PRELIMINARY TRAFFIC ASSESSMENT

PLANNING PROPOSAL – RESIDENTIAL DEVELOPMENT

LOTS 1 & 2 IN DP 626787 AND LOTS 734 & 736 IN DP 755266
285 - 305 PACIFIC HIGHWAY, LAKE MUNMORAH

PREPARED FOR: EDH PTY LTD

FEBRUARY 2019

18/112

PRELIMINARY TRAFFIC ASSESSMENT
EDH PTY LTD

PLANNING PROPOSAL
RESIDENTIAL DEVELOPMENT
LOTS 1 & 2 IN DP 626787 AND LOTS 734 & 736 IN DP 755266
285 - 305 PACIFIC HIGHWAY, LAKE MUNMORAH.

Intersect Traffic Pty Ltd (ABN: 43 112 606 952)

Address:
Shop 7 Metford Shopping Village
Cnr Chelmsford Drive & Tennyson Street
Metford NSW 2323
PO Box 268
East Maitland NSW 2323

Contact:
(Ph) 02 4936 6200
(Mob) 0423 324 188
Email: jeff@intersecttraffic.com.au

QUALITY ASSURANCE

This document has been prepared, checked and released in accordance with the Quality Control Standards established by Intersect Traffic Pty Ltd.

Issue	Date	Description	By
A	26/11/18	Draft	PA
B	12/12/18	Edit	JG
D	07/02/19	Final Proof / Client Amendments	JG
E	26/02/19	Approved	JG

This document has been authorised by

Date 26th February 2019

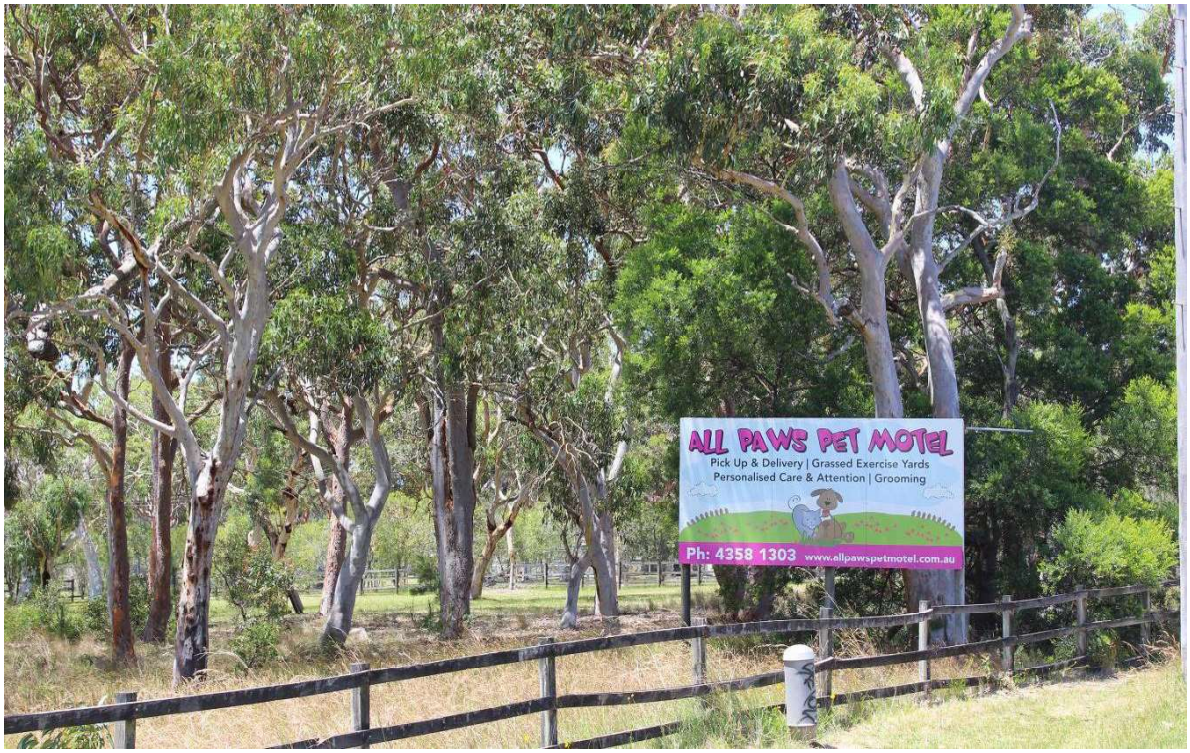
CONTENTS

ATTACHMENTS

FIGURES

PHOTOGRAPHS

TABLES



1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by EDH Pty Ltd to prepare a Preliminary Traffic Assessment for a planning proposal for a residential subdivision development on Lots 1 & 2 DP 626787 and Lots 437 & 438 DP 755266, 285 – 305 Pacific Highway, Lake Munmorah. 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 a small extension to Kookaburra Avenue. The main access to the Pacific Highway for traffic generated by the proposal will therefore be Tall Timbers Road and its signalised intersection with the Pacific Highway. Investigation of a future direct road connection may be investigated in the future following discussions with NSW Roads and Maritime Services (NSW RMS) though is not included in the current proposal. The proposed concept development plan is shown in ***Attachment A***.

This report is required to support a planning proposal to Central Council as the consent authority for the rezoning of the subject land for low density residential development. It will allow the Council and NSW Roads and Maritime Services (RMS) to assess the proposal in regard to its traffic impacts on the local and state road network.

This report presents the findings of the traffic assessment and includes the following;

1. An outline of the existing situation in the vicinity of the site.
2. An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
3. Determines any triggers for the provision of additional infrastructure.
4. Reviews parking, public transport, pedestrian and cycle way requirements for the proposed development, including assessment against Council's DCP and Australian Standard requirements.
5. Presentation of conclusions and recommendations.

2.0 SITE DESCRIPTION

The subject site is located on the western side of the Pacific Highway, Lake Munmorah. The centre of the site is approximately 1.4 kilometres north of Doyalson North, 4.3 kilometres north of Doyalson, 5.6 kilometres north of the Motorway Link and is approximately 10 kilometres from the popular Lake Haven shopping centre. Locally Lake Munmorah shopping centres, recreation facilities and schools are all within 1 kilometre of the site. Lake Macquarie foreshore and the ocean foreshore are within 5 kilometres of the development site.

A boarding kennel, 3 rural residential dwellings, demountable buildings and associated structures are currently located on the site. Environmental conservation and management land and local centre land (partially developed) adjoin the development's southern border, a developed urban residential area and transition land containing rural properties adjoin its northern boundary, with public recreation land adjoining the western border of the property and the Pacific Highway and a rural property adjoining its eastern boundaries. ***Figure 1*** below shows the site location from a local context.

The site contains the following property descriptors:

- Lots 1 & 2 DP 626787 and Lots 437 & 438 DP 755266;
- Postal address of 285 – 305 Pacific Highway, Lake Munmorah;
- Site area of approximately 23.2 ha; and
- Land zoning of RU6 – Transition pursuant to the Wyong LEP (2013).

There are four vehicular accesses to the site at the Pacific Highway, constructed as rural access crossings to each of the four lots making up the development site. ***Photograph 1*** shows some of the existing conditions at the site while ***Photograph 2*** shows one of the existing vehicular access at the Pacific Highway.

Figure 1 – Site Location

Photograph 1 – Development site from the Pacific Highway

Photograph 2 – Site structures and one of the existing vehicular accesses to the site

3.0 EXISTING ROAD NETWORK

3.1 Pacific Highway

The Pacific Highway being part of the state highway network is classified as an arterial road under a functional road classification and as such is under the care and control of NSW RMS. The Pacific Highway is a major transport route and connects the southern suburbs of Newcastle and Lake Macquarie with the Central Coast.

In the vicinity of the site it is a median separated (dual carriageway) four lane two-way road with each carriageway having a sealed width of approximately 12.5 metres. Lane widths are approximately 3.7 metres with break down / shoulder sealed widths of 4.0 metres (approx.) adjacent to the inside lane and 0.3 to 1.0 metre (approx.) adjacent to the outside lane. The northbound carriageway adjacent to the site fronts existing or proposed to be predominately urban areas of land and would be classified as an urban style road.

U-turn facilities are provided for access from the north to the southbound carriageways and vica 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. ***Photograph 3*** below shows the standard of the Pacific Highway near the site whilst ***Photograph 4*** shows the Pacific Highway mid island U-Turn facility opposite Colongra Bay Road.

At the time of inspection, the Pacific Highway was in good condition and an 80 km/h speed zone applied in this location.

Photograph 3 – The Pacific Highway south of the development site

Photograph 4 – Mid-island U-turn facility opposite Colongra Bay Road

3.2 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 60 km/h speed zoning and is under the care and control of Central Coast Council.

Generally, it is a two lane two way sealed urban road with kerb and gutter though additional turning and merge lanes are provided at its signalised intersection with the Pacific Highway. Lane widths are in the order of 3 to 3.5 metres wide and at the time of inspection Tall Timbers Road was observed to be in good condition.

3.2 Kangaroo Road

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

It is a two lane two way sealed urban road with some kerb and gutter and it connects to the Pacific Highway as give way-controlled intersection which operates as an urban seagull due to the storage capacity within the Pacific Highway median which allows 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 and at the time of inspection Kangaroo Road was observed to be in good to fair condition.

4.0 ROAD NETWORK IMPROVEMENTS

No proposed road network improvements are known in the vicinity of the site that would increase the capacity of the road network. However, design plans are currently being prepared by Central Coast Council for a shared concrete pathway along the frontage of this development, duplicating the existing shared pathway on the eastern side of the Pacific Highway. Other upgrading works as part of Central Coast Council's and NSW RMS forward works programs may occur in the future.

5.0 TRAFFIC VOLUMES

To determine existing traffic volumes on the road network, Intersect Traffic engaged Northern Transport Planning and Engineering (NTPE) to undertake traffic counts to determine the daily and likely AM and PM peak hour periods traffic via:

- Manual intersection counts at location A - the Pacific Highway / Tall Timbers Road Signalised T-intersection during AM and PM peak hours, and
- A traffic classifier for a week at location B - on the Pacific Highway adjacent to the development.

The manual counts undertaken during the AM period on the 25th October 2018 and the PM period on the 24th October 2018 determined the likely peak hour periods to be 7.30am to 8.30am and 4.00pm to 5.00pm respectively.

The traffic counter counts undertaken during the week from 12am on Monday 22nd October 2018 to 12 pm Sunday 28th October 2018 determined the likely AM and PM peak hour periods to be 8.00am to 9.00am and 3.00pm to 4.00pm respectively. Whilst the highest reading for the AM period occurred between 11.00am and 12.00pm once on a Friday, on average the AM peak was 8.00am to 9.00am. The maximum AM peak hour traffic volume that occurred on the Friday will be used as the 8.00am to 9.00am peak value for this assessment as it is less than 5% greater than the highest 8.00am to 9.00am value recorded during the week.

Likewise, whilst the highest reading for the PM period occurred at 2.00pm to the 3.00pm once on a Friday, consistently the 3.00pm to 4.00pm peak period had the highest hourly peak traffic average. Again, the maximum PM peak hour traffic volume that occurred on the Friday will be used as the 3.00pm to 4.00am peak value for this assessment as it is less than 1% greater than the highest 3.00pm to 4.00pm value recorded during the week. The manual count sheets for both these locations are provided in ***Attachment B***.

The 2018 peak hour traffic count figures have been increased by 1.5% per annum for 10 years to estimate likely peak hour traffic volumes in 2028 and similarly for another 5 years to estimate the likely peak traffic volumes in 2033. The existing 2018 and projected 2028 and 2033 peak hour traffic volumes for these count locations will be adopted within this report for the road network capacity assessment are as shown below in ***Table 1***. The traffic counts are presented as the one-way north or south bound Pacific Highway carriageways and the two-way Tall Timbers Road carriageway.

Table 1 – Intersect Traffic Peak Hour Data - Intersections A and B

Location	Road	2018 AM peak (vtph)	2018 PM peak (vtph)	2028 AM peak (vtph)	2028 PM peak (vtph)	2033 AM peak (vtph)	2033 PM peak (vtph)
A	Pacific Highway west leg	2457	2529	2851	2935	3072	3162
A	Pacific Highway east leg	2425	2398	2814	2783	3032	2998
A	Tall Timbers Road	488	755	566	876	610	944
B	Pacific Highway westbound	1354	1122	1571	1302	1693	1403
B	Pacific Highway eastbound	991	1548	1150	1797	1239	1935

Comparing the traffic figures presented in the above table for the Pacific Highway - southbound at locations A and B and the Pacific Highway - northbound at locations A and B shows they correlate very well with a maximum % difference between the two values being 10% and 4% respectively which is within the usual normal daily and hourly range experienced considering the counts were on different days and at different locations on the Pacific Highway.

Further data collection at other local roads or intersections as necessary can be carried as part of a traffic impact assessment for the proposal during the development application process should the project progress to that stage.

6.0 ROAD CAPACITY

The capacity of urban roads is generally determined by the capacity of intersections. However, Tables 4.3 & 4.4 of the RTA's *Guide to Traffic Generating Developments* provides some guidance on mid-block capacities for urban roads and likely levels of service. These tables are reproduced below.

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

Source: - RTA's Guide to Traffic Generating Developments (2002).

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. From Table 4.4 above a LoS E for one way one lane of flow occurs when mid-block traffic volumes exceed 2,800 vtph. Therefore, the one way one lane mid-block traffic volume threshold for a LoS D is 2,800 vtph. This means the one way two lane mid-block traffic volume threshold for a LoS D for either of the two-lane northbound or southbound carriageways of the Pacific Highway is 2,800 vtph. Therefore, it is considered that the two Pacific Highway carriageways in the vicinity of the site as one-way two-lane roads each have a one-way mid-block road capacity of 2,800 vtph.

Similarly, from Table 4.4, a LoS C on one lane of traffic flow is exceeded when mid-block traffic volumes exceed the LoS D of 900 vtph. Therefore, for a two-way two lane flow the LoS C mid-block traffic volumes threshold is 1,800 vtph. This means the two-way two-lane mid-block traffic volume threshold for a LoS C for Tall Timbers Road is 1,800 vtph.

From the traffic data sourced and calculated in ***Section 5*** and noting the likely technical two-way mid-block road capacities of the Pacific Highway and Tall Timbers Road are well in excess of the 2018 or predicted 2028 traffic volumes on the road network it is considered that the adjacent road network is operating within its technical capacity and has scope to cater for additional traffic generated by the new development.

7.0 ALTERNATE TRANSPORT MODES

Busways Central Coast operates public transport (bus) services to 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 the most frequent bus route services being 30 to 60-minute intervals in the morning and evening peak hours on weekdays and infrequently on Saturdays, Sundays and Public Holidays. The public transport (bus) services provide transport to various nearby local suburbs and railway stations as well as to other bus service routes for bus and train travel to destinations further afield. Busways also operate school bus services adjacent to and past the existing site, catering for the needs of the residential communities.

The nearest northbound bus stop is located on the Pacific Highway fronting the development and the nearest southbound bus stops are approximately 300 metres north and 300 metres south of the site. The local bus route map (extract) is provided below in ***Figure 2*** and the northbound bus stop is shown in ***Photograph 5*** below.

Figure 2 – Local Bus Routes

Photograph 5 – Bus Stop - Pacific Highway at the northern end of the site

A 2.5-metre-wide off-road concrete shared pathway on the west side of the Pacific Highway commences 20 metres north of the site as shown in ***Photograph 5*** above and extends approximately 1 kilometre to Elizabeth Bay Drive where a shared path overpass exists facilitating the safe crossing of the busy Pacific Highway for pedestrians and cyclists. The off-road pathway also commences on the east side of the Pacific Highway opposite the northern end of the site from a shared pathway at Colongra Bay Road and extends southbound for the full length of the site and continues further south adjoining shared pathways at Tall Timbers Road and Saliena Avenue. On-road cycleways are marked within the sealed shoulder / parking / breakdown lane on the near sides of the north and southbound carriageways on the Pacific Highway north and south of the development. Pedestrians and cyclists may also utilise the signalised and marked pedestrian crossing at the Pacific Highway / Tall Timbers Road Signalised T-intersection 300 metres south of the southern end of the development site. The cycleway on the eastern side of the Pacific Highway and the signalised pedestrian crossing of the Pacific Highway at its intersection with Tall Timbers Road are shown in ***Photographs 6 and 7***, respectively, below.

Photograph 6 – Off-road cycle / pedestrian path on the Pacific Highway opposite the site

Photograph 7 – Signalised pedestrian crossing south of the site.

8.0 DEVELOPMENT PROPOSAL

The planning proposal involves the rezoning of land titled Lots 1 & 2 DP 626787 and Lots 437 & 438 DP 755266, 285 – 305 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 a small extension to Kookaburra Avenue. The main access to the Pacific Highway for traffic generated by the proposal will therefore be Tall Timbers Road and its signalised intersection with the Pacific Highway. Investigation of a future direct road connection may be investigated in the future following discussions with NSW Roads and Maritime Services (NSW RMS) though is not included in the current proposal. The proposed concept development plan is shown in ***Attachment A***.

For Gateway determination it will be assumed all traffic generated by the site will use Chisholm Avenue, Tall Timbers Road and the Pacific Highway for trip making purposes and the development could be designed to meet this criteria. Post Gateway determination the Pacific Highway connections via Kangaroo Avenue and a possible direct connection to the Pacific Highway will be assessed once more detailed lot layout plans are available and following further discussions with NSW RMS. At that stage further detail may also be available about a possible link road between Tall Timbers Road and Carter's Road north of the site currently being considered by Central Coast Council. Connection to this proposed link road would also result in redistribution of the traffic flows to and from the site and reduce the impact of the development on Pacific Highway / Tall Timbers Road intersection.

All new internal roads, connections and other roadside infrastructure would be constructed to the requirements of Central Coast Council as per the Wyong Council DCP (2013) and engineering documentation. Detailed assessment of road upgrading requirements would also need to be further reviewed post Gateway determination as more detailed lot layout plans are developed.

9.0 TRAFFIC GENERATION

The RTA's *Guide to Traffic Generating Development's* provides specific advice on the traffic generation potential of various land uses. However, the RMS has released a Technical Direction (TDT 2013/4) releasing the results of updated traffic surveys and as a result amended land use traffic generation rates. In regard to 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 above rates do **not** include trips made internal to the subdivision, which may add up to an additional 25 %).*

Adopting a maximum rate approach for regional areas the following additional development traffic from the proposed planning proposal can be calculated (rounded up)

- *Daily vehicle trips* — *300 x 7.4 =* ***2,220 vtpd***
- *AM weekday peak hour* — *300 x 0.85 =* ***255 vtph***
- *PM weekday peak hour* — *300 x 0.9 =* ***270 vtph***

10.0 TRIP DISTRIBUTION

Before carrying out any traffic assessment the peak hour traffic generated by the development needs to be distributed through the adjoining road network. This involves making a number of assumptions as to distribution patterns to and from the development. In distributing the generated peak hour traffic through the adjacent road network, the following assumptions have been made for this site based on the traffic data collected for this report.

- In the AM peak 20% of traffic will enter the site and 80% will exit the site.
- In the PM peak 70% of traffic will enter the site and 30% will exit the site.
- All traffic entering and exiting the site will utilise Tall Timbers Road and Chisholm Avenue.
- At Tall Timbers Road traffic will be split with 50 % having an origin / destination to the west and 50 % having an origin / destination to the east.
- These assumptions will result in the trip distributions shown in ***Figure 3*** for the relevant traffic movements.

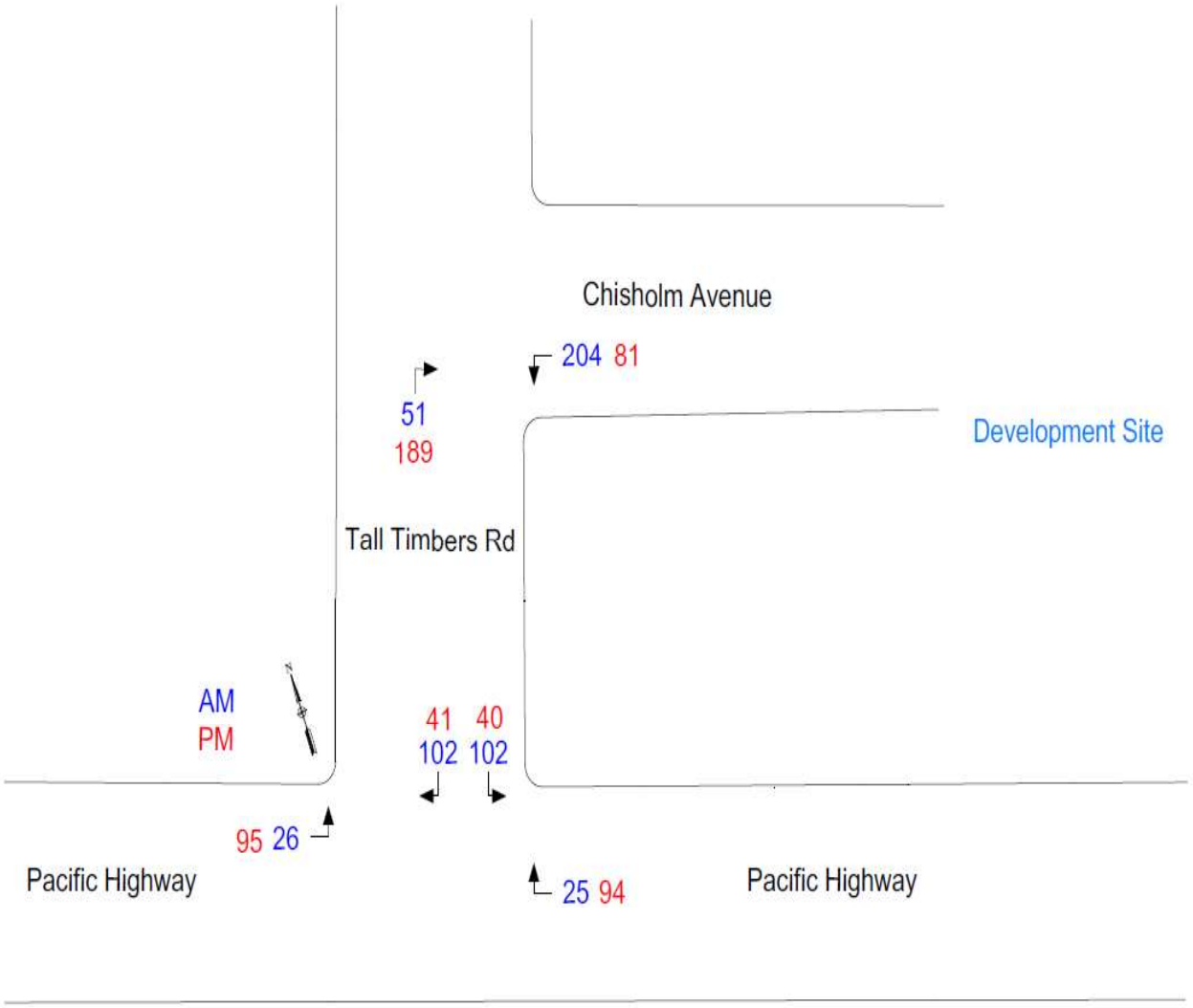


Figure 3 – Development Trip Distribution

11.0 TRAFFIC IMPACTS OF DEVELOPMENT

11.1 Road Network Capacity

It has previously been shown in ***Section 6*** of this report that the local road network is currently operating well within its technical mid-block capacity.

The proposed planning proposal is likely to generate the following additional traffic on the local road network based on the trip distributions shown in ***Figure 3***;

- The Pacific Highway east of Tall Timbers Road – 127 vtph in the AM peak and 134 vtph in the PM peak.
- The Pacific Highway west of Tall Timbers Road – 128 vtph in the AM peak and 136 vtph in the PM peak.
- Tall Timbers Road and Chisolm Avenue – 255 vtph in the AM peak and 270 vtph in the PM peak.

The addition of this traffic onto the 2018 traffic volumes determined in ***Section 5*** will not result in the capacity thresholds for the local and state road network determined in ***Section 6*** to be reached. Even considering the predicted 2028 and 2033 peak hour traffic volumes, these road capacity thresholds are not reached. This is demonstrated in ***Table 2*** below.

Table 2 - Road Capacity Assessment – post development

Location	Road	Capacity (vtph)	2018 AM peak (vtph)	2018 PM peak (vtph)	2028 AM peak (vtph)	2028 PM peak (vtph)	2033 AM peak (vtph)	2033 PM peak (vtph)	Development Traffic	
									AM (vtph)	PM (vtph)
A	Pacific Highway west leg	5600	2585	2665	2979	2935	3200	3298	128	136
A	Pacific Highway east leg	5600	2552	2532	2941	2783	3159	3132	127	134
A	Tall Timbers Road	1800	743	1025	821	876	865	1214	255	270
B	Pacific Highway westbound	2800	1379	1216	1596	1302	1718	1497	25	94
B	Pacific Highway eastbound	2800	1093	1588	1252	1797	1341	1975	102	40

Therefore, in analysing the assessment shown in ***Table 3*** above it can be concluded that the arterial and local road network has sufficient spare capacity to cater for the additional traffic generated by the proposed planning proposal.

It is noted that all roads within the planning proposal will need to be constructed in accordance with Central Coast Council's DCP requirements and some upgrading to existing roads may also be required particularly in terms of compliance for safety. These road safety issues and road standard issues will be further investigated should the planning proposal proceed past Gateway determination.

11.2 Intersection Capacity

In assessing intersection performance, the main intersection of concern will be:

- Pacific Highway / Tall Timbers Road Signalised T-intersection, and

As traffic data has not yet been collected for the Pacific Highway / Kangaroo Road / Boronia Road 4-way cross intersection it will be assumed in this preliminary assessment that the development will be designed such that all vehicular access to the site will be via Tall Timbers Road to the Pacific Highway. If the project proceeds beyond Gateway determination and a more detailed lot layout plan is provided the split of traffic volumes between the Tall Timbers Road route to the

Pacific Highway and the Kangaroo Avenue route to the Pacific Highway can be determined, current traffic volumes at the Pacific Highway / Kangaroo Avenue intersection collected and a detailed analysis of the intersection can be undertaken for the planning proposal application.

The impacts of the development on the Pacific Highway / Tall Timbers Road Signalised T-intersection are best assessed using the SIDRA intersection modelling software. This software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of the RMS shown below.

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

Source: - RTA's Guide to Traffic Generating Developments (2002).

Assumptions made in this modelling were:

- The intersection layout will remain as per current conditions.
- Traffic volumes used in the modelling were collected by NTPE for Intersect Traffic on 22nd October 2018 to 28th October 2018.
- 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 3.***

The results of the modelling are summarised in ***Table 3*** below showing the 'all vehicles' summary results. The Sidra Movement Summary Tables are provided in ***Attachment C***.

Table 3 – The Pacific Highway / Tall Timbers Road T Intersection – Sidra Modelling – Results Summary

Model Scenario	Degree of Saturation (v/c)	Average Delay (s)	Average LoS	95% back of Queue Length (cars)
2018 AM + development	0.900	30.6	C	32.1
2018 PM + development	0.911	34.1	C	40.1
2028AM + development	0.913	38.2	C	55.1
2028 PM + development	1.001	53.2	D	69.8
2033AM + development	0.957	46.4	D	68.0
2033 PM + development	1.016	68.2	E	98.4

This modelling shows that the Pacific Highway / Tall Timbers Road intersection operates satisfactorily in 2018 during both the AM and PM peak periods even with development traffic and would continue to do so in 2028 and 2023 post development. The average delays, LoS and 95 % back of queue lengths for the intersection remain at acceptable levels based on the RMS

assessment criteria listed above. However, in the PM peak the intersection is reaching capacity in 2028 through to 2033. In terms of the right turn lane on the Pacific Highway it is noted this is currently 140 metres long while the modelling indicates 95 % back of queue lengths in 2028 and 2033 may reach 220 metres and 280 metres respectively. This indicates that in the later stages of the development this right turn lane may need to be extended depending on the actual traffic generation from the site and rate of development. The intersection would therefore not require upgrading in the early stages of development and the need for upgrading can be monitored through revised traffic assessments prior to each stage of the development.

It is also considered that a direct connection to the site from the Pacific Highway as a left in and left out only intersection and connection to Kangaroo Avenue would relieve the Pacific Highway / Tall Timbers Road intersection to the point that it would continue to operate within capacity beyond 2033. This will be investigated should the development proceed beyond Gateway determination. Any proposed link road from Tall Timbers Road to Carter's Road as currently being considered by Central Coast Council would also allow a redistribution of traffic from the site that would further improve the performance of the Pacific Highway / Tall Timbers Road intersection beyond 2033.

Overall, it is concluded that the planning proposal will not adversely impact on the local and state road network with the only likely upgrade being an extension to the right turn lane on the Pacific Highway at the Pacific Highway / Tall Timbers Road intersection in the later stages of the development. However further assessment of this intersection and the Pacific Highway / Kangaroo Road / Boronia Road 4-way cross intersection post Gateway determination when more detailed lot layouts are available will review this requirement. Further intersection analysis on the proposed new external local road network connections to the subdivision will also be carried out should the proposal proceed beyond Gateway determination with more detailed subdivision and staging plans however based on this preliminary analysis it is considered that the existing local and state road network could cater for the proposed development.

11.3 On-site car parking

On-site car parking in accordance with Central Coast Council as per Wyong Council DCP 2013 needs to be provided within the planning proposal. This will be assessed in detail in future development applications for development on the individual allotments within the site however it is reasonable to conclude that as lot sizes will be equal to or greater than the minimum lot size required by Central Coast Council it is considered that a dwelling with suitable covered and uncovered parking can be provided in accordance with the Wyong Council DCP 2013.

12.0 PEDESTRIAN & CYCLE FACILITIES

The planning proposal will generate pedestrian and bicycle traffic therefore a nexus would exist to provide additional facilities. As stated in ***Section 7*** a shared concrete pedestrian path / cycleway is proposed along the full frontage of the proposed development. Internal pedestrian pathways on the newly created public roads would need to be provided to Central Coast Council subdivision requirements contained in the Council's relevant DCP.

13.0 PUBLIC TRANSPORT FACILITIES

The proposed development is likely to generate additional public transport usage of the existing service to the area. However, it is noted that approximately 40% of the new residential lots will be less than 400 metres away from the existing bus services using the Pacific Highway. As the development proceeds alterations to bus routes and the provision of infrastructure would need to be considered in line with demand for public and school services. Therefore, it is considered that the bus service routes could possibly need to alter in the future if the development proceeds.

It is however noted that the perimeter road within the proposed residential subdivision is shown as 8 metres in width while other road widths are 6.5 metres. Wyong Council's DCP requires a minimum 9 metre carriageway width if any of these roads are for minor bus routes. The various street reserve, carriageway and verge widths for the range of road types within Wyong Council DCP 13 are presented in the Table of Appendix B of the Subdivision section of the DCP. These road widths would need to be accommodated within future subdivision designs should the proposal progress further in the rezoning process. Further consultation with the provider of the local bus services i.e. Busways and NSW Transport would also be required to determine likely future bus routes, stops and facilities should a future development application be lodged for the subdivision proposal.

14.0 CONCLUSIONS

This preliminary traffic impact assessment for a planning proposal for residential development on Lots 1 & 2 DP 626787 and Lots 437 & 438 DP 755266, 285 – 305 Pacific Highway, Lake Munmorah has concluded:

- The planning proposal when fully developed is likely to generate an additional 2,220 vtpd; as well as 255 vtph during the AM peak and 270 vtph during the PM peak traffic periods.
- The local and state road network currently has sufficient spare capacity to cater for the traffic generated by this development without adversely impacting on current levels of service experienced by motorists on the local road network.
- Sidra modelling of the Pacific Highway / Tall Timbers Road Signalised T-intersection has shown that the intersection with development traffic in 2018, 2028 and 2033 operates with satisfactory average delays, LoS and 95 % back of queue lengths though capacity is reached by 2033. In terms of the right turn lane on the Pacific Highway it is noted this is currently 140 metres long while the modelling indicates 95 % back of queue lengths in 2028 and 2033 may reach 220 metres and 280 metres respectively. This indicates that in the later stages of the development this right turn lane may need to be extended depending on the actual traffic generation from the site and rate of development. The intersection would therefore not require upgrading in the early stages of development and the need for upgrading can be monitored through revised traffic assessments prior to each stage of the development.
- That a direct connection to the site from the Pacific Highway as a left in and left out only intersection and connection to Kangaroo Avenue would relieve the Pacific Highway / Tall Timbers Road intersection to the point that it would continue to operate within capacity beyond 2033. This will be investigated should the development proceed beyond Gateway determination. Any proposed link road from Tall Timbers Road to Carter's Road as currently being considered by Central Coast Council would also allow a redistribution of traffic from the site that would further improve the performance of the Pacific Highway / Tall Timbers Road intersection beyond 2033.
- The proposal will not adversely impact on the local and state road network Further intersection analysis on the proposed new external local road network connections to the subdivision will be carried out should the proposal proceed beyond Gateway determination with more detailed subdivision and staging plans.
- The proposed new lots within the planning proposal being equal to or greater than the minimum lot sizes required by Council are considered large enough to accommodate the car parking requirements of Central Coast Council, the Wyong Council DCP 2013.
- The proposed subdivision will generate pedestrian and cycle traffic therefore a nexus would exist to provide additional facilities. However, a shared pathway for the full frontage of the development is proposed to be constructed by the Central Coast Council. Internal facilities within the subdivision will be constructed to Central Coast Council's requirements.
- The site is likely to generate increased usage for the existing public transport services however the site could be serviced via the existing bus routes. The need for the bus routes to be diverted through the new development will need to be the subject of future consultation with Central Coast Council, Transport NSW and Busways should the planning proposal proceed to development application stage. Some of the internal subdivision roads may need to be constructed to cater for buses and suitable bus stops and shelters provided.

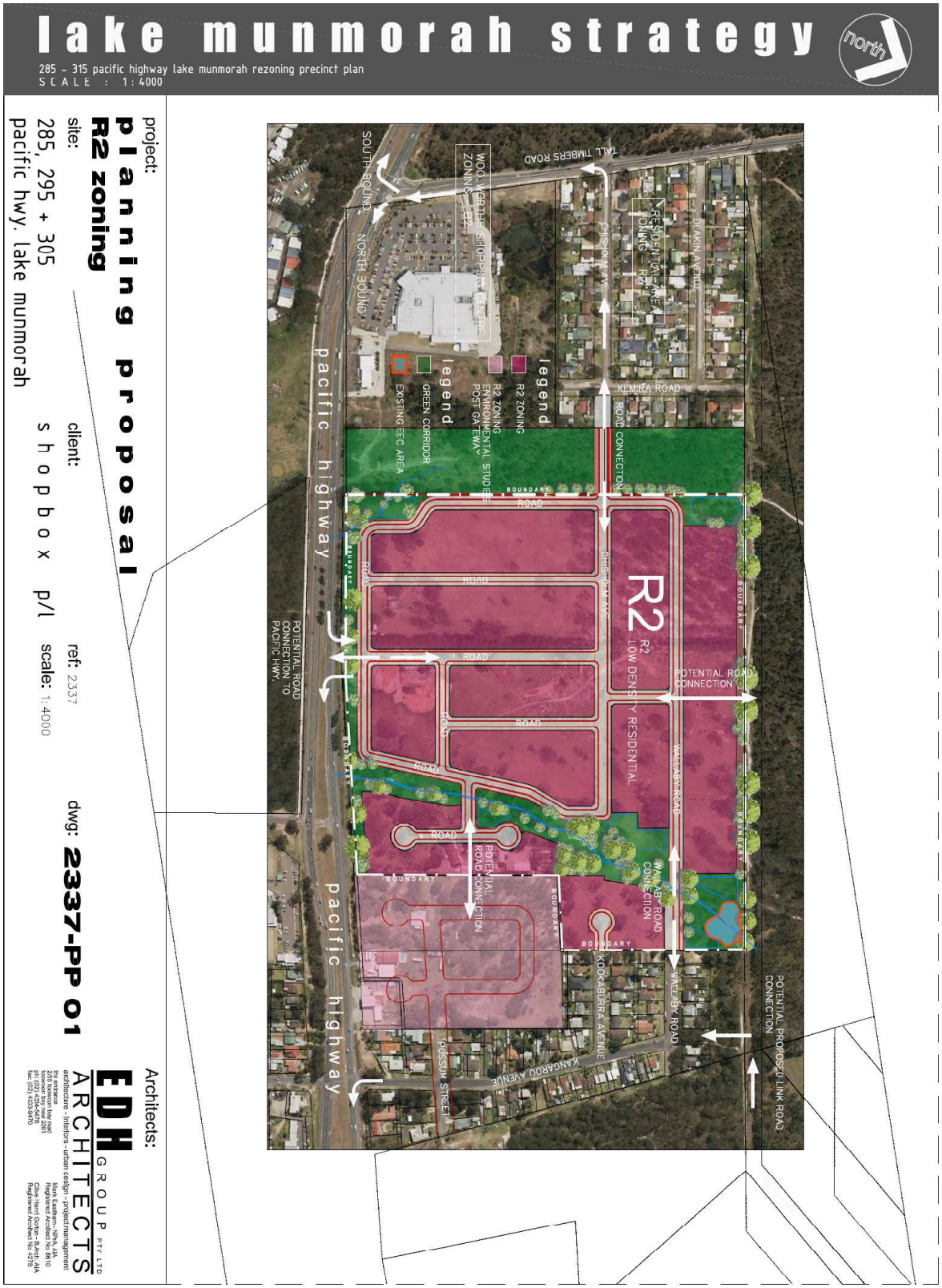
15.0 RECOMMENDATION

Having carried out this preliminary traffic impact assessment for the planning proposal for a residential development on Lots 1 & 2 DP 626787 and Lots 437 & 438 DP 755266, 285 – 305 Pacific Highway, Lake Munmorah yielding approximately 300 residential lots it is recommended that the proposal can be supported from a traffic impact perspective as it can be designed such that it will not adversely impact on the local and state road network and could comply with all relevant Central Coast Council, Austroads, and NSW Roads and Maritime Services (RMS) requirements.

JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

ATTACHMENT A
Development Plans


lake munmorah strategy
285 - 315 pacific highway lake munmorah rezoning precinct plan
SCALE : 1:4000
north
project:
planning proposal
concept precinct layout
site:
285, 295 + 305
pacific hwy. lake munmorah
client:
shopbox p/l
ref: 2337
scale: 1:4000
dwg: 2337-PP 02
Architects:
EDH GROUP PTY LTD
ARCHITECTS
legend
STAGE 1
STAGE 2
STAGE 3
STAGE 4
GREEN CORRIDOR
WATER QUALITY / OSD AREA
RETAINED EEC AREA
R2
R2 LOW DENSITY RESIDENTIAL
pacific highway
TALL TIMBERS ROAD
KEMIRA ROAD
CHISHOLM AVE
WALLABY ROAD
KOOKABURRA AVENUE
KANGAROO AVENUE
POSSUM STREET
DEAKIN AVENUE
POTENTIAL ROAD CONNECTION
POTENTIAL ROAD CONNECTION TO PACIFIC HWY.
PUBLIC CYCLEWAY
POTENTIAL PROPOSED LINK ROAD CONNECTION
ROAD CONNECTION
WALLABY ROAD CONNECTION
BOUNDARY
ROAD
SOUTH BOUND
NORTH BOUND
WOOLWORTHS SHOPPING CENTRE ZONING B2
RESIDENTIAL AREA ZONING R2


lake munmorah strategy
285 - 315 pacific highway lake munmorah rezoning precinct plan
SCALE : 1:4000
north
project:
planning proposal
R2 zoning
site:
285, 295 + 305
pacific hwy. lake munmorah
client:
shopbox p/l
ref: 2337
scale: 1:4000
dwg: 2337-PP 01
Architects:
EDH GROUP PTY LTD
ARCHITECTS
architecture - interiors - urban design - project management
TALL TIMBERS ROAD
SOUTH BOUND
NORTH BOUND
WOOLWORTHS SHOPPING CENTRE ZONING - B2
RESIDENTIAL AREA ZONING - R2
CHISHOLM AVE
DEAKIN AVENUE
KEMIRA ROAD
ROAD CONNECTION
legend
R2 ZONING
R2 ZONING ENVIRONMENTAL STUDIES POST GATEWAY
GREEN CORRIDOR
EXISTING EEC AREA
pacific highway
R2
R2 LOW DENSITY RESIDENTIAL
POTENTIAL ROAD CONNECTION
POTENTIAL ROAD CONNECTION TO PACIFIC HWY.
WALLABY ROAD
WALLABY ROAD CONNECTION
KOOKABURRA AVENUE
KANGAROO AVENUE
POSSUM STREET
POTENTIAL PROPOSED LINK ROAD CONNECTION
BOUNDARY
ROAD

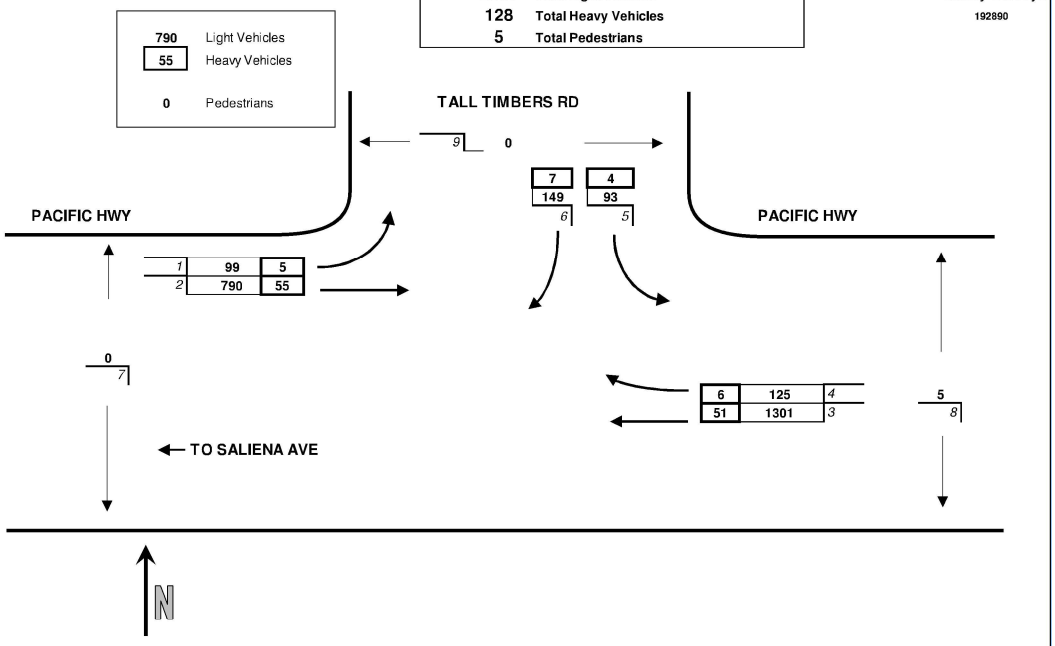
ATTACHMENT B
Traffic Count Data

25/10/2018 - PACIFIC HWY / TALL TIMBERS RD, LAKE MUNMORAH

8:30 <<< HOUR ENDING Thursday

Quality Surveys
192890

Summary:	PACIFIC HWY / TALL TIMBERS RD
2557	Total Light Vehicles
128	Total Heavy Vehicles
5	Total Pedestrians



25/10/2018 - PACIFIC HWY / TALL TIMBERS RD, LAKE MUNMORAH

	Light Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR		Pedestrians 7	8	9
06:15	9	86	247	3	7	33	385		0	0	0
06:30	4	137	268	5	6	24	444		0	0	0
06:45	6	105	246	4	5	18	384		0	2	0
07:00	9	145	203	10	13	22	402	1615	0	4	0
07:15	21	152	233	11	8	26	451	1681	0	1	0
07:30	19	164	274	15	12	25	509	1746	0	1 <	0
07:45	24	208	299	24	22	36	613	1975	0	1	0
08:00	22	174	370	28	28	36	658	2231	0	1	0
08:15	25	226	339	37	22	35	684	2464	0	2	0
08:30	28	182 <	293 <	36	21	42	602	2557 <	0	1	0
08:45	25	179	288	40	23 <	40	595	2539	0	0	0
09:00	24 <	135	204	44 <	24	43 <	474	2355	0	2	0

	Heavy Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR	
06:15	1	14	9	0	1	1	26	
06:30	0	19	20	1	0	1	41	
06:45	0	13	9	0	0	5	27	
07:00	1	19	6	1	1	1 <	29	123
07:15	2	15	12	1	1	1 <	32	129
07:30	0	20	8	4	2	0	34	122
07:45	0	18 <	11	3 <	0	3	35	130
08:00	2	12	14	0	1	0	29	130
08:15	0	13	14	2 <	2 <	2	33	131 <
08:30	3	12	12 <	1	1	2	31	128
08:45	1 <	11	8	2	0	1	23	116
09:00	0	12	13	1	1	2	29	116

	All Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR	
06:15	10	100	256	3	8	34	411	
06:30	4	156	288	6	6	25	485	
06:45	6	118	255	4	5	23	411	
07:00	10	164	209	11	14	23	431	1738
07:15	23	167	245	12	9	27	483	1810
07:30	19	184	282	19	14	25	543	1868
07:45	24	226	310	27	22	39	648	2105
08:00	24	186	384	28	29	36	687	2361
08:15	25	239	353	39	24	37	717	2595
08:30	31	194 <	305 <	37	22	44	633	2685 <
08:45	26 <	190	296	42	23 <	41	618	2655
09:00	24 <	147	217	45 <	25	45 <	503	2471

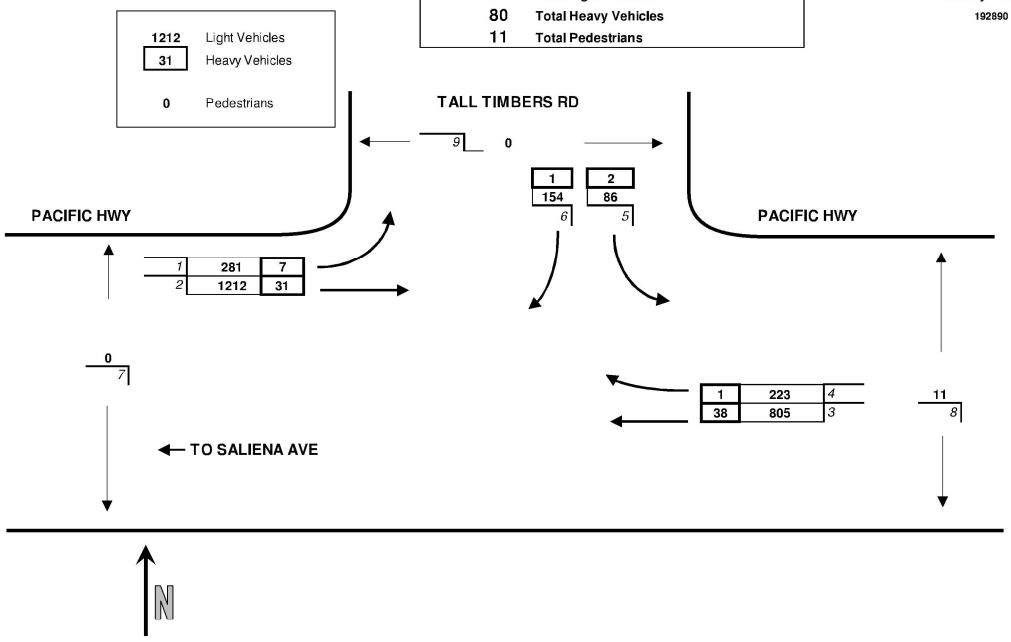
Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

24/10/2018 - PACIFIC HWY / TALL TIMBERS RD, LAKE MUNMORAH

17:00 <<< HOUR ENDING **Wednesday**

Summary:	PACIFIC HWY / TALL TIMBERS RD
2761	Total Light Vehicles
80	Total Heavy Vehicles
11	Total Pedestrians

Quality Surveys
192890



24/10/2018 - PACIFIC HWY / TALL TIMBERS RD, LAKE MUNMORAH

	Light Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR		Pedestrians 7	8	9
15:15	62	225	202	60	17	38	604		0	0	0
15:30	64	237	229	44	20	39	633		0	0	0
15:45	78	279	224	45	22	41	689		0	0	0
16:00	64	247	225	45	12	42	635	2561	0	6	0
16:15	62	303	211 <	43	23	36	678	2635	0	4	0
16:30	79	330	200	58	15	36	718	2720	0	2	0
16:45	77	268	185	53	25	31	639	2670	0	2 <	0
17:00	63	311 <	209	69	23	51	726	2761 <	0	3	0
17:15	65 <	293	187	47 <	25	35	652	2735	0	2	0
17:30	79 <	294	156	32	18 <	46	625	2642	0	0	0
17:45	64	289	194	51	22	33 <	653	2656	0	1	0
18:00	51	288	162	38	26 <	22	587	2517	0	0	0

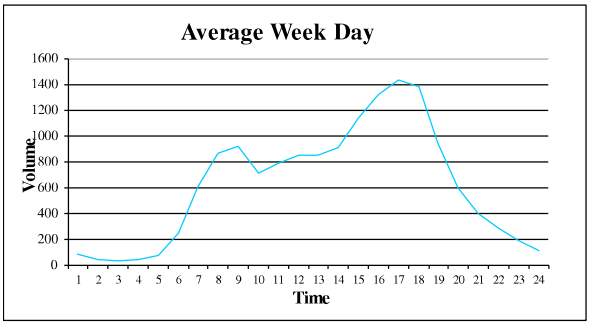
	Heavy Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR	
15:15	1	7	10	1	1	0	20	
15:30	0	8	17	1	1	2	29	
15:45	0	10	10	1	0	0	21	
16:00	2	10	11	1 <	2 <	1	27	97
16:15	4	9	14 <	0	1 <	0	28	105 <
16:30	1 <	9 <	13	0	0	0	23	99
16:45	0 <	6	4	0	1 <	1	12	90
17:00	2 <	7	7	1	0	0	17	80
17:15	1	7	7	1	0	0	16	68
17:30	0	7	4	1	0	2	14	59
17:45	3	4	12	0	0	2	21	68
18:00	1	8	9	1	1	1 <	21	72

	All Vehicles 1	2	3	4	5	6	Total Vehicles 15 MIN HOUR	
15:15	63	232	212	61	18	38	624	
15:30	64	245	246	45	21	41	662	
15:45	78	289	234	46	22	41	710	
16:00	66	257	236	46	14	43	662	2658
16:15	66	312	225 <	43	24	36	706	2740
16:30	80 <	339	213	58	15	36	741	2819
16:45	77	274	189	53	26	32	651	2760
17:00	65	318 <	216	70	23	51	743	2841 <
17:15	66	300	194	48 <	25	35	668	2803
17:30	79	301	160	33	18 <	48	639	2701
17:45	67	293	206	51	22	35 <	674	2724
18:00	52	296	171	39	27 <	23	608	2589

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

Site 1 285 Pacific HWY [80] **Eastbound**

Day	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*	*W/Day*	*W/End*	*7 Day*
Time	22/10/18	23-10-18	24-10-18	25-10-18	26-10-18	27-10-18	28-10-18	*Ave.*	*Ave.*	*Ave*
0:00	44	87	76	79	122	107	131	82	119	92
1:00	19	33	30	38	55	60	69	35	65	43
2:00	32	23	32	20	29	36	55	27	46	32
3:00	30	44	38	49	41	36	25	40	31	38
4:00	75	73	70	75	73	72	46	73	59	69
5:00	258	269	238	249	224	133	68	248	101	206
6:00	575	638	630	567	613	254	125	605	190	486
7:00	865	861	868	878	860	451	215	866	333	714
8:00	851	937	934	915	946	579	380	917	480	792
9:00	670	742	704	671	747	872	594	707	733	714
10:00	762	803	776	771	805	1089	774	783	932	826
11:00	791	848	768	852	991	1221	1023	850	1122	928
12:00	808	864	807	857	906	1129	986	848	1058	908
13:00	867	879	842	908	1068	1019	953	913	986	934
14:00	1018	1148	1129	1089	1302	1045	878	1137	962	1087
15:00	1253	1309	1267	1368	1369	1076	969	1313	1023	1230
16:00	1470	1397	1491	1548	1235	968	917	1428	943	1289
17:00	1373	1332	1445	1314	1443	924	827	1381	876	1237
18:00	809	864	935	971	1132	728	576	942	652	859
19:00	538	510	618	643	651	498	441	592	470	557
20:00	350	339	335	432	535	383	303	398	343	382
21:00	245	275	224	306	368	316	192	284	254	275
22:00	138	147	172	231	228	223	141	183	182	183
23:00	81	105	96	133	136	177	83	110	130	116
Total	**13922**	**14527**	**14525**	**14964**	**15879**	**13396**	**10771**	**14763**	**12084**	**13998**

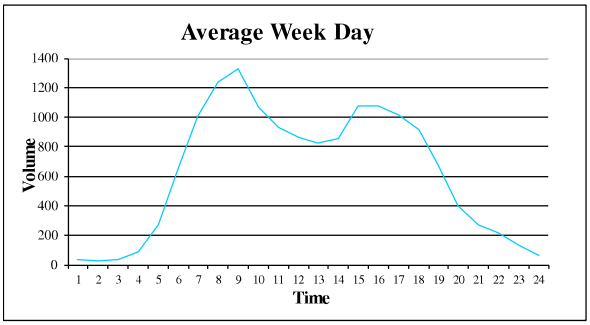


Summary

	from	to	
AM Peak	11:00 AM	12:00 PM	**991**
PM Peak	4:00 PM	5:00 PM	**1548**
		Week Day Average	**14763**
		Weekend Day Average	**12084**
		7 Day Average	**13998**

Site 1 285 Pacific HWY [80] **Westbound**

Day	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*	*W/Day*	*W/End*	*7 Day*
Time	22/10/18	23-10-18	24-10-18	25-10-18	26-10-18	27-10-18	28-10-18	*Ave.*	*Ave.*	*Ave*
0:00	28	37	45	41	38	105	141	38	123	62
1:00	27	29	27	25	37	36	54	29	45	34
2:00	32	29	29	38	42	28	46	34	37	35
3:00	81	89	92	95	89	42	48	89	45	77
4:00	288	267	265	279	248	120	69	269	95	219
5:00	681	653	663	683	624	248	125	661	187	525
6:00	998	1058	1043	1018	919	424	250	1007	337	816
7:00	1174	1250	1226	1293	1243	614	377	1237	496	1025
8:00	1313	1337	1334	1313	1354	864	657	1330	761	1167
9:00	1020	1080	1031	1077	1122	1073	936	1066	1005	1048
10:00	932	909	962	891	966	1163	1152	932	1158	996
11:00	898	834	856	827	905	1043	1169	864	1106	933
12:00	807	806	826	828	865	949	1056	826	1003	877
13:00	828	910	760	866	902	1011	924	853	968	886
14:00	1003	1083	1094	1068	1122	999	1026	1074	1013	1056
15:00	1042	1086	1118	1044	1108	973	892	1080	933	1038
16:00	993	1013	1030	981	1072	918	869	1018	894	982
17:00	818	935	893	1012	929	831	749	917	790	881
18:00	631	690	682	718	696	637	462	683	550	645
19:00	404	382	365	443	422	395	308	403	352	388
20:00	282	220	274	275	312	316	222	273	269	272
21:00	183	197	195	247	262	259	165	217	212	215
22:00	110	117	106	154	170	214	101	131	158	139
23:00	46	44	45	72	98	192	30	61	111	75
Total	**14619**	**15055**	**14961**	**15288**	**15545**	**13454**	**11828**	**15094**	**12641**	**14393**



Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**1354**
PM Peak	2:00 PM	3:00 PM	**1122**
		Week Day Average	**15094**
		Weekend Day Average	**12641**
		7 Day Average	**14393**

ATTACHMENT C

Sidra Summary Tables

MOVEMENT SUMMARY

Site: 101 [2018AM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 77 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	137	4.8	0.101	8.8	LOS A	0.9	6.6	0.27	0.67	0.27	53.9
2	T1	892	6.5	0.573	18.7	LOS B	13.0	95.7	0.82	0.72	0.82	56.7
Approach		1028	6.3	0.573	17.4	LOS B	13.0	95.7	0.75	0.71	0.75	56.3
North: Pacific Highway												
8	T1	1423	3.8	0.900	36.1	LOS C	32.1	231.9	1.00	1.07	1.28	44.6
9	R2	164	4.6	0.879	53.8	LOS D	7.3	53.2	1.00	0.97	1.53	32.1
Approach		1587	3.9	0.900	37.9	LOS C	32.1	231.9	1.00	1.06	1.31	42.9
West: Tall Timbers Road												
10	L2	209	4.1	0.426	29.9	LOS C	6.6	47.9	0.87	0.79	0.87	38.9
12	R2	272	4.5	0.894	38.0	LOS C	9.3	67.4	1.00	1.06	1.54	35.8
Approach		481	4.3	0.894	34.5	LOS C	9.3	67.4	0.94	0.94	1.25	37.1
All Vehicles		3097	4.7	0.900	30.6	LOS C	32.1	231.9	0.91	0.93	1.11	45.4

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	5	32.7	LOS D	0.0	0.0	0.92	0.92
P4	West Full Crossing	1	18.9	LOS B	0.0	0.0	0.70	0.70
All Pedestrians		6	30.4	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 10:51:04 AM
Project: Not Saved

MOVEMENT SUMMARY

Site: 101 [2018PM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 98 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	403	2.4	0.318	11.6	LOS A	6.2	44.5	0.41	0.71	0.41	51.8
2	T1	1308	2.5	0.900	40.9	LOS C	40.1	286.8	0.94	1.00	1.18	42.1
Approach		1712	2.5	0.900	34.0	LOS C	40.1	286.8	0.82	0.93	1.00	44.1
North: Pacific Highway												
8	T1	887	4.5	0.546	22.4	LOS B	15.8	114.8	0.80	0.70	0.80	53.6
9	R2	335	0.4	0.886	59.6	LOS E	18.5	129.9	1.00	0.96	1.32	30.6
Approach		1222	3.4	0.886	32.6	LOS C	18.5	129.9	0.85	0.77	0.94	44.4
West: Tall Timbers Road												
10	L2	135	2.3	0.226	30.4	LOS C	4.7	33.4	0.77	0.75	0.77	38.9
12	R2	206	0.6	0.911	46.6	LOS D	8.3	58.2	1.00	1.05	1.56	33.4
Approach		341	1.3	0.911	40.2	LOS C	8.3	58.2	0.91	0.93	1.25	35.4
All Vehicles		3275	2.7	0.911	34.1	LOS C	40.1	286.8	0.84	0.87	1.00	43.1

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	12	43.2	LOS E	0.0	0.0	0.94	0.94
P4	West Full Crossing	1	21.6	LOS C	0.0	0.0	0.66	0.66
All Pedestrians		13	41.4	LOS E			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 11:02:14 AM
Project: Not Saved

MOVEMENT SUMMARY

Site: 101 [2028AM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	154	4.8	0.107	9.2	LOS A	1.5	11.2	0.23	0.66	0.23	53.7
2	T1	1025	6.5	0.580	22.7	LOS B	21.9	162.1	0.75	0.67	0.75	53.4
Approach		1179	6.3	0.580	21.0	LOS B	21.9	162.1	0.69	0.67	0.69	53.4
North: Pacific Highway												
8	T1	1637	3.8	0.913	44.3	LOS D	55.1	398.4	0.97	1.01	1.14	40.6
9	R2	185	4.6	0.883	75.1	LOS F	12.3	89.6	1.00	0.93	1.36	27.1
Approach		1822	3.9	0.913	47.4	LOS D	55.1	398.4	0.97	1.01	1.16	38.6
West: Tall Timbers Road												
10	L2	225	4.1	0.405	39.9	LOS C	10.4	75.5	0.84	0.79	0.84	35.2
12	R2	306	4.5	0.888	48.4	LOS D	15.8	114.5	1.00	0.97	1.29	32.5
Approach		532	4.3	0.888	44.8	LOS D	15.8	114.5	0.93	0.90	1.10	33.6
All Vehicles		3533	4.7	0.913	38.2	LOS C	55.1	398.4	0.87	0.88	0.99	41.5

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	20.4	LOS C	0.0	0.0	0.58	0.58
All Pedestrians		6	48.5	LOS E			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 10:53:49 AM
Project: Not Saved

MOVEMENT SUMMARY

Site: 101 [2028PM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	448	2.4	0.352	13.2	LOS A	9.2	65.7	0.43	0.72	0.43	50.7
2	T1	1504	2.5	0.971	68.2	LOS E	69.8	498.9	0.93	1.12	1.31	32.1
Approach		1953	2.5	0.971	55.6	LOS D	69.8	498.9	0.82	1.03	1.11	35.0
North: Pacific Highway												
8	T1	1020	4.5	0.567	24.1	LOS B	21.2	154.2	0.77	0.69	0.77	52.4
9	R2	371	0.4	1.001	106.3	LOS F	31.6	221.8	1.00	1.07	1.64	22.0
Approach		1391	3.4	1.001	46.0	LOS D	31.6	221.8	0.83	0.79	1.00	38.3
West: Tall Timbers Road												
10	L2	148	2.3	0.263	38.1	LOS C	6.5	46.5	0.80	0.76	0.80	36.0
12	R2	231	0.6	0.998	87.1	LOS F	14.3	100.7	1.00	1.23	1.88	24.4
Approach		379	1.3	0.998	67.9	LOS E	14.3	100.7	0.92	1.04	1.45	27.9
All Vehicles		3722	2.7	1.001	53.2	LOS D	69.8	498.9	0.83	0.94	1.10	35.2

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	12	54.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	21.6	LOS C	0.0	0.0	0.60	0.60
All Pedestrians		13	51.5	LOS E			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 11:05:59 AM
Project: Not Saved

MOVEMENT SUMMARY

Site: 101 [2033AM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	161	4.8	0.114	9.2	LOS A	1.6	11.9	0.23	0.66	0.23	53.6
2	T1	1092	6.5	0.611	22.5	LOS B	23.8	176.0	0.76	0.68	0.76	53.5
Approach		1253	6.3	0.611	20.8	LOS B	23.8	176.0	0.69	0.68	0.69	53.5
North: Pacific Highway												
8	T1	1743	3.8	0.957	58.9	LOS E	68.0	491.5	0.98	1.12	1.27	34.9
9	R2	195	4.6	0.928	82.4	LOS F	13.8	100.1	1.00	0.98	1.49	25.7
Approach		1938	3.9	0.957	61.3	LOS E	68.0	491.5	0.98	1.11	1.29	33.7
West: Tall Timbers Road												
10	L2	233	4.1	0.455	42.8	LOS D	11.2	81.4	0.87	0.80	0.87	34.2
12	R2	308	4.5	0.935	59.7	LOS E	17.6	127.8	1.00	1.06	1.46	29.5
Approach		541	4.3	0.935	52.4	LOS D	17.6	127.8	0.95	0.95	1.21	31.4
All Vehicles		3732	4.7	0.957	46.4	LOS D	68.0	491.5	0.88	0.94	1.08	38.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	5	54.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	19.8	LOS B	0.0	0.0	0.58	0.58
All Pedestrians		6	48.4	LOS E			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 10:58:52 AM
Project: Not Saved

MOVEMENT SUMMARY

Site: 101 [2033PM + DEV]

Pacific Highway / Tall Timbers Road Signalised T-intersection
Residential Planing Proposal Lake Munmorrah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Pacific Highway												
1	L2	469	2.4	0.364	14.5	LOS B	12.1	86.5	0.42	0.72	0.42	49.8
2	T1	1603	2.5	1.003	95.5	LOS F	98.4	703.9	1.00	1.22	1.39	25.8
Approach		2073	2.5	1.003	77.2	LOS F	98.4	703.9	0.87	1.11	1.17	29.0
North: Pacific Highway												
8	T1	1087	4.5	0.574	27.8	LOS B	27.4	199.1	0.76	0.68	0.76	49.7
9	R2	387	0.4	1.012	126.3	LOS F	40.2	282.5	1.00	1.05	1.56	19.5
Approach		1475	3.4	1.012	53.7	LOS D	40.2	282.5	0.82	0.78	0.97	35.4
West: Tall Timbers Road												
10	L2	156	2.3	0.291	48.2	LOS D	8.7	62.3	0.82	0.77	0.82	32.7
12	R2	251	0.6	1.016	91.4	LOS F	19.4	136.2	1.00	1.12	1.64	18.7
Approach		406	1.3	1.016	74.9	LOS F	19.4	136.2	0.93	0.99	1.33	22.3
All Vehicles		3954	2.7	1.016	68.2	LOS E	98.4	703.9	0.86	0.97	1.11	30.1

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	North Full Crossing	12	69.2	LOS F	0.0	0.0	0.96	0.96
P4	West Full Crossing	1	23.5	LOS C	0.0	0.0	0.56	0.56
All Pedestrians		13	65.4	LOS F			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Friday, 8 February 2019 11:10:32 AM
Project: Not Saved