

A photograph of a paved road curving through a landscape with tall grass, large rocks, and several trees under a clear blue sky.

TRAFFIC IMPACT ASSESSMENT

INDUSTRIAL PLANNING PROPOSAL

PART LOT 1 AND LOT 2 & 3 IN DP 1156997

PART OF 380 MOTORWAY LINK, WALLARAH

PREPARED FOR: DARKINJUNG LALC

APRIL 2018

16/179

**TRAFFIC IMPACT ASSESSMENT
DARKINJUNG LALC****PLANNING PROPOSAL
INDUSTRIAL DEVELOPMENT
PART LOT 1 AND LOT 2 & 3 IN DP 1156997
PART OF 380 MOTORWAY LINK, WALLARAH**

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

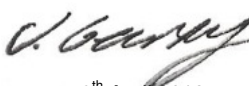
QUALITY ASSURANCE

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	23/02/17	Draft	PA
B	15/03/17	Edit	JG
D	06/04/18	Final Proof / Client Amendments	JG
E	06/04/18	Approved	JG

Copyright © Intersect Traffic Pty Ltd

This document has been authorised by


Date 6th April 2018**Disclaimer**

This report has been prepared based on the information supplied by the client and investigation undertaken by Intersect Traffic Pty Ltd & other consultants. Recommendations are based on Intersect Traffic's professional judgement only and whilst every effort has been taken to provide accurate advice, Council and any other regulatory authorities may not concur with the recommendations expressed within this report. This document and the information are solely for the use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by Intersect Traffic Pty Ltd. Intersect Traffic makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information.

Confidentiality Statement

All information, concepts, ideas, strategies, commercial data and all other information whatsoever contained within this document as well as all ideas and concepts described during the presentation are provided on a commercial in confidence basis and remain the intellectual property and Copyright of Intersect Traffic Pty Ltd and affiliated entities.

CONTENTS

1.0 INTRODUCTION	1
2.0 SITE LOCATION	2
3.0 EXISTING ROAD NETWORK	4
3.1 MOTORWAY LINK	4
3.2 MOTORWAY LINK RAMPS	5
3.3 MOTORWAY LINK OVERPASS BRIDGE / ROAD	5
3.4 TOOHEYS ROAD	6
4.0 ROAD NETWORK IMPROVEMENTS	7
5.0 TRAFFIC VOLUMES	7
6.0 ROAD CAPACITY	8
7.0 ALTERNATE TRANSPORT MODES	9
8.0 DEVELOPMENT PROPOSAL	10
9.0 TRAFFIC GENERATION	10
10.0 TRIP DISTRIBUTION	11
11.0 TRAFFIC IMPACTS OF DEVELOPMENT	12
11.1 ROAD NETWORK CAPACITY	12
11.2 INTERSECTION CAPACITY	12
11.3 ROAD SAFETY	14
11.4 ON-SITE CAR PARKING	14
12.0 PEDESTRIAN & CYCLE FACILITIES	15
13.0 PUBLIC TRANSPORT FACILITIES	15
14.0 CONCLUSIONS	16
15.0 RECOMMENDATION	17

ATTACHMENTS

ATTACHMENT A	DEVELOPMENT PLANS
ATTACHMENT B	TRAFFIC COUNT DATA
ATTACHMENT C	SIDRA MOVEMENT SUMMARY TABLES

FIGURES

Figure 1 – Site Location	2
Figure 2 – Development Trip Distribution	11

PHOTOGRAPHS

Photograph 1 – Site south of Motorway Link southern ramp / overpass road intersection	3
Photograph 2 – Site southeast of the southern ramp / overpass road intersection	3
Photograph 3 – Motorway Link east of the overpass bridge	4
Photograph 4 – Motorway Link eastbound on ramp from Toohey's Road near the site	5
Photograph 5 – Motorway Link Overpass Bridge at Toohey's Road adjacent to the site	6
Photograph 6 – Tooheys Road adjacent to the site	6
Photograph 7 – Overpass footway adjacent to the site	9

TABLES

Table 1 – Mid-block Road Capacity Assessment – AM and PM post development	12
Table 2 – Sidra Modelling – Results Summary – Development access road / Motorway Link southbound ramps / Motorway Link overpass road intersection.	13
Table 3 – Sidra Modelling – Results Summary – Motorway Link overpass road / Motorway Link northbound ramps / Tooheys Road intersection.	14



1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by Darkinjung Local Aboriginal Land Council (Darkinjung LALC) to prepare a Traffic Impact Assessment Report for a planning proposal for an industrial development / business park on Part Lot 1 and Lots 2 & 3 in DP 1156997 – Part of 380 Motorway Link, Wallarah. The residual, southern section of Lot 1 will remain as environmental conservation. These three adjoining properties are located on the southern side of the Motorway Link to the east of the M1 Motorway and to the west of the Pacific Highway. The proposal is likely to yield in the order of 72 industrial lots of average size of approximately 0.54 ha.

The planning proposal currently includes the construction of 4 (four) new public roads including the intersection upgrading of the Motorway Link southbound ramps / overpass road with the new public road access to the industrial estate and (4) four additional intersections within the proposed development. The road upgrading / improvements and intersections are to be in accordance with Central Coast Council and NSW Roads and Maritime Services (NSW RMS) requirements as relevant. The proposed site, located between the Motorway Link and the Sydney-Newcastle rail line, is shown on the concept development plan in **Attachment A**.

This report is required to support a planning proposal to Central Coast Council as the consent authority for the rezoning of the subject land for industrial development. It will allow the Council and NSW RMS to assess the proposal regarding 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 near 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 as well as road safety.
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 LOCATION

The subject site is located on the southern side of the Motorway Link, Wallarah. The three adjoining properties being utilised for the development are located on the southern side of the Motorway Link approximately 4 km east of the M1 Motorway and 3.5 km west of the Pacific Highway. The proposed development area has approximately 1.2 km of frontage to the Motorway Link to the north, 1 km of frontage to the Sydney to Newcastle rail line to the south east and approximately 500 metres frontage to the residual of part of Lot 1 in DP 1156997 to the south. The village of Blue Haven lies approximately 3 km to the east of the site, the main industrial and commercial precincts of Wyee lie approximately 4 km to the north of the site and the village of Doyalson lies approximately 5 km northeast of the site. **Figure 1** below shows the site location from a local context.

The site contains the three (3) separate land titles of Part Lot 1, Lot 2 and Lot 3 in DP 1156997 and is addressed as part of 380 Motorway Link, Wallarah.

380 Motorway Link has a site area of approximately 90 ha whilst the subject site has a development area of approximately 42 ha and is currently vacant land. Pursuant to the Wyong LEP (2013) Part Lot 1, Lots 2 and 3 are currently zoned RU6 – Transition.

Photographs 1 & 2 show the existing conditions at the proposed development site from two different perspectives, from the intersection of the Motorway Link southern ramp / overpass road, south and southeast respectively.

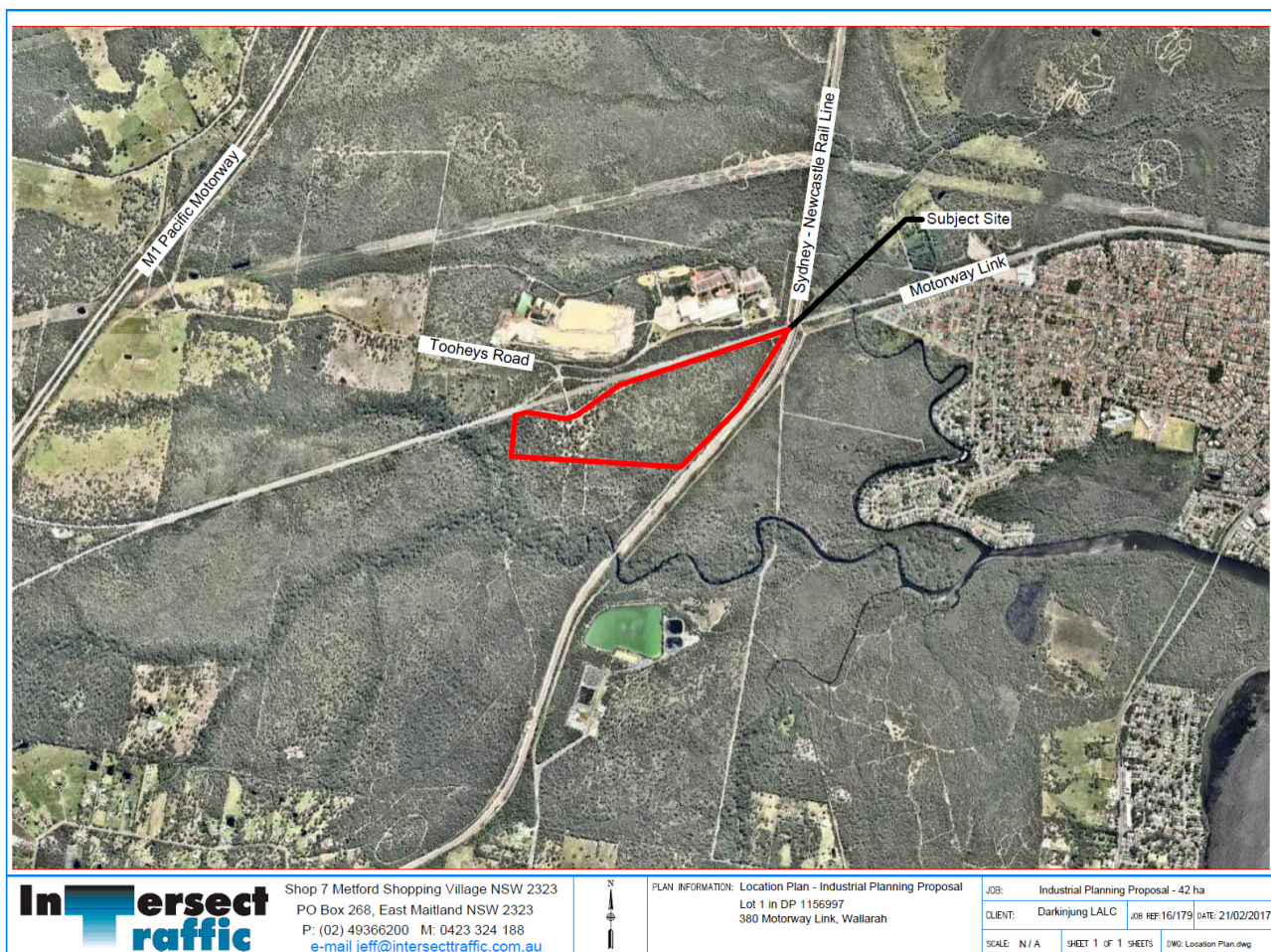


Figure 1 – Site Location



Photograph 1 – Site south of Motorway Link southern ramp / overpass road intersection



Photograph 2 – Site southeast of the southern ramp / overpass road intersection

3.0 EXISTING ROAD NETWORK

3.1 Motorway Link

The Motorway Link Road is a two-lane two-way rural road that travels through the Wallarah and Bushells Ridge localities. It connects to the Pacific Highway south of Doyalson at its eastern end and at its western end to the M1 Motorway at Kiar and Halloran, just north of Warnervale. This road was previously part of the F3 Freeway before the Freeway was extended to Newcastle. As such it is constructed to a high standard as a two-lane two-way dual carriageway freeway i.e. no private accesses and grade separated intersections. It provides a link for the areas at the northern end of the Central Coast i.e. Doyalson, Budgewoi, Lake Munmorah etc. to access the M1 Motorway (former F3 Freeway). Its grade separated intersection with the M1 Motorway only allows south bound on and northbound off movements. Traffic wishing to head north or return from the north is likely to use the Pacific Highway and Wyee Road to access the M1 Motorway's Mandalong Road interchange at Morisset or to use the Sparks Road Motorway overpass interchange. At its intersection with Tooheys Road near the site a grade separated full interchange is provided allowing on and off movements in both directions.

Under a functional road hierarchy, the Motorway Link is considered to fill the role of a sub-arterial road providing linkage between sub regions in the area. It is considered suitable to carry traffic generated by an industrial estate. It is a classified state road (MR675) under the care and control of the NSW Roads and Maritime Services (RMS). Adjacent to the site it has a sealed carriageway 13 metres wide with wide grassed verges with table drains. The sealed section of the road contains two 3.7 metre travel lanes, a 2-metre-wide median with edge lines (constructed of concrete and pavement seal adjacent to the on / off ramp intersections and seal only between the bridge and the on / off ramp intersections) and two 2.3 metre sealed shoulders / breakdown lanes. A speed zoning of 100 km/h applies to the Motorway Link and at the time of inspection it was found to be in excellent condition. **Photograph 3** below shows the Motorway Link with its access ramp connections east of its overpass bridge.



Photograph 3 – Motorway Link east of the overpass bridge

3.2 Motorway Link Ramps

The four Motorway Link Ramps on the north and south of the Motorway Link provide access to Tooheys Road on the northern side of the Motorway Link and a location for access to the development. Under a functional road hierarchy, the ramps are considered to perform the function of local roads however remain under the care and control of NSW RMS. The ramps provide entry and exit to the overpass bridge to and from both directions of the Motorway Link. All four ramps are sealed one-way one-lane carriageways with sealed widths approximately 7.0 metres, except where widening occurs at their intersections with the overpass bridge. The carriageway comprises a 3.6-metre-wide travel lane, a 2.2-metre-wide inner shoulder, a 1.2-metre-wide outer shoulder and table drains. A speed zoning of 60 km/h would apply to the Motorway Link Ramps and at the time of inspection these ramps were found to be in excellent condition. **Photograph 4** below shows the road condition of one of the departure Motorway Link ramps looking from its intersection with the overpass bridge.



Photograph 4 – Motorway Link eastbound on ramp from Toohey's Road near the site

3.3 Motorway Link Overpass Bridge / Road

The Motorway Link Overpass Bridge on Toohey's Road is a reinforced concrete bridge with sealed approaches connecting the north and south Motorway Link ramps. At its northern end, the road also connects to Tooheys Road. The Overpass Bridge / Road are a local road but remains under the care and control of NSW RMS. It is a two-way two-lane road with two 3.1 metre travel lanes, two 0.5 metre shoulders and longitudinal drainage.

A 60 km/h speed zoning would apply to this section of road and at the time of inspection it was observed to be in excellent condition. **Photograph 5** shows Motorway Link Overpass Bridge / Road at Toohey's Road from the northern frontage of the site.



Photograph 5 – Motorway Link Overpass Bridge at Toohey's Road adjacent to the site

3.4 Tooheys Road

Tooheys Road is a local rural road constructed predominately of an unsealed gravel pavement but sealed at its eastern end adjoining the overpass and Boral Brick and Tile Display Centre as shown in **Photograph 6** below.



Photograph 6 – Tooheys Road adjacent to the site

Tooheys Road has a functional road classification of a local road and is under the care and control of Central Coast Council. At its eastern end Tooheys Road is a two-way two-lane road with two 4-metre-wide travel lanes, 0.5 metres to 1.5-metre-wide shoulders and has table drains on both sides. A 60 km/h speed zoning would apply to this section of road and at the time of inspection it was observed to be in good condition.

4.0 ROAD NETWORK IMPROVEMENTS

There are no known proposed road network improvements near the site that would increase the capacity of the road network. Upgrading works as part of Central Coast Council's and NSW RMS forward works programs may occur in the future.

Some upgrading of Toohey's Road is likely with the development of the Wallarah No. 2 coal mine near the site as well as a proposed Industrial subdivision on the northern side of Toohey's Road north of the development site. These works are likely to include pavement strengthening, sealing and widening of the road to make it suitable for heavy vehicle traffic however it is unlikely to include additional travel lanes that would increase the capacity of the road network.

5.0 TRAFFIC VOLUMES

To determine existing traffic volumes on the road network, Intersect Traffic undertook traffic counts at the Motorway Link Northern Ramps / Overpass Bridge Road / Tooheys Road intersection during the AM peak traffic period on Monday 27th February 2017 and the PM peak traffic period on Thursday 23rd February 2017. Counts were undertaken at the likely peak periods, from 7.00 am to 8.00 am and 3.00 pm to 4.00 pm. Two-way traffic counts through the access road at the Boral Brick and Roof Tile Display Centre onto Tooheys Road were taken simultaneously during the count from which the two-way traffic count in Tooheys Road was determined. The manual count sheets are provided in **Attachment B**. The peak hour traffic data at the Motorway Link interchange determined from this count was;

- ◆ AM peak – 12 vtpd; and
- ◆ PM peak – 21 vtpd

It was noted that most of this traffic was generated by the Boral Brick and Tile Centre near the interchange off Toohey's Road. Northern Transport Planning and Engineering also installed traffic classifiers on Tooheys Road west of the Motorway Link Bridge Road and collected data for a period of 1 week from Thursday 23rd February 2017. The classifier data determined the following peak hour traffic volumes on Tooheys Road west of the interchange;

- ◆ AM peak – 14 vtpd; and
- ◆ PM peak – 13 vtpd.

Both data sets indicate there is very little traffic on the existing road network around the site except for on the Motorway Link Road. For the purposes of this assessment it has been assumed that the existing traffic volumes on the local road network around the site is less than 20 vtpd in both the AM and PM peak periods which would be unlikely to change significantly through to 2032 unless other development in the area occurs.

The latest available data for traffic flows on the Motorway Link Road indicate traffic volumes in 2004 of 16,130 vtpd. Adopting a 1.5 % background traffic growth rate would result in predicted existing and future traffic volumes as detailed below, using the general rule of thumb that peak hour traffic volumes on major arterial roads are 8 % of the average daily traffic volumes;

- ◆ 2017 – 1,570 vtpd;
- ◆ 2022 – 1,690 vtpd; and
- ◆ 2032 – 1,960 vtpd.

In the absence of more recent data these traffic volumes for the Motorway Link Road have been adopted in this assessment.

6.0 ROAD CAPACITY

The capacity of urban and rural roads is generally determined by the capacity of intersections. However, Tables 4.3, 4.4 & 4.5 of the RMS's *Guide to Traffic Generating Developments* provides some guidance on mid-block capacities for urban and rural roads and likely levels of service. In assessing the road capacities, the local road network has been considered to be an urban network with a speed zoning of 60km/h. Therefore, the use of Table 4.3 and 4.4 below is warranted.

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 road is generally considered to be a level of service (LoS) C or better. Noting a LoS D on a one-lane urban road occurs when mid-block traffic volumes exceed 900 vtpd per direction, the two-way two-lane mid-block traffic volume threshold for a LoS C is 1,800 vtpd. Therefore, it is considered that the local road network near the site, as two-way two lane urban network has a mid-block two-way road capacity of 1,800 vtpd and the four (4) Motorway Link Ramps, as one-way urban roads, have a mid-block one-lane road capacity of 900 vtpd.

From the traffic data sourced and calculated in **Section 5** and noting the likely technical two-way mid-block road capacities of the local road network are all greater than the predicted 2022 and 2032 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 in the area.

In terms of the Motorway Link as a major sub-arterial road it is considered that an acceptable level of service for this road would be a LoS D. Noting a LoS E on an urban road occurs when mid-block traffic volumes exceed 1,400 vtpd per direction; the two-way two-lane mid-block traffic volume threshold for a LoS D is at least 2,800 vtpd. However, with a speed limit of 100 km/h the capacity of the Motorway Link Road is likely to be higher than this value and volumes up to at least 3,000 vtpd could be catered for.

7.0 ALTERNATE TRANSPORT MODES

There are no bus routes or train stations near the site as it is currently in a remote rural transition area. As such there are no bus stops or public transport infrastructure constructed in the area.

A concrete footway across the Motorway Link Overpass Bridge, pictured in **Photograph 7**, is the only hard surface pedestrian footpath near the site. With the road network around the site currently being typically of a rural standard, pedestrians are required to utilise either the grass verges within the road reserves or the sealed and unsealed shoulders and travel lanes.



Photograph 7 – Overpass footway adjacent to the site

Similarly, cyclists in the area are required to utilise the sealed shoulders or share the travel lanes with other vehicles within the road network. This is generally only suited to experienced cyclists who may travel in the area.

8.0 DEVELOPMENT PROPOSAL

The planning proposal involves the rezoning of the subject site to permit an industrial development over approximately 42 ha of the 90-ha site. The proposal is likely to yield in the order of 72 industrial lots of average size of 0.54 ha (approximately) on the north-eastern section of the land currently zoned Transition. The planning proposal currently includes the construction of 4 (four) new public roads and includes the intersection upgrading of the Motorway Link southbound ramps / overpass road intersection with the new public road access to the industrial estate and construction of (4) four additional intersections within the proposed development. The proposed site, located between the Motorway Link and the Sydney-Newcastle rail line, is shown on the concept development plan in **Attachment A**.

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 need to be further assessed at development application stage should the rezoning proposal proceed to that stage of the approval process and as the site concept plan further develops.

9.0 TRAFFIC GENERATION

The RMS' *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 amended land use traffic generation rates.

Regarding industrial estates /business parks, the following amended advice is provided within the Technical Direction.

Daily vehicle trips = 4.6 per 100m² GFA in Sydney, 7.83 per 100m² GFA in regional areas

Weekday average evening peak hour vehicle trips = 0.56 per 100m² GFA in Sydney (maximum 1.5), 0.78 per 100m² GFA in regional areas (maximum 1.3).

Weekday average evening peak hour vehicle trips = 0.52 per 100m² GFA in Sydney (maximum 1.31), 0.70 per 100m² GFA in regional areas (maximum 1.2).

For this assessment, it will be assumed that the GLFA for the industrial sites will be approximately 35 % of the developable area of 38.63 ha i.e. 135,205 m² GLFA and the critical peak for assessment purposes will be the PM peak and will also be utilised, conservatively, as the AM peak in this report.

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

- ◆ *Daily vehicle trips* $135,205 / 100 \times 7.83 = \mathbf{10,587 \text{ vtpd}}$
- ◆ *PM weekday peak hour* $135,205 / 100 \times 0.78 = \mathbf{1,055 \text{ vtpd}}$

These values have been used to represent both the AM and PM traffic generated by the proposed development.

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 several assumptions as to distribution patterns to and from the development. In distributing the generated development peak hour traffic through the adjacent road network the following assumptions have been made for this site.

- ◆ In the AM, peak period 70% of traffic will enter the site and 30% will exit the site.
- ◆ In the PM, peak period 30% of traffic will enter the site and 70% will exit the site
- ◆ 60% of traffic generated by the development will have an origin / destination to the west via Motorway Link Ramp.
- ◆ 40% of traffic generated by the development will have an origin / destination to the east via Motorway Link Ramp.

The resulting development traffic trip distribution is shown diagrammatically in **Figure 2** below.

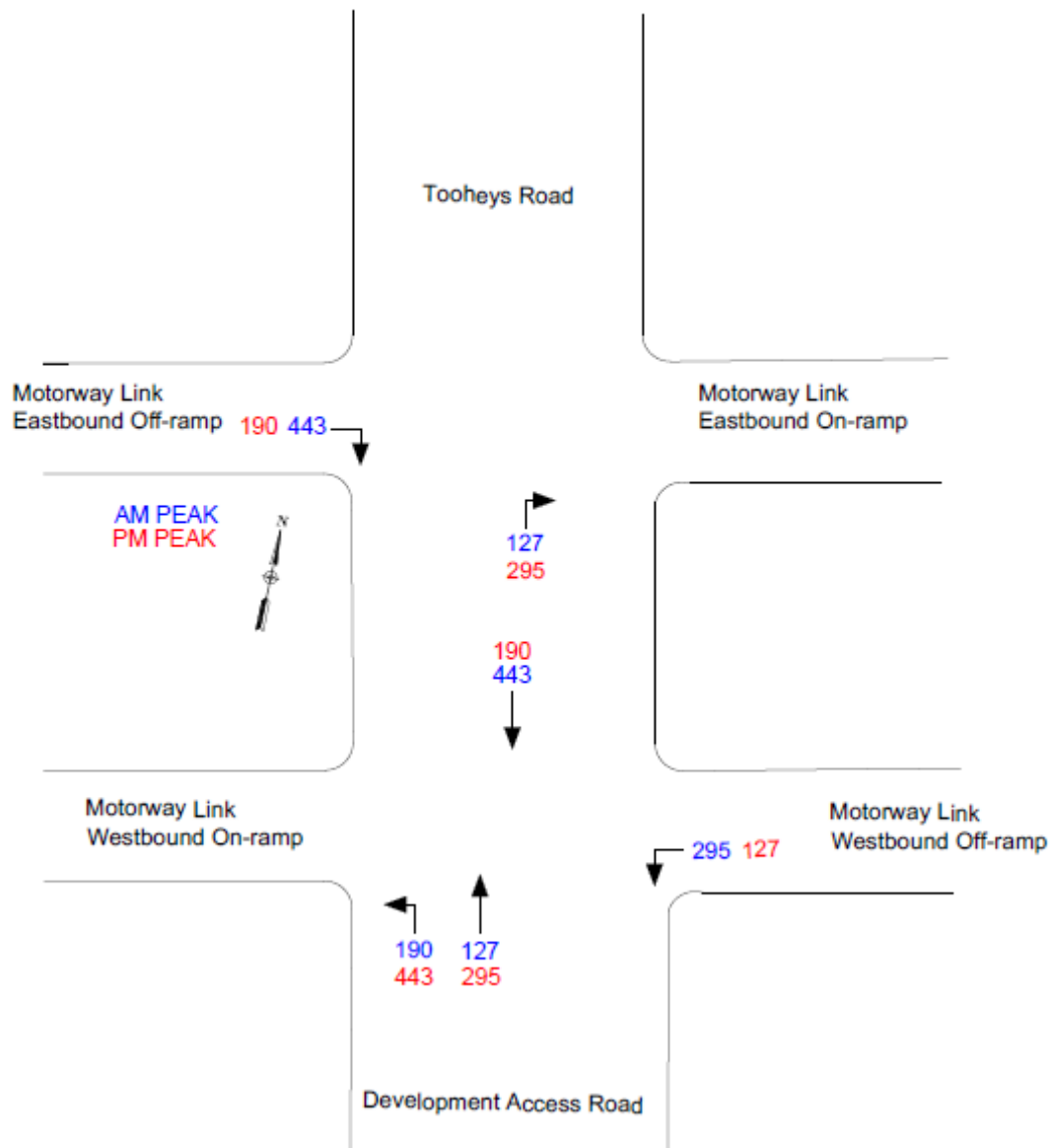


Figure 2 – Development Trip Distribution

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 within its technical mid-block capacity. Based on the trip distributions shown in **Figure 3** the maximum additional AM or PM peak hour traffic generated by the development on each road leg on the local and state road network is as follows;

- ◆ 1055 vtpm on the new public access road to the proposed development
- ◆ 633 vtpm on Motorway Link west;
- ◆ 422 vtpm on Motorway Link east;
- ◆ 443 vtpm on the westbound on-ramp;
- ◆ 443 vtpm on the eastbound off-ramp;
- ◆ 295 vtpm on the westbound on-ramp;
- ◆ 295 vtpm on the eastbound on-ramp;

Based on the available traffic data for the Motorway Link Road described in **Section 5** the addition of up to 633 vtpm on the Motorway Link Road will not cause the mid-block capacity of the road to be reached even through to 2032 with peak hour traffic volumes likely to be in the order of 2,600 vtpm. It is therefore concluded that the state road network has sufficient spare capacity to cater for this planning proposal.

Further the addition of this traffic from the planning proposals onto the local road network will not result in the capacity thresholds for the local road network determined in **Section 6** to be reached through to 2022 and 2032 traffic volumes. This is demonstrated in **Table 1** below.

Table 1 – Mid-block Road Capacity Assessment – AM and PM post development

Road	2017 AM peak (vtpm)	2017 PM peak (vtpm)	2022 AM peak (vtpm)	2022 PM peak (vtpm)	2032 AM peak (vtpm)	2032 PM peak (vtpm)	Road Capacity
Tooheys Road north of ramps	12	21	13	23	15	26	1800
Overpass between ramps	9	585	10	586	11	588	1800
Eastbound On-ramp	5	130	6	130	6	130	900
Eastbound Off-ramp	4	452	4	453	4	454	900
Westbound On-ramp	6	197	6	198	7	198	900
Westbound Off-ramp	3	303	4	304	4	305	900

Therefore, based on this assessment it can be concluded that the local and state road network subject to suitable intersection controls being in place has sufficient spare mid-block capacity to cater for the additional traffic generated by the planning proposal. All new public roads within the planning proposal will need to be constructed in accordance with Central Coast Council's DCP requirements.

11.2 Intersection Capacity

In assessing intersection performance, the main existing intersections of concern will be the development access (new public road) / Motorway Link overpass road / Motorway Link southbound ramps intersection and the existing Motorway Link overpass road / Motorway Link northbound ramps / Tooheys Road intersection.

The impacts of the development 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 for this intersection were;

- ◆ The development access intersection will be a four-way intersection with a give way control on the southern off-ramp;
- ◆ The existing Tooheys Road intersection is a four-way intersection with a give way control on the northern off-ramp road;
- ◆ 2022 and 2032 traffic volumes have been predicted using a 2 % per annum background traffic growth rate on the network.
- ◆ Speed zonings on all roads are 60km/h except for the new development access road which will be 50 km/h.
- ◆ Traffic generated by the planning proposal is distributed as per **Figure 3**.

The results of the modelling for the development access road / Motorway Link overpass road / Motorway Link southbound ramps intersection and the existing Motorway overpass road / Motorway link northbound ramps / Tooheys Road intersection are summarised in **Table 2** and **Table 3** below showing the 'all vehicles' summary results except for the LoS for the worst result for any movement. The Sidra Movement Summary Tables for both intersections are provided in **Attachment C**.

Table 2 – Sidra Modelling – Results Summary – Development access road / Motorway Link southbound ramps / Motorway Link overpass road intersection.

Model Scenario	Degree of Saturation (v/c)	Average Delay (s)	LoS	95% Back of Queue Length (cars)
2017 AM	0.004	4.8	A	0.0
2017 PM	0.009	5.2	A	0.0
2017 AM + development	0.329	3.7	A	1.6
2017 PM + development	0.430	2.8	B	0.5
2022 AM + development	0.329	3.7	A	1.6
2022 PM + development	0.430	2.9	B	0.5
2032 AM + development	0.331	3.7	A	1.6
2032 PM + development	0.430	2.9	B	0.5

Table 3 – Sidra Modelling – Results Summary – Motorway Link overpass road / Motorway Link northbound ramps / Tooheys Road intersection.

Model Scenario	Degree of Saturation (v/c)	Average Delay (s)	LoS	95% Back of Queue Length (cars)
2017 AM	0.005	3.4	A	0.0
2017 PM	0.008	2.6	A	0.0
2017 AM + development	0.499	7.2	A	3.2
2017 PM + development	0.271	6.8	A	1.0
2022 AM + development	0.499	7.2	A	3.2
2022 PM + development	0.272	6.7	A	1.0
2032 AM + development	0.501	7.2	A	3.3
2032 PM + development	0.273	6.7	A	1.0

This modelling shows that with normal background traffic growth both the Development access road / Motorway Link overpass road / Motorway Link southbound ramps intersection and the existing Motorway Link overpass road / Motorway Link northbound access ramps / Tooheys Road intersection would continue to operate satisfactorily through to 2032 in the AM and PM peak periods.

It is noted that all intersections within the planning proposal will need to be constructed in accordance with Central Coast Council's DCP and / or RMS requirements.

11.3 Road Safety

A preliminary road safety assessment of the existing road network around the site identified few issues as the road standard is very high being previously constructed as a freeway. Some signposting and intersection line marking is missing at the overpass / ramp intersections. Upon construction of the development delineation and lighting would be needed in accordance with Central Coast Council and RMS standards.

The available sight distance at the proposed subdivision access connections with the Motorway Link access ramps and the Motorway Link overpass road is required to meet the Austroads requirements (Table 3.2 of Austroads Guide to Road Design – Part 4A Unsignalised and signalised intersections) of approximately 100 metres and 125 metres for a 50 km/h and 60 km/h design speed, respectively, as relevant. All roads satisfy this requirement except the proposed new access road which has a minimum sight distance of approximately 80 metres. This is considered satisfactory as traffic exiting the development will be travelling at less than 50km/h. This can also be reviewed at development application stage as the site concept plan is developed further.

It is concluded that there are no road safety issues on the local road network that could not be overcome through normal road upgrading conditions for the planning proposal and as such road safety is not a constraint to the approval of the planning proposal.

11.4 On-site car parking

On-site car parking in accordance with Central Coast Council as per Wyong Council DCP 2013 is to be provided for individual industrial lots. The size of industrial lots provided in a development application for the subdivision plan is to comply with Council's DCP. Compliance with the DCP will ensure there is sufficient site area for developments to provide sufficient on-site car parking to meet the requirements of Central Coast Council's relevant DCP. This will need to be confirmed at DA stage for development of the individual allotments.

12.0 PEDESTRIAN & CYCLE FACILITIES

As stated there are no existing pedestrian and bicycle facilities near the site except the concrete footway on the overpass. No pedestrians or cyclists were observed near the site during peak period traffic counts and inspections. The planning proposal will not generate any significant pedestrian and bicycle traffic to require upgrading to the road network external to the development. However, internally the provision of concrete pedestrian pathways and cycleways would need to be in accordance with Central Coast Council's requirements as per the relevant DCP documentation.

13.0 PUBLIC TRANSPORT FACILITIES

There are no public transport services near the site. The proposed development is not likely to generate significant public transport usage. However, as the subdivision network of roads and intersections will be designed for the movement of B-Double heavy vehicle through the site and the current road layout includes a loop road the development roads will be able to accommodate public transport buses should the demand for this service arise in the future. Further discussion with the local bus companies may be required at DA stage to identify whether any bus stops are required to be designed into the development.



14.0 CONCLUSIONS

This traffic impact assessment for a planning proposal for a 72-lot industrial development on Part Lot 1 and Lots 2 & 3 in DP 1156997 – Part of 380 Motorway Link (M/L), Wallarah has concluded;

- ◆ Existing traffic volumes on the state and local road network are within the technical mid-block road capacities determined by Austroads and the NSW Roads and Maritime Services (RMS) therefore the local road network has capacity to cater for additional traffic associated with the development.
- ◆ The planning proposal when fully developed is likely to generate an additional 10,587 vtpd; or 1,055 vtpm during the critical PM peak traffic period.
- ◆ The local road network currently has sufficient spare capacity to cater for the traffic generated by this development without adversely impacting on the two-way mid-block traffic volumes on the state and local road network.
- ◆ Sidra modelling of the Development access (new public road) / Motorway Link overpass road / Motorway Link southbound ramps intersection and the existing Motorway Link overpass road / Motorway Link northbound ramps / Tooheys Road intersection shows that as give way controlled intersections they currently operate satisfactorily during both the AM and PM peak periods and would continue to do so post development and with 5, and 15 years' traffic growth to 2032. Average delays, LoS and 95 % back of queue lengths all remain at acceptable levels based on the RMS assessment criteria.
- ◆ The Development access (new public road) / Motorway Link overpass road / Motorway Link southbound ramps intersection will need to be constructed to Central Coast Council and RMS standards.
- ◆ The proposed new lots within the planning proposal are considered large enough to accommodate the car parking requirements of Central Coast Council (Wyong Council) DCP 2013.
- ◆ There are no road safety issues on the local road network that could not be overcome through normal road upgrading conditions for the planning proposal and as such road safety is not a constraint to the approval of the planning proposal.
- ◆ The proposed subdivision will not generate enough pedestrian and bicycle traffic to create a nexus to provide additional facilities external to the subdivision. Internally the provision of concrete pedestrian pathways and cycleways would need to be in accordance with Central Coast Council's requirements as per the relevant DCP documentation.
- ◆ The site is not likely to generate usage for public transport services. However, as the subdivision network of roads and intersections will be designed for movements of B-Double heavy vehicles and it includes a loop road the development roads will be able to accommodate public buses should the demand for this service arise in the future.



15.0 RECOMMENDATION

Having carried out this preliminary traffic impact assessment for the planning proposal for an industrial development on Part Lot 1 and Lots 2 & 3 in DP 1156997 – Part of 380 Motorway Link, Wallarah it is recommended that the proposal can be supported from a traffic impact perspective as it will not adversely impact on the state and local road network. Subject to the construction of all new public roads and intersections to Central Coast Council's and RMS requirements the proposal would 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

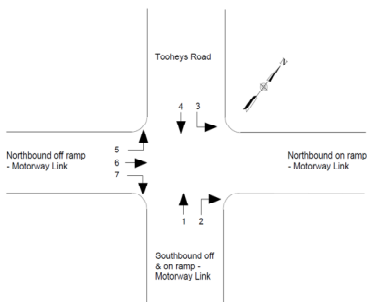


ATTACHMENT B

Traffic Count Data

Date		27/02/2017					
Day		Monday					
Time		7:00am - 8:00am					
Weather		Fine and overcast					
Conducted by:		Pete					
MOVEMENT		1	2	3	4	5	6
7:00 - 7:15	2	0	0	2	1	0	1
7:15 - 7:30	0	1	2	2	1	0	0
7:30 - 7:45	0	0	0	0	2	0	0
7:45 - 8:00	0	0	0	0	0	0	0
SUM	2	1	2	4	4	0	1
PEAK	2	1	2	4	4	0	1

Leg	PHT (vph)
Tooheys Road	12
Eastbound off - ramp	5
Eastbound on - ramp	3
Westbound on - ramp	5
Westbound off - ramp	3
Boral Access	6
Tooheys Road west	6



Date	23/02/2017						
Day	Thursday						
Time	3.00 pm - 4.00 pm						
Weather	Fine						
Conducted by:	Pete						
MOVEMENT	1	2	3	4	5	6	7
3:00 - 3:15	4	0	1	3	0	0	0
3:15 - 3:30	1	1	0	0	0	0	0
3:30 - 3:45	0	0	4	2	1	0	1
3:45 - 4:00	2	0	2	1	0	1	0
SUM	7	1	7	6	1	1	1
PEAK	7	1	7	6	1	1	1

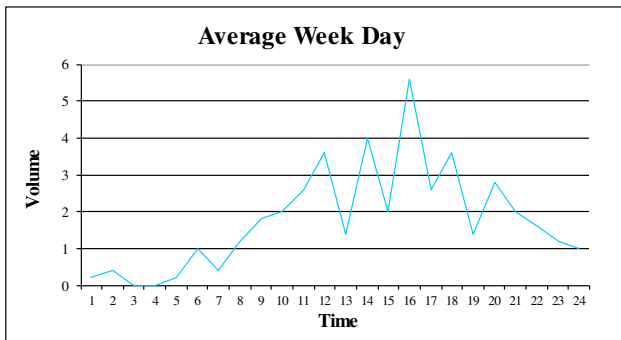
Leg	PHT (vph)
Tooheys Road	21
Eastbound off - ramp	3
Eastbound on - ramp	9
Westbound on - ramp	7
Westbound off - ramp	8
Boral Access	9
Tooheys Road west	12

The diagram illustrates the intersection layout with numbered movements:

- Movement 1:** Eastbound on-ramp from Tooheys Road.
- Movement 2:** Eastbound off-ramp to Boral Access.
- Movement 3:** Westbound on-ramp from Tooheys Road.
- Movement 4:** Westbound off-ramp to Boral Access.
- Movement 5:** Northbound off-ramp from Motorway Link.
- Movement 6:** Northbound on-ramp to Motorway Link.
- Movement 7:** Southbound off & on-ramp from Motorway Link.

Site 2 Tooheys Rd - 250m North of Motor Link Rd [80]
Northbound

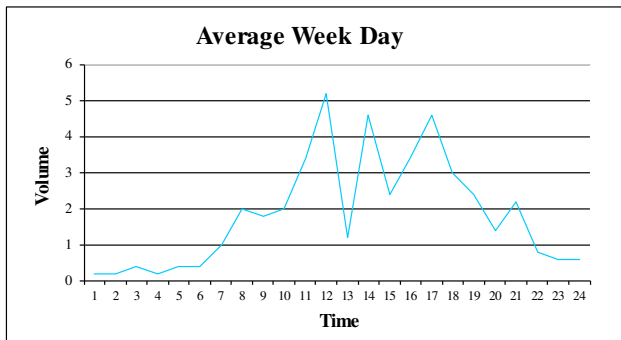
Day Time	Thu 23/02/17	Fri 24-02-17	Sat 25-02-17	Sun 26-02-17	Mon 27-02-17	Tue 28-02-17	Wed 01-03-17	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	0	0	0	0	0	0	1	0	0	0
1:00	1	0	0	0	1	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	1	0	0	0	0	1	0
4:00	0	0	0	0	1	0	0	0	0	0
5:00	1	1	1	0	2	1	0	1	1	1
6:00	1	1	1	0	0	0	0	0	1	0
7:00	1	1	3	0	2	2	0	1	2	1
8:00	3	2	2	3	2	1	1	2	3	2
9:00	4	2	3	2	0	2	2	2	3	2
10:00	3	1	1	4	7	1	1	3	3	3
11:00	3	3	3	2	4	3	5	4	3	3
12:00	0	1	5	5	3	2	1	1	5	2
13:00	3	4	5	5	4	4	5	4	5	4
14:00	4	3	1	5	0	2	1	2	3	2
15:00	5	7	3	6	8	5	3	6	5	5
16:00	4	0	7	2	4	0	5	3	5	3
17:00	5	2	5	3	4	4	3	4	4	4
18:00	3	0	1	1	1	2	1	1	1	1
19:00	3	4	3	2	4	2	1	3	3	3
20:00	4	1	3	2	1	1	3	2	3	2
21:00	1	2	1	5	2	1	2	2	3	2
22:00	0	1	0	1	1	3	1	1	1	1
23:00	2	2	0	0	0	1	0	1	0	1
Total	51	38	48	49	51	37	36	43	49	44



Summary			
	from	to	
AM Peak	10:00 AM	11:00 AM	7
PM Peak	3:00 PM	4:00 PM	8
Week Day Average			43
Weekend Day Average			49
7 Day Average			44

Site 2 Tooheys Rd - 250m North of Motor Link Rd [80]
Southbound

Day Time	Thu 23/02/17	Fri 24-02-17	Sat 25-02-17	Sun 26-02-17	Mon 27-02-17	Tue 28-02-17	Wed 01-03-17	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	1	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	1	0	0	0	0	0
2:00	0	0	0	0	2	0	0	0	0	0
3:00	0	0	0	0	1	0	0	0	0	0
4:00	0	0	0	1	2	0	0	0	1	0
5:00	1	0	1	1	1	0	0	0	1	1
6:00	1	1	0	0	1	1	1	1	0	1
7:00	2	1	2	0	3	2	2	2	1	2
8:00	3	1	1	1	1	2	2	2	1	2
9:00	4	2	2	3	1	1	2	2	3	2
10:00	2	3	3	7	7	3	2	3	5	4
11:00	6	5	4	3	4	4	7	5	4	5
12:00	0	2	1	4	1	2	1	1	3	2
13:00	5	4	4	5	4	6	4	5	5	5
14:00	4	4	3	6	2	2	0	2	5	3
15:00	3	3	1	4	5	2	4	3	3	3
16:00	5	3	1	4	9	4	2	5	3	4
17:00	5	3	8	3	4	2	1	3	6	4
18:00	2	3	5	3	1	2	4	2	4	3
19:00	3	1	1	2	3	0	0	1	2	1
20:00	4	4	1	1	0	1	2	2	1	2
21:00	1	0	1	1	2	0	1	1	1	1
22:00	0	1	0	2	0	0	2	1	1	1
23:00	0	0	0	0	1	2	0	1	0	0
Total	52	41	39	51	56	36	37	44	45	45



Summary			
	from	to	
AM Peak	10:00 AM	11:00 AM	7
PM Peak	4:00 PM	5:00 PM	9
Week Day Average			44
Weekend Day Average			45
7 Day Average			45

ATTACHMENT C

Sidra Movement Summary Tables

MOVEMENT SUMMARY

▽ Site: AM2017

Industrial Development Access Intersection Wallarah
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	1	15.0	0.001	3.9	LOS A	0.0	0.0	0.00	0.26	46.5
2	T1	1	15.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.26	44.6
Approach		2	15.0	0.001	1.9	NA	0.0	0.0	0.00	0.26	46.0
East: Westbound Off Ramp											
4	L2	1	15.0	0.004	5.7	LOS A	0.0	0.1	0.02	0.59	48.4
5	T1	1	15.0	0.004	4.3	LOS A	0.0	0.1	0.02	0.59	53.3
6	R2	3	15.0	0.004	5.9	LOS A	0.0	0.1	0.02	0.59	48.5
Approach		5	15.0	0.004	5.6	LOS A	0.0	0.1	0.02	0.59	49.8
North: Overpass Road											
8	T1	1	15.0	0.004	1.1	LOS A	0.0	0.1	0.02	0.55	42.2
9	R2	5	15.0	0.004	5.9	LOS A	0.0	0.1	0.02	0.55	49.5
Approach		6	15.0	0.004	5.1	NA	0.0	0.1	0.02	0.55	49.0
All Vehicles		13	15.0	0.004	4.8	NA	0.0	0.1	0.02	0.52	49.0

MOVEMENT SUMMARY

▽ Site: AM2017 + dev

Industrial Development Access Intersection Wallarah
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	190	15.0	0.185	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	127	15.0	0.185	0.0	LOS A	0.0	0.0	0.00	0.31	43.7
Approach		317	15.0	0.185	2.3	NA	0.0	0.0	0.00	0.31	45.6
East: Westbound Off Ramp											
4	L2	295	15.0	0.329	8.7	LOS A	1.6	12.9	0.56	0.81	45.1
5	T1	1	15.0	0.329	12.5	LOS A	1.6	12.9	0.56	0.81	51.0
6	R2	3	15.0	0.329	12.8	LOS A	1.6	12.9	0.56	0.81	45.7
Approach		299	15.0	0.329	8.8	LOS A	1.6	12.9	0.56	0.81	45.1
North: Overpass Road											
8	T1	443	15.0	0.254	1.1	LOS A	0.1	0.5	0.01	0.20	52.9
9	R2	5	15.0	0.254	7.7	LOS A	0.1	0.5	0.01	0.20	53.7
Approach		448	15.0	0.254	1.2	NA	0.1	0.5	0.01	0.20	52.9
All Vehicles		1064	15.0	0.329	3.7	NA	1.6	12.9	0.16	0.41	47.0

MOVEMENT SUMMARY

▽ Site: AM2022 + dev

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	190	15.0	0.185	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	127	15.0	0.185	0.0	LOS A	0.0	0.0	0.00	0.31	43.7
Approach		317	15.0	0.185	2.3	NA	0.0	0.0	0.00	0.31	45.6
East: Westbound Off Ramp											
4	L2	295	15.0	0.329	8.7	LOS A	1.6	12.9	0.56	0.81	45.1
5	T1	1	15.0	0.329	12.5	LOS A	1.6	12.9	0.56	0.81	51.0
6	R2	3	15.0	0.329	12.8	LOS A	1.6	12.9	0.56	0.81	45.7
Approach		299	15.0	0.329	8.8	LOS A	1.6	12.9	0.56	0.81	45.1
North: Overpass Road											
8	T1	443	15.0	0.255	1.2	LOS A	0.1	0.5	0.02	0.20	52.8
9	R2	6	15.0	0.255	7.7	LOS A	0.1	0.5	0.02	0.20	53.7
Approach		449	15.0	0.255	1.2	NA	0.1	0.5	0.02	0.20	52.8
All Vehicles		1065	15.0	0.329	3.7	NA	1.6	12.9	0.17	0.41	47.0

MOVEMENT SUMMARY

▽ Site: AM2032 + dev

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	190	15.0	0.185	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	127	15.0	0.185	0.0	LOS A	0.0	0.0	0.00	0.31	43.7
Approach		317	15.0	0.185	2.3	NA	0.0	0.0	0.00	0.31	45.6
East: Westbound Off Ramp											
4	L2	295	15.0	0.331	8.7	LOS A	1.6	13.0	0.56	0.81	45.1
5	T1	1	15.0	0.331	12.6	LOS A	1.6	13.0	0.56	0.81	50.9
6	R2	4	15.0	0.331	12.9	LOS A	1.6	13.0	0.56	0.81	45.7
Approach		300	15.0	0.331	8.8	LOS A	1.6	13.0	0.56	0.81	45.1
North: Overpass Road											
8	T1	443	15.0	0.257	1.2	LOS A	0.1	0.8	0.03	0.20	52.5
9	R2	9	15.0	0.257	7.7	LOS A	0.1	0.8	0.03	0.20	53.6
Approach		452	15.0	0.257	1.3	NA	0.1	0.8	0.03	0.20	52.6
All Vehicles		1069	15.0	0.331	3.7	NA	1.6	13.0	0.17	0.41	47.0

MOVEMENT SUMMARY

▽ Site: PM2017

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	1	15.0	0.001	3.9	LOS A	0.0	0.0	0.00	0.26	46.5
2	T1	1	15.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.26	44.6
Approach		2	15.0	0.001	1.9	NA	0.0	0.0	0.00	0.26	46.0
East: Westbound Off Ramp											
4	L2	1	15.0	0.009	5.7	LOS A	0.0	0.2	0.03	0.61	48.2
5	T1	1	15.0	0.009	4.3	LOS A	0.0	0.2	0.03	0.61	53.1
6	R2	8	15.0	0.009	6.0	LOS A	0.0	0.2	0.03	0.61	48.3
Approach		10	15.0	0.009	5.8	LOS A	0.0	0.2	0.03	0.61	48.9
North: Overpass Road											
8	T1	1	15.0	0.005	1.1	LOS A	0.0	0.2	0.02	0.57	41.8
9	R2	7	15.0	0.005	5.9	LOS A	0.0	0.2	0.02	0.57	49.4
Approach		8	15.0	0.005	5.3	NA	0.0	0.2	0.02	0.57	49.0
All Vehicles		20	15.0	0.009	5.2	NA	0.0	0.2	0.02	0.56	48.8

MOVEMENT SUMMARY

▽ Site: PM2017 + dev

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	443	15.0	0.430	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	295	15.0	0.430	0.0	LOS A	0.0	0.0	0.00	0.31	43.6
Approach		738	15.0	0.430	2.3	NA	0.0	0.0	0.00	0.31	45.5
East: Westbound Off Ramp											
4	L2	127	15.0	0.119	6.5	LOS A	0.5	3.8	0.32	0.59	46.9
5	T1	1	15.0	0.119	15.6	LOS B	0.5	3.8	0.32	0.59	52.2
6	R2	8	15.0	0.119	10.2	LOS A	0.5	3.8	0.32	0.59	47.2
Approach		136	15.0	0.119	6.8	LOS A	0.5	3.8	0.32	0.59	47.0
North: Overpass Road											
8	T1	190	15.0	0.119	1.6	LOS A	0.2	1.2	0.08	0.20	50.4
9	R2	7	15.0	0.119	11.7	LOS A	0.2	1.2	0.08	0.20	52.9
Approach		197	15.0	0.119	1.9	NA	0.2	1.2	0.08	0.20	50.7
All Vehicles		1071	15.0	0.430	2.8	NA	0.5	3.8	0.06	0.33	46.3

MOVEMENT SUMMARY

▽ Site: PM2022 + dev

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	443	15.0	0.430	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	295	15.0	0.430	0.0	LOS A	0.0	0.0	0.00	0.31	43.6
Approach		738	15.0	0.430	2.3	NA	0.0	0.0	0.00	0.31	45.5
East: Westbound Off Ramp											
4	L2	127	15.0	0.121	6.5	LOS A	0.5	3.9	0.32	0.59	46.9
5	T1	1	15.0	0.121	15.7	LOS B	0.5	3.9	0.32	0.59	52.2
6	R2	9	15.0	0.121	10.2	LOS A	0.5	3.9	0.32	0.59	47.2
Approach		137	15.0	0.121	6.8	LOS A	0.5	3.9	0.32	0.59	47.0
North: Overpass Road											
8	T1	190	15.0	0.122	1.7	LOS A	0.2	1.5	0.10	0.20	49.8
9	R2	9	15.0	0.122	11.7	LOS A	0.2	1.5	0.10	0.20	52.6
Approach		199	15.0	0.122	2.2	NA	0.2	1.5	0.10	0.20	50.1
All Vehicles		1074	15.0	0.430	2.9	NA	0.5	3.9	0.06	0.33	46.2

MOVEMENT SUMMARY

▽ Site: PM2032 + dev

Industrial Development Access Intersection Wallarah
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access Road											
1	L2	443	15.0	0.430	3.9	LOS A	0.0	0.0	0.00	0.31	46.1
2	T1	295	15.0	0.430	0.0	LOS A	0.0	0.0	0.00	0.31	43.6
Approach		738	15.0	0.430	2.3	NA	0.0	0.0	0.00	0.31	45.5
East: Westbound Off Ramp											
4	L2	127	15.0	0.122	6.5	LOS A	0.5	3.9	0.33	0.60	46.9
5	T1	1	15.0	0.122	15.7	LOS B	0.5	3.9	0.33	0.60	52.2
6	R2	10	15.0	0.122	10.2	LOS A	0.5	3.9	0.33	0.60	47.2
Approach		138	15.0	0.122	6.8	LOS A	0.5	3.9	0.33	0.60	47.0
North: Overpass Road											
8	T1	190	15.0	0.122	1.7	LOS A	0.2	1.5	0.10	0.20	49.8
9	R2	9	15.0	0.122	11.7	LOS A	0.2	1.5	0.10	0.20	52.6
Approach		199	15.0	0.122	2.2	NA	0.2	1.5	0.10	0.20	50.1
All Vehicles		1075	15.0	0.430	2.9	NA	0.5	3.9	0.06	0.33	46.2

MOVEMENT SUMMARY

▽ Site: AM2017

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 5 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	2	15.0	0.002	0.0	LOS A	0.0	0.0	0.03	0.21	57.2
3	R2	1	15.0	0.002	5.9	LOS A	0.0	0.0	0.03	0.21	52.8
Approach		3	15.0	0.002	2.0	NA	0.0	0.0	0.03	0.21	55.6
North: Tooheys Road											
7	L2	2	15.0	0.004	5.7	LOS A	0.0	0.0	0.00	0.20	56.0
8	T1	4	15.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.20	57.4
Approach		7	15.0	0.004	1.9	NA	0.0	0.0	0.00	0.20	56.8
West: Eastbound Off-Ramp											
10	L2	4	15.0	0.005	5.7	LOS A	0.0	0.1	0.02	0.57	53.1
11	T1	1	15.0	0.005	4.3	LOS A	0.0	0.1	0.02	0.57	53.3
12	R2	1	15.0	0.005	5.9	LOS A	0.0	0.1	0.02	0.57	48.6
Approach		7	15.0	0.005	5.5	LOS A	0.0	0.1	0.02	0.57	52.5
All Vehicles		17	15.0	0.005	3.4	NA	0.0	0.1	0.01	0.35	54.6

MOVEMENT SUMMARY

▽ Site: AM2017 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	2	15.0	0.078	0.0	LOS A	0.4	3.0	0.04	0.60	52.5
3	R2	128	15.0	0.078	5.9	LOS A	0.4	3.0	0.04	0.60	48.8
Approach		130	15.0	0.078	5.8	NA	0.4	3.0	0.04	0.60	48.8
North: Tooheys Road											
7	L2	2	15.0	0.003	5.7	LOS A	0.0	0.0	0.00	0.20	56.0
8	T1	4	15.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.20	57.4
Approach		6	15.0	0.003	1.9	NA	0.0	0.0	0.00	0.20	56.8
West: Eastbound Off-Ramp											
10	L2	4	15.0	0.499	6.1	LOS A	3.2	25.4	0.27	0.66	51.5
11	T1	1	15.0	0.499	5.8	LOS A	3.2	25.4	0.27	0.66	51.7
12	R2	444	15.0	0.499	7.7	LOS A	3.2	25.4	0.27	0.66	46.6
Approach		449	15.0	0.499	7.7	LOS A	3.2	25.4	0.27	0.66	46.6
All Vehicles		585	15.0	0.499	7.2	NA	3.2	25.4	0.21	0.64	47.2

MOVEMENT SUMMARY

▽ Site: AM2022 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	2	15.0	0.078	0.0	LOS A	0.4	3.0	0.04	0.60	52.5
3	R2	128	15.0	0.078	5.9	LOS A	0.4	3.0	0.04	0.60	48.8
Approach		130	15.0	0.078	5.8	NA	0.4	3.0	0.04	0.60	48.8
North: Tooheys Road											
7	L2	2	15.0	0.003	5.7	LOS A	0.0	0.0	0.00	0.20	56.0
8	T1	4	15.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.20	57.4
Approach		6	15.0	0.003	1.9	NA	0.0	0.0	0.00	0.20	56.8
West: Eastbound Off-Ramp											
10	L2	4	15.0	0.499	6.1	LOS A	3.2	25.4	0.27	0.66	51.5
11	T1	1	15.0	0.499	5.8	LOS A	3.2	25.4	0.27	0.66	51.7
12	R2	444	15.0	0.499	7.7	LOS A	3.2	25.4	0.27	0.66	46.6
Approach		449	15.0	0.499	7.7	LOS A	3.2	25.4	0.27	0.66	46.6
All Vehicles		585	15.0	0.499	7.2	NA	3.2	25.4	0.21	0.64	47.2

MOVEMENT SUMMARY

▽ Site: AM2032 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	3	15.0	0.079	0.0	LOS A	0.4	3.0	0.05	0.59	52.5
3	R2	128	15.0	0.079	5.9	LOS A	0.4	3.0	0.05	0.59	48.8
Approach		131	15.0	0.079	5.8	NA	0.4	3.0	0.05	0.59	48.9
North: Tooheys Road											
7	L2	3	15.0	0.005	5.7	LOS A	0.0	0.0	0.00	0.22	55.8
8	T1	5	15.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.22	57.1
Approach		8	15.0	0.005	2.1	NA	0.0	0.0	0.00	0.22	56.4
West: Eastbound Off-Ramp											
10	L2	5	15.0	0.501	6.1	LOS A	3.3	25.7	0.28	0.66	51.5
11	T1	1	15.0	0.501	5.9	LOS A	3.3	25.7	0.28	0.66	51.7
12	R2	444	15.0	0.501	7.7	LOS A	3.3	25.7	0.28	0.66	46.5
Approach		450	15.0	0.501	7.7	LOS A	3.3	25.7	0.28	0.66	46.6
All Vehicles		589	15.0	0.501	7.2	NA	3.3	25.7	0.23	0.64	47.2

MOVEMENT SUMMARY

▽ Site: PM2017

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
South: Overpass Road											
2	T1	7	15.0	0.005	0.0	LOS A	0.0	0.0	0.02	0.08	58.9
3	R2	1	15.0	0.005	5.9	LOS A	0.0	0.0	0.02	0.08	54.2
Approach		8	15.0	0.005	0.7	NA	0.0	0.0	0.02	0.08	58.2
North: Tooheys Road											
7	L2	7	15.0	0.008	5.7	LOS A	0.0	0.0	0.00	0.32	55.0
8	T1	6	15.0	0.008	0.0	LOS A	0.0	0.0	0.00	0.32	55.9
Approach		13	15.0	0.008	3.1	NA	0.0	0.0	0.00	0.32	55.3
West: Eastbound Off-Ramp											
10	L2	1	15.0	0.002	5.7	LOS A	0.0	0.1	0.05	0.56	53.1
11	T1	1	15.0	0.002	4.4	LOS A	0.0	0.1	0.05	0.56	53.4
12	R2	1	15.0	0.002	6.0	LOS A	0.0	0.1	0.05	0.56	48.6
Approach		3	15.0	0.002	5.4	LOS A	0.0	0.1	0.05	0.56	52.0
All Vehicles		24	15.0	0.008	2.6	NA	0.0	0.1	0.01	0.27	55.6

MOVEMENT SUMMARY

▽ Site: PM2017 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
South: Overpass Road											
2	T1	7	15.0	0.183	0.1	LOS A	1.0	7.7	0.07	0.58	52.4
3	R2	296	15.0	0.183	5.9	LOS A	1.0	7.7	0.07	0.58	48.7
Approach		303	15.0	0.183	5.8	NA	1.0	7.7	0.07	0.58	48.8
North: Tooheys Road											
7	L2	7	15.0	0.008	5.7	LOS A	0.0	0.0	0.00	0.32	55.0
8	T1	6	15.0	0.008	0.0	LOS A	0.0	0.0	0.00	0.32	55.9
Approach		13	15.0	0.008	3.1	NA	0.0	0.0	0.00	0.32	55.3
West: Eastbound Off-Ramp											
10	L2	1	15.0	0.271	5.8	LOS A	1.0	8.2	0.41	0.74	50.9
11	T1	1	15.0	0.271	6.4	LOS A	1.0	8.2	0.41	0.74	51.1
12	R2	191	15.0	0.271	8.6	LOS A	1.0	8.2	0.41	0.74	45.8
Approach		193	15.0	0.271	8.5	LOS A	1.0	8.2	0.41	0.74	45.9
All Vehicles		509	15.0	0.271	6.8	NA	1.0	8.2	0.20	0.64	47.8

MOVEMENT SUMMARY

▽ Site: PM2022 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	8	15.0	0.184	0.1	LOS A	1.0	7.7	0.08	0.58	52.4
3	R2	296	15.0	0.184	5.9	LOS A	1.0	7.7	0.08	0.58	48.7
Approach		304	15.0	0.184	5.8	NA	1.0	7.7	0.08	0.58	48.8
North: Tooheys Road											
7	L2	8	15.0	0.009	5.7	LOS A	0.0	0.0	0.00	0.31	55.0
8	T1	7	15.0	0.009	0.0	LOS A	0.0	0.0	0.00	0.31	55.9
Approach		15	15.0	0.009	3.0	NA	0.0	0.0	0.00	0.31	55.4
West: Eastbound Off-Ramp											
10	L2	1	15.0	0.272	5.8	LOS A	1.0	8.2	0.42	0.74	50.9
11	T1	1	15.0	0.272	6.5	LOS A	1.0	8.2	0.42	0.74	51.1
12	R2	191	15.0	0.272	8.6	LOS A	1.0	8.2	0.42	0.74	45.8
Approach		193	15.0	0.272	8.6	LOS A	1.0	8.2	0.42	0.74	45.9
All Vehicles		512	15.0	0.272	6.7	NA	1.0	8.2	0.21	0.63	47.9

MOVEMENT SUMMARY

▽ Site: PM2032 + dev

Industrial Development Wallarah
Tooheys Rd-AccessRamps-Overpass Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Overpass Road											
2	T1	9	15.0	0.185	0.1	LOS A	1.0	7.8	0.09	0.58	52.4
3	R2	296	15.0	0.185	5.9	LOS A	1.0	7.8	0.09	0.58	48.7
Approach		305	15.0	0.185	5.8	NA	1.0	7.8	0.09	0.58	48.8
North: Tooheys Road											
7	L2	9	15.0	0.010	5.7	LOS A	0.0	0.0	0.00	0.31	55.1
8	T1	8	15.0	0.010	0.0	LOS A	0.0	0.0	0.00	0.31	55.9
Approach		17	15.0	0.010	3.0	NA	0.0	0.0	0.00	0.31	55.4
West: Eastbound Off-Ramp											
10	L2	1	15.0	0.273	5.8	LOS A	1.0	8.3	0.42	0.75	50.8
11	T1	1	15.0	0.273	6.5	LOS A	1.0	8.3	0.42	0.75	51.1
12	R2	191	15.0	0.273	8.6	LOS A	1.0	8.3	0.42	0.75	45.8
Approach		193	15.0	0.273	8.6	LOS A	1.0	8.3	0.42	0.75	45.8
All Vehicles		515	15.0	0.273	6.7	NA	1.0	8.3	0.21	0.63	47.9