17:30	4	162	35	1	10	0	1	0	1	163	0 <	0	1	1	3 <	0	382	1612				
17:45	4	152	28	2	3	1	0	0	2	153	2	0	1 <	0	1	0	349	1534				
18:00	1	116	20	0	4	0	0	0	2	122	1 <	2 <	1	0	2	0	271	1411				

Note: Arrows "<" indicate the end time for the peak hour for each turning movement.