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16 July 2020

Pahee Rathan
Senior Land Use Assessment Coordinator
Transport for NSW
Sent via email

Re: Georges Cove Marina at 146 Newbridge Road, Moorebank - Response to TfNSW matters

Dear Pahee,

This letter responds to the traffic related matters that have been raised by Transport for NSW (TfNSW) in their letter dated 16 June 2020 for the Georges Cove Marina (TfNSW Ref: SYD18/01728/05, Council Ref: DA-611/2018).

TfNSW Comment

TfNSW has reviewed the submitted information and notes TfNSW's request in its letter dated 30 March 2020 has not been satisfied. The EMM's letter justified that the traffic generated by the proposed development is unlikely to have significant impact on the operation of Newbridge Road and Brickmakers Drive intersection. However, no traffic modeling analysis was undertaken to support this claim. SIDRA traffic modelling should be undertaken and provided to TfNSW for review.

EMM Response

EMM has undertaken intersection modelling to compare the traffic impacts at the Newbridge Road/Governor Macquarie Drive/Brickmakers Drive intersection for the subject development (Georges Cove Marina commercial) against the traffic impacts due to all five developments (cumulative) in this precinct in 2026.

The background traffic in 2026 is calculated by incorporating a factor of 12% growth of annual traffic from our surveyed traffic volumes in 2020 which is consistent with our previous analysis. Figure 1 presents the 2026 baseline traffic.

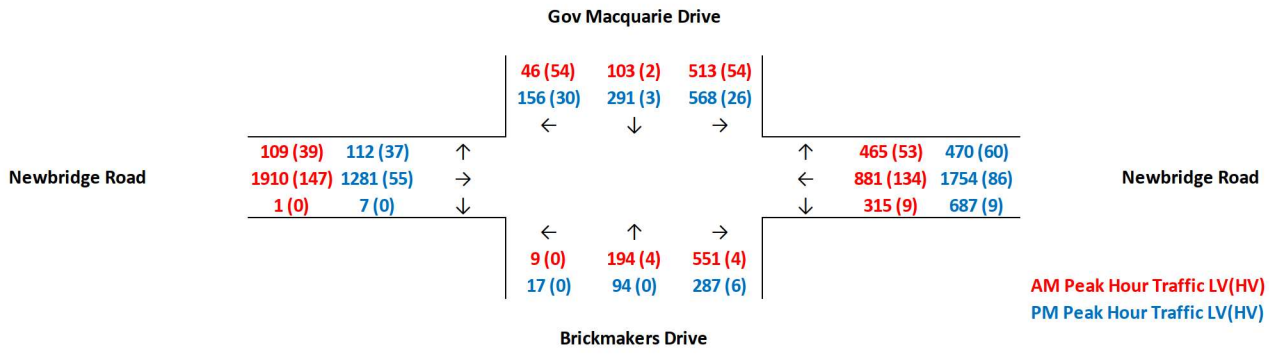


Figure 1 2026 baseline traffic (without any development)

Figure 2 presents the 2026 baseline traffic with the subject development (Georges Cove Marina commercial).

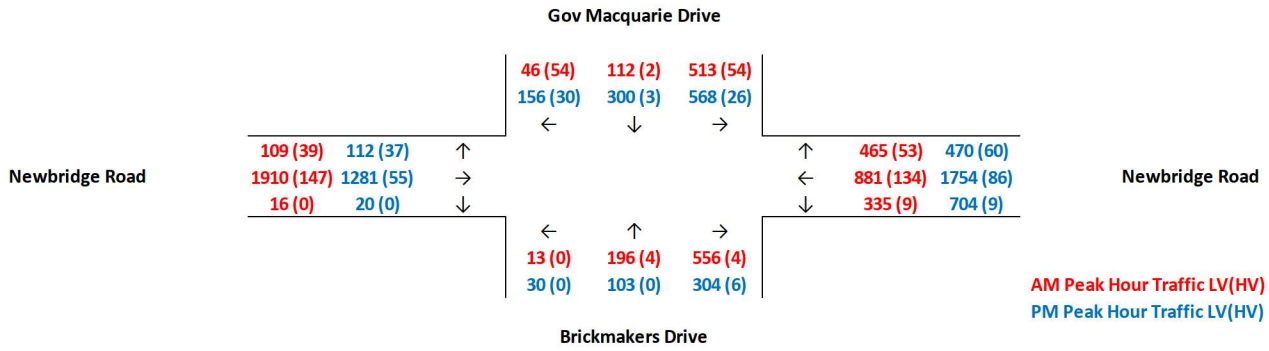


Figure 2 **2026 development traffic (with the subject development)**

Figure 3 presents the 2026 baseline traffic with the subject development as well as cumulative traffic at this intersection. Cumulative traffic includes Moorebank Cove residential, Moorebank Recycling Facility, Georges Cove Marina residential, and Benedict B6 Corridor mixed-use development.

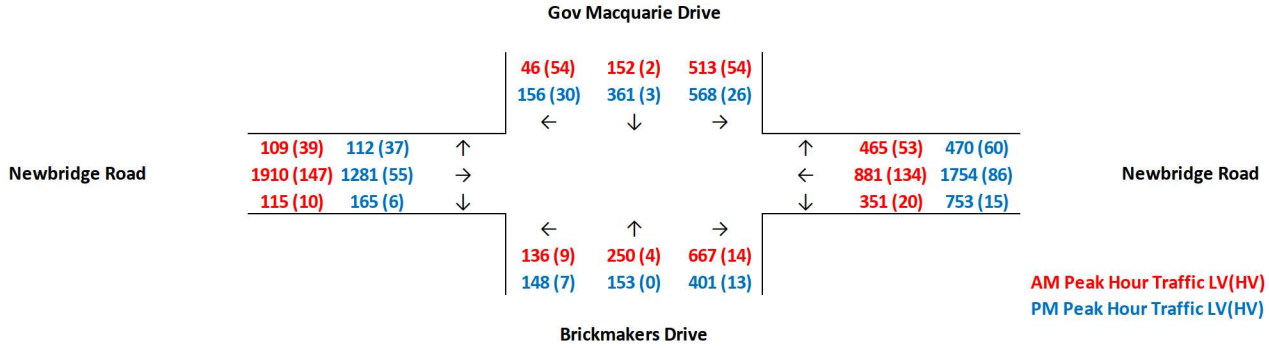


Figure 3 **2026 development traffic with cumulative traffic (all five developments in the precinct)**

The SIDRA results are presented in Table 1.

Table 1 **SIDRA results for the proposed development with and without cumulative traffic**

Period hour	2026 baseline				With subject development (Georges Cove Marina commercial)				With subject development plus cumulative traffic			
	DOS	LOS	DEL	Q95	DOS	LOS	DEL	Q95	DOS	LOS	DEL	Q95
AM	1.344	F	84.7	503.6	1.344	F	86.2	518.0	1.371	F	117.8	588.5
PM	1.053	D	49.1	490.0	1.095	E	57.5	544.1	1.333	F	106.3	956.9

In 2026 without any development, the Newbridge Road/Governor Macquarie Drive/Brickmakers Drive intersection will operate approximately 35% and 5% over capacity, with a LOS F and D, in the AM and PM peak hour respectively. The longest queuing will occur on western approach (citybound) which are over 500 m during the AM peak and on the eastern approach (outbound) close to 500 m during the PM peak. The average delays in the respective AM and PM peak hour are 85 s and 49 s respectively.

With our development during the AM peak hour, the intersection will be slightly impacted with an increase of 1.5 s in average delay and approximately 15 m longer queue during the AM peak. The queueing will be higher during the PM peak. Also, during the PM peak, the LOS will change from D to E although the degree of saturation is only increased by less than 5%. The average delay will increase marginally on both the peak periods.

With the additional cumulative traffic, the average delay will increase by an additional 32 s (37% over the baseline) and 49 s (99% over the baseline) in the AM and PM peak respectively. Although for the AM peak the capacity will increase marginally, during the PM peak, the intersection will become 23.8% more saturated with performance worsening to LOS F. Queuing at the eastern approach will also increase significantly by over 400 m.

A comparison between the traffic impact between the subject development and cumulative development reveals that during the AM peak, the average delay and queuing will increase significantly due to the cumulative impact. During the PM peak, all the modelled parameters will increase, most notably queuing on the eastern approach will increase by over 400 m. In summary, the subject development alone does not have a significant impact on the performance of the Newbridge Road/Governor Macquarie Drive/Brickmakers Drive intersection which will be the case for the cumulative development traffic.

Nevertheless, the performance of the Newbridge Road/Governor Macquarie Drive/Brickmakers Drive intersection is not related to approval for signalisation of the Brickmakers Drive/Link Road intersection.

We trust this thoroughly addresses the TfNSW comments and seek TfNSW in principle approval of the traffic signals at Brickmakers Drive/Link Road intersection. Should you require further clarification regarding this matter, please do not hesitate to contact the undersigned.

Yours sincerely

Abdullah Uddin
Associate Traffic Engineer

auddin@emmconsulting.com.au

0425 478 650

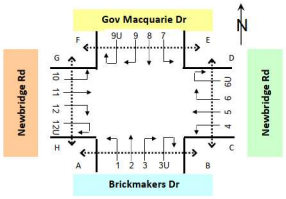
Appendix A

Intersection and tube count data

Job No. : N5560
Client : EMM
Suburb : Moorebank
Location : 1. Newbridge Rd / Gov Macquarie Dr / Brickmakers Dr

Day/Date : Thu, 30th January 2020
Weather : Fine
Description : Classified Intersection Count
: 15 mins Data

Classifications	Class 1	Class 2
	Lights	Heavies



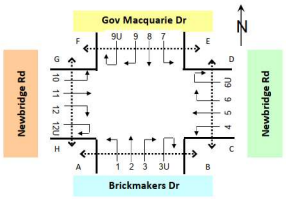
MATRIX Traffic and Transport Data

Approach	Brickmakers Dr												Newbridge Rd											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:00 to 7:15	1	0	1	33	2	35	134	1	135	0	0	0	70	1	71	200	30	230	101	14	115	0	0	0
7:15 to 7:30	2	0	2	41	1	42	124	0	124	0	0	0	60	1	61	181	39	220	113	16	129	0	0	0
7:30 to 7:45	4	0	4	42	0	42	88	0	88	0	0	0	63	0	63	194	26	220	60	6	66	0	0	0
7:45 to 8:00	1	0	1	57	1	58	146	3	149	0	0	0	88	6	94	212	25	237	141	11	152	0	0	0
8:00 to 8:15	3	0	3	72	0	72	161	2	163	0	0	0	65	0	65	164	25	189	125	14	139	0	0	0
8:15 to 8:30	6	0	6	72	1	73	117	1	118	0	0	0	64	1	65	149	23	172	152	12	164	0	0	0
8:30 to 8:45	2	0	2	64	1	65	108	2	110	0	0	0	58	2	60	159	29	188	118	13	131	0	0	0
8:45 to 9:00	3	0	3	49	1	50	109	1	110	0	0	0	64	1	65	196	32	228	97	15	112	0	0	0
AM Totals	**22**	**0**	**22**	**430**	**7**	**437**	**987**	**10**	**997**	**0**	**0**	**0**	**532**	**12**	**544**	**1,455**	**229**	**1,684**	**907**	**101**	**1,008**	**0**	**0**	**0**
16:00 to 16:15	4	0	4	25	1	26	102	4	106	0	0	0	165	2	167	411	19	430	121	12	133	0	0	0
16:15 to 16:30	2	1	3	21	0	21	112	0	112	0	0	0	151	1	152	332	19	351	91	15	106	0	0	0
16:30 to 16:45	2	0	2	24	0	24	73	0	73	0	0	0	146	2	148	306	23	329	92	17	109	0	0	0
16:45 to 17:00	5	0	5	26	0	26	54	1	55	0	0	0	162	1	163	381	24	405	125	11	136	0	0	0
17:00 to 17:15	4	0	4	16	0	16	77	2	79	0	0	0	166	2	168	411	14	425	89	13	102	0	0	0
17:15 to 17:30	4	0	4	18	0	18	52	2	54	0	0	0	139	3	142	468	16	484	114	13	127	1	0	1
17:30 to 17:45	1	0	1	18	0	18	55	0	55	0	0	0	145	0	145	398	17	415	109	12	121	0	0	0
17:45 to 18:00	1	0	1	24	0	24	46	0	46	0	0	0	159	0	159	383	17	400	141	15	156	0	0	0
PM Totals	**23**	**1**	**24**	**172**	**1**	**173**	**571**	**9**	**580**	**0**	**0**	**0**	**1,233**	**11**	**1,244**	**3,090**	**149**	**3,239**	**882**	**108**	**990**	**1**	**0**	**1**

Approach	Gov Macquarie Dr												Newbridge Rd												Crossing Pedestrians								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)										
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H	Total
7:00 to 7:15	113	14	127	24	0	24	10	14	24	0	0	0	16	10	26	389	23	412	0	0	0	0	0	0	0	0	1	0	0	0	3	1	4
7:15 to 7:30	98	11	109	21	1	22	11	8	19	0	0	0	26	8	34	506	43	549	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1
7:30 to 7:45	130	14	144	19	0	19	9	14	23	0	0	0	24	6	30	435	33	468	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
7:45 to 8:00	117	9	126	28	1	29	11	12	23	0	0	0	31	11	42	375	32	407	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
8:00 to 8:15	133	16	149	26	5	31	8	10	18	0	0	0	26	17	43	294	32	326	0	1	1	1	0	1	1	0	0	0	1	0	6	1	9
8:15 to 8:30	142	16	158	19	0	19	14	13	27	0	0	0	38	11	49	316	36	352	1	0	1	0	0	0	0	1	0	1	0	0	8	2	12
8:30 to 8:45	135	22	157	45	1	46	19	15	34	0	0	0	51	10	61	295	44	339	0	1	1	0	0	0	0	0	0	0	0	0	4	0	4
8:45 to 9:00	72	26	98	26	2	28	25	11	36	0	0	0	49	10	59	316	49	365	5	0	5	0	0	0	0	0	0	1	0	0	2	1	4
AM Totals	**940**	**128**	**1,068**	**208**	**10**	**218**	**107**	**97**	**204**	**0**	**0**	**0**	**261**	**83**	**344**	**2,926**	**292**	**3,218**	**7**	**2**	**9**	**1**	**0**	**1**	**1**	**1**	**0**	**2**	**1**	**0**	**28**	**7**	**40**
16:00 to 16:15	194	24	218	64	0	64	41	11	52	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	6	8
16:15 to 16:30	197	14	211	59	0	59	35	10	45	0	0	0	6	3	9	178	14	192	1	0	1	1	0	1	1	0	4	0	3	2	0	0	10
16:30 to 16:45	140	3	143	63	0	63	31	6	37	0	0	0	23	12	35	351	15	366	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
16:45 to 17:00	105	8	113	51	2	53	20	9	29	0	0	0	25	6	31	209	11	220	1	0	1	0	0	0	1	0	1	1	0	3	1	1	8
17:00 to 17:15	153	9	162	79	1	80	42	5	47	0	0	0	27	7	34	276	11	287	3	0	3	0	0	0	0	0	0	0	0	1	0	0	1
17:15 to 17:30	109	3	112	67	0	67	46	7	53	0	0	0	25	8	33	308	12	320	2	0	2	0	0	0	0	0	0	0	0	0	0	1	1
17:30 to 17:45	109	4	113	53	0	53	29	5	34	0	0	0	14	8	22	311	15	326	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
17:45 to 18:00	80	3	83	37	0	37	26	8	34	0	0	0	24	6	30	234	12	246	2	0	2	0	0	0	0	0	1	0	0	0	0	0	1
PM Totals	**1,087**	**68**	**1,155**	**473**	**3**	**476**	**270**	**61**	**331**	**0**	**0**	**0**	**146**	**50**	**196**	**1,868**	**90**	**1,958**	**11**	**0**	**11**	**1**	**0**	**1**	**3**	**0**	**7**	**1**	**3**	**7**	**2**	**9**	**32**

Job No. : N5560
Client : EMM
Suburb : Moorebank
Location : 1. Newbridge Rd / Gov Macquarie Dr / Brickmakers Dr

Day/Date : Thu, 30th January 2020
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



MATRIX Traffic and Transport Data

Approach	Brickmakers Dr												Newbridge Rd											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:00 to 8:00	8	0	8	173	4	177	492	4	496	0	0	0	281	8	289	787	120	907	415	47	462	0	0	0
7:15 to 8:15	10	0	10	212	2	214	519	5	524	0	0	0	276	7	283	751	115	866	439	47	486	0	0	0
7:30 to 8:30	14	0	14	243	2	245	512	6	518	0	0	0	280	7	287	719	99	818	478	43	521	0	0	0
7:45 to 8:45	12	0	12	265	3	268	532	8	540	0	0	0	275	9	284	684	102	786	536	50	586	0	0	0
8:00 to 9:00	14	0	14	257	3	260	495	6	501	0	0	0	251	4	255	668	109	777	492	54	546	0	0	0
AM Totals	**22**	**0**	**22**	**430**	**7**	**437**	**987**	**10**	**997**	**0**	**0**	**0**	**532**	**12**	**544**	**1,455**	**229**	**1,684**	**907**	**101**	**1,008**	**0**	**0**	**0**
16:00 to 17:00	13	1	14	96	1	97	341	5	346	0	0	0	624	6	630	1,430	85	1,515	429	55	484	0	0	0
16:15 to 17:15	13	1	14	87	0	87	316	3	319	0	0	0	625	6	631	1,430	80	1,510	397	56	453	0	0	0
16:30 to 17:30	15	0	15	84	0	84	256	5	261	0	0	0	613	8	621	1,566	77	1,643	420	54	474	1	0	1
16:45 to 17:45	14	0	14	78	0	78	238	5	243	0	0	0	612	6	618	1,658	71	1,729	437	49	486	1	0	1
17:00 to 18:00	10	0	10	76	0	76	230	4	234	0	0	0	609	5	614	1,660	64	1,724	453	53	506	1	0	1
PM Totals	**23**	**1**	**24**	**172**	**1**	**173**	**571**	**9**	**580**	**0**	**0**	**0**	**1,233**	**11**	**1,244**	**3,090**	**149**	**3,239**	**882**	**108**	**990**	**1**	**0**	**1**

Approach	Gov Macquarie Dr	Newbridge Rd	Crossing

Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)			Pedestrians							
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H	Total
7:00 to 8:00	458	48	**506**	92	2	**94**	41	48	**89**	0	0	**0**	97	35	**132**	1,705	131	**1,836**	1	0	**1**	0	0	**0**	0	0	0	0	0	0	8	3	**11**
7:15 to 8:15	478	50	**528**	94	7	**101**	39	44	**83**	0	0	**0**	107	42	**149**	1,610	140	**1,750**	1	1	**2**	1	0	**1**	1	0	0	0	1	0	11	3	**16**
7:30 to 8:30	522	55	**577**	92	6	**98**	42	49	**91**	0	0	**0**	119	45	**164**	1,420	133	**1,553**	1	1	**2**	1	0	**1**	1	1	0	1	1	0	18	5	**27**
7:45 to 8:45	527	63	**590**	118	7	**125**	52	50	**102**	0	0	**0**	146	49	**195**	1,280	144	**1,424**	1	2	**3**	1	0	**1**	1	1	0	1	1	0	21	4	**29**
8:00 to 9:00	482	80	**562**	116	8	**124**	66	49	**115**	0	0	**0**	164	48	**212**	1,221	161	**1,382**	6	2	**8**	1	0	**1**	1	1	0	2	1	0	20	4	**29**
AM Totals	**940**	**128**	**1,068**	**208**	**10**	**218**	**107**	**97**	**204**	**0**	**0**	**0**	**261**	**83**	**344**	**2,926**	**292**	**3,218**	**7**	**2**	**9**	**1**	**0**	**1**	**1**	**1**	**0**	**2**	**1**	**0**	**28**	**7**	**40**
16:00 to 17:00	636	49	**685**	237	2	**239**	127	36	**163**	0	0	**0**	56	21	**77**	739	40	**779**	2	0	**2**	1	0	**1**	3	0	6	1	3	6	2	8	**29**
16:15 to 17:15	595	34	**629**	252	3	**255**	128	30	**158**	0	0	**0**	81	28	**109**	1,014	51	**1,065**	5	0	**5**	1	0	**1**	2	0	5	1	3	7	2	2	**22**
16:30 to 17:30	507	23	**530**	260	3	**263**	139	27	**166**	0	0	**0**	100	33	**133**	1,144	49	**1,193**	6	0	**6**	0	0	**0**	1	0	1	1	0	5	2	3	**13**
16:45 to 17:45	476	24	**500**	250	3	**253**	137	26	**163**	0	0	**0**	91	29	**120**	1,104	49	**1,153**	8	0	**8**	0	0	**0**	1	0	1	1	0	4	1	2	**10**
17:00 to 18:00	451	19	**470**	236	1	**237**	143	25	**168**	0	0	**0**	90	29	**119**	1,129	50	**1,179**	9	0	**9**	0	0	**0**	0	0	1	0	0	1	0	1	**3**
PM Totals	**1,087**	**68**	**1,155**	**473**	**3**	**476**	**270**	**61**	**331**	**0**	**0**	**0**	**146**	**50**	**196**	**1,868**	**90**	**1,958**	**11**	**0**	**11**	**1**	**0**	**1**	**3**	**0**	**7**	**1**	**3**	**7**	**2**	**9**	**32**

Job No	N5560
Client	Eric Lei
Site	Brickmakers Drive
Location	Mooorebank
Site No	1
Start Date	30-Jan-20
Description	Volume Summary
Direction	Combined

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	3-Feb	4-Feb	5-Feb	30-Jan	31-Jan	1-Feb	2-Feb		
AM Peak	1152	1099	1092	1122	1200	882	710		
PM Peak	1217	1228	1259	1313	1203	919	772	**14929**	**13700**
0:00	81	83	79	82	98	167	196	85	112
1:00	42	51	52	34	31	95	103	42	58
2:00	30	25	29	38	37	70	77	32	44
3:00	35	43	46	56	53	72	59	47	52
4:00	141	139	136	148	141	86	60	141	122
5:00	460	454	443	448	432	188	100	447	361
6:00	800	853	850	828	806	357	161	827	665
7:00	1030	879	1086	996	994	433	255	997	810
8:00	1152	1099	1092	1122	1200	609	343	1133	945
9:00	778	811	942	785	795	772	513	822	771
10:00	579	598	624	631	669	882	653	620	662
11:00	551	634	593	674	670	838	710	624	667
12:00	600	700	671	616	722	919	772	662	714
13:00	657	712	727	735	782	795	736	723	735
14:00	970	983	963	1076	1012	724	651	1001	911
15:00	1217	1187	1189	1306	1203	646	674	1220	1060
16:00	1162	1228	1135	1313	1179	615	691	1203	1046
17:00	1211	1197	1259	1180	1182	651	642	1206	1046
18:00	969	1024	1039	975	931	655	593	988	884
19:00	666	666	662	661	701	541	420	671	617
20:00	497	520	553	568	536	451	400	535	504
21:00	343	445	478	446	486	444	325	440	424
22:00	231	289	278	292	363	399	253	291	301
23:00	152	128	168	136	280	317	143	173	189
Total	14354	14748	15094	15146	15303	11726	9530	14929	13700

7-19	10876	11052	11320	11409	11339	8539	7233	11199	10253
6-22	13182	13536	13863	13912	13868	10332	8539	13672	12462
6-24	13565	13953	14309	14340	14511	11048	8935	14136	12952
0-24	14354	14748	15094	15146	15303	11726	9530	14929	13700

Appendix B

SIDRA results (existing)

MOVEMENT SUMMARY

Site: 101 [Ex Newbridge Rd/Gov Macquarie Dr/Brickmakers Dr AM]

Existing Four Way Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brickmakers Drive												
1	L2	9	0.0	0.838	76.1	LOS F	15.1	107.2	1.00	0.97	1.21	24.2
2	T1	198	2.0	0.838	71.6	LOS F	15.1	107.2	1.00	0.97	1.21	24.2
3	R2	555	0.7	1.107	184.3	LOS F	33.9	238.8	1.00	1.42	2.02	12.3
Approach		762	1.0	1.107	153.7	LOS F	33.9	238.8	1.00	1.30	1.80	14.2
East: Newbridge Road												
4	L2	324	2.8	0.273	9.4	LOS A	3.9	28.2	0.31	0.68	0.31	51.4
5	T1	1015	13.2	0.300	12.5	LOS A	10.3	80.5	0.49	0.43	0.49	56.6
6	R2	518	10.2	1.344	237.7	LOS F	48.1	366.2	1.00	1.33	2.25	11.4
Approach		1857	10.6	1.344	74.8	LOS F	48.1	366.2	0.60	0.72	0.95	26.2
North: Governor Macquarie Drive												
7	L2	567	9.5	0.557	39.7	LOS C	11.6	88.0	0.90	0.88	1.06	35.9
8	T1	105	1.9	0.424	63.0	LOS E	6.7	47.9	0.97	0.77	0.97	25.7
9	R2	100	54.0	0.431	48.5	LOS D	5.3	54.3	0.94	0.78	0.94	29.8
Approach		772	14.2	0.557	44.0	LOS D	11.6	88.0	0.91	0.85	1.03	33.5
West: Newbridge Road												
10	L2	148	26.4	0.979	90.7	LOS F	65.7	503.6	1.00	1.18	1.49	25.4
11	T1	2057	7.1	0.979	83.0	LOS F	67.6	502.3	1.00	1.18	1.38	27.1
12	R2	1	0.0	0.001	32.0	LOS C	0.0	0.3	0.61	0.61	0.61	36.7
Approach		2206	8.4	0.979	83.5	LOS F	67.6	503.6	1.00	1.18	1.39	27.0
All Vehicles		5597	8.9	1.344	84.7	LOS F	67.6	503.6	0.86	1.00	1.25	24.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	16.0	LOS B	0.0	0.0	0.48	0.48
P2	East Full Crossing	1	64.1	LOS F	0.0	0.0	0.96	0.96
P3	North Full Crossing	1	35.7	LOS D	0.0	0.0	0.71	0.71
P4	West Full Crossing	12	64.2	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		15	58.7	LOS E			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Ex Newbridge Rd/Gov Macquarie Dr/Brickmakers Dr PM]

Existing Four Way Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brickmakers Drive												
1	L2	17	0.0	0.365	61.9	LOS E	6.8	47.9	0.94	0.75	0.94	27.1
2	T1	94	0.0	0.365	57.4	LOS E	6.8	47.9	0.94	0.75	0.94	27.2
3	R2	293	2.0	0.800	77.1	LOS F	10.6	75.4	1.00	0.91	1.19	23.2
Approach		404	1.5	0.800	71.9	LOS F	10.6	75.4	0.98	0.87	1.12	24.2
East: Newbridge Road												
4	L2	696	1.3	1.033	110.2	LOS F	69.2	490.0	1.00	1.13	1.60	17.0
5	T1	1840	4.7	0.620	14.3	LOS A	29.9	218.0	0.59	0.53	0.59	55.0
6	R2	530	11.3	1.053	88.9	LOS F	25.0	191.7	0.99	1.03	1.52	21.8
Approach		3066	5.1	1.053	49.0	LOS D	69.2	490.0	0.75	0.76	0.98	32.3
North: Governor Macquarie Drive												
7	L2	594	4.4	0.453	36.0	LOS C	11.4	83.0	0.81	0.88	1.02	37.9
8	T1	294	1.0	0.966	94.9	LOS F	25.5	179.9	1.00	1.15	1.47	20.2
9	R2	186	16.1	0.587	50.0	LOS D	10.5	83.5	0.94	0.80	0.94	32.3
Approach		1074	5.5	0.966	54.5	LOS D	25.5	179.9	0.88	0.94	1.13	30.6
West: Newbridge Road												
10	L2	149	24.8	0.701	44.3	LOS D	26.7	204.1	0.90	0.84	1.02	37.1
11	T1	1336	4.1	0.701	38.8	LOS C	28.8	208.9	0.91	0.81	0.93	40.1
12	R2	7	0.0	0.015	41.4	LOS C	0.3	2.3	0.71	0.66	0.71	32.9
Approach		1492	6.2	0.701	39.3	LOS C	28.8	208.9	0.91	0.82	0.94	39.8
All Vehicles		6036	5.2	1.053	49.1	LOS D	69.2	490.0	0.83	0.81	1.01	32.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	15.1	LOS B	0.0	0.0	0.46	0.46
P2	East Full Crossing	2	64.1	LOS F	0.0	0.0	0.96	0.96
P3	North Full Crossing	5	38.6	LOS D	0.0	0.0	0.74	0.74
P4	West Full Crossing	5	64.1	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		14	50.6	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix C

SIDRA results (with proposed development)

MOVEMENT SUMMARY

Site: 101 [Single Dev Newbridge Rd/Gov Macquarie Dr/ Brickmakers Dr AM]

Network: N101 [Single Dev AM]

Dev Four Way Intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Brickmakers Drive														
1	L2	13	0.0	13	0.0	0.379	46.6	LOS D	11.5	81.7	0.84	0.71	0.84	31.7
2	T1	200	2.0	200	2.0	0.379	42.1	LOS C	11.5	81.7	0.84	0.71	0.84	31.7
3	R2	560	0.7	560	0.7	1.117	191.9	LOS F	35.0	246.4	1.00	1.44	2.06	11.9
Approach		773	1.0	773	1.0	1.117	150.7	LOS F	35.0	246.4	0.96	1.24	1.73	14.4
East: Newbridge Road														
4	L2	344	2.6	344	2.6	0.300	9.8	LOS A	4.7	33.6	0.34	0.68	0.34	51.3
5	T1	1015	13.2	1015	13.2	0.300	12.5	LOS A	10.3	80.5	0.49	0.43	0.49	56.6
6	R2	518	10.2	518	10.2	1.344	237.7	LOS F	48.1	366.2	1.00	1.33	2.25	11.4
Approach		1877	10.4	1877	10.4	1.344	74.2	LOS F	48.1	366.2	0.60	0.73	0.95	25.6
North: Governor Macquarie Drive														
7	L2	567	9.5	567	9.5	0.557	39.7	LOS C	11.6	88.0	0.90	0.88	1.06	35.9
8	T1	114	1.8	114	1.8	0.517	65.7	LOS E	7.5	53.4	0.99	0.79	0.99	19.6
9	R2	100	54.0	100	54.0	0.793	80.5	LOS F	7.4	76.3	1.00	0.92	1.25	23.7
Approach		781	14.1	781	14.1	0.793	48.7	LOS D	11.6	88.0	0.92	0.87	1.07	31.5
West: Newbridge Road														
10	L2	148	26.4	148	26.4	0.986	94.5	LOS F	67.5	517.4	1.00	1.18	1.38	24.7
11	T1	2057	7.1	2057	7.1	0.986	87.0	LOS F	69.7	518.0	1.00	1.20	1.37	26.3
12	R2	16	0.0	16	0.0	0.021	32.5	LOS C	0.6	4.4	0.62	0.67	0.62	31.6
Approach		2221	8.4	2221	8.4	0.986	87.1	LOS F	69.7	518.0	1.00	1.19	1.37	26.2
All Vehicles		5652	8.8	5652	8.8	1.344	86.2	LOS F	69.7	518.0	0.85	1.00	1.24	24.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	16.0	LOS B	0.0	0.0	0.48	0.48
P2	East Full Crossing	1	53.2	LOS E	0.0	0.0	0.87	0.87
P3	North Full Crossing	1	35.7	LOS D	0.0	0.0	0.71	0.71
P4	West Full Crossing	12	50.6	LOS E	0.0	0.0	0.85	0.85
All Pedestrians		15	47.3	LOS E			0.82	0.82

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

MOVEMENT SUMMARY

Site: 101 [Single Dev Newbridge Rd/Gov Macquarie Dr/ Brickmakers Dr PM]

Network: N102 [Single Dev PM]

Dev Four Way Intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Brickmakers Drive														
1	L2	30	0.0	30	0.0	0.241	45.5	LOS D	6.9	48.3	0.81	0.68	0.81	31.8
2	T1	103	0.0	103	0.0	0.241	40.9	LOS C	6.9	48.3	0.81	0.68	0.81	31.8
3	R2	310	1.9	310	1.9	0.846	79.9	LOS F	11.5	81.8	1.00	0.96	1.27	22.7
Approach		443	1.4	443	1.4	0.846	68.5	LOS E	11.5	81.8	0.94	0.88	1.13	24.8
East: Newbridge Road														
4	L2	713	1.3	713	1.3	1.061	130.7	LOS F	76.9	544.1	1.00	1.18	1.71	10.9
5	T1	1840	4.7	1840	4.7	0.626	14.3	LOS A	30.4	221.5	0.59	0.53	0.59	55.1
6	R2	530	11.3	530	11.3	1.053	88.9	LOS F	25.0	191.7	0.99	1.03	1.52	21.8
Approach		3083	5.0	3083	5.0	1.061	54.0	LOS D	76.9	544.1	0.75	0.77	1.01	30.0
North: Governor Macquarie Drive														
7	L2	594	4.4	594	4.4	0.453	36.0	LOS C	11.4	83.0	0.81	0.88	1.02	37.9
8	T1	303	1.0	303	1.0	1.095	171.5	LOS F	36.0	253.8	1.00	1.45	1.96	9.2
9	R2	186	16.1	186	16.1	0.981	112.7	LOS F	17.3	137.6	1.00	1.11	1.62	20.8
Approach		1083	5.4	1083	5.4	1.095	87.0	LOS F	36.0	253.8	0.89	1.08	1.39	22.4
West: Newbridge Road														
10	L2	149	24.8	149	24.8	0.708	46.2	LOS D	27.6	210.5	0.91	0.83	0.91	36.4
11	T1	1336	4.1	1336	4.1	0.708	39.3	LOS C	29.3	212.1	0.91	0.81	0.91	39.9
12	R2	20	0.0	20	0.0	0.044	42.0	LOS C	0.9	6.6	0.72	0.70	0.72	27.3
Approach		1505	6.1	1505	6.1	0.708	40.0	LOS C	29.3	212.1	0.91	0.81	0.91	39.4
All Vehicles		6114	5.1	6114	5.1	1.095	57.5	LOS E	76.9	544.1	0.83	0.84	1.06	29.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	15.1	LOS B	0.0	0.0	0.46	0.46
P2	East Full Crossing	2	54.0	LOS E	0.0	0.0	0.88	0.88
P3	North Full Crossing	5	38.6	LOS D	0.0	0.0	0.74	0.74
P4	West Full Crossing	5	51.4	LOS E	0.0	0.0	0.86	0.86
All Pedestrians		14	44.1	LOS E			0.79	0.79

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

Appendix D

SIDRA results (with proposed development and cumulative traffic)

MOVEMENT SUMMARY

Site: 101 [Dev Newbridge Rd/Gov Macquarie Dr/Brickmakers Dr AM]

Network: N101 [Dev AM]

Dev Four Way Intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Brickmakers Drive														
1	L2	145	6.2	145	6.2	0.728	52.4	LOS D	24.4	175.9	0.96	0.85	0.96	28.9
2	T1	254	1.6	254	1.6	0.728	47.8	LOS D	24.4	175.9	0.96	0.85	0.96	29.4
3	R2	681	2.1	681	2.1	1.371	402.5	LOS F	63.9	455.0	1.00	1.96	2.96	6.3
Approach		1080	2.5	1080	2.5	1.371	272.0	LOS F	63.9	455.0	0.99	1.55	2.22	8.9
East: Newbridge Road														
4	L2	371	5.4	371	5.4	0.371	12.0	LOS A	6.7	49.4	0.44	0.71	0.44	48.5
5	T1	1015	13.2	1015	13.2	0.300	12.5	LOS A	10.3	80.5	0.49	0.43	0.49	56.6
6	R2	518	10.2	518	10.2	1.344	237.7	LOS F	48.1	366.2	1.00	1.33	2.25	11.4
Approach		1904	10.9	1904	10.9	1.344	73.7	LOS F	48.1	366.2	0.62	0.73	0.96	25.6
North: Governor Macquarie Drive														
7	L2	567	9.5	567	9.5	0.557	39.7	LOS C	11.6	88.0	0.90	0.88	1.06	35.9
8	T1	154	1.3	154	1.3	0.697	68.3	LOS E	10.5	74.6	1.00	0.84	1.06	19.1
9	R2	100	54.0	100	54.0	1.013	135.6	LOS F	10.2	104.5	1.00	1.20	1.87	17.4
Approach		821	13.4	821	13.4	1.013	56.7	LOS E	11.6	104.5	0.93	0.91	1.16	29.0
West: Newbridge Road														
10	L2	148	26.4	148	26.4	1.019	113.9	LOS F	76.7	587.3	1.00	1.27	1.50	21.8
11	T1	2057	7.1	2057	7.1	1.019	107.4	LOS F	79.2	588.5	1.00	1.30	1.51	22.8
12	R2	125	8.0	125	8.0	0.170	34.6	LOS C	5.3	40.0	0.67	0.75	0.67	30.6
Approach		2330	8.4	2330	8.4	1.019	103.9	LOS F	79.2	588.5	0.98	1.27	1.46	22.9
All Vehicles		6135	8.8	6135	8.8	1.371	117.8	LOS F	79.2	588.5	0.86	1.10	1.40	19.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	16.0	LOS B	0.0	0.0	0.48	0.48
P2	East Full Crossing	1	53.2	LOS E	0.0	0.0	0.87	0.87
P3	North Full Crossing	1	35.7	LOS D	0.0	0.0	0.71	0.71
P4	West Full Crossing	12	50.6	LOS E	0.0	0.0	0.85	0.85
All Pedestrians		15	47.3	LOS E			0.82	0.82

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

MOVEMENT SUMMARY

Site: 101 [Dev Newbridge Rd/Gov Macquarie Dr/Brickmakers Dr PM]

Network: N102 [Dev PM]

Dev Four Way Intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Brickmakers Drive														
1	L2	155	4.5	155	4.5	0.576	50.5	LOS D	17.9	128.0	0.91	0.81	0.91	29.3
2	T1	153	0.0	153	0.0	0.576	45.9	LOS D	17.9	128.0	0.91	0.81	0.91	29.8
3	R2	414	3.1	414	3.1	1.140	210.4	LOS F	27.0	194.2	1.00	1.50	2.19	11.0
Approach		722	2.8	722	2.8	1.140	141.2	LOS F	27.0	194.2	0.96	1.20	1.65	15.0
East: Newbridge Road														
4	L2	768	2.0	768	2.0	1.333	360.5	LOS F	134.4	956.9	1.00	1.61	2.79	4.6
5	T1	1840	4.7	1840	4.7	0.620	14.2	LOS A	30.0	218.1	0.59	0.53	0.59	55.1
6	R2	530	11.3	530	11.3	1.053	88.9	LOS F	25.0	191.7	0.99	1.03	1.52	21.8
Approach		3138	5.1	3138	5.1	1.333	111.6	LOS F	134.4	956.9	0.76	0.88	1.28	19.3
North: Governor Macquarie Drive														
7	L2	594	4.4	594	4.4	0.453	36.0	LOS C	11.4	83.0	0.81	0.88	1.02	37.9
8	T1	364	0.8	364	0.8	1.314	350.0	LOS F	63.7	449.1	1.00	1.97	2.77	4.8
9	R2	186	16.1	186	16.1	1.133	212.0	LOS F	24.8	197.3	1.00	1.38	2.21	13.0
Approach		1144	5.2	1144	5.2	1.314	164.5	LOS F	63.7	449.1	0.90	1.31	1.77	13.9
West: Newbridge Road														
10	L2	149	24.8	149	24.8	0.747	47.0	LOS D	29.8	226.8	0.93	0.84	0.93	36.1
11	T1	1336	4.1	1336	4.1	0.747	39.3	LOS C	31.5	228.4	0.91	0.81	0.91	39.9
12	R2	171	3.5	171	3.5	0.378	46.8	LOS D	9.1	65.5	0.83	0.80	0.83	25.5
Approach		1656	5.9	1656	5.9	0.747	40.8	LOS C	31.5	228.4	0.90	0.81	0.90	38.3
All Vehicles		6660	5.1	6660	5.1	1.333	106.3	LOS F	134.4	956.9	0.84	0.97	1.31	20.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	15.1	LOS B	0.0	0.0	0.46	0.46
P2	East Full Crossing	2	54.0	LOS E	0.0	0.0	0.88	0.88
P3	North Full Crossing	5	38.6	LOS D	0.0	0.0	0.74	0.74
P4	West Full Crossing	5	51.4	LOS E	0.0	0.0	0.86	0.86
All Pedestrians		14	44.1	LOS E			0.79	0.79

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