



TRAFFIC MANAGEMENT & SAFETY CONSULTANTS

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RESPONSE REPORT

PROPOSED SUBDIVISION

NORTHBANK ENTERPRISE HUB

TOMAGO ROAD, TOMAGO

June 2012

The Applicant
Northbank Enterprise Hub Pty Ltd

Port Stephens Council Local Government Area

Prepared by
Terry Keating
Director
TPK & Associates Pty Ltd

NORTHBANK INDUSTRIAL PARK

RESPONSE REPORT

INTRODUCTION

The Project to Date

TPK & Associates Pty Ltd (TPK) were invited by ADW Johnson Pty Ltd (ADW) to join their project team in preparation of a traffic impact assessment for an Industrial Park on mostly vacant land at:

Lot 1001 DP1127780, Tomago Road, TOMAGO

The site location is shown on Figure 1; this site adjoins a site with current Project Application approval for Industry related land use and is to be connected to this development site.

The TPK Traffic Assessment Edition 1, dated December 2010 was submitted to authorities as part of the Development Application and included a holistic view of the overall impact of both sites.

The Department of Planning & Infrastructure (DoPI) subsequently provided comment on the traffic assessment and those comments were considered by the project team.

The project team initiated a meeting with RTA Newcastle to ensure that the original traffic assessment report had been suitable to their needs; the outcome of the meeting was:

- RTA provided a revised traffic generation rate, to that RTA had nominated for the original TPK traffic assessment; this revised rate was to be used in further analysis to be undertaken by TPK. The outcomes are provided in this report.
- RTA confirmed that they would plan and manage the progressive upgrade requirements of Tomago Road and primarily required revised indicators for the subject development by TPK utilising the new traffic generation rate they provided; RTA also confirmed analysis of the site frontage was sufficient for their needs.

TPK then prepared a second report (Edition 2, dated October 2011) that has now been considered by the relevant authorities in the March 2012 DoPI “Adequacy Review”. This Response Report should be read in conjunction with TPK Edition 2 Report Oct 2011 and it addresses those matters raised by NSW DoPI, RMS and Port Stephens Council.

Provided with this report is Appendix A, the site plan used in TPK’s Report Edition 2 and Appendix B the existing Tomago Road traffic counter data from 2010.

TPK & ASSOCIATES – NORTHBANK ENTERPRISE HUB, TOMAGO – TRAFFIC ASSESSMENT

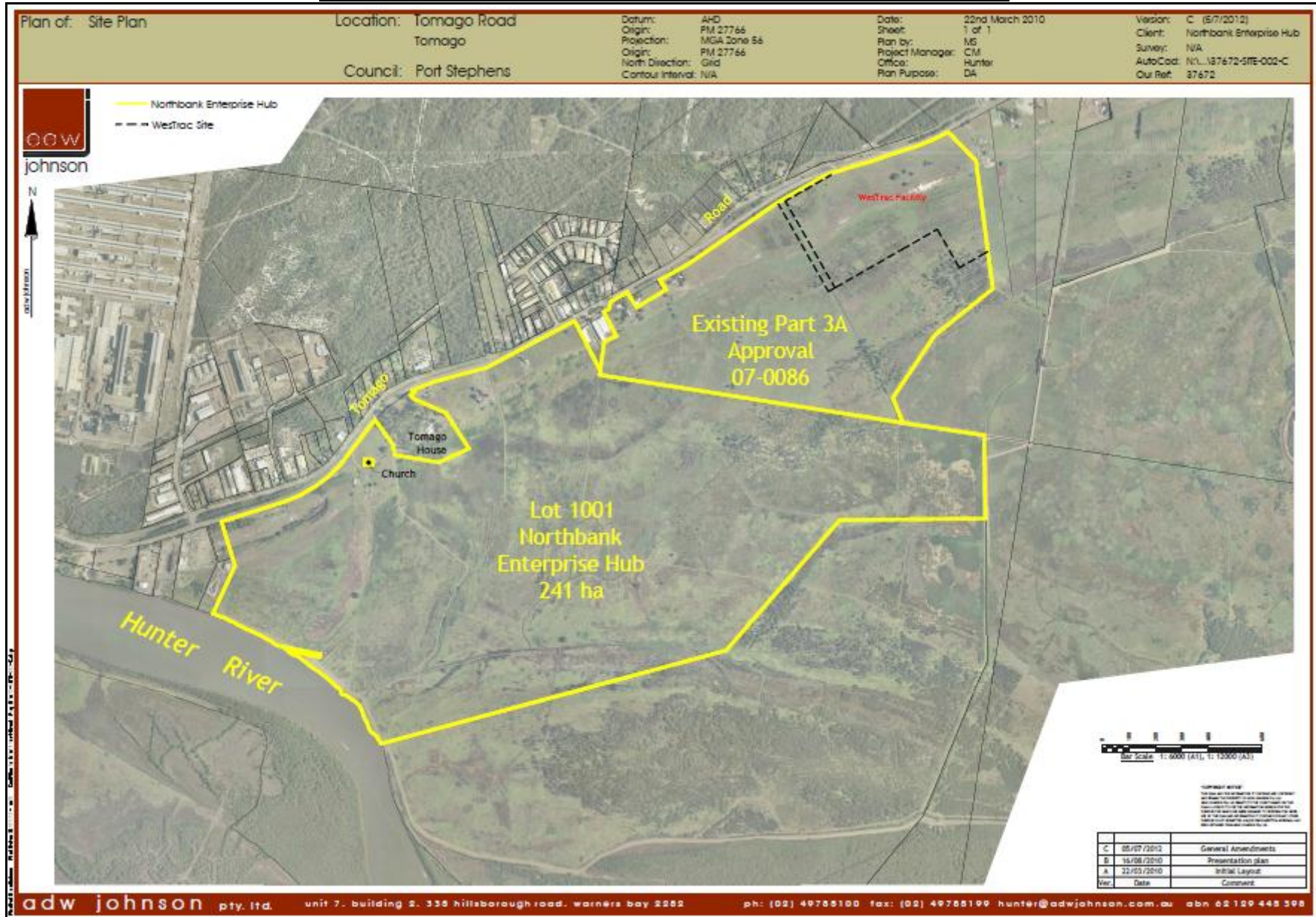


FIGURE 1 – LOCALITY OVERVIEW

RESPONSE TO COMMENTS

The three dot points raised by DoPI in their “Adequacy Review” correspondence dated 14.03.12 under the heading Traffic is also raised in comments by RMS; these are addressed below. Also provided below is a response to comments made by Port Stephens Council.

Roads & Maritime Services (RMS)

The following points (in italics) were raised by RMS, Newcastle; TPK’s response follows each point listed.

2022 shall be adopted for assessment of future year scenarios

The TPK reports (Edition 1 and Edition 2) were assessments commenced in 2010 and utilised the traffic counter data collected for Tomago Road in 2010.

RMS required 10 year forward modelling for the intersections hence the 2020 Movement Summaries were provided in the TPK reports.

The 4%pa growth is only applied to the existing traffic on Tomago Road as the developments traffic is not subject to growth as they are calculated from the RMS required traffic generation rates for the nominated land use.

Therefore to update past analysis by 2 years up to 2022 all that was required was the addition of 35 trips to westbound through traffic and 45 trips to eastbound through traffic.

TPK has rerun the Western Intersection models presented in TPK Edition 2 (refer to that reports Movement Summaries M4 & M5). The new Movement Summaries are provided in this report as MR1 & MR2; there was no change to the geometric SIDRA model used at the Western Intersection for response to this RMS point.

The additional 2 years growth to Tomago Road as set out above was a small volume by comparison to potential usage and the impact of that traffic on the previous modelling was minimal; for example Average Intersection Delay rose 0.7 seconds in the AM Peak and 3.5 seconds in the PM Peak whilst overall LoS remained at C.

The Central Intersection is dealt with in page 6 of this report.

The Western Intersection is subjected to higher volumes and has the same geometric layout as the Eastern Intersection (Westrac Drive). Given the rerun for the Western Intersection disclosed no additional impacts for the extra 2 years growth TPK concluded there should be no necessity to rerun the Eastern Intersection model.

MR1 – MOVEMENT SUMMARY

Site: TCS AM

TOMAGO ROAD & SITE ACCESS ROAD WESTERN, TOMAGO

Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV Deg. Satn %	v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
							Vehicles veh	Distance m			
South: SITE ACCESS ROAD WESTERN											
1	L	222	5.0	0.129	25.1	LOS C	3.2	23.6	0.58	0.75	35.6
3	R	39	5.0	0.104	46.1	LOS D	1.7	12.4	0.84	0.73	26.6
Approach		261	5.0	0.129	28.2	LOS C	3.2	23.6	0.62	0.75	33.9
East: TOMAGO ROAD											
4	L	92	5.0	0.125	29.9	LOS C	3.0	22.1	0.66	0.75	33.0
5	T	1328	5.0	0.860	33.5	LOS C	33.4	243.6	0.92	0.90	29.9
Approach		1420	5.0	0.860	33.2	LOS C	33.4	243.6	0.91	0.89	30.0
West: TOMAGO ROAD (FROM HWY)											
11	T	2111	5.0	0.819	4.4	LOS A	19.9	145.4	0.39	0.36	51.8
12	R	515	5.0	0.877	45.1	LOS D	10.6	77.3	1.00	0.96	26.9
Approach		2625	5.0	0.877	12.4	LOS B	19.9	145.4	0.51	0.48	43.8
All Vehicles		4306	5.0	0.877	20.2	LOS C	33.4	243.6	0.65	0.63	37.5

MR2 – MOVEMENT SUMMARY

Site: TCS PM

TOMAGO ROAD & SITE ACCESS ROAD WESTERN, TOMAGO

Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV Deg. Satn %	v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
							Vehicles veh	Distance m			
South: SITE ACCESS ROAD WESTERN											
1	L	515	5.0	0.458	52.5	LOS D	15.0	109.4	0.85	0.83	24.6
3	R	92	5.0	0.333	69.8	LOS E	6.0	44.1	0.94	0.78	20.6
Approach		606	5.0	0.458	55.1	LOS E	15.0	109.4	0.87	0.82	23.9
East: TOMAGO ROAD											
4	L	39	5.0	0.049	20.8	LOS C	1.1	8.1	0.42	0.71	38.3
5	T	2193	5.0	0.957	35.5	LOS D	81.6	596.0	0.92	0.97	29.1
Approach		2232	5.0	0.957	35.2	LOS D	81.6	596.0	0.92	0.97	29.2
West: TOMAGO ROAD (FROM HWY)											
11	T	1486	5.0	0.513	1.7	LOS A	5.2	37.7	0.11	0.10	56.7
12	R	222	5.0	0.774	64.0	LOS E	6.7	48.9	1.00	0.87	21.8
Approach		1708	5.0	0.774	9.8	LOS A	6.7	48.9	0.22	0.20	46.9
All Vehicles		4546	5.0	0.957	28.3	LOS C	81.6	596.0	0.65	0.66	32.9

The central intersection shall provide sufficient capacity to allow for an exclusive right turn phase on the side streets

TPK has assumed RMS prefer the Double Diamond phasing option for the intersection rather than the Single DO-Side Street Split phasing option TPK adopted.

The models have been rerun with:

- The 2 years additional growth to move forward to 2022.
- The geometric layout altered to suit Double DO phasing.

The revised Geometric Layout is shown in Figure 2.

The revised Movement Summaries for the AM & PM Peak are provided as MDO1 & MDO2 respectively.

The Movement Summaries indicate that the split approach phasing presented in TPK Edition 2 provides better capacity in the AM Peak whilst the PM Peak is approaching levels of concern similar to the split approach phasing.

The need to monitor this intersection if the adopted traffic generations do eventuate will be a requirement under either geometric/phasing layout adopted by RMS.

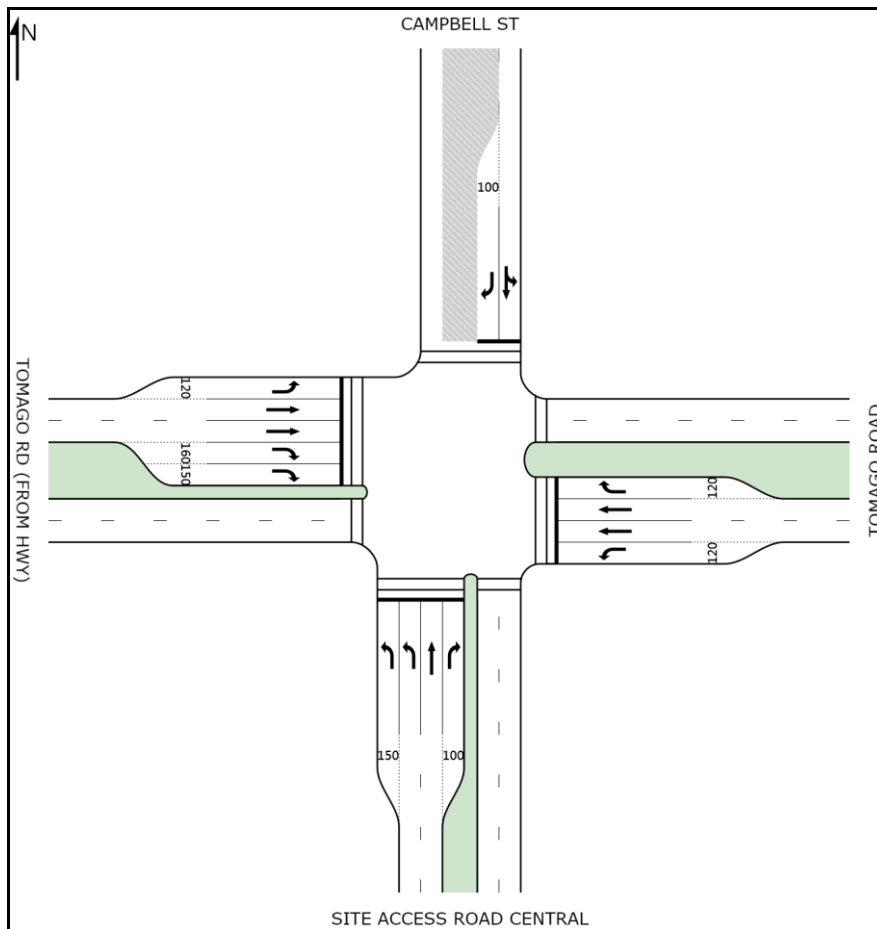


FIGURE 2 – REVISED CENTRAL INTERSECTION GEOMETRIC LAYOUT

MDO1 – MOVEMENT SUMMARY

Site: TCS DOUBLE DO AM

TOMAGO ROAD & SITE ACCESS ROAD CENTRAL, TOMAGO
 Signals - Fixed Time Cycle Time = 130 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed	
		veh/h	%	v/c	sec	veh	m		per veh	km/h	
South: SITE ACCESS ROAD CENTRAL											
1	L	220	5.0	0.145	24.6	LOS C	3.4	24.5	0.65	0.75	35.9
2	T	5	5.0	0.014	44.2	LOS D	0.3	1.9	0.82	0.55	26.1
3	R	39	5.0	0.471	78.0	LOS E	2.6	18.9	1.00	0.73	19.2
Approach		264	5.0	0.471	32.8	LOS C	3.4	24.5	0.70	0.74	31.6
East: TOMAGO ROAD											
4	L	89	5.0	0.156	23.3	LOS C	2.3	16.9	0.67	0.75	36.7
5	T	1098	5.0	0.840	43.5	LOS D	32.3	235.5	0.95	0.89	26.2
6	R	26	5.0	0.273	75.7	LOS E	1.7	12.4	0.99	0.72	19.5
Approach		1214	5.0	0.840	42.8	LOS D	32.3	235.5	0.93	0.88	26.6
North: CAMPBELL ST											
7	L	11	5.0	0.038	49.7	LOS D	0.8	5.6	0.80	0.73	25.7
8	T	5	5.0	0.038	41.3	LOS D	0.8	5.6	0.80	0.57	26.3
9	R	63	5.0	0.763	81.6	LOS F	4.4	32.0	1.00	0.85	18.6
Approach		79	5.0	0.763	74.6	LOS E	4.4	32.0	0.96	0.81	19.7
West: TOMAGO RD (FROM HWY)											
10	L	153	5.0	0.223	19.9	LOS B	4.0	29.6	0.46	0.74	38.9
11	T	1611	5.0	0.827	21.6	LOS C	37.0	270.4	0.79	0.73	35.9
12	R	511	5.0	0.805	46.2	LOS D	10.6	77.6	1.00	0.91	26.6
Approach		2274	5.0	0.827	27.0	LOS C	37.0	270.4	0.81	0.77	33.4
All Vehicles		3831	5.0	0.840	33.4	LOS C	37.0	270.4	0.84	0.80	30.4

MDO2 – MOVEMENT SUMMARY

Site: TCS DOUBLE DO PM

TOMAGO ROAD & SITE ACCESS ROAD CENTRAL, TOMAGO
 Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed	
		veh/h	%	v/c	sec	veh	m		per veh	km/h	
South: SITE ACCESS ROAD CENTRAL											
1	L	511	5.0	0.485	50.6	LOS D	12.0	87.5	0.87	0.93	25.1
2	T	5	5.0	0.016	54.5	LOS D	0.3	2.3	0.85	0.57	23.3
3	R	89	5.0	0.576	81.5	LOS F	6.5	47.7	1.00	0.78	18.6
Approach		605	5.0	0.576	55.2	LOS E	12.0	87.5	0.89	0.90	23.9
East: TOMAGO ROAD											
4	L	39	5.0	0.056	18.5	LOS B	0.9	6.9	0.48	0.71	39.9
5	T	1682	5.0	0.968	61.4	LOS E	72.9	531.9	1.00	1.09	21.5
6	R	11	5.0	0.147	87.5	LOS F	0.8	5.7	0.99	0.68	17.6
Approach		1732	5.0	0.968	60.6	LOS E	72.9	531.9	0.99	1.08	21.7
North: CAMPBELL ST											
7	L	26	5.0	0.080	57.9	LOS E	1.8	13.3	0.83	0.74	23.3
8	T	5	5.0	0.080	49.5	LOS D	1.8	13.3	0.83	0.62	23.7
9	R	153	5.0	0.982	117.4	LOS F	14.3	104.7	1.00	1.09	14.3
Approach		184	5.0	0.982	107.0	LOS F	14.3	104.7	0.97	1.03	15.3
West: TOMAGO RD (FROM HWY)											
10	L	63	5.0	0.091	17.4	LOS B	1.5	11.3	0.36	0.71	40.7
11	T	1085	5.0	0.532	16.4	LOS B	17.7	128.9	0.49	0.44	40.0
12	R	220	5.0	0.767	51.6	LOS D	5.3	38.6	1.00	0.84	25.0
Approach		1368	5.0	0.767	22.1	LOS C	17.7	128.9	0.57	0.52	36.5
All Vehicles		3889	5.0	0.982	48.4	LOS D	72.9	531.9	0.82	0.85	25.2

The western intersection shall be realigned opposite McIntyre Road (eastern occurrence)

TPK as part of traffic assessments to date had not supported the potential to align McIntyre Road (eastern occurrence) with the new western intersection.

TPK held concern with creating a cross intersection with McIntyre (east) for the following reasons:

- School Drive runs parallel to Tomago Road at this point, basically a service road. To signalise McIntyre Road into the new Western Intersection would require restrictions to be placed on the service road traffic OR design of specific phasing to manage all the traffic movements required for control.
- McIntyre Rd (east) does not connect to McIntyre Rd (west) so the western intersection would still require control (most likely traffic signals) OR basically closed and its traffic diverted to McIntyre Rd (east) along the service road.
- The modelling for inclusion of Campbell St in the Central Intersection has disclosed this intersection would be the “controlling intersection” for co-ordination of the traffic signals. The potential traffic demands on the Western Intersection that incorporated McIntyre Road traffic would be greater than the Central Intersection hence there must be concerns with practical capacity long term.
- Furthermore TPK’s experience with setting up SCATS systems also led to the conclusion that a far more balanced outcome with respect to cycle times and green band co-ordination would be achieved with McIntyre Road traffic managed downstream at the western intersection.
- As School Drive service road terminates at McIntyre Rd west a suitable geometric layout can be designed to manage both the service road and McIntyre Road traffic.

This matter has been discussed with Mr D Young, RMS Newcastle. The Newcastle RMS office is giving further consideration to this matter and the matter remains pending for resolution.

The development’s site layout plan is seen as conceptual and if RMS do require the adjustment to the location of the Western Intersection it can simply be made a term of development consent to be incorporated into future detailed design as the intersection becomes required.

Mr Young indicated TPK should simply reply in support of the Western Intersection being a T-Junction as proposed.

Strategic concept designs of the proposed signalised intersections shall be prepared and submitted to RMS for review.

See the attached Concept Plans in Appendix C

Electronic copies of all modelling files shall be submitted to RMS

TPK's SIDRA files have been e-mailed to Mr D Young, RMS Newcastle.

Port Stephens Council

The text encased below is the comments raised by Council.

Traffic and Pedestrian Access

The additional information provided with regard to transport and traffic issues is required to be referred to the Roads and Maritime Services (RMS). RMS will need to consider the impacts of the proposed development on Tomago Road and any proposed staging of the development.

Other comments previously provided that have not been considered in the EA include:

- The proposed internal road system shows block lengths well in excess of Council's Development Control Plan requirements. These long blocks will require some form of speed management to ensure a suitable speed environment, to enable safe access to properties within the subdivision and safe operation of the intersections.
- Several of the internal intersections are shown as 4-way intersections. These will need careful design and prioritisation by regulatory signage to ensure safe operation and compliance with relevant Australian standards.
- Provision is required for public transport facilities along Tomago Road. These will include bus bays, bus shelters and connecting pedestrian facilities to encourage the use of alternative transport.
- Pedestrian linkages are required throughout the site to facilitate and encourage walking.
- Provision for cyclists is required as marked on-road facilities either in the parking lane or in the kerbside lane where parking is not proposed.

Dot Point 1 – TPK Response

The site layout at this point in time is seen more as the conceptual base for the overall site rather than a base for specific lot detail.

The area for development is expansive and will be a staged development; as demand is identified and the development site expanded the tenants or purchaser's requirements will be identified.

The current site layout provides a wide view of the core road network however demand for smaller lots may deem intermediate minor roads eventuate to service a smaller lot size demand.

Therefore TPK submits that flexibility within the site remains but that Council's comments on block length are acknowledged and will be resolved as lot size detail emerges.

TPK does raise the following with respect to speed and access within the estate:

- The estate road network will no doubt be required to manage the trips of the largest legal vehicle classifications. The size and turn paths of these vehicles deem proposals for placement of traffic calming devices is not practical at this stage of development assessment.
- Furthermore TPK submits that devices such as speed thresholds or chicanes are not suited to the road environment of such estates; TPK suggests that if traffic calming measures are conditioned on the estate that strategically placed roundabouts with suitable design circulation paths should be the preferred initiative.

Dot Point 2 – TPK Response

The first intersections into the estate from all three access intersections are proposed on the site layout as roundabouts hence priority/control is established.

The current site layout has four other cross intersections further into the estate and one is also proposed for roundabout control. TPK acknowledge that the priority route is not identified in plans at the other three and suggests E-W be adopted as the priority routes.

Dot Point 3 – TPK Response

The provision of public transport amenity such as bus bays should be part of the design for the signalised access intersections.

Such amenity is provided in the Eastern Intersection (already built) and logically needs to be repeated at the Central and Western Intersections.

The pedestrian connectivity to the estate is provided by the pedestrian facilities of the traffic control signals.

This was the recommendations of Section 5.3 of TPK's Report Edition 2, dated October 2011 and can simply be conditioned as part of project approval.

Dot Point 4 – TPK Response

The internal road reserves are to be provided to Council requirements; that by default includes area set aside for pedestrian footways. The need for formed paths within the footway space, if required can be conditioned by Council on each lot as part of the lot development consent.

Dot Point 5 – TPK Response

TPK's Report indicates the internal roads are proposed to have a 15m carriageway, kerb to kerb. Should Council require these routes to have specific roadmarking for cyclists then this can be acknowledged now, conditioned and shown in the detailed road design plans as they are prepared, post DA approval when they would be submitted to Council for approval.

TPK makes the comment that a global requirement on the estate to provide extensive roadmarking for cyclists; that may comprise centreline and edgeline imposes significant increase in on-going maintenance to Council and perhaps a more selective approach to roadmarking requirements, as the estate develops would be more effective and economically responsible.

In Conclusion

The comments made by NSW DoPI, RMS and Port Stephens Council in the March 2012 “Adequacy Review” have been considered and addressed in this report; TPK submits the proposal can be considered acceptable.

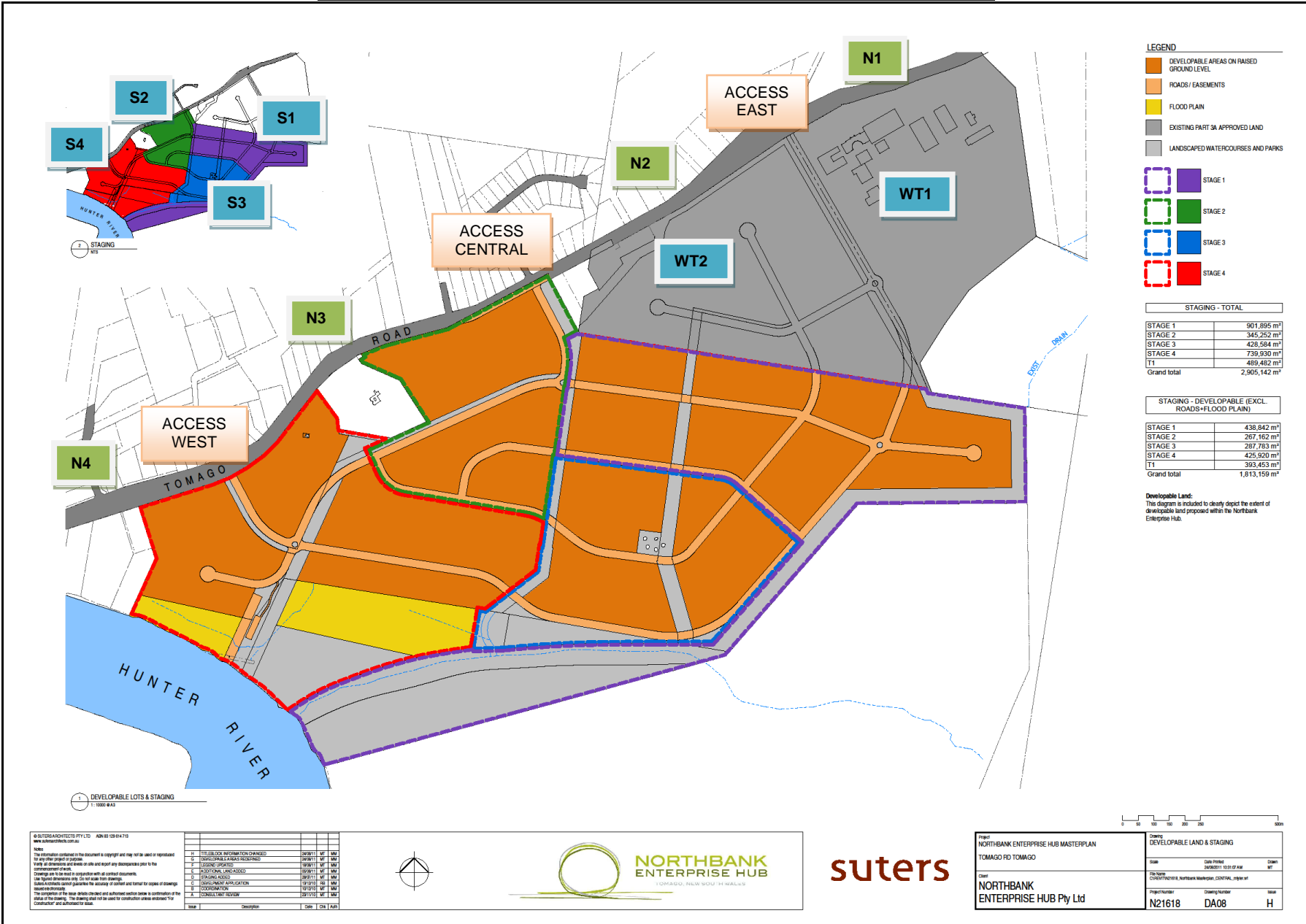
Prepared by

T Keating

Mr. T Keating
Director, TPK & Associates

APPENDIX A
Business Park Layout Plan

TPK & ASSOCIATES – NORTHBANK ENTERPRISE HUB, TOMAGO – TRAFFIC ASSESSMENT



LEGEND

- DEVELOPABLE AREAS ON RAISED GROUND LEVEL
- ROADS / EASEMENTS
- FLOOD PLAIN
- EXISTING PART 3A APPROVED LAND
- LANDSCAPED WATERCOURSES AND PARKS

STAGE 1 (Purple)

STAGE 2 (Green)

STAGE 3 (Blue)

STAGE 4 (Red)

STAGING - TOTAL

STAGE 1	901,895 m ²
STAGE 2	345,252 m ²
STAGE 3	428,584 m ²
STAGE 4	739,930 m ²
T1	489,482 m ²
Grand total	2,905,142 m ²

STAGING - DEVELOPABLE (EXCL. ROADS+FLOOD PLAIN)

STAGE 1	438,842 m ²
STAGE 2	267,162 m ²
STAGE 3	287,783 m ²
STAGE 4	425,920 m ²
T1	393,453 m ²
Grand total	1,813,159 m ²

Developable Land:
This diagram is included to clearly depict the extent of developable land proposed within the Northbank Enterprise Hub.

DEVELOPABLE LOTS & STAGING
1:1000 @A3

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6. The completion of the site works checked and approved sections shall be in accordance with the above information. The drawings shall not be used for construction unless reviewed, the contractor and authorized for them.

Rev	Description	Date	By	Appr
1	ISSUE FOR INFORMATION	20/09/11	MF	MF
2	DEVELOPMENTAL ANALYSIS REQUIRED	06/09/11	MF	MF
3	DESIGN UPDATES	16/09/11	MF	MF
4	ADDITIONAL LANDSCAPE	02/09/11	MF	MF
5	FINAL DESIGN	09/07/11	MF	MF
6	CONVEYANCE APPLICATION	19/07/11	MF	MF
7	CONVEYANCE	19/07/11	MF	MF
8	CONSULTANT REVIEW	28/11/11	MF	MF



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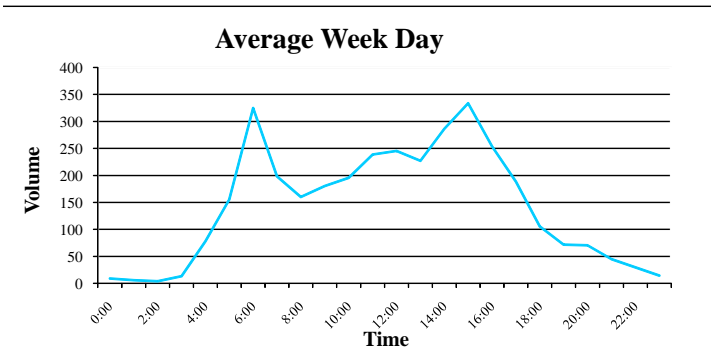
Project: NORTHBANK ENTERPRISE HUB MASTERPLAN TOMAGO RD TOMAGO	Client: NORTHBANK ENTERPRISE HUB Pty Ltd	Category: DEVELOPABLE LAND & STAGING	Scale: DATE PLOTTED: 23/02/2011 11:51:07 AM DATE: MF
Client: NORTHBANK ENTERPRISE HUB Pty Ltd	Project Number: N21618	Drawing Number: DA08	Issue: H

APPENDIX B
Traffic Data

Site 11 Tomago Rd West of Campbell Eastb

East

Day Time	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day Ave.	W/End Ave.	7 Day Ave
	19-Sep-10	20-Sep-10	21-Sep-10	22-Sep-10	23-Sep-10	24-Sep-10	25-Sep-10			
0:00	11	8	7	10	9	11	14	9	13	10
1:00	13	2	7	6	8	7	6	6	10	7
2:00	1	3	3	3	4	6	7	4	4	4
3:00	14	10	10	14	15	17	9	13	12	13
4:00	41	75	72	66	89	88	63	78	52	71
5:00	92	169	144	150	157	158	67	156	80	134
6:00	206	342	345	312	313	312	124	325	165	279
7:00	389	199	179	206	204	204	99	198	244	211
8:00	501	134	169	191	148	158	132	160	317	205
9:00	594	176	195	162	175	194	256	180	425	250
10:00	596	211	194	172	176	224	300	195	448	268
11:00	357	221	201	244	234	294	337	239	347	270
12:00	233	244	213	208	248	314	289	245	261	250
13:00	194	195	219	167	220	335	322	227	258	236
14:00	136	286	228	278	284	355	247	286	192	259
15:00	115	289	356	317	314	392	276	334	196	294
16:00	115	242	234	228	245	321	164	254	140	221
17:00	111	177	157	182	173	254	111	189	111	166
18:00	76	88	71	71	103	195	93	106	85	100
19:00	37	40	61	57	61	140	50	72	44	64
20:00	40	39	57	58	66	133	51	71	46	63
21:00	45	29	24	36	46	90	40	45	43	44
22:00	13	19	23	19	38	49	39	30	26	29
23:00	14	9	14	12	16	21	22	14	18	15
Total	3944	3207	3183	3169	3346	4272	3118	3435	3531	3463

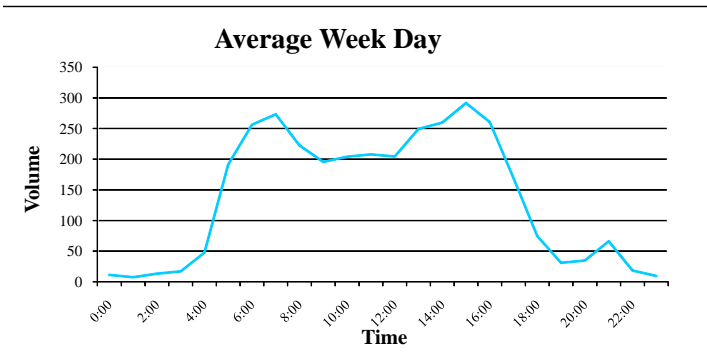


Summary			
	from	to	
AM Peak	6:00 AM	7:00 AM	345
PM Peak	3:00 PM	4:00 PM	392
Week Day Average			3435
Weekend Day Average			3531
7 Day Average			3463

Site 11 Tomago Rd West of Campbell Eastb

West

Day Time	Sun 19-Sep-10	Mon 20-Sep-10	Tue 21-Sep-10	Wed 22-Sep-10	Thu 23-Sep-10	Fri 24-Sep-10	Sat 25-Sep-10	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	11	9	13	12	15	8	7	11	9	11
1:00	6	4	11	8	6	8	5	7	6	7
2:00	2	20	10	14	12	10	7	13	5	11
3:00	5	23	13	22	13	14	12	17	9	15
4:00	16	50	39	51	47	52	26	48	21	40
5:00	41	202	190	204	186	176	90	192	66	156
6:00	60	270	244	242	271	255	83	256	72	204
7:00	105	310	262	283	260	251	150	273	128	232
8:00	119	201	237	218	245	211	179	222	149	201
9:00	165	230	189	175	172	212	175	196	170	188
10:00	236	266	165	164	193	232	180	204	208	205
11:00	203	258	183	199	180	219	197	208	200	206
12:00	205	216	189	172	201	244	171	204	188	200
13:00	327	259	234	226	232	297	177	250	252	250
14:00	517	235	263	258	245	297	214	260	366	290
15:00	334	300	280	290	298	291	134	292	234	275
16:00	962	247	281	295	284	196	188	261	575	350
17:00	792	190	168	155	181	151	123	169	458	251
18:00	133	81	49	69	79	96	93	75	113	86
19:00	68	38	24	29	32	32	36	31	52	37
20:00	40	22	28	40	45	39	29	35	35	35
21:00	62	37	68	73	73	80	41	66	52	62
22:00	22	45	11	10	16	10	51	18	37	24
23:00	7	7	7	9	11	13	15	9	11	10
Total	4438	3520	3158	3218	3297	3394	2383	3317	3411	3344



Summary			
	from	to	
AM Peak	7:00 AM	8:00 AM	310
PM Peak	3:00 PM	4:00 PM	300
Week Day Average			3317
Weekend Day Average			3411
7 Day Average			3344

APPENDIX C

Traffic Signal Concept Plans

Central & Western Intersections

Approximate scale - 1:1000 @ A3



<p>TRAFFIC ANALYSIS: TPK & Associates 10 Haig Street Belmont, NSW 2280</p>	<p>DRAWN BY: EXARTA Cad Design. June 2012 19 Coniston Close Rankin Park, NSW 2287</p>
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PROVISION OF TRAFFIC CONTROL SIGNALS AT INTERSECTION
 OF TOMAGO ROAD AND CAMPBELL STREET TOMAGO
 "ACCESS CENTRAL"

PLAN REFERENCE:
DR 01

Approximate scale - 1:1000 @ A3



<p>TRAFFIC ANALYSIS: TPK & Associates 10 Haig Street Belmont.NSW 2280</p>	<p>DRAWN BY: EXARTA Cad Design. June 2012 19 Coniston Close Rankin Park. NSW 2287</p>
--	--

PROVISION OF TRAFFIC CONTROL SIGNALS AT INTERSECTION
 OF TOMAGO ROAD AND WESTERN ACCESS ROAD TOMAGO
 "WESTERN ACCESS"

PLAN REFERENCE:
DR02



TRAFFIC MANAGEMENT & SAFETY CONSULTANTS

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TRAFFIC ASSESSMENT REPORT

PROPOSED SUBDIVISION

NORTHBANK ENTERPRISE HUB

TOMAGO ROAD, TOMAGO

EDITION 2
October 2011

The Applicant
Northbank Enterprise Hub Pty Ltd

Port Stephens Council Local Government Area

Prepared by
Terry Keating
Director
TPK & Associates Pty Ltd

C O N T E N T S

- 1 . I N T R O D U C T I O N

- 2 . C U R R E N T E N V I R O N M E N T &
B A C K G R O U N D

- 3 . T R A F F I C & P A R K I N G G U I D E L I N E S

- 4 . R O A D N E T W O R K A S S E S S M E N T

- 5 . S I T E A M E N I T Y A S S E S S M E N T

- 6 . S U M M A T I O N

A p p e n d i x A

B e t t e r T r a n s p o r t F u t u r e s
R e p o r t 2 0 0 9

A p p e n d i x B

S i t e L a y o u t

A p p e n d i x C

T r a f f i c D a t a

N O R T H B A N K I N D U S T R I A L P A R K

TRAFFIC ASSESSMENT

SECTION 1 - INTRODUCTION

1.1. – The Project

TPK & Associates Pty Ltd (TPK) were invited by ADW Johnson Pty Ltd (ADW) to join their project team in preparation of a traffic impact assessment for an Industrial Park on mostly vacant land at:

Lot 1001 DP1127780, Tomago Road, TOMAGO

The site location is shown on Figure 1; this site adjoins a site with current Project Application approval for Industry related land use and is to be connected to this development site.

The TPK Traffic Assessment Edition 1 was submitted to authorities as part of the Development Application and included a holistic view of the overall impact of both sites.

The Department of Planning (DoP) has subsequently provided comment on the traffic assessment and those comments were considered by the project team.

The project team initiated a meeting with RTA Newcastle to ensure that the original traffic assessment report had been suitable to their needs; the outcome of the meeting was:

- RTA provided a revised traffic generation rate, to that RTA had nominated for the original TPK traffic assessment; this revised rate was to be used in further analysis to be undertaken by TPK. The outcomes are provided in this report.
- RTA confirmed that they would plan and manage the progressive upgrade requirements of Tomago Road and primarily required revised indicators for the subject development by TPK utilising the new traffic generation rate they provided; RTA also confirmed analysis of the site frontage was sufficient for their needs.

1.2. – Task Description

The assessment and report focuses on the following objectives: -

- Recommendations for a road network that balances road function and road environment around the site with a focus on all road user needs.
- Recommendations for the connectivity of this site and the adjoining approved land use to the east internally and to Tomago Road.
- Confirmation that the proposed road network and on-site amenity will service all user needs in terms of road safety and traffic management.
- Establish that appropriate road safety and traffic management guidelines and standards have been addressed by the proposal

This assessment report is a supplement to the Project Application documentation for the project.

1.3. – Project Representative

Mr. Terry Keating, Director, TPK & Associates Pty Ltd undertook the evaluation and preparation of the report. He has over 40 years experience in the road safety and traffic management profession, including the assessment of traffic generating developments.

1.4. – References

The assessment and report have been provided as an outcome of reference to:

- Port Stephens Council DCP 2007-B3.
- AS2890.1 & 2.
- Roads & Traffic Authority (RTA) Guide to Traffic Generating Developments.
- Austroads Part 5 Intersections at Grade & Part 2 Roadway Capacity.
- Better Transport Futures Traffic Impact Statement (TIS) for adjoining site, October 2009.
- Site Layout Plan as provided by Suters Architects/ADW Johnson. (See Appendix B)

SECTION 2 – CURRENT ENVIRONMENT & BACKGROUND

The proposed site is mostly vacant land situated on the southern side of Tomago Road surrounding the existing Tomago House; located between McIntyre Road and Graham Drive (east) both existing intersections on the north side of Tomago Road. Figure 1 provides a locality view of the area.

Tomago Road is a State Road classification identified as MR 302; the route provides connection between the Pacific Highway (SH10) to the west and Nelson Bay Road (MR 108) to the east. Tomago Road is also the arterial link to the surrounding predominately Industrial based land use.

Relevant factors related to existing road and land use environment are considered to be:

- The route is provided with centreline and edgeline marking plus appropriate signposting in accordance with standards for the rural road environment.
- The current applied Speed Limit is 80kph.
- The intersection of Tomago & Old Punt Road is a under control of a 2 lane circulating roundabout.
- The intersection of Pacific Highway & Tomago Road is traffic signal controlled; the right turn from Tomago is prohibited.
- The intersection of the Pacific Highway & Old Punt Road is traffic signal controlled; all movements are permitted.

Section 1.1 of this report indicated a portion of the total site under consideration in this assessment has previous approval to develop significant industrial land use; the reference is Development Approval under Part 3A, Item 07-0086.

Better Transport Futures, Traffic Impact Statement October 2009 prepared for the DA submission of that approved site is a relevant reference for this assessment and is attached in Appendix A. The report submitted the following with respect to development impacts:

- Stages 1 & 2 of that development could be managed on the existing road network however Stage 2 approached levels of capacity concern where an upgrade from 2 to 4 lanes for Tomago Road should be planned.
- The combination of Stage 3, Background Growth and other development deemed the need to develop an overall planning strategy that adopts an agreed level of development and supporting infrastructure with necessary investment apportioned accordingly

TPK & ASSOCIATES – NORTHBANK ENTERPRISE HUB, TOMAGO – TRAFFIC ASSESSMENT

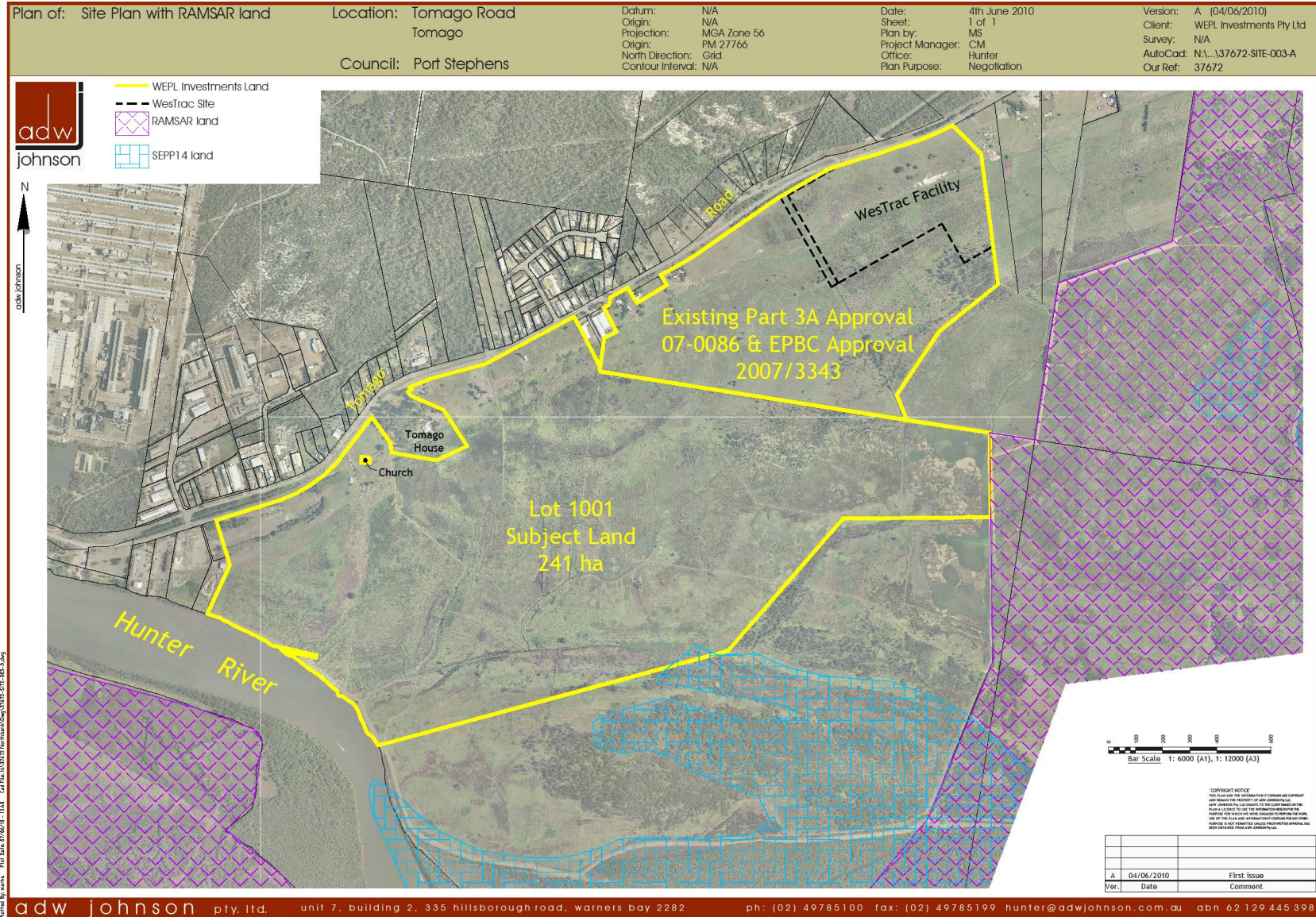


FIGURE 1 – LOCALITY OVERVIEW

SECTION 3 – POTENTIAL TRAFFIC GENERATIONS & PARKING REQUIREMENTS

3.1 – Land Use

This report has been prepared to assess the traffic impact for the combination of:

1. Connectivity to the Approved Adjoining Site – Part 3A approval 07-0086.
2. The subject site including internal and external connectivity.

The land use category assessed is Industrial Park; the Site Layout is in Appendix B.

Table 1 summarises the land use staging adopted in this assessment; the general areas are indicated on Appendix B plan.

TABLE 1 – POTENTIAL LAND USE

STAGE	DESCRIPTION
WT1	Approved WesTrac Facility, CAT Institute & Caterpillar Warehouse (See Table 4.1 Better Transport Futures Report, October 2009)
WT2	Approved Industrial Park – 48.49ha (See Table 4.1 Better Transport Futures Report, October 2009)
S1	Developable Area shown shaded PURPLE in Appendix B – 43.9ha – 438,842m ²
S2	Developable Area shown shaded GREEN in Appendix B – 26.7ha – 267,162m ²
S3	Developable Area shown shaded BLUE in Appendix B – 28.8ha – 287,783m ²
S4	Developable Area shown shaded RED in Appendix B – 42.6ha – 425,920m ²

3.2 – Traffic Generation Rates & Distribution

The traffic generation rates for the peak hours has been discussed with RTA to establish rates reflective of the potential road environment and development precinct; the following rate have been adopted for this report:

- GFA deemed to be 35% of the site areas.
- 0.33 trips per hour per 100m² GFA for the am and pm peaks.

The additional traffic generated will be distributed:

- 70%:30% for the peak directional flow.
- The catchment split to be 85% to/from The Pacific Highway

For consistency across assessments TPK has adopted the following factors in this assessment; these factors are sourced from Better Transport Futures, Traffic Impact Statement October 2009:

- 1400vph mid block capacity
- 4% background growth on Tomago Road.

TPK has concluded that the area of influence for this traffic assessment is contained between the site and west to the Pacific Highway intersection.

TPK had traffic surveys undertaken in 2010 to establish the traffic demands on the Tomago Road frontage; the Average Weekly Summary is provided in Appendix C.

Table 4.1 of Better Transport Futures Report, October 2009 is provided in Appendix A, it shows the approved land use footprint and traffic generations adopted for the approved site (WT1 & WT2); these are adopted in this assessment.

Table 2 below provides the calculation for the traffic demands adopted for the additional developable areas (S1 to S4).

TABLE 2 – POTENTIAL TRAFFIC GENERATIONS, ADDITIONAL AREAS

ITEM	ADOPTED VALUE	
Total Developable Area for:	142ha	
Stage 1 (S1)	43.9ha – 438,842m ²	
Stage 2 (S2)	26.7ha – 267,162m ²	
Stage 3 (S3)	28.8ha – 287,783m ²	
Stage 4 (S4)	42.6ha – 425,920m ²	
<u>35% for GFA</u>		
Stage 1 (S1)	153,595m ²	
Stage 2 (S2)	93,507m ²	
Stage 3 (S3)	100,724m ²	
Stage 4 (S4)	149,072m ²	
	AM PEAK (Peak into site)	PM PEAK (Peak exits site)
0.33 trips per 100m ² GFA – S1	507 Trips	507 Trips
0.33 trips per 100m ² GFA – S2	309 Trips	309 Trips
0.33 trips per 100m ² GFA – S3	332 Trips	332 Trips
0.33 trips per 100m ² GFA – S4	492 Trips	492 Trips
Peak Split 70:30 – S1	354:153	354:153
Peak Split 70:30 – S2	216:93	216:93
Peak Split 70:30 – S3	232:100	232:100
Peak Split 70:30 – S4	344:148	344:148
85% to Pacific Hwy – S1	301:53 – 130:23	301:53 – 130:23
85% to Pacific Hwy – S2	184:32 – 79:14	184:32 – 79:14
85% to Pacific Hwy – S3	197:35 – 85:15	197:35 – 85:15
85% to Pacific Hwy – S4	292:52 – 126:22	292:52 – 126:22

Section 4 of this report provides the road network impact analysis.

3.3 – Parking Requirements

The required provisions for parking, per lot dependant on designated land use are set out in Table 3. This report is focused to the total subdivision masterplan for the site and has only listed the parking rates for confirmation and use in future individual lot DA submissions.

TABLE 3 – PARKING REQUIREMENTS, Adapted from Port Stephens Council's DCP 2007-B3

<u>USE</u>	<u>RATE</u>
COMMERCIAL	1 spaces per 40m ² GFA
FACTORY	1 space per 100m ² GFA and/or 4 spaces per work bay, whichever is greater
WAREHOUSE	1 space per 200m ² GFA
BULKY GOODS	1 spaces per 55m ² GFA
FOOD OUTLETS	15 spaces per 100m ² GFA or 1 space per 3 seats, whichever is greater.

SECTION 4 – ROAD NETWORK ANALYSIS

4.1 – Overview

The road network analysis in this assessment will consider:

- Route capacity between the site and The Pacific Highway.
- The intersection capacity for the site's accesses to Tomago Road.
- The downstream implications on existing intersections west to The Pacific Highway.

It is proposed that traffic will ultimately have the option to enter and exit the development site at three intersections (See Appendix B):

- Tomago Road & Site Access Road (Access East). (Approved intersection, soon to be constructed)
- Tomago Road & Site Access Road (Access Central). (Incorporates existing Campbell St).
- Tomago Road & Site Access Road (Access Western).

The assessment for intersection capacity will consider the following scenarios:

- Eastern Intersection – Existing traffic conditions plus the approved adjoining Westrac Industrial Subdivision; termed WT1 & WT2 in this assessment plus S1 & S2.
- Central Intersection – Existing traffic conditions plus the approved adjoining Westrac Industrial Subdivision; termed WT1 & WT2 in this assessment plus S1, S2 & S3
- Western Intersection – Existing traffic conditions plus the approved adjoining Westrac Industrial Subdivision; termed WT1 & WT2 in this assessment plus S1 to S4

This report then discusses the range of implications when other potential outcomes may delay or accelerate the need for the Central & Western Intersections.

For route capacity consideration in this assessment 4 mid-block nodes have been identified; they are listed below & indicated on the Site Layout Appendix B:

- N1 Tomago Road east of the site
- N2 Tomago Road east of Campbell Street
- N3 Tomago Road west of Campbell Street
- N4 Tomago Road west of the site

4.2 – Traffic Data

Appendix B provides the existing traffic flows on Tomago Road.

Better Transport Futures Report of 2009, Table 4.1 provides the traffic flows for the approved development area, see Appendix A.

Table 2 of this report (see Section 3) calculates the potential traffic generations for the additional land use assessed in this assessment.

Tables 4 figures provide the traffic volumes adopted in the assessment for the staged growth of the site. The volumes are the additional traffic for WT1 & WT2 plus S1 to S4.

TABLE 4 – PEAK TRAFFIC GENERATIONS

STAGE	INTO DEVELOPMENT SITE			EXIT DEVELOPMENT SITE		
	DIRECTION	RIGHT	LEFT	DIRECTION	LEFT	RIGHT
+WT1	AM Peak	502	88	AM Peak	214	38
	PM Peak	301	53	PM Peak	415	73
+WT2	AM Peak	485	185	AM Peak	352	62
	PM Peak	303	53	PM Peak	707	125
+S1	AM Peak	301	53	AM Peak	130	23
	PM Peak	130	23	PM Peak	301	53
+S2	AM Peak	184	32	AM Peak	79	14
	PM Peak	79	14	PM Peak	184	32
+S3	AM Peak	197	35	AM Peak	85	15
	PM Peak	85	15	PM Peak	197	35
+S4	AM Peak	292	52	AM Peak	126	22
	PM Peak	126	22	PM Peak	292	52

Table 5 provides the accumulative traffic flows for the nodes identified in Section 4.1 of this report.

TABLE 5 – MID BLOCK NODE TRAFFIC DEMANDS

SCENARIO	PEAK ¹	1 LANE CAPACITY	NODE TRAFFIC DEMAND (vph) ²			
			N1	N2	N3	N4
EXISTING	AM Peak E	1400vph	345	345	345	345
	PM Peak E	1400vph	392	392	392	392
	AM Peak W	1400vph	310	310	310	310
	PM Peak W	1400vph	300	300	300	300
WT1	AM Peak E	1400vph	383	847	847	847
	PM Peak E	1400vph	465	693	693	693
	AM Peak W	1400vph	398	524	524	524
	PM Peak W	1400vph	353	715	715	715
WT2	AM Peak E	1400vph	445	1332	1332	1332
	PM Peak E	1400vph	590	996	996	996
	AM Peak W	1400vph	583	876	876	876
	PM Peak W	1400vph	406	1422	1422	1422
S1 ³	AM Peak E	1400vph	468	1355	1633	1633
	PM Peak E	1400vph	643	1049	1126	1126
	AM Peak W	1400vph	636	929	1006	1006
	PM Peak W	1400vph	429	1445	1723	1723
S2	AM Peak E	1400vph	482	1369	1817	1817
	PM Peak E	1400vph	675	1081	1205	1205
	AM Peak W	1400vph	668	961	1085	1085
	PM Peak W	1400vph	443	1459	1907	1907
S3 ³	AM Peak E	1400vph	497	1384	1832	2014
	PM Peak E	1400vph	710	1116	1240	1290
	AM Peak W	1400vph	703	996	1120	1170
	PM Peak W	1400vph	458	1474	1922	2104
S4	AM Peak E	1400vph	519	1406	1854	2306
	PM Peak E	1400vph	762	1168	1292	1416
	AM Peak W	1400vph	755	1048	1172	1296
	PM Peak W	1400vph	480	1496	1944	2396

1. E is eastbound, W is westbound.
2. Node Traffic Demand volumes do not include the 4% Background Growth Factor for Tomago Road.
3. Intersection Central introduced at S1; Intersection West at S3

4.3 – Analysis Model

TPK utilise the intersection-modelling program SIDRA to review intersection performance.

The outcomes of the model include:

- Level of Service
- Average Delay
- 95% back of queue length

The term Level of Service (LoS) is one output parameter of the SIDRA model; it provides an insight into “operating conditions” of the intersection and each approach. The output range is indicated in the range LoS A to LoS F where A indicates good operating conditions reducing to F where other forms of control may need to be considered.

4.4 – Intersection Assessments

SIDRA analysis is provided in this report for the following intersections:

1. Tomago Road & Site Access Road East
2. Tomago Road & Site Access Road Central (incorporates existing Campbell St).
3. Tomago Road & Site Access Road Western.

The following text discusses the modelled intersections plus:

- 3 Tomago Road & McIntyre Street
- 4 Tomago Road & Old Punt Road
- 5 Tomago Road & Pacific Highway

Intersection Assessment in this report will be provided on the following pages in a sequence commencing at the Site Access Road Eastern intersection then westerly towards the highway.

4.4.1 – Tomago Road & Site Access – Eastern Intersection (Westrac Drive)

This intersection had detailed analysis completed by Better Transport Futures Report for their Traffic Impact Report 2009 as part of the application documentation for the approved adjoining Industrial Subdivision WesTrac (WT1 & WT2). The analysis and recommendations have not changed and are submitted to be valid input for this assessment covering Lot 1001 (S1 to S4).

The approved intersection layout for adjoining WesTrac Industrial Subdivision is a channelized T-Junction that includes right turn and left turn lanes on Tomago Road; basically a CHR Geometric Layout. The intersection as approved was then conditioned for review prior to WesTrac Stages 2 & 3 to determine the timing for the required intersection upgrade to a traffic signal controlled intersection.

The Better Transport Futures analysis included SIDRA modelling for a fully developed site for a base year 2019. The Level of Service, Queue and Delay factors indicated in both peak periods of their SIDRA modelling were acceptable in terms of intersection capacity.

The terms of development consent are consistent with that roadwork staging approach however it is noted that the T-Junction stage will not proceed and in fact the traffic signal controlled intersection at Stage 1 (WT1) is currently under construction.

The question of additional loading to this intersection by the proposed estate expansion (say S1) is a valid inquiry. The key questions that will determine the answer are:

- Has the approved Westrac Industrial Subdivision (WT1 & WT2) precinct reached its maximum potential in terms of traffic demand?
- Is that traffic demand in excess of the Better Transport Futures Report 2009 expectations in terms of over traffic demand?

The projected traffic generation, including construction traffic, will be reviewed prior to each stage being developed. This will include review of actual traffic generations from the Westrac Industrial Subdivision. If these traffic flows when analysed indicate that the eastern intersection (Westrac Drive) will not have capacity for stage development (e.g. S1) then an additional intersection on Tomago Drive will be required. In the absence of this information the following scenario has been modelled:

- The year is 2020
- 4% per annum has been applied to the 2010 Tomago Road through traffic.
- WT1 & WT2 are fully developed and the potential traffic generations assumed to be indicative and
- S1 traffic is added to the intersection.

SIDRA modelling has been undertaken for the am peak of the above scenario; see next page for details.

Figure 2 shows the SIDRA geometric layout for the Eastern intersection (Westrac Drive).

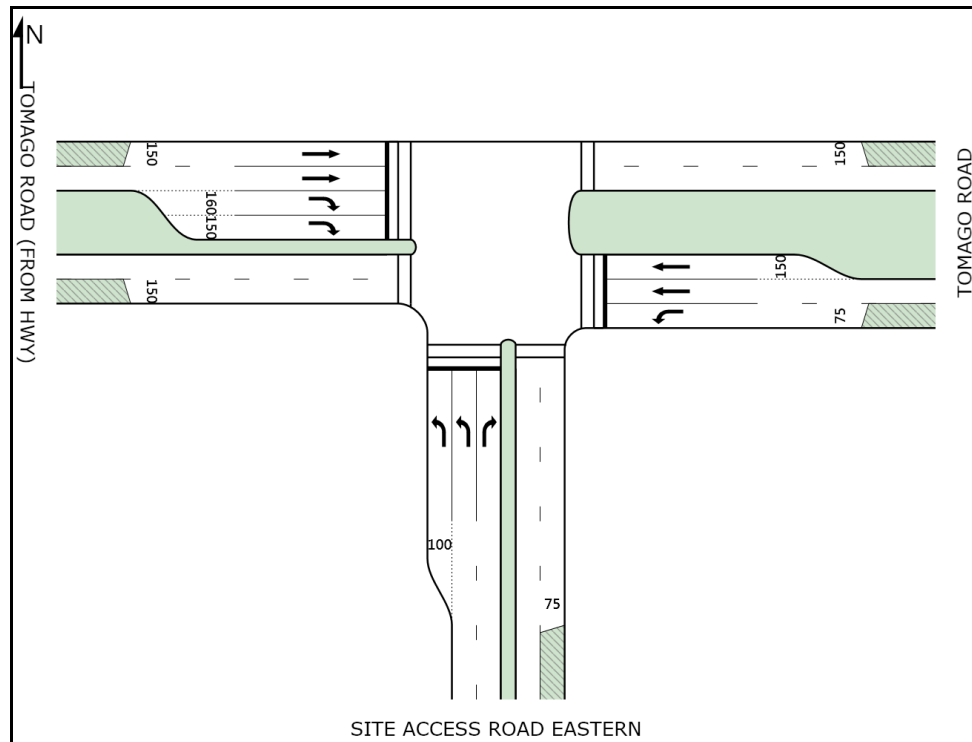


FIGURE 2 – SIDRA GEOMETRIC LAYOUT, EASTERN INTERSECTION

M1 – MOVEMENT SUMMARY

Site: TCS AM

TOMAGO ROAD & SITE ACCESS ROAD EASTERN, TOMAGO – AM PEAK 2020
 Signals - Fixed Time Cycle Time = 130 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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
South: SITE ACCESS ROAD EASTERN											
1	L	733	5.0	0.403	16.9	LOS B	13.3	96.8	0.43	0.76	41.1
3	R	129	5.0	0.408	59.9	LOS E	7.4	53.9	0.93	0.80	22.8
Approach		862	5.0	0.408	23.4	LOS C	13.3	96.8	0.51	0.77	36.6
East: TOMAGO ROAD											
4	L	281	5.0	1.000 ³	60.1	LOS E	16.8	122.4	0.99	0.84	22.6
5	T	517	5.0	0.694	50.5	LOS D	16.1	117.7	0.93	0.79	24.0
Approach		798	5.0	1.000	53.9	LOS D	16.8	122.4	0.95	0.81	23.5
West: TOMAGO ROAD (FROM HWY)											
11	T	773	5.0	0.309	3.0	LOS A	6.1	44.3	0.17	0.15	54.2
12	R	1107	5.0	1.000 ³	38.8	LOS D	33.5	244.8	0.93	0.92	29.2
Approach		1880	5.0	1.000	24.1	LOS C	33.5	244.8	0.61	0.60	36.0
All Vehicles		3540	5.0	1.000	30.6	LOS C	33.5	244.8	0.67	0.69	32.3

The outcome based on these standard assumptions indicates that the intersection constructed for the Westrac development and associated land use (WT1 & WT2) will not have the capacity to manage additional traffic demands from any stages of the development site under consideration in this report. Consequently review of existing traffic generation and analysis at the actual time of proceeding to S1 is the recommended approach to any decision on the construction of the central intersection.

4.4.2 – Tomago Road & Site Access – Central Intersection

The location of the Central Site Access Intersection is proposed at a location that allows the existing Campbell Road intersection, on the northern side of Tomago Road to be incorporated into the intersection forming a cross intersection.

Construction of this intersection will be a requirement before occupation by any of the subject development sites land use clients; should WT1 & WT2 be fully developed.

The opportunity remains for site management to review the actual traffic generations of WT1 & WT2 when commencing development of the subject site for S1 to determine if actual generations were less than calculated generations and undertake modelling for capacity at that time.

Capacity analysis, at interim stages may confirm a short term use of the Eastern intersection feasible however the Eastern intersection would not be able to manage all potential demands for the precincts WT1, WT2 & S1 at full development; the Central intersection is the logical next access as growth in these sites evolves.

The recommended form of control for the ultimate expected traffic demands at this location is for a traffic signal controlled intersection, especially as it is proposed to incorporate Campbell Street as the fourth leg of the intersection forming a cross intersection.

TPK, for this assessment has completed SIDRA modelling for the predicted intersection traffic demands of S1 & S2 based on:

- WT1 & WT2 fully developed.
- S1 and S2 fully developed.
- 10 years Background growth on Tomago Road general traffic at 4%
- Indicative traffic demands for Campbell Street.

The phasing adopted for SIDRA was Single DO (optional B Phase allowed only in the am peak) and Side Street Split Phases.

The geometric layout adopted by SIDRA for the Central intersection is provided as Figures 3.

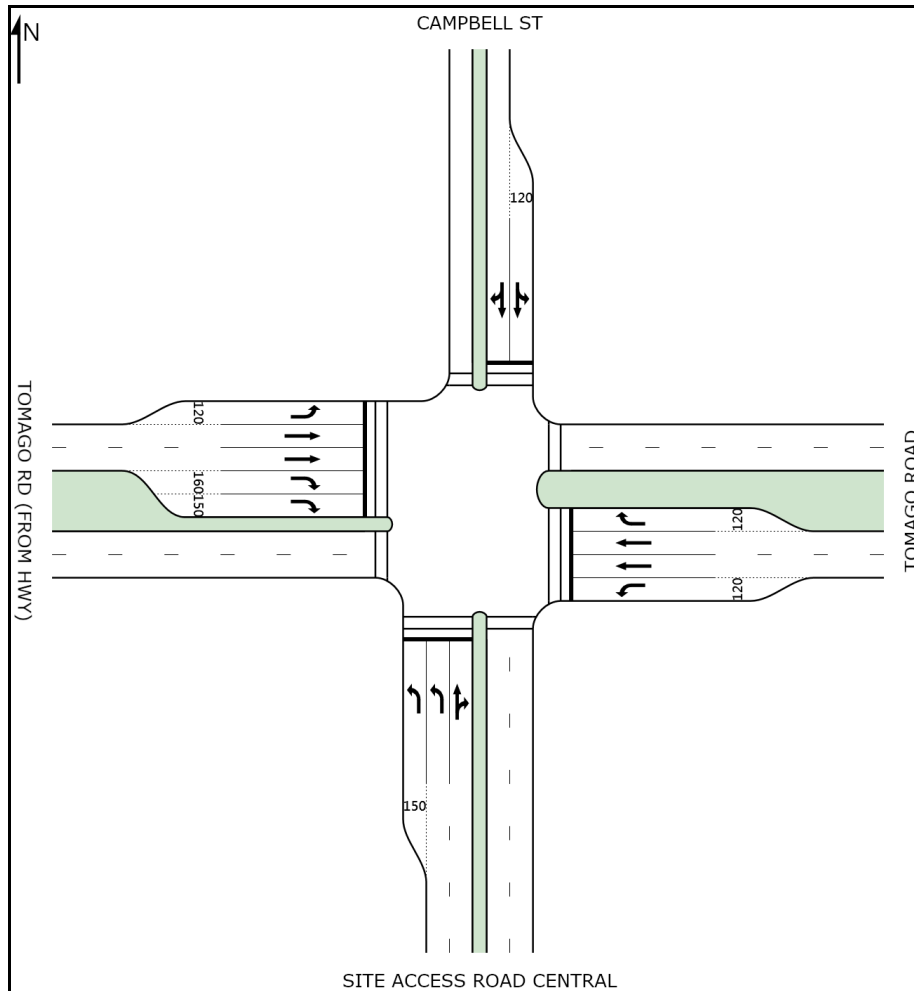


FIGURE 3 – SIDRA GEOMETRIC MODEL, CENTRAL INTERSECTION

The Movement Summaries M2 & M3 for the am and pm peak respectively are provided on the following page of this report.

The outcome of the SIDRA modelling indicates under this scenario where:

- The Westrac sites (WT1 & WT2) and this assessment's S1 & S2 are fully developed and
- Both precincts are generating the predicted traffic demands then

The Central intersection will be approaching or at saturation in the peak periods.

M2 – MOVEMENT SUMMARY

Site: TCS SPLIT AM

TOMAGO ROAD & SITE ACCESS ROAD CENTRAL, TOMAGO – AM PEAK 2020
 Signals - Fixed Time Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance – Vehicles											
Mov ID	Turn	Demand Flow	HV Deg.	Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SITE ACCESS ROAD CENTRAL											
1	L	220	5.0	0.147	21.9	LOS C	2.9	21.5	0.64	0.75	37.6
2	T	5	5.0	0.113	40.6	LOS D	2.1	15.2	0.84	0.64	26.4
3	R	39	5.0	0.113	48.6	LOS D	2.1	15.2	0.84	0.74	25.9
Approach		264	5.0	0.147	26.2	LOS C	2.9	21.5	0.67	0.75	34.9
East: TOMAGO ROAD											
4	L	89	5.0	0.100	15.9	LOS B	1.4	10.3	0.52	0.73	41.9
5	T	1051	5.0	0.878	48.3	LOS D	31.4	229.3	0.99	0.98	24.8
6	R	26	5.0	0.252	69.8	LOS E	1.6	11.4	0.99	0.72	20.6
Approach		1166	5.0	0.878	46.3	LOS D	31.4	229.3	0.95	0.95	25.4
North: CAMPBELL ST											
7	L	11	5.0	0.108	65.0	LOS E	0.9	6.5	0.95	0.70	21.8
8	T	5	5.0	0.108	56.6	LOS E	0.9	6.5	0.95	0.67	22.0
9	R	63	5.0	0.704	74.6	LOS E	4.0	29.2	1.00	0.82	19.8
Approach		79	5.0	0.704	72.1	LOS E	4.0	29.2	0.99	0.80	20.2
West: TOMAGO RD (FROM HWY)											
10	L	153	5.0	0.261	27.6	LOS C	5.1	37.2	0.73	0.76	34.2
11	T	1563	5.0	0.871	29.5	LOS C	40.6	296.6	0.89	0.86	31.6
12	R	511	5.0	0.854	48.0	LOS D	10.2	74.7	1.00	0.96	26.0
Approach		2226	5.0	0.871	33.6	LOS C	40.6	296.6	0.90	0.88	30.3
All Vehicles		3736	5.0	0.878	37.9	LOS D	40.6	296.6	0.90	0.89	28.5

M3 – MOVEMENT SUMMARY

Site: TCS SPLIT PM

TOMAGO ROAD & SITE ACCESS ROAD CENTRAL, TOMAGO – PM PEAK 2020
 Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance – Vehicles											
Mov ID	Turn	Demand Flow	HV Deg.	Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SITE ACCESS ROAD CENTRAL											
1	L	511	5.0	0.593	43.8	LOS D	12.8	93.7	0.94	0.83	27.2
2	T	5	5.0	0.316	59.6	LOS E	6.1	44.9	0.92	0.73	21.3
3	R	89	5.0	0.316	67.6	LOS E	6.1	44.9	0.92	0.78	21.1
Approach		605	5.0	0.593	47.5	LOS D	12.8	93.7	0.94	0.82	26.1
East: TOMAGO ROAD											
4	L	39	5.0	0.052	15.3	LOS B	0.8	6.0	0.31	0.70	42.4
5	T	1635	5.0	0.866	29.3	LOS C	48.2	351.8	0.86	0.81	31.8
6	R	11	5.0	0.080	79.7	LOS E	0.7	5.4	0.96	0.68	18.8
Approach		1684	5.0	0.866	29.3	LOS C	48.2	351.8	0.84	0.80	31.8
North: CAMPBELL ST											
7	L	26	5.0	0.115	67.5	LOS E	2.0	14.6	0.90	0.74	21.1
8	T	5	5.0	0.115	59.0	LOS E	2.0	14.6	0.90	0.66	21.4
9	R	153	5.0	0.851	88.8	LOS F	12.1	88.5	1.00	0.93	17.6
Approach		184	5.0	0.851	84.9	LOS F	12.1	88.5	0.98	0.90	18.1
West: TOMAGO RD (FROM HWY)											
10	L	63	5.0	0.081	15.5	LOS B	1.2	8.9	0.43	0.71	42.2
11	T	1048	5.0	0.555	21.0	LOS C	19.9	145.5	0.57	0.51	36.7
12	R	220	5.0	0.837	91.0	LOS F	8.7	63.9	1.00	0.91	17.2
Approach		1332	5.0	0.837	32.3	LOS C	19.9	145.5	0.64	0.59	31.1
All Vehicles		3805	5.0	0.866	35.9	LOS D	48.2	351.8	0.79	0.74	29.4

4.4.3 – Tomago Road & Site Access – Western Intersection

The location of the Western Site Access Intersection is proposed in a location to connect with the internal loop road; the internal layout is designed to ensure that site access in the ultimate is spread over the three access intersections and does not subject this intersection to overload due to internal rat running by traffic at the eastern end of the site.

The timing for construction of this intersection will be driven by:

- Any staging or full development of S3 or S4.
- Any consideration of connection to S3 or S4 via the Central Intersection where analysis indicates the Tomago Road & Site Access Road Central cannot manage the increase in traffic demand.

The consideration for staging of S3 or S4 prior to S1 or S2 is not known at this time and traffic analysis at that future time, were such staging considered would be subject to analysis of the impact on the prevailing traffic flows.

Any early consideration to develop either S3 or S4 prior to the S1 or S2 stages would generate the requirement for a Western Intersection; there may be potential for that to be an interim intersection layout dependant on the timing and existing traffic demands at that time.

The recommended form of control for the ultimate traffic demands is for a traffic signal controlled intersection. This form of traffic management:

- Is seen as a logical extension to the control proposed for the two site access intersections to the east as it can enhance the capacity and performance of Tomago Road through co-ordination of the three traffic signal sites (SCATS).
- Traffic Signal Control can also offer acceptable access to Tomago Road in both directions hence reducing the potential for rat running within the broader Industrial Site WT1 to WT4.

TPK for this assessment has completed SIDRA modelling for the ultimate intersection requirements based on:

- WT1 & WT2 fully developed.
- S1 & S2 fully developed.
- 10 years Background growth on Tomago Road general traffic at 4%

The geometric layout adopted by SIDRA is provided as Figure 3.

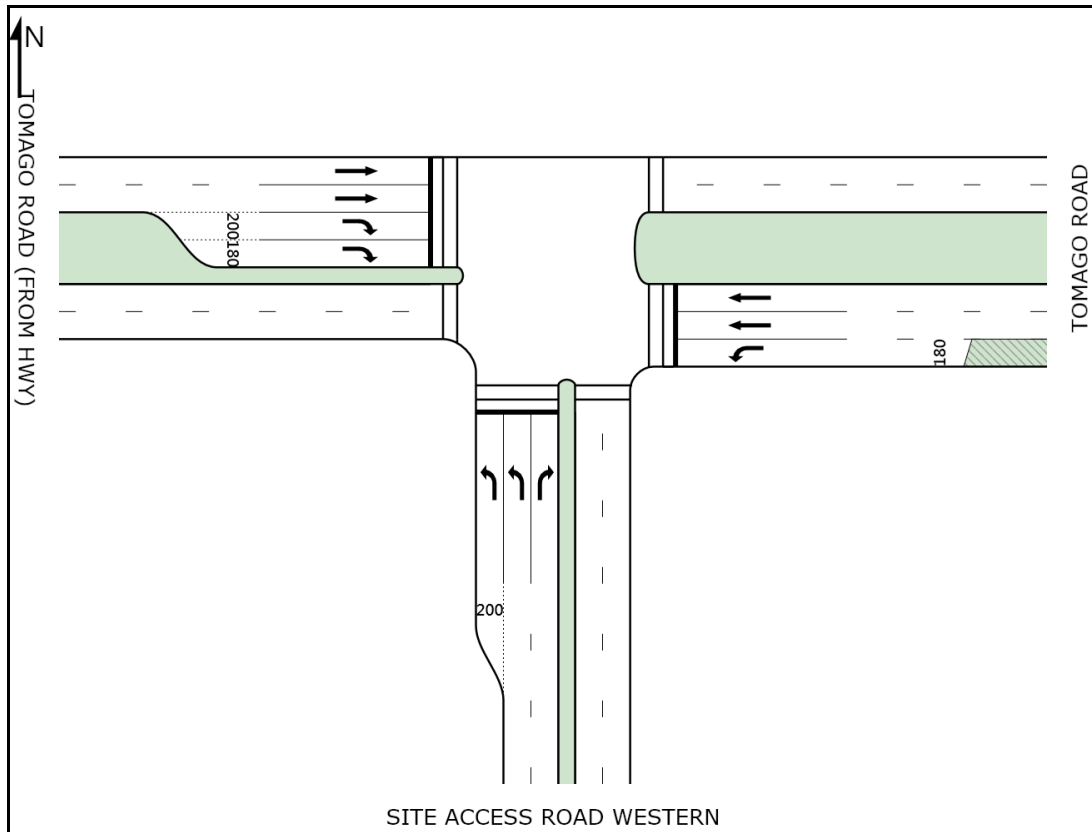


FIGURE 3 – SIDRA GEOMETRIC MODEL, WESTERN INTERSECTION

The Movement Summaries M4 & M5 for the am and pm peak respectively are provided on the following page of this report.

The outcome of the SIDRA modelling indicates that the Western Intersection can provide acceptable traffic management for the modelled scenario.

The model indicates that the pm peak will generate substantive queues for the westbound through traffic. The site is modelled in isolation and the extent of those queues will be subject to improvement under the RTA SCATS programs and co-ordination with other intersections along Tomago Road.

M4 – MOVEMENT SUMMARY

Site: TCS AM

TOMAGO ROAD & SITE ACCESS ROAD WESTERN, TOMAGO – AM PEAK 2020
 Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV Deg. Satn %	v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
							Vehicles veh	Distance m			
South: SITE ACCESS ROAD WESTERN											
1	L	222	5.0	0.126	24.5	LOS C	3.2	23.2	0.57	0.75	35.9
3	R	39	5.0	0.104	46.1	LOS D	1.7	12.4	0.84	0.73	26.6
Approach		261	5.0	0.126	27.7	LOS C	3.2	23.2	0.61	0.75	34.1
East: TOMAGO ROAD											
4	L	92	5.0	0.128	30.6	LOS C	3.1	22.4	0.67	0.76	32.6
5	T	1281	5.0	0.848	33.2	LOS C	31.6	230.8	0.92	0.88	30.0
Approach		1373	5.0	0.848	33.0	LOS C	31.6	230.8	0.90	0.88	30.1
West: TOMAGO ROAD (FROM HWY)											
11	T	2074	5.0	0.805	4.3	LOS A	18.6	136.0	0.37	0.35	52.0
12	R	515	5.0	0.831	40.4	LOS D	9.8	71.3	1.00	0.92	28.5
Approach		2588	5.0	0.831	11.5	LOS B	18.6	136.0	0.50	0.46	44.7
All Vehicles		4222	5.0	0.848	19.5	LOS B	31.6	230.8	0.63	0.61	38.0

M5 – MOVEMENT SUMMARY

Site: TCS PM

TOMAGO ROAD & SITE ACCESS ROAD WESTERN, TOMAGO PM PEAK 2020
 Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV Deg. Satn %	v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
							Vehicles veh	Distance m			
South: SITE ACCESS ROAD WESTERN											
1	L	515	5.0	0.458	52.5	LOS D	15.0	109.4	0.85	0.83	24.6
3	R	92	5.0	0.333	69.8	LOS E	6.0	44.1	0.94	0.78	20.6
Approach		606	5.0	0.458	55.1	LOS E	15.0	109.4	0.87	0.82	23.9
East: TOMAGO ROAD											
4	L	39	5.0	0.049	20.8	LOS C	1.1	8.1	0.42	0.71	38.3
5	T	2145	5.0	0.936	27.9	LOS C	70.7	515.9	0.86	0.87	32.4
Approach		2184	5.0	0.936	27.8	LOS C	70.7	515.9	0.85	0.87	32.5
West: TOMAGO ROAD (FROM HWY)											
11	T	1449	5.0	0.501	1.7	LOS A	4.9	35.9	0.10	0.10	56.8
12	R	222	5.0	0.774	64.0	LOS E	6.7	48.9	1.00	0.87	21.8
Approach		1672	5.0	0.774	10.0	LOS A	6.7	48.9	0.22	0.20	46.8
All Vehicles		4462	5.0	0.936	24.8	LOS C	70.7	515.9	0.62	0.61	34.8

4.4.3.1 – Summary on the 3 Site Access Intersections

The SIDRA modelling for the revised RTA traffic generations provides a number of indicators for both the accesses to the subject site and the integration of the Westrac and this development site into the Tomago Road traffic strategy of RTA; the main indicators are:

1. The revised traffic generation rates provided by RTA have been applied to the models for the three (3) proposed access intersections; the outcomes suggest that traffic can be managed in the peaks under two lane traffic flows in each direction plus appropriate auxiliary lanes at each intersection providing access to both sites.
2. The Node Traffic Demands set out in Table 5 of this report indicate that introduction of additional traffic flows in excess of a fully developed WT1 & WT2 will generate the need to implement the two lane flow for through traffic.
3. The RTA has confirmed with this project team that it will be the RTA's accountability to manage and plan the progressive upgrade of Tomago Road; this assessment was only to provide analysis for the 3 access intersections proposed to the subject site. The SIDRA Movement Summaries for the Central Intersection when viewed against the Eastern & Western Intersections would suggest that the inclusion of the existing Campbell Street into the proposed signalised intersection may have an unbalancing effect on intersection performance and SCATS co-ordination. That impact has been raised for RTA consideration in planning the Tomago Road strategy for overall access by all land use precincts.
4. This assessment has provided SIDRA analysis in a development sequential order of WT1, WT2 followed by S1 to S4. Circumstances may arise in the future where for example it is preferred to implement S3 prior to other stage areas. There are many similar scenarios that can be made however TPK submit analysis of all potential combinations is not realistic at this time.

What is submitted is that any plan to implement a further stage beyond WT1 & WT2 should include a review of the actual traffic generations, at that time, of occupied precincts of WT1 & WT2 benchmarked against the traffic generation rates adopted in the Better Transport Futures analysis.

The benchmarking will allow reconsideration of the traffic generation rate for new stages to establish realistic measures and ensure greater confidence in the detailed planning for the route and intersections also the scheduling of the central and/or western intersections to meet capacity requirements.

4.4.4 – Tomago Road & McIntyre Street

The existing intersection of McIntyre Road with Tomago Road is a basic T-Junction. The progressive growth to traffic on Tomago Road from the subject development site and general traffic growth will undoubtedly necessitate an upgrade of this intersection.

School Drive is a service road running parallel to Tomago Road on the northern side, east of McIntyre Road. Traffic generated by this service road also accesses Tomago Road via the McIntyre Road intersection; it does not connect east to Campbell Street at this time.

TPK considered relocating the access to Tomago Road for the McIntyre Street & School Drive traffic to be incorporated into the new Tomago Road & Site Access Road Western intersection in TPK's original report for this project. It was determined then that the traffic management and geometric needs to establish a cross intersection were not realistic; in particular the proximity of School Road to Tomago Road was of concern.

The ultimate form of traffic control at this intersection requires consideration of the potential restrictions to be imposed on private driveways between this intersection and the Tomago Road & Old Punt Road intersection which is currently a two lane circulating roundabout control.

For example if a philosophy of central median and left in left out only restrictions to all private driveways be adopted by road authorities as the long term strategy for Tomago Road then roundabout control at the McIntyre Street intersection would facilitate U-Turns as does the existing Old Punt Road roundabout control.

Conversely the preferred intersection control for road authorities at McIntyre Road intersection could be traffic signal control reflecting a desire to expand the traffic signal co-ordination of the development sites three access intersections.

There is the option to incorporate U-Turn amenity into that traffic signal control and still adopt the central median control at the mid block private driveways west of the McIntyre Road intersection. The development WT1, WT2 & S1 to S4 will not have direct access to Tomago Road hence the central median control on Tomago Road does not generate U-Turns from this sites frontage.

TPK has identified that this intersection will need adjustment or upgrade dependant on long term planning strategies of road authorities; RTA did not require TPK to model this intersection as part of this assessment as that analysis would be part of the Tomago Road Route Strategy planning to be determined by road authorities.

4.4.5 – Tomago Road & Old Punt Road

Growth impacts on Tomago Road from east of this intersection will combine with the significant volumes that currently enter/exit Old Punt Road and travel to/from The Pacific Highway to the west.

The potential traffic volumes on Tomago Road between Old Punt Road and The Pacific Highway will require 2 lane capacities in either direction, as a minimum to manage route growth.

Old Punt Road north of Tomago Road services an existing expansive Industrial & Business precinct that has the option to use Tomago Road or Old Punt Road to access the Pacific Highway; both highway intersections are traffic signal controlled.

The Pacific Highway upgrade, F3 to Raymond Terrace has a preferred route adopted; the RTA Concept Plan is provided as Figure 4 in this report. The detail of connectivity as part of this highway upgrade would also influence any adopted Tomago Road Traffic Management Route Strategy.

TPK has identified that this intersection will need adjustment or upgrade dependant on long term planning strategies of road authorities; RTA did not require TPK to model this intersection as part of this assessment as that analysis would be part of the Tomago Road Route Strategy planning to be determined by road authorities.

4.4.6 – Tomago Road & Pacific Highway

TPK has identified that this intersection will need adjustment or upgrade dependant on long term planning strategies of road authorities; RTA did not require TPK to model this intersection as part of this assessment as that analysis would be part of the Tomago Road Route Strategy planning to be determined by road authorities.

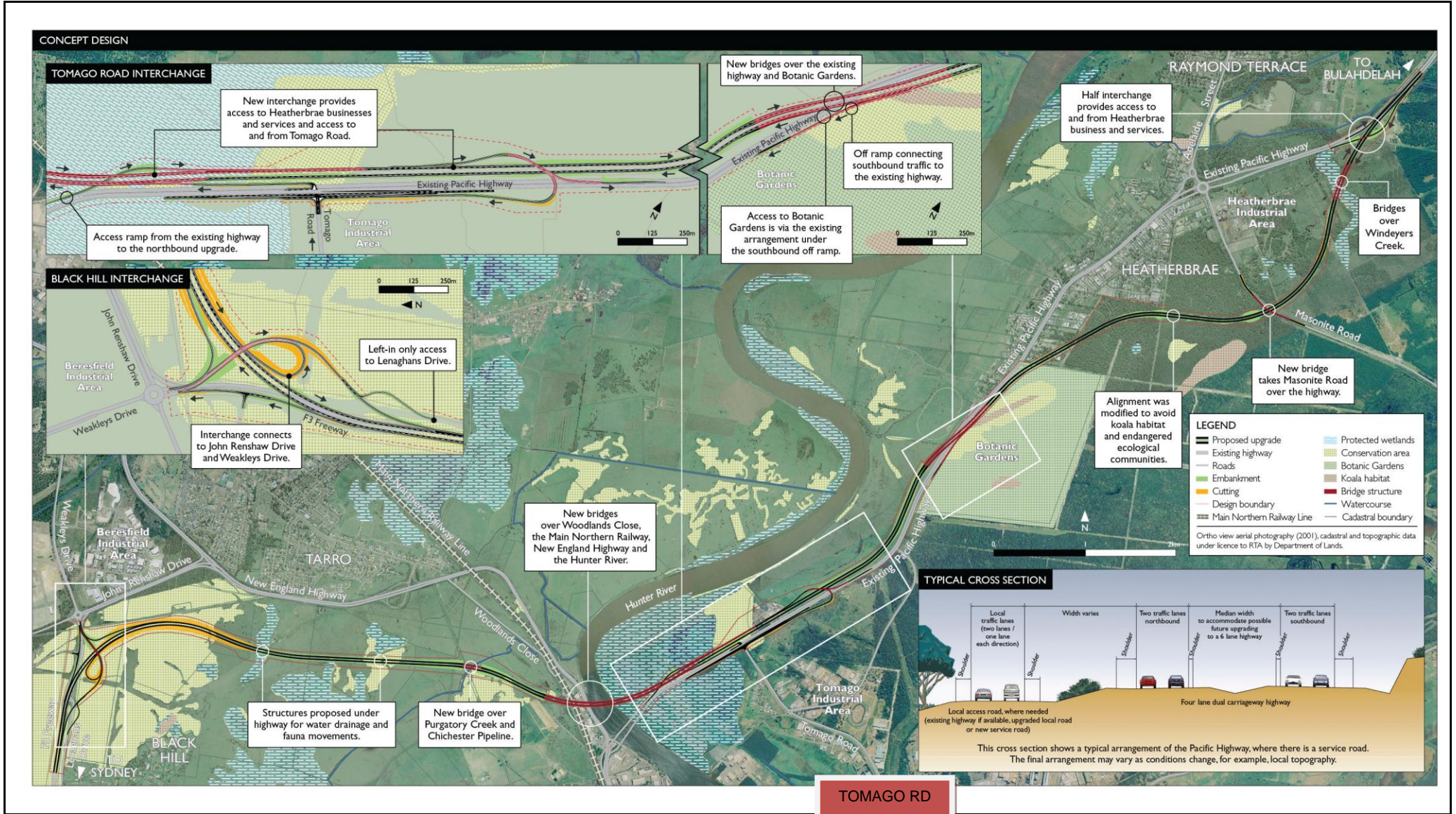


FIGURE 4 – RTA PREFERRED ROUTE FOR PACIFIC HIGHWAY UPGRADE AT HEXHAM

4.5 – Tomago Road Route Strategy –TPK Comment

The intersections discussed in Section 4.4 provide recommendations for access to Tomago Road by the subject development site and also identifies the need for a wider based Tomago Road Route Strategy.

This assessment in itself cannot determine an ultimate strategy to be adopted by key stakeholders but clearly the potential for traffic growth determines that forward planning in combination with threshold traffic reviews are essential to ensure traffic demands are managed along the route.

Whilst this assessment has considered some of the key intersections there are other private accesses direct to Tomago Road, some well channelized and unrestricted at the moment that require consideration in the development of any total strategy.

The following points are clear:

- Traffic growth, as the subject site stage develops can be assessed against the current traffic demands to review the interim needs at that point in time.
- The combination of traffic from the subject development site and general background growth will require Tomago Road to present two lane capacity in each direction east of Old Punt Road to at least the eastern extremity of the subject development site.
- Tomago Road between Old Punt Road and The Pacific Highway potentially requires route capacity in excess of 2 lanes in each direction in the long term.

An option for long term planning of Tomago Road is to consider traffic restrictions for Old Punt Road north of Tomago Road. Restricting access for that leg of Old Punt Road would reassign a significant traffic demand from Tomago Road and require that traffic to utilise the Pacific Highway and Old Punt Road intersection.

The Pacific Highway and Old Punt Road intersection would require upgrade to manage the increased traffic demand however the reassignment of traffic could remove the need for 3 lane capacity in each direction of Tomago Road between Old Punt Road and The Pacific Highway.

The potential development along Tomago Road and the associated traffic growth should also influence connectivity considerations for the upgrade of The Pacific Highway, F3 to Raymond Terrace.

4.6 – Construction Traffic – Assessment & Discussion

The traffic for the construction phase of site development (any of S1 to S4) will generate two construction steps:

1. The delivery of in-fill for the site.
2. Staff and deliveries to establish the road and lot construction.

The in-fill delivery will be provided by truck & dog vehicular classification to maximise loads. The truck activity will occur irregularly during each stage construction phase as fill is required. The in-fill process is not a daily constant and would generate up to 50 trucks per day over the business week working period of 6am to 6pm; at this in-fill time there will be minimal staff (up to 10) on site.

The establishment of the road and lot phase of construction generate a greater level of on-site staff; during any one stage of construction the staff level could reach 50 persons generating trips in the peak periods plus the business hours delivery traffic generating trips spread over the working day.

For this assessment it is logical to adopt the position that the Eastern Intersection is established therefore for any given stage of development (S1 to S4) the optimum site access to the construction zone could be:

1. Utilise an existing signalised intersection that provides acceptable access in terms of intersection capacity, impact on existing land use and/or suitability to mix existing land use and construction traffic.
2. Provide a dedicated construction area access intersection off Tomago Road.

As an example the process to determine the preferred access for construction follows these steps:

- It is planned to commence S1.
- The Eastern Intersection is not at full traffic load as land use within WT1 & WT2 has not become fully occupied and operational.
- Modelling of the Eastern Intersection under the traffic demands at that time plus construction traffic confirms capacity.
- The mix of existing land use traffic and construction traffic is not deemed unsafe.
- S1 Construction Traffic approved to use the Eastern Intersection.

OR

- Modelling of the Eastern Intersection under the traffic demands at that time plus construction traffic indicates unacceptable capacity and/or the mix of land use and construction traffic is not agreed to.
- S1 Construction Traffic generates the requirement for Central Intersection or an interim derivation thereof.

The philosophy in the above steps can be applied to any stage of construction from S1 through to S4. As the key to the approved choice can be very dependent on operating conditions at an existing intersection TPK concluded that SIDRA analysis of potential scenarios would be of little value at this point in time.

SECTION 5 – SITE AMENITY ASSESSMENT

5.1 – Parking

Table 3 of this report provides the parking requirements for each lot relative to the nominated land use when the development application is submitted.

The provision of the required parking spaces at that time will minimise the potential for on street parking. Council may wish to ensure all internal roads within the estate are clear of parking; provision of yellow edgeline marking against the kerb is an effective method to enforce No Stopping and avoids ongoing sign maintenance.

The off street parking layouts should be designed in accordance with the requirements of relevant Australian Standards and Council's Principles of Development.

5.2 – Traffic Flow

Traffic will ultimately have the option to enter and exit the estate at three intersections:

- Tomago Road & Site Access Road Eastern.
- Tomago Road & Site Access Road Central (incorporates existing Campbell St).
- Tomago Road & Site Access Road Western.

The internal roads are proposed at a 26m road reserve and 15m carriageway kerb to kerb; roads to this standard will allow for:

- Two lane capacity in each direction for the first block off each connection to/from Tomago Road; applying No Stopping on the kerbside lanes.
- Adequate footway space for pedestrians and services.
- Acceptable manoeuvre paths for vehicles entering and exiting land use sites.

Each land use tenant/owner will need to submit a development application to occupy the site; at that time it can be confirmed that all site traffic will be able to enter and exit the road network in a forward direction.

The site layouts should be designed in accordance with the requirements of relevant Australian Standards and Council's Principles of Development.

5.3 – Public Transport

The internal layout and road widths provide for potential bus routes through the developed precinct.

The 3 intersections to Tomago Road are proposed ultimately for traffic signal control; this allows the alternative for public transport to service the precinct from Tomago Road with bus stops located near the intersections.

All intersections will incorporate pedestrian amenity in the traffic signal control.

SECTION 6 – SUMMATION

The assessment by TPK & Associates has concluded that:

1. The Intersection and Route Capacity for Tomago Road west of the approved Eastern Site Access intersection could require a theoretical Mid-Block capacity of 4 lanes at full development of the site.
2. The capacity geometric needs are driven by many factors that need to occur for the potential capacity requirements identified in this assessment to eventuate; of most significance are:
 - a. That the predicted areas of developable land adopted for this assessment are achieved.
 - b. That the traffic generation rates required by RTA for this site assessment eventuate.
 - c. That the Tomago Road background growth of 4% per annum eventuates.These doubts determine the need to require traffic assessments for each stage of development on this site as it is identified.
3. The subject site does not have a detailed staging strategy at this time and it may be a fact that the development timeframe, to full levels in all precincts exceeds a time period that is reasonable for traffic assessments made at this time to be adopted with confidence for the more detailed levels of traffic management such as ultimate auxiliary lane lengths.
4. It is unreasonable to have an expectation for detailed prediction of road network needs for such expansive precincts when large areas have the potential to be taken up and by nature of their business footprint they could actually generate traffic levels well under the traffic generation rates adopted in these wide scope assessments.
5. The Tomago Road route also has a traffic function for the wider and nearby land uses; the overview and strategies for managing the long term needs can be established in concept form given the indicators from this assessment. It is suggested that there is a need for road authorities to establish in their strategies:
 - a. A target road reserve area that ensures capacity can be managed.
 - b. The potential for a future need to divert precincts traffic generations off Tomago Road to other routes to balance road network demand.
 - c. That the upgrade of The Pacific Highway from F3 to Raymond Terrace considers the need for high standard connectivity to the high traffic demand precincts around Tomago.

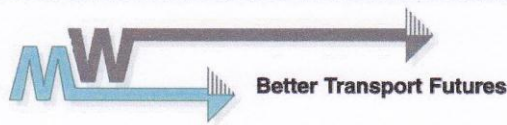
Prepared by

T Keating

Mr. T Keating
Director, TPK & Associates

APPENDIX A

Better Transport Futures – TIS 2009



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 Transport Planning & Engineering

normal peak and is representative of the normal work practices associated with the industrial development along Tomago Road in the general vicinity of the site.

The future predicted traffic volumes associated with the development are presented in **Table 4.1** below.

Table 4.1 – Predicted Future Traffic Volumes

Stage	Facility	Area	Rate	Volume
Stage 1 - WesTrac	Administration	590 m ²	2 per 100 m ²	12
	Machinery Sales			
	Workshops	9780 m ²	-	Assumed 120
	Parts Warehouse and Distribution	6120 m ²	-	Assume 80
	Machinery Storage	-	-	-
Stage 1 - CAT Institute	Apprentice training	1500 m ²		Assumed 100
	WesTrac			
	Universities/other educational			
Stage 2 - Caterpillar	Administration	1500 m ²	2 per 100 m ²	30
	Warehouse ²	100,000 m ²	0.5 per 100 m ²	500 ¹
			50 employees	100 ³
	Equipment demo and training	Approx. 20 hectares	-	-
Stage 3	Industrial Park	48.49 hectares		984 am 1188 pm
			TOTAL	1826 am¹ 2030 pm¹
				1426³ 1630³

Notes:

1. All rates assumed from RTA Guide to Traffic Generating Developments unless specified otherwise.
2. Warehouse assumed to include a component of direct sales. That is traffic generation is based on both staff and customer movements
3. Warehouse rate based on planned staffing levels only assuming warehouse activity only for the facility.

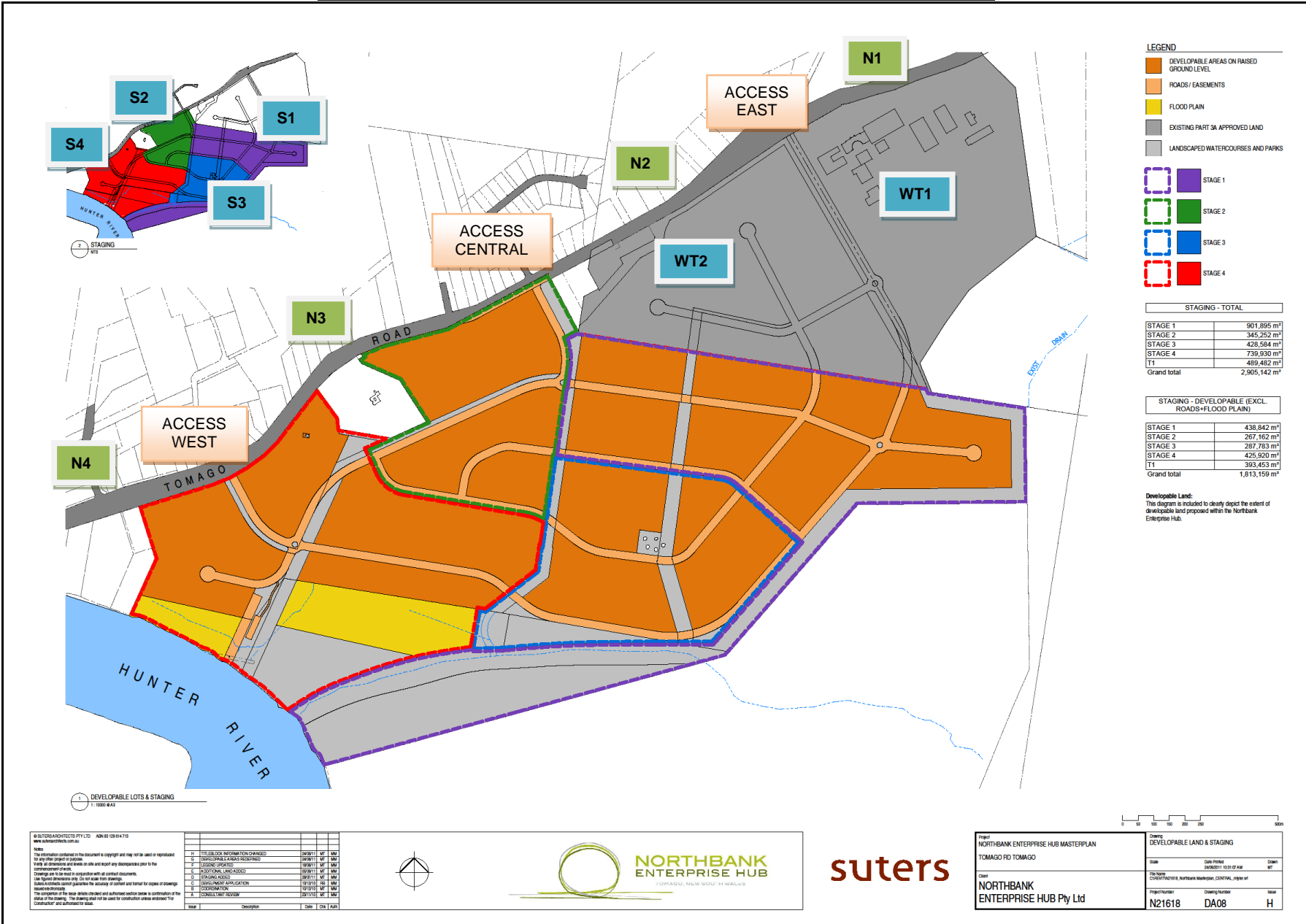
The two levels of total traffic generation presented in Table 4.1 above reflect alternate activity levels from the main warehouse facility.

Please note the following in relation to the above traffic generation data:

- a) The machinery sales building will be located within the administration building on the site. The machinery itself will generally be stored outside rather than within a building.
- b) The site has a large footprint and there is a large area available for storage of machinery. Again, this machinery will be stored outside on the site.
- c) Total staff assumed for the workshop is 120 and all staff arrive/depart at same time.
- d) Assumes 50 staff at the warehouse and distribution centre and all staff arrive/depart at same time. For the purposes of the traffic analysis this scenario has been assumed generation of 100 vehicle trips in the peak period based on staff only, or the alternate RTA rate for warehouse activity.
- e) Assumed that typical training days could accommodate a maximum of 100 students.
- f) The equipment and demonstration area supplements the development and allows for demonstrations from the sales area as well as use by the CAT Institute.

APPENDIX B
Business Park Layout Plan

TPK & ASSOCIATES – NORTHBANK ENTERPRISE HUB, TOMAGO – TRAFFIC ASSESSMENT

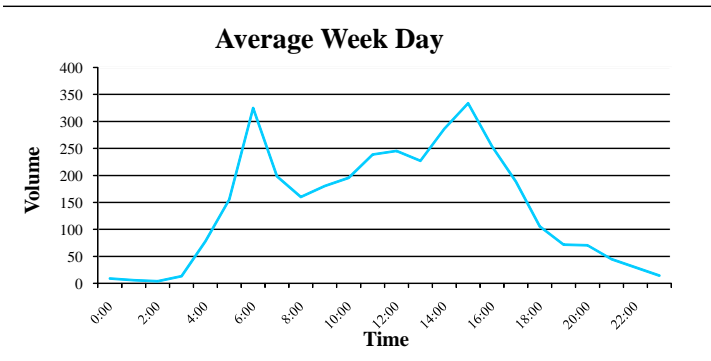


APPENDIX C
Traffic Data

Site 11 Tomago Rd West of Campbell Eastb

East

Day Time	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day Ave.	W/End Ave.	7 Day Ave
	19-Sep-10	20-Sep-10	21-Sep-10	22-Sep-10	23-Sep-10	24-Sep-10	25-Sep-10			
0:00	11	8	7	10	9	11	14	9	13	10
1:00	13	2	7	6	8	7	6	6	10	7
2:00	1	3	3	3	4	6	7	4	4	4
3:00	14	10	10	14	15	17	9	13	12	13
4:00	41	75	72	66	89	88	63	78	52	71
5:00	92	169	144	150	157	158	67	156	80	134
6:00	206	342	345	312	313	312	124	325	165	279
7:00	389	199	179	206	204	204	99	198	244	211
8:00	501	134	169	191	148	158	132	160	317	205
9:00	594	176	195	162	175	194	256	180	425	250
10:00	596	211	194	172	176	224	300	195	448	268
11:00	357	221	201	244	234	294	337	239	347	270
12:00	233	244	213	208	248	314	289	245	261	250
13:00	194	195	219	167	220	335	322	227	258	236
14:00	136	286	228	278	284	355	247	286	192	259
15:00	115	289	356	317	314	392	276	334	196	294
16:00	115	242	234	228	245	321	164	254	140	221
17:00	111	177	157	182	173	254	111	189	111	166
18:00	76	88	71	71	103	195	93	106	85	100
19:00	37	40	61	57	61	140	50	72	44	64
20:00	40	39	57	58	66	133	51	71	46	63
21:00	45	29	24	36	46	90	40	45	43	44
22:00	13	19	23	19	38	49	39	30	26	29
23:00	14	9	14	12	16	21	22	14	18	15
Total	3944	3207	3183	3169	3346	4272	3118	3435	3531	3463

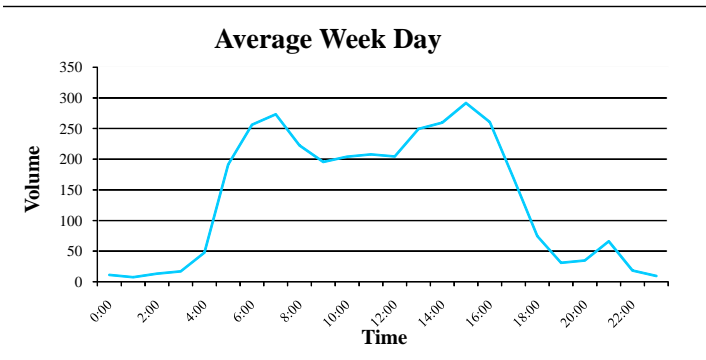


Summary			
	from	to	
AM Peak	6:00 AM	7:00 AM	345
PM Peak	3:00 PM	4:00 PM	392
Week Day Average			3435
Weekend Day Average			3531
7 Day Average			3463

Site 11 Tomago Rd West of Campbell Eastb

West

Day Time	Sun 19-Sep-10	Mon 20-Sep-10	Tue 21-Sep-10	Wed 22-Sep-10	Thu 23-Sep-10	Fri 24-Sep-10	Sat 25-Sep-10	W/Day Ave.	W/End Ave.	7 Day Ave
0:00	11	9	13	12	15	8	7	11	9	11
1:00	6	4	11	8	6	8	5	7	6	7
2:00	2	20	10	14	12	10	7	13	5	11
3:00	5	23	13	22	13	14	12	17	9	15
4:00	16	50	39	51	47	52	26	48	21	40
5:00	41	202	190	204	186	176	90	192	66	156
6:00	60	270	244	242	271	255	83	256	72	204
7:00	105	310	262	283	260	251	150	273	128	232
8:00	119	201	237	218	245	211	179	222	149	201
9:00	165	230	189	175	172	212	175	196	170	188
10:00	236	266	165	164	193	232	180	204	208	205
11:00	203	258	183	199	180	219	197	208	200	206
12:00	205	216	189	172	201	244	171	204	188	200
13:00	327	259	234	226	232	297	177	250	252	250
14:00	517	235	263	258	245	297	214	260	366	290
15:00	334	300	280	290	298	291	134	292	234	275
16:00	962	247	281	295	284	196	188	261	575	350
17:00	792	190	168	155	181	151	123	169	458	251
18:00	133	81	49	69	79	96	93	75	113	86
19:00	68	38	24	29	32	32	36	31	52	37
20:00	40	22	28	40	45	39	29	35	35	35
21:00	62	37	68	73	73	80	41	66	52	62
22:00	22	45	11	10	16	10	51	18	37	24
23:00	7	7	7	9	11	13	15	9	11	10
Total	4438	3520	3158	3218	3297	3394	2383	3317	3411	3344



Summary			
	from	to	
AM Peak	7:00 AM	8:00 AM	310
PM Peak	3:00 PM	4:00 PM	300
Week Day Average			3317
Weekend Day Average			3411
7 Day Average			3344