Ref: 16/108

21st March 2017

Nords Wharf Development Company Pty Ltd
256 Darby Street
NEWCASTLE NSW 2300

Attention: - Paul Lambass

Dear Paul,

RE: Traffic Review – 101 Lot Residential Subdivision – Awabakal Drive, Nords Wharf.

Reference is made to your previous engagement of Intersect Traffic to undertake a review of the external road infrastructure requirements of an approved 84 lot residential subdivision off Awabakal Drive, Nords Wharf.

At your request Intersect Traffic has assessed the implications of modifying the current Concept approval for 90 lots and subsequent Development consent as approved by Lake Macquaire Council for 84 lots to an increased lot yield of 101 lots as presented in ***Attachment 1***. As part of this assessment the previous review (August 2016) needs to be updated to include the alternate 101 lot subdivision which if satisfactory would be the subject of a Concept Approval modification issued by the NSW Department of Planning and subsequently a S96 application to Lake Macquarie City Council in the future.

The following advice is provided noting that this advice is to be specifically targeted at the conversion of the Pacific Highway / Awabakal Drive intersection from a give way controlled intersection to a left in and left out intersection through either the construction of a central median in the Pacific Highway and/ or the extension of the Brifen wire crash barrier through the intersection as well as the signalisation of the Pacific Highway / Nords Wharf Road intersection.

Background

Nords Wharf Development Company Pty Ltd are considering the purchase of land off Awabakal Drive, Nords Wharf from Coal and Allied for which an approval exists for an 84 lot residential subdivision. As part of the due diligence being undertaken for the site purchase, Nords Wharf Development Company Pty Ltd have requested Intersect Traffic review the development approval requirement for the partial signalisation of the Pacific Highway / Awabakal Drive intersection to determine if a nexus exists for this intersection upgrade or whether alternate upgrading requirements or staging of the intersection upgrade could be undertaken to address the capacity or road safety concerns relating to the intersection and the impact of the additional development traffic on the intersection.

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This assessment therefore is based on a lot yield of 101 lots rather than the previously approved 84 lots and the alternate intersection treatments involving conversion of the Pacific Highway / Awabakal Drive intersection to a left in and left out

It is understood this advice will be referred to NSW Roads and Maritime Services (RMS) by DoP for concurrence and supporting conditions to be included in subsequent modified Concept approval and related agreements. Note the proposed subdivision and agreed works at the Pacific Highway / Awabakal Drive intersection are shown in ***Attachment 1***.

Scope of Works

In undertaking this assessment Intersect Traffic has reviewed the following reports;

- Coal and Allied Southern Estates – Nords Wharf Site – Traffic and Transport Assessment by Hyder Consulting dated March 2013.
- Coal and Allied Industries – Lower Hunter Lands Project – Nords Wharf – Traffic and Transport Assessment by Hyder Consulting dated October 2010.

Updated manual traffic counts have been carried out during the AM (8 am to 9 am) and PM (4 pm to 5 pm) peak traffic periods. These counts were carried out by Intersect Traffic on Friday 29th July 2016 and the resultant tally sheets are provided in ***Attachment 2***. These counts were compared against the 2007 and 2010 counts undertaken on behalf of Hyder Consulting when preparing its reports to check assumptions made in the Hyder reports and both intersections remodelled using the latest Sidra intersection modelling software as per the proposed intersection upgrades detailed previously i.e.;.

1. Conversion of the pacific Highway / Awabakal Drive intersection to a left in and left out only intersection; and
2. Signalisation of the Pacific Highway / Nords Wharf Road intersection.

This option is considered feasible as traffic from the proposed subdivision and the southern parts of Nords Wharf could use Government Road and Nords Wharf Road for unrestricted access to the Pacific Highway. The use of the Nords Wharf Road intersection for these movements would eliminate conflict points on the Pacific Highway at the Awabakal Drive intersection thereby improving road safety on this section without any significant inconvenience to motorists provided levels of service at the Nords Wharf Road intersection are maintained at acceptable levels with the additional traffic directed to it.

Traffic Count Data

The traffic counts undertaken by Intersect Traffic showed that there had been little if any growth in traffic on Awabakal Drive while traffic volumes on the Pacific Highway had increased by approximately 1 % per annum since 2007. Based on this result it is considered the Hyder Consulting assumption that a 2% per annum background traffic growth on the Pacific Highway would account for the cumulative impacts of the

other major developments in the area at Cams Wharf, Gwandalan and Catherine Hill Bay is considered valid and has also been adopted in this review.

Intersection Modelling

Sidra modelling of the Pacific Highway / Awabakal Drive and Pacific Highway / Nords Wharf Road intersection was carried out as part of this assessment. Modelling was initially carried out for the existing 2016 traffic counts and for future 2026 traffic volumes using a 2% background traffic growth rate on the Pacific Highway to determine likely traffic levels in 2026.

The Sidra 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

The Pacific Highway / Awabakal Drive intersection and the Pacific Highway / Nords Wharf Road intersections were then modelled with their upgraded layouts with the additional development traffic from the subdivision added to predicted 2026 traffic volumes to determine the impact of the development noting a development period of 10 years.

Development traffic was estimated using the latest RMS advice for low density residential housing contained in Technical Direction TDT 13_04 which for regional areas and maximum rates is;

- Morning weekday peak = 0.85 vtph per dwelling; and
- Evening weekday peak = 0.9 vtph per dwelling.

This results in additional development traffic (101 lots) of 86 vtph in the AM peak and 91 vtph in the PM peak. In distributing this additional development traffic onto the

local road network the assumptions contained within the Hyder Consulting reports were also adopted. These assumptions were;

- All development traffic will be directed to the Pacific Highway / Awabakal Drive intersection except 6 vtph in both the AM and PM periods which is assumed will go to local services in Nords Wharf;
- In the AM peak 80 % of traffic is outbound and 20 % inbound which is mirrored in the PM peak; and
- At the Pacific Highway 60 % of traffic will have an origin / destination to the north (Swansea) and 40 % of traffic will have an origin / destination to the south (Doyalson).

The resulting development traffic distribution at the Pacific Highway / Awabakal Drive intersection and the Pacific Highway / Nords Wharf Road intersection is as shown in ***Figure 1*** below. Note the development traffic at the Pacific Highway / Nords Wharf Road intersection includes the existing traffic volumes on the movements at the Pacific Highway / Awabakal Drive intersection to be prohibited with the upgrade of the intersection to a left in and left out only intersection.

A summary of the results of the Sidra modelling for the Pacific Highway / Awabakal Drive intersection is shown below in ***Table 1*** while the Sidra Movement Summary Tables are provided in ***Attachment 3***.

The modelling showed that existing right turn movements out of Awabakal Drive were experiencing some delays with normally unacceptable levels of service (E and F) however as the delays were not excessive and queue lengths were still low and all other movements were operating satisfactorily the results currently would not normally result in a requirement for upgrading of the intersection.

Table 1 – Sidra Results Summary – all vehicles – Pacific Hwy / Awabakal Dr intersection

Model	Deg. Satn (v/c)	Average Delay (s)	Worst Level of Service	95 % back of queue length (cars)
2016 AM	0.381	1.5	E	1.1
2016 PM	0.645	2.5	F	1.9
2026 AM + development	0.318	0.3	A	0.2
2026 PM + development	0.306	0.3	A	0.1

With the addition of the development traffic and the conversion of the intersection to a left in and left out only intersection the intersection operates satisfactorily post development through to at least 2026. Average delays, LoS and back of queue lengths for all movements remain within the acceptable criteria set by the RMS.

A summary of the results of the Sidra modelling for the Pacific Highway / Awabakal Drive intersection is shown below in ***Table 2*** while the Sidra Movement Summary Tables are provided in ***Attachment 3***.

The modelling showed the existing intersection would operate satisfactorily through to 2026 with background traffic growth with average delays, LoS and back of queue lengths for all movements remaining within the acceptable criteria set by the RMS.

Table 2 – Sidra Results Summary – Pacific Highway / Nords Wharf Road intersection.

Model	Deg. Satn (v/c)	Average Delay (s)	Worst Level of Service	95 % back of queue length (cars)
2016 AM	0.335	0.9	B	0.3
2016 PM	0.307	0.8	B	0.5
2026 AM + development - signals	0.884	19.1	B	24.6
2026 PM + development - signals	0.871	18.5	B	20.9

With the addition of the development traffic and the conversion of the intersection to traffic signal control the intersection operates satisfactorily post development through to at least 2026. Average delays, LoS and back of queue lengths for all movements remain within the acceptable criteria set by the RMS.

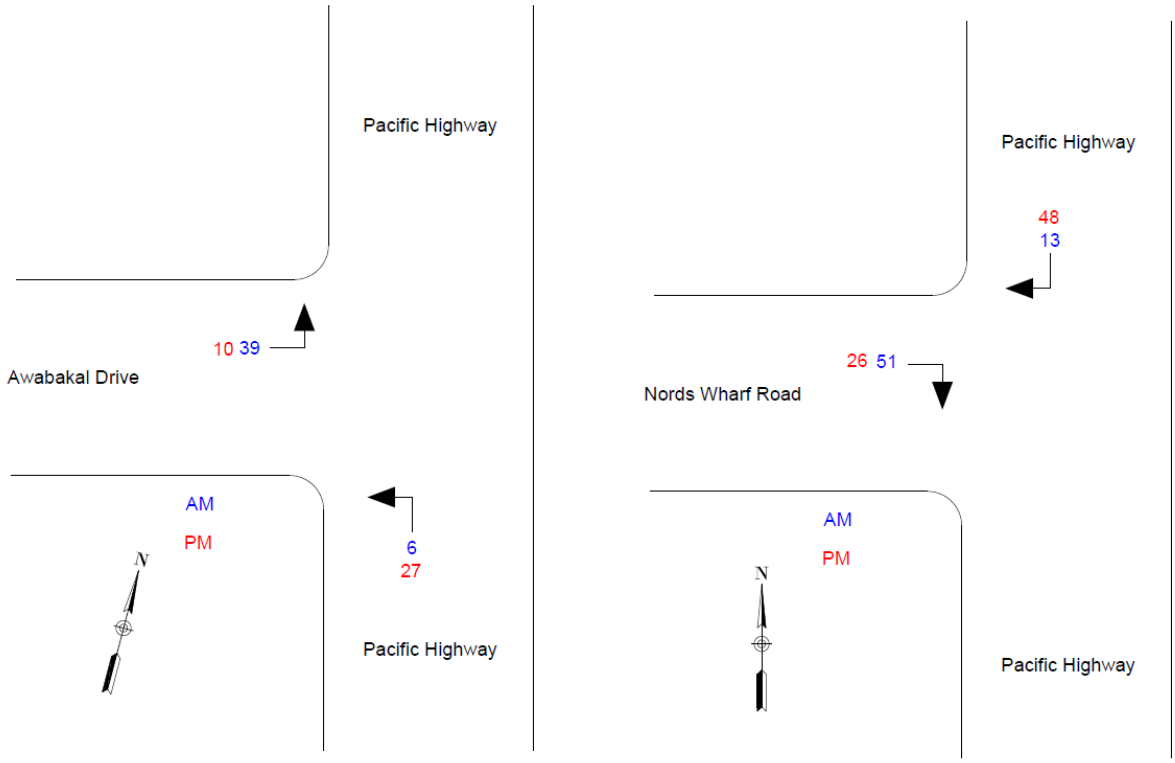


Figure 1 – Additional Traffic – Left in and Left out only at Awabakal Drive

Overall the intersection analysis shows the proposed intersection upgrades on the Pacific Highway i.e. Awabakal Drive to left in and left out only and the signalisation of the Nords Wharf Road intersection would be able to cater for the additional traffic generated by the proposed 101 lot subdivision without any adverse impact on the state road network.

Noting it is intersection capacity that generally determines the overall capacity of the road network it would also be reasonable to assume the proposal will not adversely impact on the local road network around Nords Wharf.

Conclusions

The following conclusions have been drawn from this traffic analysis of the Pacific Highway / Awabakal Drive and the Pacific Highway / Nords Wharf Road intersections at Nords Wharf.

- Updated traffic counts and Sidra modelling of the intersections shows that all movements at these intersections currently operate satisfactorily except for the right turn movement out of Awabakal Drive.
- Sidra modelling of the Pacific Highway / Awabakal Drive intersection shows the right turn movement out of Awabakal Drive experiences significant delays and that by 2026 with just background traffic growth these delays would reach unacceptable levels.
- The delays predicted by the Sidra modelling for the right turn movement out of Awabakal Drive at the Pacific Highway did not match the observed delays indicating drivers are already accepting less than the recommended minimum headway gap in undertaking this movement.
- As such whether the proposed subdivision proceeds or not intersection upgrade works will be required to be carried out prior to 2016.
- The proposed Concept approval modification and subsequent S96 application for the 101 lot subdivision will include a proposal to convert the Pacific Highway / Awabakal Drive intersection to a left in and left out only intersection and to signalise the Pacific Highway / Nords Wharf Road intersection.
- Sidra analysis of the subject intersections has shown that the proposed intersection upgrades on the Pacific Highway i.e. Awabakal Drive to left in and left out only and the signalisation of the Nords Wharf Road intersection would be able to cater for the additional traffic generated by the proposed 101 lot subdivision without any adverse impact on the state road network.

Recommendation

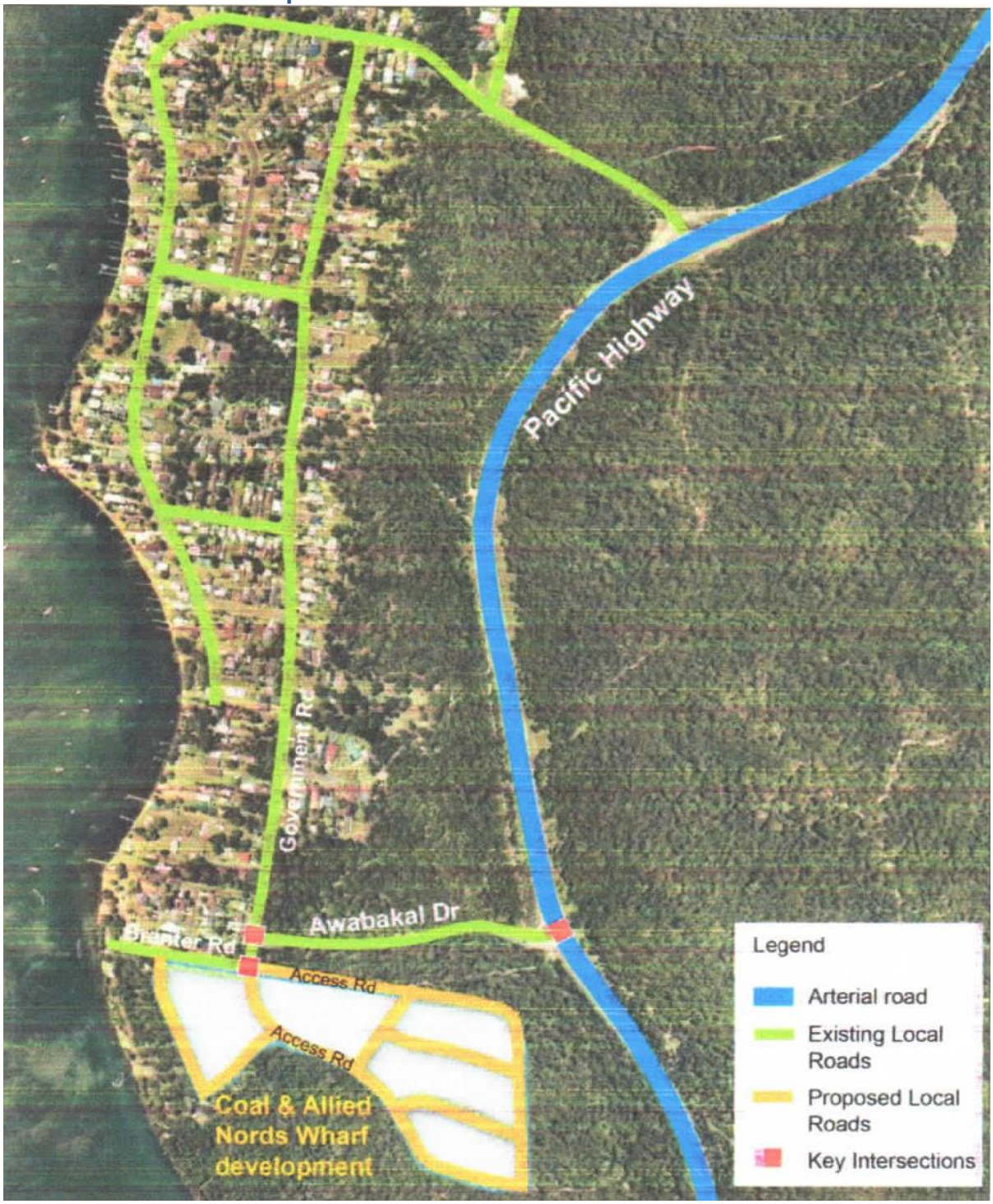
Having undertaken this traffic analysis of the proposed 101 lot subdivision it is considered that the NSW RMS and Lake Macquarie City Council could support the proposal which includes the conversion of the Pacific Highway / Awabakal Drive intersection to a left in and left out intersection and the signalisation of the Pacific Highway / Nords Wharf Road intersection as the proposal would not adversely impact on traffic flows on the state and local road networks.

Hoping this information is to your satisfaction. Should you require further information or clarification please do not hesitate to contact me on 02 4936 6200 or 0423 324 188.

Yours sincerely

Jeff Garry
Director
Intersect Traffic

Attachment 1 – Development Plans



Stage 1 - 80 Lots
Stage 2 - 13 lots
Stage 3 - 8 lots
Total - 101 Lots

Notes:
1.Road hierarchy and road reserve allocation as per previously approved Concept plan.
2. Where required excessive cut or fill batters will be replaced with retaining walls subject to LMCC approval.

0 20 40 60 80 100m
Scale 1:2,00 A3

Project No	025/2016
Suburb	Nords Wharf
Street	Branter Road
Lot & DP	1 & 2
Site area	ha
Dwg Title	Residential Subdivision
Sheet Title	Plan of subdivision
Number of Sheets	1
Sheet Number	1
Issued	13/3/2017

URBANISE
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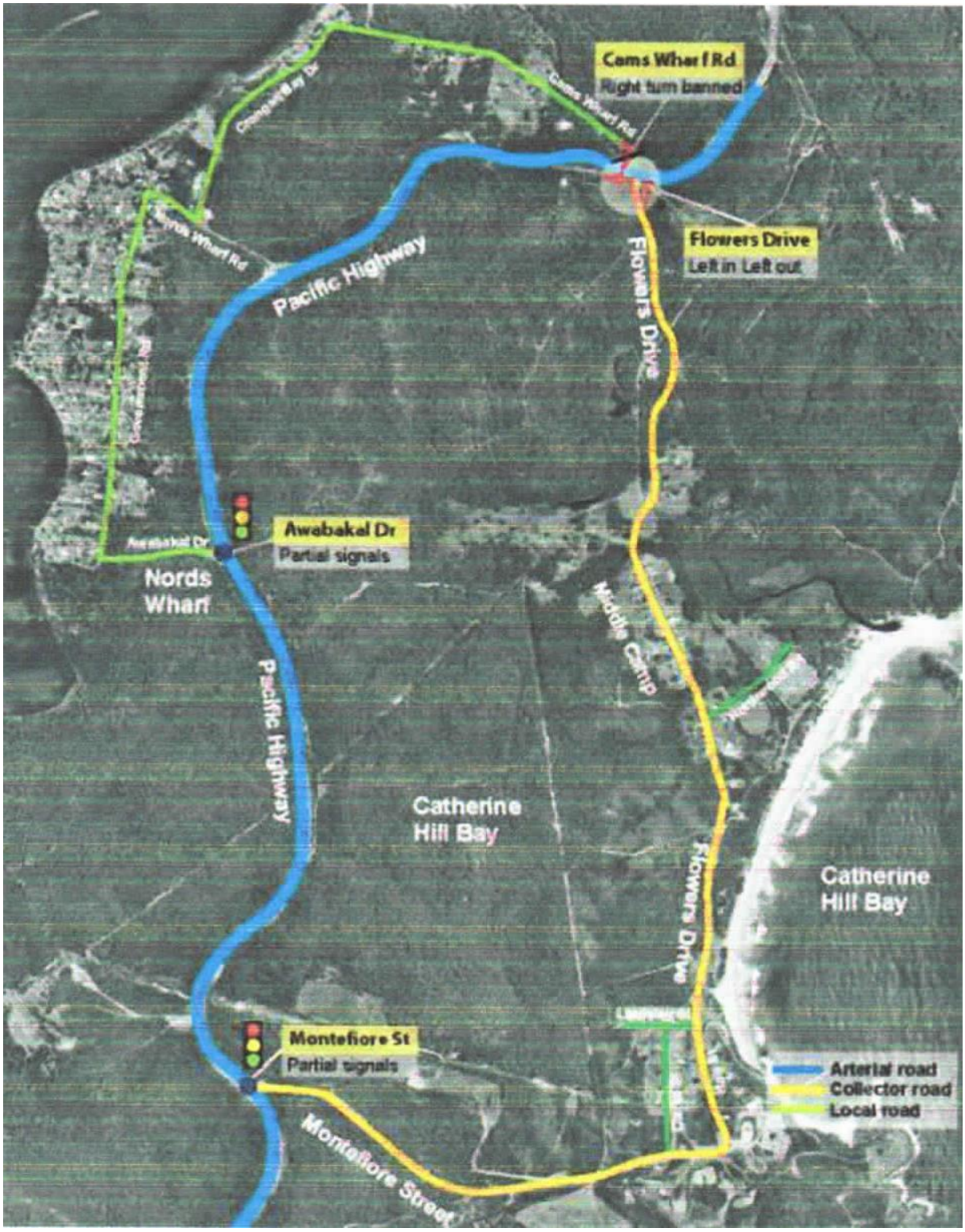
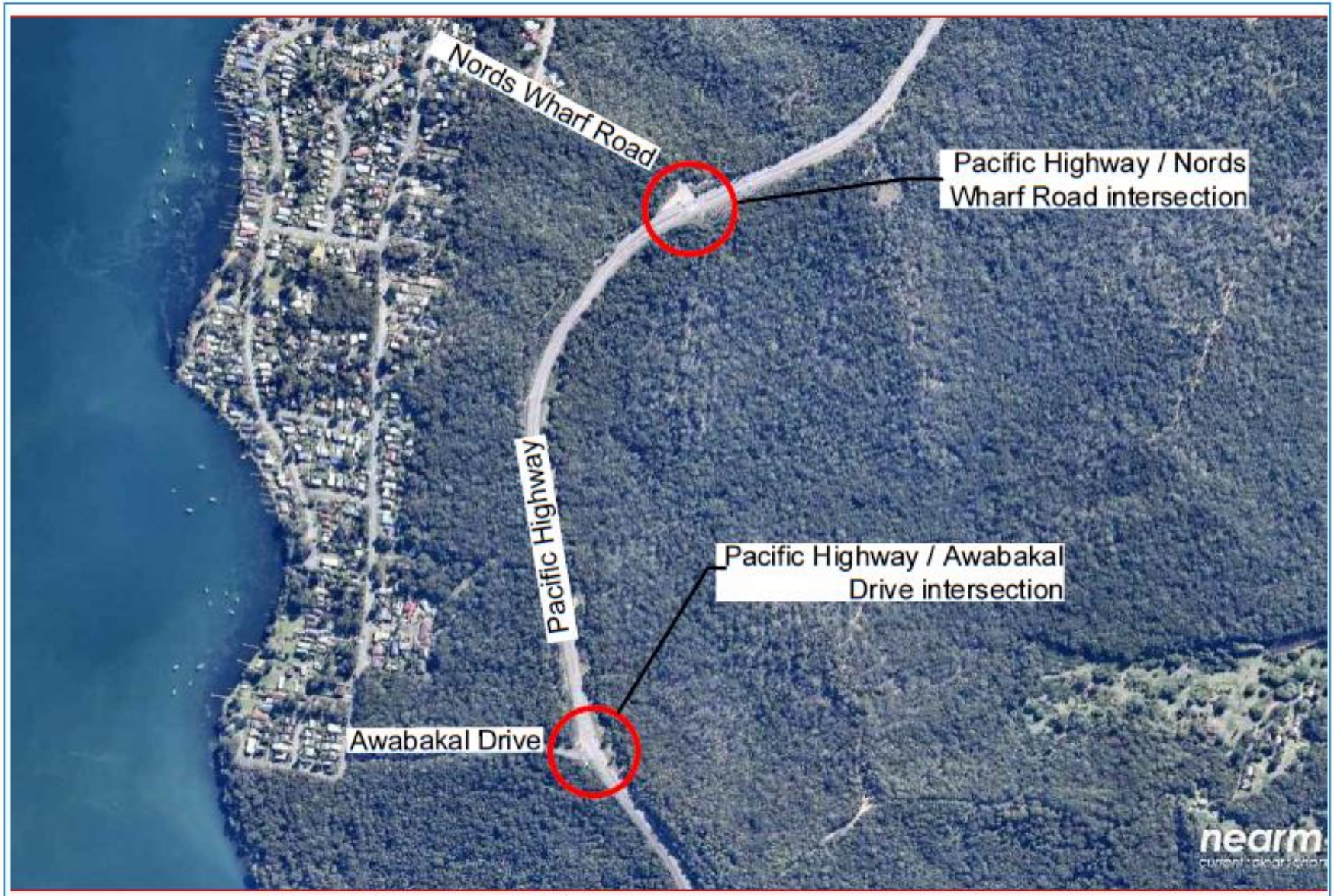

Cams Wharf Rd
Right turn banned
Flowers Drive
Left in Left out
Pacific Highway
Awabakal Dr
Partial signals
Nords Wharf
Catherine Hill Bay
Montefiore St
Partial signals
Montefiore Street
Arterial road
Collector road
Local road

Lazaran Drive
PACIFIC
HIGHWAY



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e-mail jeff@intersecttraffic.com.au

PLAN INFORMATION: Location Plan
Nords Wharf Intersections - Pacific Highway

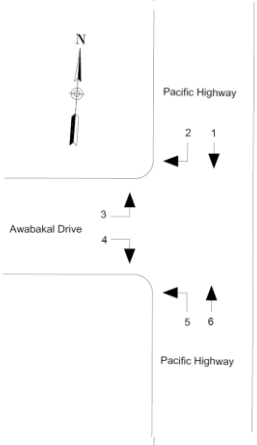
JOB: Residential Subdivision (80 lots)
CLIENT: CVG Finance
JOB REF: 16/108
DATE: 02/08/2016
SCALE: N/A
SHEET 1 OF 1 SHEETS
DWG: Location Plan.dwg

Attachment 2 – Traffic Counts

Date	29-07-16
Day	Friday
Time	8:00am - 9:00am
Weather	Fine
Conducted by:	Pete

MOVEMENT	1	2	3	4	5	6
8:00 - 8:15	149	0	5	5	3	223
8:15 - 8:30	141	2	1	9	7	192
8:30 - 8:45	135	0	4	5	4	159
8:45 - 9:00	115	2	1	6	2	165
SUM	540	4	11	25	16	739
PEAK	540	4	11	25	16	739

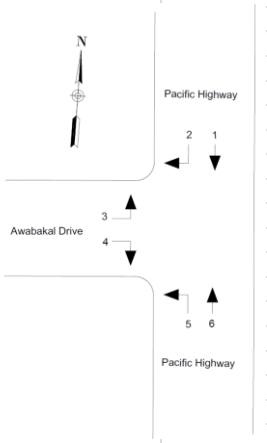
Leg	PHT (vph)
Pacific Highway North	1294
Pacific Highway South	1320
Awabakal Drive	56



Date	29-07-16
Day	Friday
Time	4.00 pm - 5.00 pm
Weather	Fine
Conducted by:	Peter

MOVEMENT	1	2	3	4	5	6
4:00 - 4:15	211	1	2	7	8	202
4:15 - 4.30	231	2	0	4	6	161
4:30 - 4:45	228	1	2	6	7	180
4:45 - 5:00	219	3	1	4	7	169
SUM	889	7	5	21	28	712
PEAK	889	7	5	21	28	712

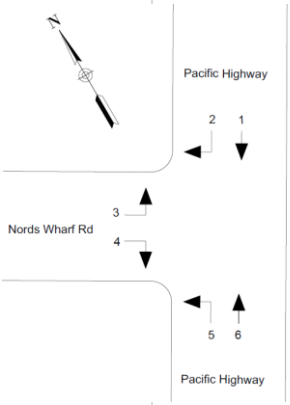
Leg	PHT (vph)
Pacific Highway North	1613
Pacific Highway South	1650
Awabakal Drive	61



Date	29-07-16
Day	Friday
Time	4.00 pm - 5.00 pm
Weather	Fine
Conducted by:	Jeff

MOVEMENT	1	2	3	4	5	6
4:00 - 4:15	218	15	11	3	5	194
4:15 - 4.30	219	11	8	1	4	160
4:30 - 4:45	236	15	11	1	9	178
4:45 - 5:00	219	12	8	3	4	164
SUM	892	53	38	8	22	696
PEAK	892	53	38	8	22	696

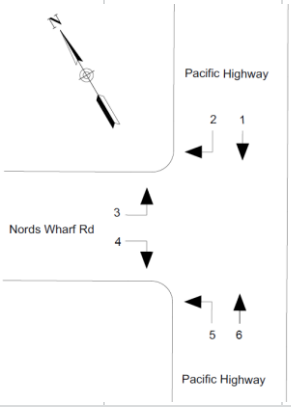
Leg	PHT (vph)
Pacific Highway North	1679
Pacific Highway South	1618
Nords Wharf Road	121



Date	29-07-16
Day	Friday
Time	8:00am - 9:00am
Weather	Fine
Conducted by:	Jeff

MOVEMENT	1	2	3	4	5	6
8:00 - 8:15	144	5	12	5	2	222
8:15 - 8:30	133	4	13	4	4	194
8:30 - 8:45	148	6	15	1	1	165
8:45 - 9:00	99	12	22	6	2	177
SUM	524	27	62	16	9	758
PEAK	524	27	62	16	9	758

Leg	PHT (vph)
Pacific Highway North	1371
Pacific Highway South	1307
Nords Wharf Road	114



Attachment 3 – Sidra Movement Summary Tables

MOVEMENT SUMMARY

Site: 2016 AM

Pacific Highway / Awabakal Drive give way
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
SouthEast: Pacific Highway											
21	L2	16	5.0	0.009	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
22	T1	739	10.0	0.262	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
Approach		755	9.9	0.262	0.2	NA	0.0	0.0	0.00	0.01	89.3
NorthWest: Pacific Highway											
28	T1	540	5.0	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
29	R2	4	10.0	0.012	16.2	LOS B	0.0	0.3	0.67	0.81	50.0
Approach		544	5.0	0.143	0.1	NA	0.0	0.3	0.00	0.01	89.4
SouthWest: Awabakal Drive											
30	L2	11	5.0	0.011	5.7	LOS A	0.0	0.3	0.34	0.54	53.6
32	R2	25	5.0	0.381	69.8	LOS E	1.1	8.4	0.95	1.02	27.7
Approach		36	5.0	0.381	50.2	LOS D	1.1	8.4	0.76	0.87	32.5
All Vehicles		1335	7.8	0.381	1.5	NA	1.1	8.4	0.02	0.03	85.3

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

MOVEMENT SUMMARY

Site: 2016 PM

Pacific Highway / Awabakal Drive give way
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
SouthEast: Pacific Highway											
21	L2	28	5.0	0.016	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
22	T1	712	10.0	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
Approach		740	9.8	0.253	0.3	NA	0.0	0.0	0.00	0.02	88.8
NorthWest: Pacific Highway											
28	T1	889	5.0	0.235	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
29	R2	7	10.0	0.021	15.9	LOS B	0.1	0.5	0.66	0.84	50.2
Approach		896	5.0	0.235	0.2	NA	0.1	0.5	0.01	0.01	89.3
SouthWest: Awabakal Drive											
30	L2	5	5.0	0.005	5.7	LOS A	0.0	0.1	0.33	0.52	53.6
32	R2	21	5.0	0.645	182.3	LOS F	1.9	14.1	0.99	1.07	15.0
Approach		26	5.0	0.645	148.3	LOS F	1.9	14.1	0.86	0.97	17.4
All Vehicles		1662	7.2	0.645	2.5	NA	1.9	14.1	0.02	0.03	83.7

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

MOVEMENT SUMMARY

▽ Site: 2026 AM + development - left in and left out

Pacific Highway / Awabakal Drive give way
Including Nords Wharf development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
SouthEast: Pacific Highway											
21	L2	22	5.0	0.012	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
22	T1	887	10.0	0.318	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
Approach		909	9.9	0.318	0.2	NA	0.0	0.0	0.00	0.02	89.2
NorthWest: Pacific Highway											
28	T1	648	5.0	0.172	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
Approach		648	5.0	0.172	0.0	NA	0.0	0.0	0.00	0.00	89.9
SouthWest: Awabakal Drive											
30	L2	50	5.0	0.053	6.1	LOS A	0.2	1.4	0.38	0.59	53.5
Approach		50	5.0	0.053	6.1	LOS A	0.2	1.4	0.38	0.59	53.5
All Vehicles		1607	7.8	0.318	0.3	NA	0.2	1.4	0.01	0.03	87.6

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

MOVEMENT SUMMARY

Site: 2026 PM + development - left in and left out

Pacific Highway / Awabakal Drive give way
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
SouthEast: Pacific Highway											
21	L2	55	5.0	0.031	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
22	T1	854	10.0	0.306	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
Approach		909	9.7	0.306	0.5	NA	0.0	0.0	0.00	0.04	88.2
NorthWest: Pacific Highway											
28	T1	1067	5.0	0.282	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
Approach		1067	5.0	0.282	0.0	NA	0.0	0.0	0.00	0.00	89.9
SouthWest: Awabakal Drive											
30	L2	15	5.0	0.016	5.9	LOS A	0.1	0.4	0.36	0.56	53.5
Approach		15	5.0	0.016	5.9	LOS A	0.1	0.4	0.36	0.56	53.5
All Vehicles		1991	7.1	0.306	0.3	NA	0.1	0.4	0.00	0.02	88.6

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

MOVEMENT SUMMARY

Site: 2016 AM

Pacific Hwy / Nords Wharf Road rural seagull
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
NorthEast: Pacific Highway											
25	T1	524	10.0	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
26	R2	27	5.0	0.085	16.8	LOS B	0.3	1.9	0.70	0.89	49.6
Approach		551	9.8	0.143	0.8	NA	0.3	1.9	0.03	0.04	86.5
NorthWest: Nords Wharf Road											
27	L2	62	5.0	0.055	5.2	LOS A	0.2	1.5	0.25	0.53	53.9
29	R2	16	5.0	0.087	21.7	LOS B	0.3	1.9	0.79	0.90	43.6
Approach		78	5.0	0.087	8.6	LOS A	0.3	1.9	0.36	0.60	51.4
SouthWest: Pacific Highway											
30	L2	9	5.0	0.005	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
31	T1	758	10.0	0.335	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
Approach		767	9.9	0.335	0.1	NA	0.0	0.0	0.00	0.01	89.5
All Vehicles		1396	9.6	0.335	0.9	NA	0.3	1.9	0.03	0.06	84.8

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

MOVEMENT SUMMARY

Site: 2016 PM

Pacific Hwy / Nords Wharf Road rural seagull
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
NorthEast: Pacific Highway											
25	T1	892	10.0	0.244	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
26	R2	53	5.0	0.150	16.0	LOS B	0.5	3.5	0.68	0.89	50.1
Approach		945	9.7	0.244	0.9	NA	0.5	3.5	0.04	0.05	86.0
NorthWest: Nords Wharf Road											
27	L2	38	5.0	0.033	5.1	LOS A	0.1	0.9	0.23	0.52	53.9
29	R2	8	5.0	0.040	19.6	LOS B	0.1	0.9	0.76	0.89	44.7
Approach		46	5.0	0.040	7.7	LOS A	0.1	0.9	0.33	0.58	52.1
SouthWest: Pacific Highway											
30	L2	22	5.0	0.012	7.5	LOS A	0.0	0.0	0.00	0.65	68.7
31	T1	696	10.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
Approach		718	9.8	0.307	0.3	NA	0.0	0.0	0.00	0.02	89.0
All Vehicles		1709	9.6	0.307	0.8	NA	0.5	3.5	0.03	0.05	85.7

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

MOVEMENT SUMMARY

Site: 2026 AM - left in and left out Awabakal - Signals

Pacific Hwy / Nords Wharf Road
Signals - Fixed Time Isolated Cycle Time = 55 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
NorthEast: Pacific Highway											
25	T1	629	10.0	0.378	10.8	LOS A	5.6	42.9	0.70	0.60	71.1
26	R2	40	5.0	0.204	33.6	LOS C	1.1	7.7	0.94	0.73	40.4
Approach		669	9.7	0.378	12.2	LOS A	5.6	42.9	0.71	0.60	68.0
NorthWest: Nords Wharf Road											
27	L2	62	5.0	0.106	18.7	LOS B	1.2	8.6	0.73	0.70	45.2
29	R2	67	5.0	0.342	31.1	LOS C	1.8	13.2	0.96	0.75	39.2
Approach		129	5.0	0.342	25.1	LOS B	1.8	13.2	0.85	0.73	41.9
SouthWest: Pacific Highway											
30	L2	9	5.0	0.011	16.3	LOS B	0.1	1.0	0.57	0.67	49.6
31	T1	910	10.0	0.884	23.3	LOS B	24.6	187.2	0.91	0.96	57.1
Approach		919	10.0	0.884	23.3	LOS B	24.6	187.2	0.91	0.95	57.0
All Vehicles		1717	9.5	0.884	19.1	LOS B	24.6	187.2	0.83	0.80	59.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 SUMMARY

Site: 2026 PM - left in and left out Awabakal - signals

Pacific Hwy / Nords Wharf Road
Signals - Fixed Time Isolated Cycle Time = 52 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
NorthEast: Pacific Highway											
25	T1	1070	10.0	0.691	14.1	LOS A	11.7	88.8	0.87	0.78	66.7
26	R2	101	5.0	0.488	33.0	LOS C	2.6	19.1	0.98	0.77	40.7
Approach		1171	9.6	0.691	15.8	LOS B	11.7	88.8	0.88	0.78	63.2
NorthWest: Nords Wharf Road											
27	L2	38	5.0	0.061	17.0	LOS B	0.7	4.8	0.69	0.68	46.1
29	R2	34	5.0	0.164	28.6	LOS C	0.8	6.1	0.93	0.71	40.3
Approach		72	5.0	0.164	22.5	LOS B	0.8	6.1	0.81	0.69	43.2
SouthWest: Pacific Highway											
30	L2	22	5.0	0.029	17.0	LOS B	0.3	2.4	0.61	0.69	49.2
31	T1	835	10.0	0.871	22.0	LOS B	20.9	158.6	0.92	0.94	58.3
Approach		857	9.9	0.871	21.9	LOS B	20.9	158.6	0.91	0.94	58.1
All Vehicles		2100	9.5	0.871	18.5	LOS B	20.9	158.6	0.89	0.84	60.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.