

MEMO

TO: Nick Fadeev
FROM: Ryan Miller
SUBJECT: Dee Why Town Centre
OUR REF: 2196793A-ITP-MEM-005.docx
DATE: 8 April 2016

Level 27, Ernst & Young Centre
680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101

www.wsp-pb.com

Please find below a summary of the outcomes of the Paramics modelling undertaken for the Dee Why Town Centre project. This memo provides a background to the Paramics modelling undertaken to date for Warringah Council, the various scenarios more recently, a summary of the performance of each scenario and the preferred Dee Why Town Centre road network arrangement based upon traffic modelling performance criteria and infrastructure requirements.

1. HISTORY

Parsons Brinckerhoff was commissioned by Warringah Council to undertake Paramics modelling as part of the Dee Why Town Centre project.

1.1 Context

Previous Paramics traffic modelling was undertaken by GTA Consultants in 2008 which was then further revised by GHD in 2014. GTA recommended that a one-way loop anti-clockwise system be implemented for improved traffic operation within the Dee Why Town Centre. It was unclear the reasoning behind this decision and whether a two-way system was analysed at that time.

Parsons Brinckerhoff reviewed the revised models undertaken by GHD to some extent, made further revisions and undertook model optimisation.

1.2 GHD Paramics model issues

The Paramics model previously prepared had the following issues:

- The model did not provide for a mid-block pedestrian traffic signals on Howard Avenue. The provision of signal control in lieu of marked zebra crossings has been necessitated by the proposed one way operation and the consequential introduction of two trafficable lanes in a single direction.
- No signalised intersections were modelled at either end of the proposed one-way link road (New Link Road) with both Oaks Avenue and Howard Avenue.
- No signalised intersection was modelled at the Woolworths Lane and Oaks Avenue intersection.
- The model did not include a signalised intersection at Pittwater Road and Pacific Parade, rather a priority controlled intersection with two left turning lanes from Pacific Parade.
- The model provided a full length left turn lane on Howard Avenue where the proposed bus stop is located.
- Average set timings for all pedestrian crossings applied to the model which does not give any variation in pedestrian timings. This has not been changed.
- The model provided a left turn slip lane with no pedestrian crossing delay for this movement at the Pittwater Road and St David Avenue intersection (north-west corner). This has not been changed.

1.3 Revisions made to the GHD Paramics model

The following changes were made to the model primarily for feasible one-way system operation:

- Improved Pittwater Road traffic signal optimisation via coordinated signals with like (same) cycle times
- Implementation of traffic signals at the Pittwater Road and Pacific Parade intersection including a signalised pedestrian crossing across Pacific Parade (two phase with additional 'pedestrian' dummy phase and 140 second cycle time)
- Signals at the intersection of Oaks Avenue with Woolworths Lane and New Link Road (each with two phases and 70 second cycle time)
- Signals at the intersection of Howard Avenue and New Link Road (two phase with 70/140 second cycle time)
- Mid-block pedestrian signals on Howard Avenue (two phase with 70/140 second cycle time)
- For increased vehicle throughput on Howard Avenue, a combined through and right turn lane has been introduced in lane 3
- Revised access locations to the Meriton site based on the latest design plans provide by Warringah Council (the revised Town Centre zone connections mean the pattern of circulating traffic will change between the GHD models and the revised PB models)
- Rerouting of bus services and relocation of bus stops.

1.4 GHD Paramics model review

The findings of the 2014 GHD model were previously interpreted as acceptable, with all intersections generally operating at LoS D or better. However, the GHD model and outputs lacked details important to understanding the actual impact of the new road network. The model was updated in the following ways:

1. The layout of the road network in the future GHD model was not as accurate as with the current model, including lack of signalised intersections, as well as missing traffic lanes or unusual lane configurations at some locations. These differences were updated to be more realistic in the Parsons Brinckerhoff models, thus the Parsons Brinckerhoff model has produced more accurate LoS and queuing results. The key differences are:
 - a) Pacific Parade/Pittwater Road intersection – priority junction in GHD model, signalised with pedestrian crossing on south-east leg in Parsons Brinckerhoff model
 - b) St David Avenue/Pittwater Road intersection – bus turn coded as priority in GHD model, signalised with VA bus call in Parsons Brinckerhoff model
 - c) Oaks Avenue/Woolworths Lane intersection – priority junction in GHD model, signalised with pedestrian crossings on all legs in Parsons Brinckerhoff model
 - d) Oaks Avenue/New Link Road intersection – priority junction in GHD model, signalised with pedestrian crossings on north and west legs only in Parsons Brinckerhoff model
 - e) Howard Avenue/New Link Road intersection – priority junction in GHD model, signalised with pedestrian crossings on all legs in Parsons Brinckerhoff model
 - f) Oaks Avenue – uncontrolled pedestrian crossing (coded as 'end speed') in GHD model, signalised pedestrian crossing in Parsons Brinckerhoff model

- g) Howard Avenue – uncontrolled pedestrian crossing (coded as 'end speed') in GHD model, signalised mid-block pedestrian crossing in Parsons Brinckerhoff model.
2. In addition, the results of the GHD model were displayed at an intersection level, showing the average LoS over the whole intersection, which is weighted according to the volumes and LoS of each approach. This has been broken down by approach and movement for closer examination of the results. As such, a number of approaches, and individual turn movements, are shown to operate at or over capacity, with an unacceptable LoS.
3. The performance of Pittwater Road was assessed in more detail as the analysis requires it to be compared to existing conditions to ascertain the impacts of the Dee Why Town Centre Master Plan on the major road corridor. This was not completed in previous iterations.
4. A minor change to trip generation from zone 17 and 18 due to retail trip generation rates for the AM peak hour being revised and reduced to half of the PM peak hour.

2. METHODOLOGY

The following methodology was applied to remove double counting or incorrectly applied traffic generations. Further modifications were also included on advice from Warringah Council and include:

- Removal of traffic generated by those sites which were already fully developed and operational when 2013 surveys were undertaken
- Review of traffic generated by Zone 17 (Council Car Park). Traffic spot counts undertaken to determine generations. Zone 17 split into two (additional Zone 24 to reflect existing situation)
- Revised traffic generations for Cobalt, Meriton, Car Park and Woolworths based on latest development types and yields provided by Council
- Removal of those sites counted in both the 'LEP' and 'Approved and Pending Development' categories
- Inclusion of a 139 space car park at Zone 17
- Varying road layouts and sensitivity analyses
- Update of modelling demand matrices
- Undertake modelling runs and reporting preparation.

3. PARAMICS MODELLING

3.1 Road Network

Several changes have been proposed for the road network and are discussed further below. These changes are directly related to the scenarios analysed.

One-way loop system

The introduction of a one-way loop system will require the implementation of the following:

- One-way eastbound on Oaks Avenue between Pittwater Road and New Link Road
- One-way westbound on Howard Avenue between New Link Road and Pittwater Road
- One-way northbound on New Link Road
- Two-way on Woolworths Lane
- Right turn bay extension on Pittwater Road into Oaks Avenue
- Implementation of No Left Turn from Fisher Road into Pittwater Road
- New intersection layout for the St David Avenue and Fisher Road intersection.

Two-way system

Comprises the existing road network plus a revised Pittwater Road, Howard Avenue and St David Avenue intersection layout.

The Pittwater Road, Howard Avenue and St David Avenue intersection modifications would include:

- Increasing the number of lanes on Howard Avenue westbound from two to three at the stop line and reducing the number of eastbound lanes to one.
- No Left Turn for larger vehicles from Pittwater Road onto Howard Avenue
- Revising the lane/turn allocations on both Howard Avenue and St David Avenue at the intersection
- Two-way on New Link Road
- One-way northbound or two-way on Woolworths Lane
- No left turn from Fisher Rod into Pittwater Road
- Right turn bay extension on Pittwater Road into Oaks Avenue.

139 space car park

The inclusion of a 139 space car park at the same location as per the existing Council owned car park situated between Howard Avenue and Oaks Avenue.

New links

Woolworths Lane - this is a proposed one-way northbound or two-way two lane that runs north-south between Oakes Avenue and Pacific Parade to the west of the existing Woolworths site. Under the one-way loop system, the Woolworths Lane and Oaks Avenue intersection would become signalised and the Pacific Parade intersection, priority controlled. Under the two-way system, all Woolworths Lane intersections would be priority controlled.

New Link Road - this is a proposed link road that runs north-south between Howard Avenue and Oaks Avenue through the existing Council car park. This link road has been assessed as a one-way northbound under the proposed one-way loop system and two-way under the two-way system. Under the one-way loop system, all New Link Road intersections would be signalised. Under the two-way system, all New Link Road intersections would be priority controlled.

3.2 Scenarios

The following five modelling scenarios have been assessed based upon the most recent requirements from Warringah Council:

- Existing two-way system – disaggregated and model extended (“PB Base” Model)
- One-way loop system – Oaks Avenue to Howard Avenue (“1WAY” Model)
- Revised two-way system with improvements to Howard Avenue / Pittwater Road intersection plus Woolworths Lane two-way plus New Link Road two-way (“2WAY” Model), also referred to as Opt1
- Revised two-way system with improvements to Howard Avenue / Pittwater Road intersection plus Woolworths Lane two-way plus New Link Road two-way plus extended right turn lane on Pittwater Road into Oaks Avenue (“2WAYext” Model), also referred to as Opt2
- Revised two-way system with improvements to Howard Avenue / Pittwater Road intersection plus Woolworths Lane one-way northbound plus New Link Road two-way plus extended right turn lane on Pittwater Road into Oaks Avenue (“2WAYextW1” Model), also referred to as Opt3.

Figure 3.1 Existing two-way system network (“GHD Base” Model 2013)

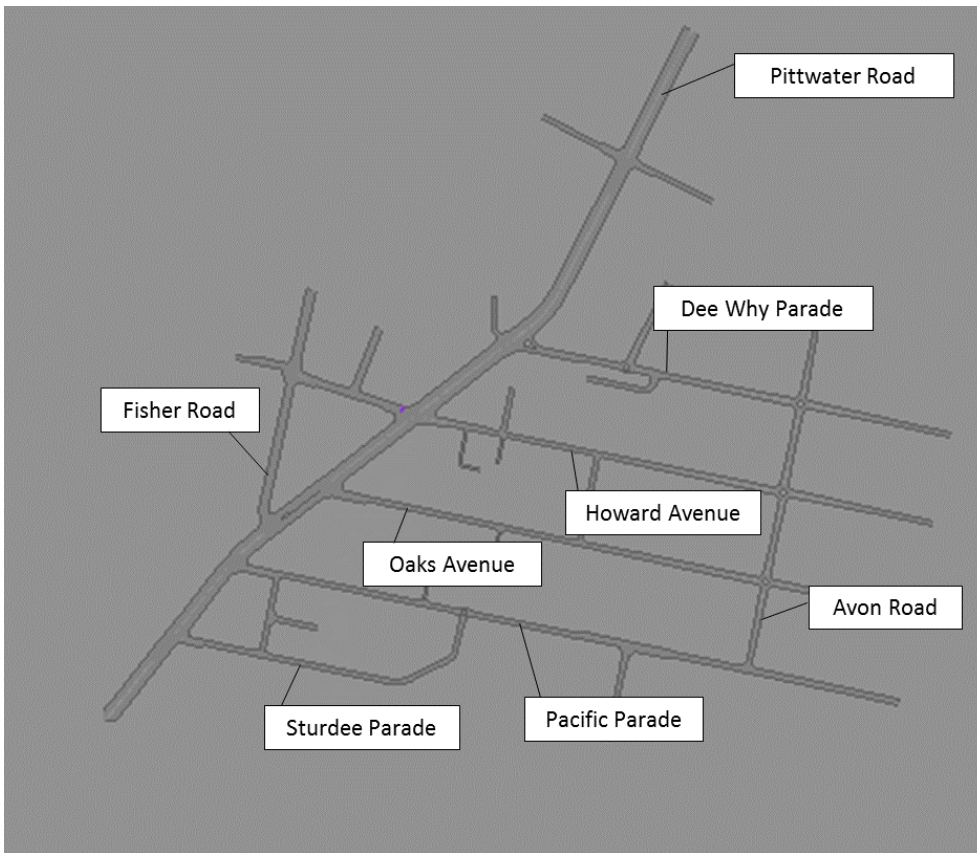


Figure 3.2 Proposed one-way loop system design (“GHD 1W” Model)

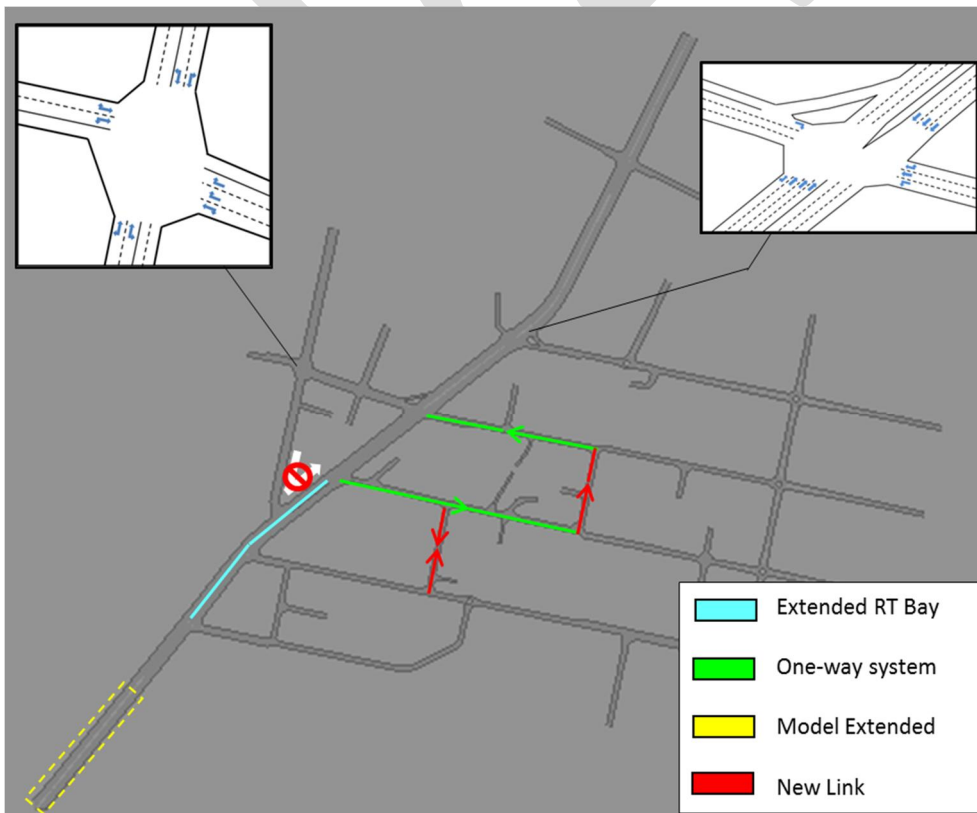


Figure 3.3 Existing Two-way System Network (extended network, disaggregated zones) ["Base" Model]



Figure 3.4 One-way Scheme – Oaks Avenue to Howard Avenue ("1W" Model)

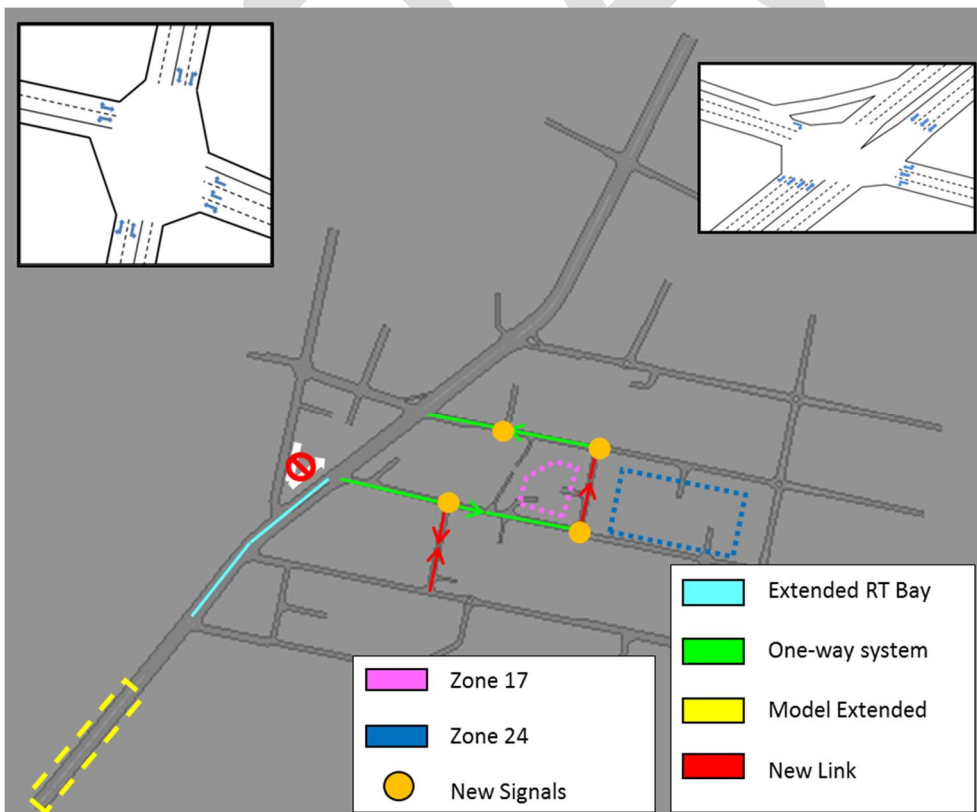


Figure 3.5 Revised Two-way System with improvements to Howard / Pittwater Intersection [“2W-Opt1” Model]

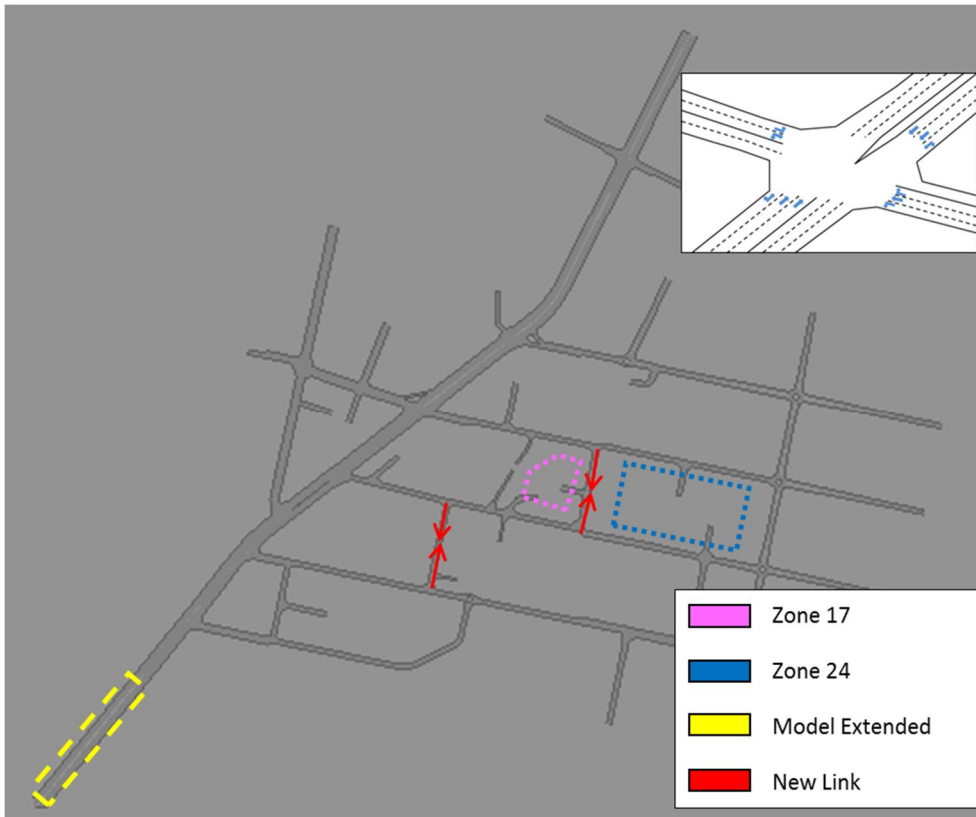


Figure 3.6 Revised Two-way System with improvements to Howard / Pittwater Intersection (extended right turn bay to Oaks and barred turns) [“2W-Opt2” Model]

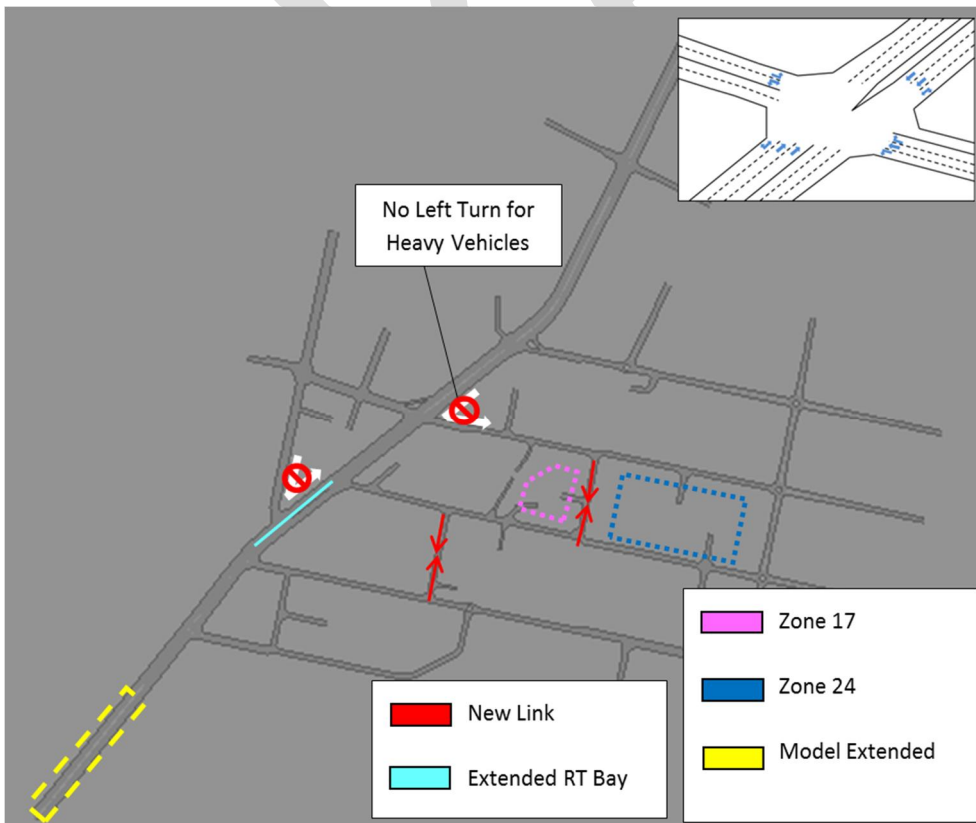
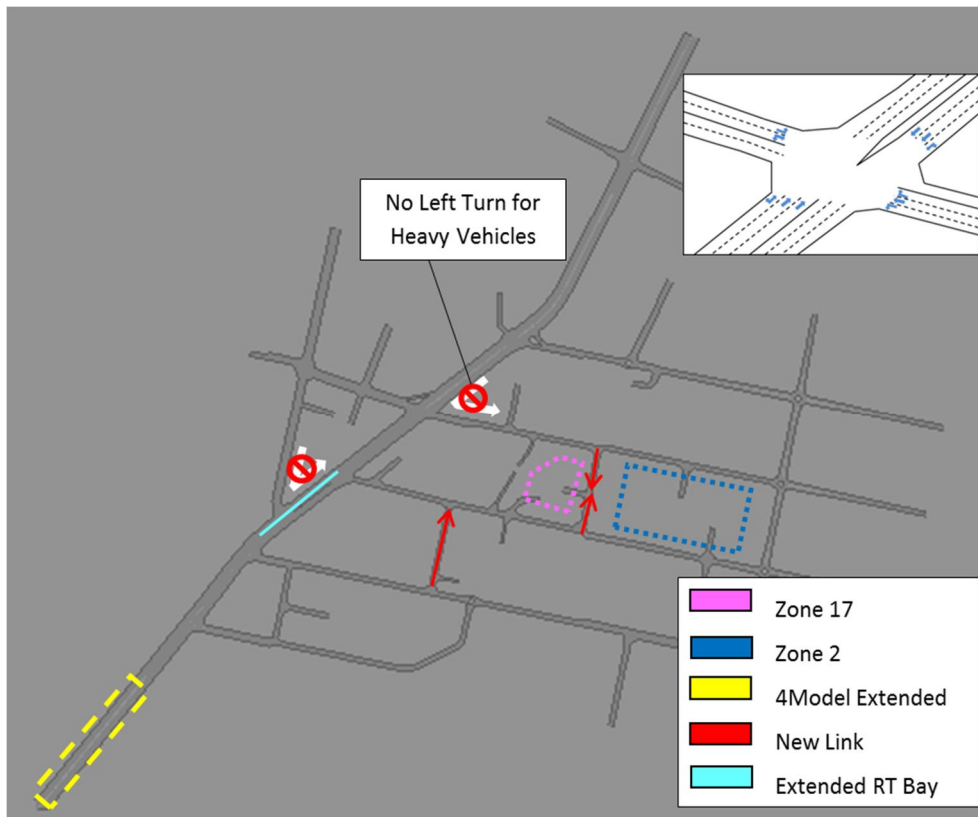


Figure 3.7 Revised Two-way System with improvements to Howard / Pittwater Intersection (extended right turn bay to Oaks, barred turns and one-way northbound Woolworth link) [“2W-Opt3” Model]



3.3 Modelling results summary

DEE WHY TOWN CENTRE RESULTS

Table 3.1 Results

PERIOD	MODEL	COMP	INCOMP	UNREL	ALL TRIPS	DIST (KM)	TT (HRS)	SPD (KPH)	STOPS	FFT (HRS)	DELAY (HRS)
AM	Base	7075	219	4	7297	6142	223	28	13805	102	121
	1W	7612	325	21	7958	7024	298	24	18528	118	180
	2W Opt1	7693	243	1	7937	6583	253	26	16010	110	144
	2W Opt2	7742	255	3	7990	6663	256	26	16182	111	145
	2W Opt3	7687	255	6	7948	6622	259	26	16353	110	149
PM	Base	7743	307	65	8115	6549	284	23	17784	110	174
	1W	8767	308	3	9078	7861	325	24	22282	134	191
	2W Opt1	8737	364	22	9124	7330	351	21	22920	124	227
	2W Opt2	8669	395	16	9079	7306	350	21	22785	123	227
	2W Opt3	8709	386	17	9112	7340	349	21	22595	124	225
SatMD	Base	7071	280	7	7358	6185	248	25	15344	104	145
	1W	8283	374	7	8664	7749	339	23	22969	132	207

PERIOD	MODEL	COMP	INCOMP	UNREL	ALL TRIPS	DIST (KM)	TT (HRS)	SPD (KPH)	STOPS	FFT (HRS)	DELAY (HRS)
	2W Opt1	8090	441	100	8631	7043	359	20	24010	119	241
	2W Opt2	8245	366	7	8618	7071	320	22	21841	119	201
	2W Opt3	8215	388	18	8621	7107	332	21	22755	120	213

Below is a summary of the results tabled above:

- The base model has reduced vehicle trips due to no development. In the AM peak this is approximately 600 trips, up to 1,000 trips in the PM peak and 1,300 trips in the Saturday midday peak.
- Distance significantly decreased in all 2W Opt1/2/3 from 1W. Up to 450 km less for AM, 550 km less for PM with 700 km less on weekends.
- Travel time decreased in 2W options by up to 40-45 hours during the AM peak. Travel time increased in 2W Options by average 25 hours compared to 1W during PM peak. Travel time increased by 20 hours for 2W Opt1 and decreased for 2W Opt2/3 by 20 and 10 hours respectively compared to 1W across weekends.
- Average speed increased by 2 km/h across all 2W Opt1/2/3 during AM peak. Average speed decreased by 3 km/h across all 2W Opt1/2/3 during PM peak. Average speed decreased by 3, 2 and 1 km/h across 2W Opt1/2/3 respectively during weekends.
- Total stops recorded decreased by 2000-2500 during the AM peak for 2W Opt1/2/3 compared to 1W. Total stops increased for 2W Opt2 by 300-650 stops during the PM peak compared to 1W. Total stops increased for 2W Opt1 by 1050 and decreased for 2W Opt2/3 by 1150 and 200 respectively compared to 1W on weekends.

Overall, the two-way systems are preferred as they generally provide decreased distances travelled, total travel times and total stops with increased average speeds.

DEE WHY TOWN CENTRE – RESULTS WITH DYNAMIC FEEDBACK

Table 3.2 Dynamic Results

PERIOD	MODEL	COMP	INCOMP	UNREL	ALL TRIPS	DIST (KM)	TT (HRS)	SPD (KPH)	STOPS	FFT (HRS)	DELAY (HRS)
AM	Base	7070	208	0	7278	6156	223	28	13823	102	120
	1W	7577	329	14	7920	7016	292	24	18249	118	174
	2W Opt1	7699	225	1	7924	6634	254	26	16168	111	143
	2W Opt2	7685	238	0	7923	6607	252	26	16015	110	142
	2W Opt3	7668	238	0	7906	6600	249	26	15762	110	139
PM	Base	7830	290	43	8162	6631	277	24	17645	112	165
	1W	8777	308	10	9095	7908	318	25	21528	135	183
	2W Opt1	8770	338	59	9166	7342	326	23	21588	124	201
	2W Opt2	8688	361	22	9071	7321	323	23	21424	124	199
	2W Opt3	8752	366	27	9123	7361	339	22	22506	125	214
SatMD	Base	7136	251	0	7386	6281	234	27	14643	106	129
	1W	8277	317	0	8595	7720	309	25	20864	132	178

PERIOD	MODEL	COMP	INCOMP	UNREL	ALL TRIPS	DIST (KM)	TT (HRS)	SPD (KPH)	STOPS	FFT (HRS)	DELAY (HRS)
	2W Opt1	8291	366	0	8657	7234	306	24	20138	123	183
	2W Opt2	8288	325	1	8614	7209	301	24	19854	122	179
	2W Opt3	8288	355	4	8647	7204	304	24	20302	122	182

Below is a summary of the results tabled above:

- The base model has reduced vehicle trips due to no development. In the AM peak this is approximately 600 trips, up to 1,000 trips in the PM peak and 1,300 trips in the Saturday midday peak.
- Distance significantly decreased in all 2W Opt1/2/3 from 1W. Up to 400 km less for AM, 550-600 km less for PM with 500 km less on weekends.
- Travel time decreased in 2W options by up to 40-45 hours during the AM peak. Travel time increased in 2W Options by average 5-20 hours compared to 1W during PM peak. Travel time decreased by 5-10 hours compared to 1W across weekends.
- Average speed increased by 2 km/h across all 2W Opt1/2/3 during AM peak. Average speed decreased by 2 and 3 km/h across 2W Opt1/2 and 2W Opt3 respectively during PM peak. Average speed decreased by 1 km/h across all 2W Opt1/2/3 during AM peak.
- Total stops recorded decreased by 2100-2500 during the AM peak for 2W Opt1/2/3 compared to 1W. Total stops increased for 2W Opt1/3 by 100 and 1000 stops respectively with 2W Opt2 decreasing by 100 during the PM peak compared to 1W. Total stops decrease by 500-1000 stops for 2W Opt1/2/3 on weekends.

Overall, the two-way systems are slightly preferred as they generally provide decreased distances travelled, total travel times more so in the AM and Saturday peaks, reduced total stops and increased vehicle average speeds in the AM peak only.

3.4 Intersection Level of Service –without Dynamic Feedback

Table 3.3 PB- Base

Intersection LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
PB-Base									
1302 Fisher Rd / Sr David Av / Lewis St	24	B	1564	26	B	1778	21	B	1404
940 Pittwater Rd / Hawkesbury Rd	19	B	3799	25	B	3706	20	B	3486
941 Pittwater Road / Dee Why Parade	21	B	2916	20	B	2872	19	B	2917
942 Pittwater Rd / Howard Av / St David Av	20	B	2940	19	B	2801	33	C	3036
943 Pittwater Rd / Oaks Av	16	B	2804	12	A	2804	24	B	3002
944 Pittwater Rd / Fisher Road	19	B	3693	22	B	3780	26	B	3642
945 Pittwater Rd / Pacific Parade	16	B	3677	22	B	3815	20	B	3696
946 Pittwater Rd / Sturdee St	20	B	3789	44	D	3862	18	B	3572

Table 3.4 1Way

Intersection LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
1WAY									
1302 Fisher Rd / Sr David Av / Lewis St	38	C	1898	27	B	2219	49	D	2067
940 Pittwater Rd / Hawkesbury Rd	24	B	3885	19	B	3948	19	B	3826
941 Pittwater Road / Dee Why Parade	32	C	3013	24	B	3181	27	B	3305
942 Pittwater Rd / Howard Av / St David Av	31	C	3159	38	C	3560	37	C	3737
943 Pittwater Rd / Oaks Av	18	B	3018	17	B	3392	17	B	3601
944 Pittwater Rd / Fisher Road	22	B	4046	24	B	4304	25	B	4275
945 Pittwater Rd / Pacific Parade	16	B	4246	15	A	4483	14	A	4423
946 Pittwater Rd / Sturdee St	20	B	4117	25	B	4555	21	B	4215

Table 3.5 2Way (also referred to as Opt1)

Intersection LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAY									
1302 Fisher Rd / Sr David Av / Lewis St	27	B	1841	30	C	2147	42	C	1880
940 Pittwater Rd / Hawkesbury Rd	19	B	3880	24	B	3979	19	B	3793
941 Pittwater Road / Dee Why Parade	21	B	3039	19	B	3168	22	B	3260
942 Pittwater Rd / Howard Av / St David Av	25	B	3361	23	B	3482	40	C	3589
943 Pittwater Rd / Oaks Av	19	B	3027	18	B	3181	34	C	3325
944 Pittwater Rd / Fisher Road	21	B	3919	34	C	4161	39	C	3961
945 Pittwater Rd / Pacific Parade	18	B	3917	36	C	4170	30	C	3973
946 Pittwater Rd / Sturdee St	21	B	4051	44	D	4229	35	C	3843

Table 3.6 2Wayext (also referred to as Opt2)

Intersection LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAYext									
1302 Fisher Rd / Sr David Av / Lewis St	26	B	1888	29	C	2170	29	B	1968
940 Pittwater Rd / Hawkesbury Rd	19	B	3877	24	B	3930	19	B	3798
941 Pittwater Road / Dee Why Parade	22	B	3050	19	B	3126	21	B	3229
942 Pittwater Rd / Howard Av / St David Av	25	B	3393	25	B	3455	39	C	3589
943 Pittwater Rd / Oaks Av	19	B	2964	21	B	3097	35	C	3273
944 Pittwater Rd / Fisher Road	19	B	3915	35	C	4133	34	C	3975
945 Pittwater Rd / Pacific Parade	17	B	3967	34	C	4190	26	B	4053
946 Pittwater Rd / Sturdee St	22	B	4059	43	D	4227	24	B	3921

Notes: At Pacific Parade there is more traffic turning north and south on to Pittwater Road compared to Woolworths 1-way northbound link (2WAYextW1). This additional traffic causes congestion on Pittwater between Fisher and Pacific Parade, which in turn has knock on effects back to Sturdee Street. Hence, Sturdee Street performs better with the Woolworths 1-way northbound link. This applies to the PM period. AM and SatMD periods compare similarly.

Table 3.7 2WayextW1 (also referred to as Opt3)

Intersection LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
<u>2WAYextW1.</u>									
1302 Fisher Rd / Sr David Av / Lewis St	27	B	1884	32	C	2157	30	C	1956
940 Pittwater Rd / Hawkesbury Rd	19	B	3877	25	B	3965	19	B	3826
941 Pittwater Road / Dee Why Parade	21	B	3027	19	B	3127	23	B	3265
942 Pittwater Rd / Howard Av / St David Av	27	B	3413	27	B	3536	40	C	3672
943 Pittwater Rd / Oaks Av	19	B	2954	23	B	3105	36	C	3330
944 Pittwater Rd / Fisher Road	19	B	3906	34	C	4082	34	C	4003
945 Pittwater Rd / Pacific Parade	17	B	3952	32	C	4123	25	B	4040
946 Pittwater Rd / Sturdee St	22	B	4032	38	C	4258	25	B	3915

3.4.1 Summary of Intersection Level of Service

- The two way systems perform better than the one way system in the AM peak
- The one way system performs better in the PM peak and marginally better in the Saturday midday peak.
- Intersections operating only satisfactorily included Fisher Street, St David Avenue and Lewis Street under one way system in the Saturday midday peak and Pittwater Road and Sturdee Street under the two way systems in the PM peak.

3.5 Pittwater Road Level of Service –without Dynamic Feedback

Table 3.8 PB- Base

Pittwater Road LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay	LoS	Traffic	Av Delay	LoS	Traffic	Av Delay	LoS	Traffic
<u>PB-Base</u>									
940 Pittwater Rd / Hawkesbury Rd									
Pittwater Road SB	14	A	1670	20	B	1156	20	B	1382
Pittwater Road NB	10	A	1055	15	A	1503	8	A	1293
941 Pittwater Road / Dee Why Parade									
Pittwater Road SB	16	B	1616	16	B	1041	7	A	1275
Pittwater Road NB	9	A	848	8	A	1361	7	A	1131
942 Pittwater Rd / Howard Av / St David Av									
Pittwater Road SB	13	A	1613	13	A	1036	21	B	1344
Pittwater Road NB	12	A	755	9	A	1213	28	B	1038
943 Pittwater Rd / Oaks Av									
Pittwater Road SB	17	B	1672	10	A	1050	30	C	1382
Pittwater Road NB	6	A	807	6	A	1265	8	A	1088
944 Pittwater Rd / Fisher Road									
Pittwater Road SB	16	B	1791	16	B	1176	30	C	1543
Pittwater Road NB	10	A	976	8	A	1551	10	A	1364
945 Pittwater Rd / Pacific Parade									
Pittwater Road SB	11	A	2106	17	B	1500	16	B	1821
Pittwater Road NB	17	B	1259	16	B	1825	21	B	1488
946 Pittwater Rd / Sturdee St									
Pittwater Road SB	16	B	2080	22	B	1508	18	B	1801
Pittwater Road NB	15	B	1237	45	D	1792	14	A	1467

Table 3.9 1Way

Pittwater Road LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
1WAY									
940 Pittwater Rd / Hawkesbury Rd									
Pittwater Road SB	16	B	1744	14	A	1320	18	B	1540
Pittwater Road NB	18	B	1067	5	A	1593	10	A	1484
941 Pittwater Road / Dee Why Parade									
Pittwater Road SB	36	C	1676	29	C	1212	28	B	1433
Pittwater Road NB	9	A	841	12	A	1478	16	B	1318
942 Pittwater Rd / Howard Av / St David Av									
Pittwater Road SB	27	B	1718	49	D	1289	37	C	1604
Pittwater Road NB	11	A	695	21	B	1224	22	B	1052
943 Pittwater Rd / Oaks Av									
Pittwater Road SB	15	B	1688	21	B	1171	14	A	1539
Pittwater Road NB	18	B	1068	16	B	1701	19	B	1492
944 Pittwater Rd / Fisher Road									
Pittwater Road SB	10	A	2125	10	A	1600	11	A	1994
Pittwater Road NB	15	A	1494	14	A	2302	15	B	1838
945 Pittwater Rd / Pacific Parade									
Pittwater Road SB	10	A	2125	10	A	1600	11	A	1994
Pittwater Road NB	15	A	1494	14	A	2302	15	B	1838
946 Pittwater Rd / Sturdee St									
Pittwater Road SB	16	B	2202	21	B	1654	18	B	1960
Pittwater Road NB	12	A	1399	22	B	2118	16	B	1669

Table 3.10 2Way (also referred to as Opt 1)

Pittwater Road LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAY									
940 Pittwater Rd / Hawkesbury Rd									
Pittwater Road SB	14	A	1745	21	B	1309	21	B	1551
Pittwater Road NB	9	A	1062	17	B	1632	8	A	1430
941 Pittwater Road / Dee Why Parade									
Pittwater Road SB	18	B	1713	17	B	1203	9	A	1470
Pittwater Road NB	9	A	868	9	A	1499	10	A	1276
942 Pittwater Rd / Howard Av / St David Av									
Pittwater Road SB	17	B	1671	17	B	1141	33	C	1469
Pittwater Road NB	13	A	756	13	A	1256	33	C	1026
943 Pittwater Rd / Oaks Av									
Pittwater Road SB	18	B	1649	16	B	1052	40	C	1323
Pittwater Road NB	6	A	855	7	A	1340	11	A	1093
944 Pittwater Rd / Fisher Road									
Pittwater Road SB	18	B	1794	25	B	1226	34	C	1623
Pittwater Road NB	13	A	1101	13	A	1754	20	B	1438
945 Pittwater Rd / Pacific Parade									
Pittwater Road SB	12	A	2187	26	B	1551	16	B	1945
Pittwater Road NB	22	B	1413	35	C	2129	43	D	1631
946 Pittwater Rd / Sturdee St									
Pittwater Road SB	16	B	2161	34	C	1557	19	B	1917
Pittwater Road NB	18	B	1392	43	C	2101	51	D	1617

Table 3.11 2Wayext (also referred to as Opt 2)

Pittwater Road LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAYext									
940 Pittwater Rd / Hawkesbury Rd									
Pittwater Road SB	14	A	1764	21	B	1325	21	B	1559
Pittwater Road NB	10	A	1068	16	B	1570	8	A	1426
941 Pittwater Road / Dee Why Parade									
Pittwater Road SB	17	B	1726	17	B	1216	11	A	1452
Pittwater Road NB	9	A	860	8	A	1441	11	A	1276
942 Pittwater Rd / Howard Av / St David Av									
Pittwater Road SB	16	B	1688	17	B	1149	36	C	1454
Pittwater Road NB	13	A	729	15	A	1207	34	C	1012
943 Pittwater Rd / Oaks Av									
Pittwater Road SB	18	B	1657	18	B	1062	44	D	1295
Pittwater Road NB	7	A	831	11	A	1293	11	A	1080
944 Pittwater Rd / Fisher Road									
Pittwater Road SB	17	B	1801	27	B	1233	38	C	1611
Pittwater Road NB	13	A	1084	13	A	1717	16	B	1446
945 Pittwater Rd / Pacific Parade									
Pittwater Road SB	11	A	2205	27	B	1579	17	B	1981
Pittwater Road NB	20	B	1417	33	C	2111	29	C	1639
946 Pittwater Rd / Sturdee St									
Pittwater Road SB	17	B	2171	34	C	1574	23	B	1966
Pittwater Road NB	20	B	1394	45	D	2089	20	B	1621

Table 3.12 2WayextW1 (also referred to as Opt 3)

Pittwater Road LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAYextW1.									
940 Pittwater Rd / Hawkesbury Rd									
Pittwater Road SB	14	A	1759	21	B	1332	21	B	1538
Pittwater Road NB	10	A	1062	17	B	1583	8	A	1477
941 Pittwater Road / Dee Why Parade									
Pittwater Road SB	17	B	1707	18	B	1213	10	A	1424
Pittwater Road NB	9	A	855	8	A	1457	11	A	1328
942 Pittwater Rd / Howard Av / St David Av									
Pittwater Road SB	17	B	1666	18	B	1134	35	C	1457
Pittwater Road NB	14	A	735	15	B	1216	34	C	1042
943 Pittwater Rd / Oaks Av									
Pittwater Road SB	18	B	1675	21	B	1073	44	D	1310
Pittwater Road NB	6	A	836	10	A	1290	11	A	1105
944 Pittwater Rd / Fisher Road									
Pittwater Road SB	18	B	1825	29	C	1275	36	C	1647
Pittwater Road NB	13	A	1087	12	A	1710	17	B	1476
945 Pittwater Rd / Pacific Parade									
Pittwater Road SB	12	A	2177	27	B	1599	16	B	1999
Pittwater Road NB	20	B	1434	30	C	2112	32	C	1674
946 Pittwater Rd / Sturdee St									
Pittwater Road SB	17	B	2141	35	C	1578	21	B	1938
Pittwater Road NB	20	B	1414	33	C	2084	27	B	1658

3.5.1 Summary of Pittwater Road Level of Service

- The one way system performs marginally better than the two way systems
- Under the one way system, the Pittwater Rod southbound approach at the Howard Avenue and St David Avenue interforms only satisfactorily at LoS D
- Under the two way system, approached performing only satisfactorily include:
 - Pittwater Road northbound at the Pacific Parade and Sturdee Street in the Saturday midday peak

- Pittwater Road southbound at the Oaks Avenue intersection in the Saturday midday peak
- Pittwater Road northbound at the Sturdee Street intersection in the PM peak.

3.6 Dynamic Feedback Comparison

Table 3.13 Comparison

Intersection LoS	No Dynamic Feedback									Dynamic Feedback								
	Morning Peak			Evening Peak			Saturday Peak			Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (\$)	LoS	Traffic Flow vph	Av Delay (\$)	LoS	Traffic Flow vph	Av Delay (\$)	LoS	Traffic Flow vph	Av Delay (\$)	LoS	Traffic Flow vph	Av Delay (\$)	LoS	Traffic Flow vph	Av Delay (\$)	LoS	Traffic Flow vph
PB_Base																		
1302 Fisher Rd / Sr David Av / Lewis St	24	B	1564	26	B	1778	21	B	1404	23	B	1570	25	B	1824	20	B	1409
940 Pittwater Rd / Hawkesbury Rd	19	B	3799	25	B	3706	20	B	3486	20	B	3778	25	B	3685	20	B	3485
941 Pittwater Road / Dee Why Parade	21	B	2916	20	B	2872	19	B	2917	21	B	2907	23	B	3436	17	B	2884
942 Pittwater Rd / Howard Av / St David Av	20	B	2940	19	B	2801	33	C	3036	20	B	2885	18	B	2736	29	B	2956
943 Pittwater Rd / Oaks Av	16	B	2804	12	A	2804	24	B	3002	16	B	2729	11	A	2739	20	B	2901
944 Pittwater Rd / Fisher Road	19	B	3693	22	B	3780	26	B	3642	19	B	3655	24	B	4528	24	B	3564
945 Pittwater Rd / Pacific Parade	16	B	3677	22	B	3815	20	B	3696	16	B	3635	22	B	3776	20	B	3603
946 Pittwater Rd / Sturdee St	20	B	3789	44	D	3862	18	B	3572	21	B	3748	42	C	3885	19	B	3520
TWAY																		
1302 Fisher Rd / Sr David Av / Lewis St	38	C	1898	27	B	2219	49	D	2067	34	C	1872	31	C	2192	45	D	2054
940 Pittwater Rd / Hawkesbury Rd	24	B	3885	19	B	3948	19	B	3826	25	B	3869	18	B	3951	19	B	3823
941 Pittwater Road / Dee Why Parade	32	C	3013	24	B	3181	27	B	3305	31	C	2979	20	B	3136	23	B	3263
942 Pittwater Rd / Howard Av / St David Av	31	C	3159	38	C	3560	37	C	3737	30	C	3047	32	C	3472	31	C	3636
943 Pittwater Rd / Oaks Av	18	B	3018	17	B	3392	17	B	3601	18	B	2933	15	B	3301	15	B	3487
944 Pittwater Rd / Fisher Road	22	B	4046	24	B	4304	25	B	4275	21	B	4009	25	B	4282	23	B	4212
945 Pittwater Rd / Pacific Parade	16	B	4246	15	A	4483	14	A	4423	15	B	4199	13	A	4411	12	A	4293
946 Pittwater Rd / Sturdee St	20	B	4117	25	B	4555	21	B	4215	22	B	4086	27	B	4583	20	B	4140
ZWAY																		
1302 Fisher Rd / Sr David Av / Lewis St	27	B	1841	30	C	2147	42	C	1880	25	B	1863	28	B	2175	28	B	1986
940 Pittwater Rd / Hawkesbury Rd	19	B	3880	24	B	3979	19	B	3793	18	B	3878	24	B	3923	19	B	3836
941 Pittwater Road / Dee Why Parade	21	B	3039	19	B	3168	22	B	3260	21	B	3039	19	B	3071	17	B	3206
942 Pittwater Rd / Howard Av / St David Av	25	B	3361	23	B	3482	40	C	3589	23	B	3301	25	B	3373	37	C	3598
943 Pittwater Rd / Oaks Av	19	B	3027	18	B	3181	34	C	3325	17	B	2945	14	A	2936	24	B	3121
944 Pittwater Rd / Fisher Road	21	B	3919	34	C	4161	39	C	3961	20	B	3900	26	B	3964	29	C	3816
945 Pittwater Rd / Pacific Parade	18	B	3917	36	C	4170	30	C	3973	18	B	3894	31	C	3971	24	B	3848
946 Pittwater Rd / Sturdee St	21	B	4051	44	D	4229	35	C	3843	25	B	4017	41	C	4136	25	B	3825
ZWAYext																		
1302 Fisher Rd / Sr David Av / Lewis St	26	B	1888	29	C	2170	29	B	1968	25	B	1888	28	B	2134	29	B	2001
940 Pittwater Rd / Hawkesbury Rd	19	B	3877	24	B	3930	19	B	3798	19	B	3877	24	B	3912	19	B	3831
941 Pittwater Road / Dee Why Parade	22	B	3050	19	B	3126	21	B	3229	22	B	3016	19	B	3075	18	B	3213
942 Pittwater Rd / Howard Av / St David Av	25	B	3393	25	B	3455	39	C	3589	24	B	3264	26	B	3341	36	C	3604
943 Pittwater Rd / Oaks Av	19	B	2964	21	B	3097	35	C	3273	18	B	2894	15	A	2928	23	B	3083
944 Pittwater Rd / Fisher Road	19	B	3915	35	C	4133	34	C	3975	19	B	3898	25	B	3982	29	B	3820
945 Pittwater Rd / Pacific Parade	17	B	3967	34	C	4190	26	B	4053	17	B	3927	30	C	4017	23	B	3859
946 Pittwater Rd / Sturdee St	22	B	4059	43	D	4227	24	B	3921	23	B	4008	40	C	4153	24	B	3838
ZWAYWTL																		
1302 Fisher Rd / Sr David Av / Lewis St	27	B	1884	32	C	2157	30	C	1956	26	B	1864	30	C	2150	29	C	2005
940 Pittwater Rd / Hawkesbury Rd	19	B	3877	25	B	3965	19	B	3826	19	B	3862	25	B	3953	19	B	3838
941 Pittwater Road / Dee Why Parade	21	B	3027	19	B	3127	23	B	3265	21	B	2990	18	B	3089	17	B	3203
942 Pittwater Rd / Howard Av / St David Av	27	B	3413	27	B	3536	40	C	3672	24	B	3292	26	B	3492	38	C	3596
943 Pittwater Rd / Oaks Av	19	B	2954	23	B	3105	36	C	3330	18	B	2888	17	B	3011	28	B	3155
944 Pittwater Rd / Fisher Road	19	B	3906	34	C	4082	34	C	4003	19	B	3880	25	B	4004	29	B	3861
945 Pittwater Rd / Pacific Parade	17	B	3952	32	C	4123	25	B	4040	17	B	3904	30	C	4034	21	B	3879
946 Pittwater Rd / Sturdee St	22	B	4032	38	C	4258	25	B	3915	22	B	3994	47	D	4179	23	B	3800

The dynamic feedback in general provides for improved network performance given increased vehicle route choice. This is however less apparent and less reflective under the one way system due to limited vehicle route choice. Intersection overall LoS under the two way variants perform marginally better with dynamic feedback applied.

3.7 Approach Level of Service

Table 3.14 PB- Base

Approach LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
PB-Base									
1302 Fisher Road North	16	B	747	17	B	707	14	A	624
1302 Fisher Road South	10	A	424	11	A	570	13	A	306
1302 Lewis Street West	44	D	197	40	C	280	45	D	239
1302 St David Avenue East	63	E	196	73	F	220	25	B	235
940 Hawkesbury East	81	F	289	80	F	360	51	D	277
940 Hawkesbury West	42	C	219	45	D	223	46	D	199
940 Pittwater Road North	13	A	2170	20	B	1490	20	B	1611
940 Pittwater Road South	11	A	1120	15	B	1633	9	A	1399
941 Dee Why Parade East	62	E	418	68	E	443	76	F	482
941 Pittwater Road North	16	B	1616	16	B	1041	7	A	1275
941 Pittwater Road South	9	A	881	8	A	1388	8	A	1159
942 Howard Avenue East	71	F	274	80	F	246	103	F	302
942 Pittwater Road North	13	A	1660	13	A	1091	21	B	1404
942 Pittwater Road South	12	A	785	9	A	1227	28	B	1084
942 St David Avenue West	38	C	221	35	C	237	39	C	246
943 Oaks Avenue East	58	E	80	71	F	116	71	F	152
943 Pittwater Road North	17	B	1692	10	A	1110	29	C	1475
943 Pittwater Road South	12	A	1032	9	A	1578	13	A	1374
944 Fisher Road West	65	E	501	101	F	482	78	F	428
944 Pittwater Road North	16	B	1791	16	B	1176	30	C	1543
944 Pittwater Road South	8	A	1401	7	A	2122	9	A	1671
945 Pacific Parade East	64	E	182	81	F	362	59	E	254
945 Pittwater Road North	11	A	2237	16	B	1628	15	A	1954
945 Pittwater Road South	17	B	1259	16	B	1825	21	B	1488
946 Pittwater Road North	16	B	2124	22	B	1575	18	B	1883
946 Pittwater Road South	21	B	1401	60	E	2084	16	B	1556
946 Sturdee Street East	45	D	265	38	C	203	43	D	133

Table 3.15 1Way

Approach LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
1WAY									
1302 Fisher Road North	44	D	898	29	B	837	29	C	768
1302 Fisher Road South	17	B	446	13	A	628	37	C	371
1302 Lewis Street West	49	D	184	47	D	305	54	D	423
1302 St David Avenue East	41	C	370	29	B	449	84	F	505
940 Hawkesbury East	94	F	291	86	F	354	52	D	272
940 Hawkesbury West	51	D	212	50	D	226	50	D	199
940 Pittwater Road North	15	B	2247	14	A	1646	18	B	1764
940 Pittwater Road South	19	B	1135	6	A	1723	11	A	1591
941 Dee Why Parade East	66	E	461	49	D	460	51	D	527
941 Pittwater Road North	36	C	1676	29	C	1212	28	B	1433
941 Pittwater Road South	9	A	877	13	A	1510	16	B	1345
942 Howard Avenue East	66	E	657	45	D	1004	55	D	1008
942 Pittwater Road North	27	B	1718	49	D	1289	37	C	1604
942 Pittwater Road South	11	A	778	21	B	1263	22	B	1121
942 St David Avenue West	128	F	6	88	F	4	144	F	3
943 Pittwater Road North	19	B	1951	20	B	1692	17	B	2125
943 Pittwater Road South	17	B	1067	13	A	1700	17	B	1477
944 Fisher Road West	49	D	851	63	E	805	62	E	886
944 Pittwater Road North	15	B	1688	21	B	1171	14	A	1539
944 Pittwater Road South	14	A	1508	12	A	2328	15	B	1850
945 Pacific Parade East	102	F	215	86	F	202	79	F	159
945 Pittwater Road North	9	A	2537	8	A	1979	9	A	2427
945 Pittwater Road South	15	A	1494	14	A	2302	15	B	1838
946 Pittwater Road North	16	B	2302	21	B	1795	17	B	2148
946 Pittwater Road South	18	B	1561	25	B	2419	18	B	1768
946 Sturdee Street East	75	F	253	57	E	340	67	E	299

Table 3.16 2Way (also referred to as Opt 1)

Approach LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAY									
1302 Fisher Road North	17	B	878	21	B	819	29	B	779
1302 Fisher Road South	11	A	478	13	A	677	16	B	398
1302 Lewis Street West	46	D	189	38	C	309	72	F	360
1302 St David Avenue East	69	E	296	79	F	342	71	F	345
940 Hawkesbury East	75	F	302	63	E	349	47	D	268
940 Hawkesbury West	42	C	207	45	D	234	51	D	204
940 Pittwater Road North	14	A	2239	20	B	1631	20	B	1788
940 Pittwater Road South	10	A	1132	18	B	1765	9	A	1534
941 Dee Why Parade East	61	E	419	58	E	436	88	F	487
941 Pittwater Road North	18	B	1713	17	B	1203	9	A	1470
941 Pittwater Road South	9	A	907	9	A	1529	10	A	1303
942 Howard Avenue East	61	E	444	51	D	609	70	E	536
942 Pittwater Road North	17	B	1763	17	B	1258	33	C	1603
942 Pittwater Road South	14	A	833	14	A	1304	33	C	1094
942 St David Avenue West	47	D	320	39	C	311	48	D	354
943 Oaks Avenue East	72	F	104	90	F	164	83	F	294
943 Pittwater Road North	18	B	1762	15	A	1212	37	C	1540
943 Pittwater Road South	16	B	1162	13	A	1805	21	B	1490
944 Fisher Road West	64	E	547	165	F	504	132	F	516
944 Pittwater Road North	18	B	1794	25	B	1226	34	C	1623
944 Pittwater Road South	11	A	1578	11	A	2432	17	B	1823
945 Pacific Parade East	66	E	221	89	F	370	67	E	258
945 Pittwater Road North	11	A	2284	25	B	1670	15	B	2084
945 Pittwater Road South	22	B	1413	35	C	2129	43	D	1631
946 Pittwater Road North	16	B	2216	34	C	1624	19	B	2005
946 Pittwater Road South	23	B	1558	46	D	2404	52	D	1708
946 Sturdee Street East	46	D	278	97	F	201	55	D	130

Table 3.17 2Wayext (also referred to as Opt 2)

Approach LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
<u>2WAYext</u>									
1302 Fisher Road North	17	B	898	20	B	832	21	B	785
1302 Fisher Road South	11	A	502	12	A	687	16	B	412
1302 Lewis Street West	46	D	188	38	C	318	41	C	405
1302 St David Avenue East	67	E	299	81	F	333	44	D	365
940 Hawkesbury East	82	F	287	60	E	354	50	D	265
940 Hawkesbury West	41	C	219	46	D	225	51	D	209
940 Pittwater Road North	14	A	2243	20	B	1647	20	B	1792
940 Pittwater Road South	11	A	1129	17	B	1703	9	A	1531
941 Dee Why Parade East	65	E	429	56	D	437	81	F	473
941 Pittwater Road North	17	B	1726	17	B	1216	11	A	1452
941 Pittwater Road South	9	A	895	8	A	1473	11	A	1304
942 Howard Avenue East	64	E	450	53	D	598	55	D	528
942 Pittwater Road North	16	B	1782	17	B	1266	35	C	1581
942 Pittwater Road South	14	A	807	15	B	1255	34	C	1077
942 St David Avenue West	50	D	354	40	C	336	47	D	403
943 Oaks Avenue East	67	E	99	96	F	164	86	F	312
943 Pittwater Road North	18	B	1779	16	B	1221	41	C	1516
943 Pittwater Road South	15	B	1086	17	B	1711	18	B	1445
944 Fisher Road West	50	D	528	173	F	492	94	F	519
944 Pittwater Road North	17	B	1801	27	B	1233	38	C	1611
944 Pittwater Road South	10	A	1586	11	A	2408	13	A	1845
945 Pacific Parade East	66	E	220	84	F	357	74	F	287
945 Pittwater Road North	11	A	2330	26	B	1722	17	B	2127
945 Pittwater Road South	20	B	1417	33	C	2111	29	C	1639
946 Pittwater Road North	17	B	2222	34	C	1647	22	B	2054
946 Pittwater Road South	26	B	1564	47	D	2394	22	B	1720
946 Sturdee Street East	46	D	273	76	F	187	53	D	147

Table 3.18 2WayextW1 (also referred to as Opt 3)

Approach LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
<u>2WAYextW1</u>									
1302 Fisher Road North	17	B	881	21	B	826	21	B	770
1302 Fisher Road South	10	A	489	14	A	617	16	B	368
1302 Lewis Street West	43	D	181	38	C	322	42	C	423
1302 St David Avenue East	68	E	333	79	F	392	49	D	395
940 Hawkesbury East	81	F	293	68	E	370	49	D	276
940 Hawkesbury West	41	C	211	45	D	227	48	D	200
940 Pittwater Road North	14	A	2245	21	B	1652	21	B	1772
940 Pittwater Road South	11	A	1127	18	B	1715	9	A	1578
941 Dee Why Parade East	65	E	421	60	E	427	93	F	486
941 Pittwater Road North	17	B	1707	18	B	1213	10	A	1424
941 Pittwater Road South	9	A	898	8	A	1487	11	A	1355
942 Howard Avenue East	65	E	494	59	E	671	64	E	594
942 Pittwater Road North	17	B	1757	17	B	1258	34	C	1575
942 Pittwater Road South	14	A	810	16	B	1251	34	C	1104
942 St David Avenue West	51	D	352	42	C	356	47	D	399
943 Oaks Avenue East	69	E	110	110	F	192	91	F	332
943 Pittwater Road North	18	B	1755	19	B	1202	40	C	1520
943 Pittwater Road South	15	A	1089	16	B	1711	19	B	1478
944 Fisher Road West	52	D	504	163	F	477	97	F	522
944 Pittwater Road North	18	B	1825	29	C	1275	36	C	1647
944 Pittwater Road South	10	A	1576	10	A	2330	14	A	1834
945 Pacific Parade East	66	E	187	86	F	263	62	E	199
945 Pittwater Road North	11	A	2331	27	B	1748	16	B	2166
945 Pittwater Road South	20	B	1434	30	C	2112	32	C	1674
946 Pittwater Road North	17	B	2189	35	C	1653	21	B	2032
946 Pittwater Road South	26	B	1586	37	C	2399	28	B	1748
946 Sturdee Street East	44	D	257	64	E	207	42	C	135

3.8 Turn Level of Service

Table 3.19 PB- Base

Turn LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
PB-Base									
1302 Fisher Road North2East	15	B	199	14	A	186	13	A	192
1302 Fisher Road North2South	15	B	438	16	B	416	14	A	353
1302 Fisher Road North2West	20	B	110	24	B	105	17	B	80
1302 Fisher Road South2East	18	B	5	8	A	4	18	B	8
1302 Fisher Road South2North	10	A	371	11	A	495	12	A	262
1302 Fisher Road South2West	14	A	48	14	A	71	16	B	36
1302 Lewis Street West2East	44	D	76	39	C	99	45	D	87
1302 Lewis Street West2North	44	D	59	40	C	133	44	D	115
1302 Lewis Street West2South	44	D	62	44	D	49	52	D	38
1302 St David Avenue East2North	67	E	143	78	F	145	22	B	130
1302 St David Avenue East2South	58	E	2	39	C	14	51	D	34
1302 St David Avenue East2West	53	D	51	69	E	60	17	B	70
940 Hawkesbury East2North	90	F	191	82	F	207	53	D	145
940 Hawkesbury East2South	60	E	24	61	E	17	44	D	43
940 Hawkesbury East2West	65	E	73	78	F	136	49	D	88
940 Hawkesbury West2East	42	C	154	44	D	154	45	D	156
940 Hawkesbury West2North	37	C	27	43	D	25	50	D	5
940 Hawkesbury West2South	43	D	38	50	D	44	52	D	38
940 Pittwater Road North2East	12	A	501	19	B	334	17	B	229
940 Pittwater Road North2South	14	A	1670	20	B	1156	20	B	1382
940 Pittwater Road South2East	34	C	43	26	B	104	28	B	83
940 Pittwater Road South2North	10	A	1055	15	A	1503	8	A	1293
940 Pittwater Road South2West	8	A	21	14	A	26	6	A	24
941 Dee Why Parade East2North	60	E	287	68	E	278	68	E	271
941 Dee Why Parade East2South	66	E	57	76	F	66	87	F	137
941 Dee Why Parade East2West	64	E	74	64	E	98	85	F	74
941 Pittwater Road North2South	16	B	1616	16	B	1041	7	A	1275
941 Pittwater Road South2North	9	A	848	8	A	1361	7	A	1131
941 Pittwater Road South2West	11	A	34	12	A	28	12	A	28
942 Howard Avenue East2North	75	F	45	89	F	60	107	F	54
942 Howard Avenue East2South	76	F	64	83	F	60	105	F	114
942 Howard Avenue East2West	68	E	165	74	F	126	99	F	135
942 Pittwater Road North2East	9	A	47	12	A	56	13	A	60
942 Pittwater Road North2South	13	A	1613	13	A	1036	21	B	1344
942 Pittwater Road South2North	12	A	755	9	A	1213	28	B	1038
942 Pittwater Road South2West	12	A	30	19	B	14	23	B	46
942 St David Avenue West2East	38	C	218	34	C	235	39	C	246
942 St David Avenue West2South	62	E	3	87	F	2	57	E	1
943 Oaks Avenue East2South	58	E	80	71	F	116	71	F	152
943 Pittwater Road North2East	15	A	20	5	A	61	14	A	93
943 Pittwater Road North2South	17	B	1672	10	A	1050	30	C	1382
943 Pittwater Road South2East	35	C	224	20	B	313	30	C	286
943 Pittwater Road South2North	6	A	807	6	A	1265	8	A	1088
944 Fisher Road West2North	71	F	56	87	F	27	75	F	13
944 Fisher Road West2South	64	E	445	102	F	454	78	F	415
944 Pittwater Road North2South	16	B	1791	16	B	1176	30	C	1543
944 Pittwater Road South2North	10	A	976	8	A	1551	10	A	1364
944 Pittwater Road South2West	3	A	425	3	A	571	2	A	307
945 Pacific Parade East2North	57	E	121	81	F	272	55	D	174
945 Pacific Parade East2South	79	F	60	79	F	90	66	E	80
945 Pittwater Road North2East	3	A	130	8	A	129	6	A	133
945 Pittwater Road North2South	11	A	2106	17	B	1500	16	B	1821
945 Pittwater Road South2North	17	B	1259	16	B	1825	21	B	1488
946 Pittwater Road North2East	15	B	44	18	B	66	9	A	82
946 Pittwater Road North2South	16	B	2080	22	B	1508	18	B	1801
946 Pittwater Road South2East	65	E	164	155	F	291	61	E	89
946 Pittwater Road South2North	15	B	1237	45	D	1792	14	A	1467
946 Sturdee Street East2North	62	E	13	69	E	33	77	F	18
946 Sturdee Street East2South	44	D	252	32	C	170	38	C	115

Table 3.20 1Way

Turn LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
1WAY									
1302 Fisher Road North2East	41	C	112	23	B	80	26	B	72
1302 Fisher Road North2South	44	D	665	27	B	620	31	C	569
1302 Fisher Road North2West	49	D	122	39	C	137	24	B	128
1302 Fisher Road South2East	32	C	13	30	C	5	32	C	19
1302 Fisher Road South2North	16	B	369	12	A	511	36	C	274
1302 Fisher Road South2West	20	B	65	18	B	112	39	C	79
1302 Lewis Street West2East	52	D	17	45	D	40	46	D	87
1302 Lewis Street West2North	50	D	54	46	D	141	45	D	147
1302 Lewis Street West2South	48	D	113	50	D	124	65	E	189
1302 St David Avenue East2North	40	C	197	28	B	221	80	F	183
1302 St David Avenue East2South	47	D	82	34	C	76	96	F	147
1302 St David Avenue East2West	38	C	91	28	B	152	78	F	175
940 Hawkesbury East2North	101	F	189	95	F	202	58	E	133
940 Hawkesbury East2South	76	F	24	81	F	21	43	D	45
940 Hawkesbury East2West	81	F	78	73	F	131	48	D	94
940 Hawkesbury West2East	50	D	148	50	D	162	50	D	158
940 Hawkesbury West2North	51	D	23	46	D	28	58	E	6
940 Hawkesbury West2South	53	D	40	54	D	37	51	D	35
940 Pittwater Road North2East	11	A	503	13	A	325	16	B	224
940 Pittwater Road North2South	16	B	1744	14	A	1320	18	B	1540
940 Pittwater Road South2East	56	D	47	20	B	108	32	C	84
940 Pittwater Road South2North	18	B	1067	5	A	1593	10	A	1484
940 Pittwater Road South2West	18	B	20	6	A	21	12	A	23
941 Dee Why Parade East2North	64	E	297	44	D	270	47	D	277
941 Dee Why Parade East2South	73	F	84	64	E	89	58	E	174
941 Dee Why Parade East2West	66	E	80	49	D	101	50	D	75
941 Pittwater Road North2South	36	C	1676	29	C	1212	28	B	1433
941 Pittwater Road South2North	9	A	841	12	A	1478	16	B	1318
941 Pittwater Road South2West	7	A	36	30	C	31	18	B	28
942 Howard Avenue East2North	53	D	112	36	C	200	35	C	142
942 Howard Avenue East2South	85	F	237	58	E	408	75	F	519
942 Howard Avenue East2West	55	D	309	37	C	396	32	C	347
942 Pittwater Road North2South	27	B	1718	49	D	1289	37	C	1604
942 Pittwater Road South2North	11	A	695	21	B	1224	22	B	1052
942 Pittwater Road South2West	10	A	83	23	B	39	24	B	69
942 St David Avenue West2South	128	F	6	88	F	4	144	F	3
943 Pittwater Road North2East	12	A	299	21	B	538	14	A	605
943 Pittwater Road North2South	20	B	1653	20	B	1154	19	B	1520
943 Pittwater Road South2East	47	D	266	30	C	415	41	C	349
943 Pittwater Road South2North	7	A	800	7	A	1284	9	A	1128
944 Fisher Road West2South	49	D	851	63	E	805	62	E	886
944 Pittwater Road North2South	15	B	1688	21	B	1171	14	A	1539
944 Pittwater Road South2North	18	B	1068	16	B	1701	19	B	1492
944 Pittwater Road South2West	2	A	440	3	A	627	2	A	358
945 Pacific Parade East2South	102	F	215	86	F	202	79	F	159
945 Pittwater Road North2East	3	A	411	2	A	379	1	A	433
945 Pittwater Road North2South	10	A	2125	10	A	1600	11	A	1994
945 Pittwater Road South2North	15	A	1494	14	A	2302	15	B	1838
946 Pittwater Road North2East	10	A	101	16	B	141	11	A	188
946 Pittwater Road North2South	16	B	2202	21	B	1654	18	B	1960
946 Pittwater Road South2East	77	F	163	46	D	301	36	C	99
946 Pittwater Road South2North	12	A	1399	22	B	2118	16	B	1669
946 Sturdee Street East2North	82	F	97	58	E	199	71	F	156
946 Sturdee Street East2South	70	F	156	57	E	142	62	E	143

Table 3.21 2Way (also referred to as Opt 1)

Turn LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAY									
1302 Fisher Road North2East	15	A	284	16	B	242	19	B	248
1302 Fisher Road North2South	16	B	472	21	B	444	35	C	406
1302 Fisher Road North2West	22	B	122	29	B	133	27	B	124
1302 Fisher Road South2East	20	B	19	22	B	18	21	B	11
1302 Fisher Road South2North	10	A	382	13	A	519	15	B	274
1302 Fisher Road South2West	14	A	77	14	A	140	16	B	113
1302 Lewis Street West2East	45	D	82	36	C	120	39	C	168
1302 Lewis Street West2North	43	D	58	36	C	134	34	C	119
1302 Lewis Street West2South	49	D	49	48	D	55	209	F	73
1302 St David Avenue East2North	73	F	182	83	F	197	61	E	162
1302 St David Avenue East2South	60	E	32	58	E	26	170	F	43
1302 St David Avenue East2West	65	E	83	76	F	119	50	D	140
940 Hawkesbury East2North	82	F	194	69	E	199	51	D	125
940 Hawkesbury East2South	59	E	25	53	D	24	39	C	48
940 Hawkesbury East2West	63	E	83	55	D	127	45	D	95
940 Hawkesbury West2East	41	C	138	43	D	161	50	D	153
940 Hawkesbury West2North	35	C	27	42	C	30	37	C	4
940 Hawkesbury West2South	47	D	42	51	D	43	54	D	46
940 Pittwater Road North2East	12	A	494	18	B	323	16	B	237
940 Pittwater Road North2South	14	A	1745	21	B	1309	21	B	1551
940 Pittwater Road South2East	34	C	49	34	C	106	26	B	83
940 Pittwater Road South2North	9	A	1062	17	B	1632	8	A	1430
940 Pittwater Road South2West	9	A	21	16	B	27	4	A	20
941 Dee Why Parade East2North	59	E	277	56	D	271	72	F	263
941 Dee Why Parade East2South	68	E	68	65	E	71	114	F	148
941 Dee Why Parade East2West	64	E	74	59	E	94	96	F	76
941 Pittwater Road North2South	18	B	1713	17	B	1203	9	A	1470
941 Pittwater Road South2North	9	A	868	9	A	1499	10	A	1276
941 Pittwater Road South2West	7	A	38	14	A	30	14	A	27
942 Howard Avenue East2North	79	F	88	63	E	187	77	F	126
942 Howard Avenue East2South	65	E	81	56	D	81	66	E	91
942 Howard Avenue East2West	54	D	275	43	D	341	68	E	319
942 Pittwater Road North2East	17	B	92	13	A	117	25	B	134
942 Pittwater Road North2South	17	B	1671	17	B	1141	33	C	1469
942 Pittwater Road South2North	13	A	756	13	A	1256	33	C	1026
942 Pittwater Road South2West	17	B	77	25	B	48	32	C	68
942 St David Avenue West2East	47	D	318	39	C	310	48	D	352
942 St David Avenue West2South	81	F	3	43	D	1	71	F	2
943 Oaks Avenue East2South	72	F	104	90	F	164	83	F	294
943 Pittwater Road North2East	16	B	112	6	A	159	18	B	217
943 Pittwater Road North2South	18	B	1649	16	B	1052	40	C	1323
943 Pittwater Road South2East	42	C	307	31	C	465	46	D	397
943 Pittwater Road South2North	6	A	855	7	A	1340	11	A	1093
944 Fisher Road West2North	74	F	59	141	F	56	144	F	52
944 Fisher Road West2South	63	E	488	168	F	448	130	F	464
944 Pittwater Road North2South	18	B	1794	25	B	1226	34	C	1623
944 Pittwater Road South2North	13	A	1101	13	A	1754	20	B	1438
944 Pittwater Road South2West	5	A	478	4	A	678	5	A	385
945 Pacific Parade East2North	59	E	146	83	F	281	65	E	182
945 Pacific Parade East2South	79	F	74	108	F	89	72	F	77
945 Pittwater Road North2East	3	A	96	16	B	119	5	A	139
945 Pittwater Road North2South	12	A	2187	26	B	1551	16	B	1945
945 Pittwater Road South2North	22	B	1413	35	C	2129	43	D	1631
946 Pittwater Road North2East	14	A	55	35	C	67	11	A	87
946 Pittwater Road North2South	16	B	2161	34	C	1557	19	B	1917
946 Pittwater Road South2East	69	E	165	65	E	302	67	E	91
946 Pittwater Road South2North	18	B	1392	43	C	2101	51	D	1617
946 Sturdee Street East2North	76	F	15	265	F	31	149	F	17
946 Sturdee Street East2South	44	D	263	67	E	170	42	C	114

Table 3.22 2Wayext (also referred to as Opt 2)

Turn LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
2WAYext									
1302 Fisher Road North2East	16	B	328	17	B	262	19	B	274
1302 Fisher Road North2South	16	B	456	19	B	436	22	B	387
1302 Fisher Road North2West	22	B	113	27	B	134	23	B	125
1302 Fisher Road South2East	20	B	26	20	B	15	21	B	17
1302 Fisher Road South2North	10	A	393	12	A	530	16	B	279
1302 Fisher Road South2West	12	A	83	13	A	142	16	B	117
1302 Lewis Street West2East	47	D	80	36	C	131	39	C	189
1302 Lewis Street West2North	43	C	62	39	C	143	37	C	142
1302 Lewis Street West2South	49	D	47	43	C	44	54	D	75
1302 St David Avenue East2North	71	F	188	86	F	193	44	D	173
1302 St David Avenue East2South	56	D	32	55	D	30	72	F	55
1302 St David Avenue East2West	62	E	80	79	F	110	34	C	138
940 Hawkesbury East2North	90	F	187	67	E	196	55	D	129
940 Hawkesbury East2South	61	E	23	49	D	22	45	D	44
940 Hawkesbury East2West	69	E	76	53	D	136	46	D	93
940 Hawkesbury West2East	40	C	156	46	D	152	50	D	159
940 Hawkesbury West2North	39	C	24	43	D	31	54	D	6
940 Hawkesbury West2South	47	D	39	49	D	42	57	D	43
940 Pittwater Road North2East	12	A	478	19	B	322	16	B	233
940 Pittwater Road North2South	14	A	1764	21	B	1325	21	B	1559
940 Pittwater Road South2East	39	C	44	36	C	107	26	B	84
940 Pittwater Road South2North	10	A	1068	16	B	1570	8	A	1426
940 Pittwater Road South2West	8	A	18	16	B	26	5	A	22
941 Dee Why Parade East2North	62	E	282	54	D	268	65	E	256
941 Dee Why Parade East2South	71	F	71	65	E	68	108	F	146
941 Dee Why Parade East2West	69	E	76	57	D	102	86	F	71
941 Pittwater Road North2South	17	B	1726	17	B	1216	11	A	1452
941 Pittwater Road South2North	9	A	860	8	A	1441	11	A	1276
941 Pittwater Road South2West	8	A	35	13	A	32	15	B	28
942 Howard Avenue East2North	93	F	92	68	E	185	74	F	137
942 Howard Avenue East2South	71	F	77	59	E	84	61	E	89
942 Howard Avenue East2West	53	D	281	44	D	329	44	D	302
942 Pittwater Road North2East	13	A	94	13	A	118	27	B	126
942 Pittwater Road North2South	16	B	1688	17	B	1149	36	C	1454
942 Pittwater Road South2North	13	A	729	15	A	1207	34	C	1012
942 Pittwater Road South2West	17	B	78	29	C	47	33	C	66
942 St David Avenue West2East	49	D	351	40	C	336	47	D	401
942 St David Avenue West2South	63	E	3	26	B	0	87	F	2
943 Oaks Avenue East2South	67	E	99	96	F	164	86	F	312
943 Pittwater Road North2East	19	B	123	6	A	159	21	B	221
943 Pittwater Road North2South	18	B	1657	18	B	1062	44	D	1295
943 Pittwater Road South2East	43	D	255	35	C	418	41	C	365
943 Pittwater Road South2North	7	A	831	11	A	1293	11	A	1080
944 Fisher Road West2South	50	D	528	173	F	492	94	F	519
944 Pittwater Road North2South	17	B	1801	27	B	1233	38	C	1611
944 Pittwater Road South2North	13	A	1084	13	A	1717	16	B	1446
944 Pittwater Road South2West	3	A	502	4	A	690	3	A	399
945 Pacific Parade East2North	59	E	151	77	F	274	66	E	199
945 Pacific Parade East2South	80	F	69	108	F	83	90	F	89
945 Pittwater Road North2East	3	A	125	20	B	143	6	A	146
945 Pittwater Road North2South	11	A	2205	27	B	1579	17	B	1981
945 Pittwater Road South2North	20	B	1417	33	C	2111	29	C	1639
946 Pittwater Road North2East	13	A	52	36	C	73	15	A	88
946 Pittwater Road North2South	17	B	2171	34	C	1574	23	B	1966
946 Pittwater Road South2East	71	F	170	66	E	304	55	D	99
946 Pittwater Road South2North	20	B	1394	45	D	2089	20	B	1621
946 Sturdee Street East2North	72	F	13	182	F	30	124	F	22
946 Sturdee Street East2South	45	D	259	56	D	157	41	C	125

Table 3.23 2WayextW1 (also referred to as Opt 3)

Turn LoS	Morning Peak			Evening Peak			Saturday Peak		
	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph	Av Delay (s)	LoS	Traffic Flow vph
<u>2WAYextW1</u>									
1302 Fisher Road North2East	16	B	324	17	B	276	18	B	266
1302 Fisher Road North2South	16	B	443	20	B	417	23	B	379
1302 Fisher Road North2West	22	B	115	28	B	132	21	B	125
1302 Fisher Road South2East	21	B	26	24	B	12	28	B	13
1302 Fisher Road South2North	9	A	393	13	A	502	15	B	276
1302 Fisher Road South2West	13	A	70	18	B	103	18	B	79
1302 Lewis Street West2East	41	C	83	38	C	135	39	C	199
1302 Lewis Street West2North	42	C	59	34	C	137	36	C	141
1302 Lewis Street West2South	50	D	39	47	D	50	63	E	83
1302 St David Avenue East2North	70	F	198	83	F	222	49	D	163
1302 St David Avenue East2South	68	E	32	55	D	27	87	F	55
1302 St David Avenue East2West	65	E	102	76	F	143	37	C	177
940 Hawkesbury East2North	88	F	193	74	F	208	55	D	132
940 Hawkesbury East2South	66	E	23	56	D	19	40	C	48
940 Hawkesbury East2West	68	E	77	61	E	143	46	D	97
940 Hawkesbury West2East	40	C	149	45	D	160	46	D	155
940 Hawkesbury West2North	37	C	25	44	D	29	37	C	3
940 Hawkesbury West2South	44	D	37	46	D	39	54	D	41
940 Pittwater Road North2East	11	A	486	18	B	319	17	B	234
940 Pittwater Road North2South	14	A	1759	21	B	1332	21	B	1538
940 Pittwater Road South2East	33	C	44	36	C	108	26	B	84
940 Pittwater Road South2North	10	A	1062	17	B	1583	8	A	1477
940 Pittwater Road South2West	10	A	21	14	A	24	5	A	17
941 Dee Why Parade East2North	63	E	286	59	E	272	74	F	251
941 Dee Why Parade East2South	72	F	64	66	E	62	118	F	162
941 Dee Why Parade East2West	66	E	71	59	E	93	104	F	72
941 Pittwater Road North2South	17	B	1707	18	B	1213	10	A	1424
941 Pittwater Road South2North	9	A	855	8	A	1457	11	A	1328
941 Pittwater Road South2West	9	A	43	15	B	30	19	B	27
942 Howard Avenue East2North	89	F	90	81	F	192	88	F	150
942 Howard Avenue East2South	67	E	80	59	E	86	63	E	89
942 Howard Avenue East2West	58	E	324	48	D	392	54	D	355
942 Pittwater Road North2East	14	A	91	13	A	124	23	B	118
942 Pittwater Road North2South	17	B	1666	18	B	1134	35	C	1457
942 Pittwater Road South2North	14	A	735	15	B	1216	34	C	1042
942 Pittwater Road South2West	18	B	75	37	C	35	34	C	62
942 St David Avenue West2East	51	D	349	42	C	355	47	D	397
942 St David Avenue West2South	73	F	3	72	F	1	86	F	2
943 Oaks Avenue East2South	69	E	110	110	F	192	91	F	332
943 Pittwater Road North2East	17	B	80	7	A	129	21	B	211
943 Pittwater Road North2South	18	B	1675	21	B	1073	44	D	1310
943 Pittwater Road South2East	43	C	253	35	C	420	42	C	373
943 Pittwater Road South2North	6	A	836	10	A	1290	11	A	1105
944 Fisher Road West2South	52	D	504	163	F	477	97	F	522
944 Pittwater Road North2South	18	B	1825	29	C	1275	36	C	1647
944 Pittwater Road South2North	13	A	1087	12	A	1710	17	B	1476
944 Pittwater Road South2West	4	A	489	3	A	621	3	A	358
945 Pacific Parade East2North	59	E	124	71	F	197	57	D	149
945 Pacific Parade East2South	80	F	63	131	F	66	78	F	50
945 Pittwater Road North2East	3	A	154	20	B	149	5	A	167
945 Pittwater Road North2South	12	A	2177	27	B	1599	16	B	1999
945 Pittwater Road South2North	20	B	1434	30	C	2112	32	C	1674
946 Pittwater Road North2East	15	B	48	33	C	75	13	A	94
946 Pittwater Road North2South	17	B	2141	35	C	1578	21	B	1938
946 Pittwater Road South2East	74	F	172	63	E	315	55	D	89
946 Pittwater Road South2North	20	B	1414	33	C	2084	27	B	1658
946 Sturdee Street East2North	62	E	13	150	F	34	102	F	14
946 Sturdee Street East2South	43	D	243	47	D	173	36	C	121

3.9 Turn Volumes

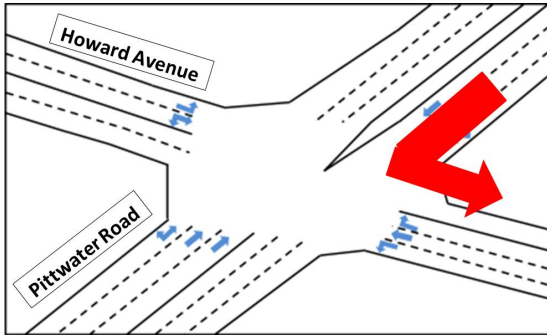


Figure 3.8 Turn No 1 – Left turn from Pittwater Road into Howard Avenue

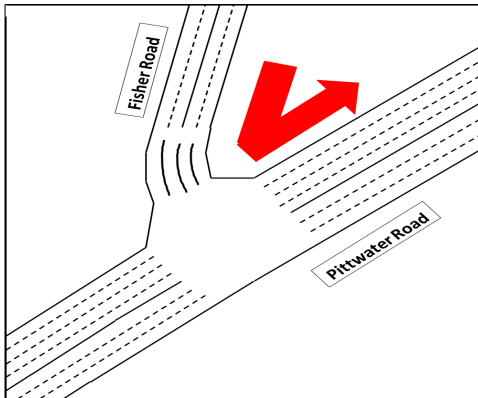


Figure 3.9 Turn No 2 – Left turn from Fisher Road into Pittwater Road

Table 3.24 Turn Volumes

	Turn ID	AM 8-9	PM 17-18	SatMD 11-12
Base-GHD	01	23	49	79
	02	81	26	6
Base-PB	01	44	54	61
	02	51	33	18
1WAY	01	0	0	0
	02	0	0	6
2WAY	01	93	122	160
	02	64	59	50
2WAYext	01	100	108	133
	02	0	0	0
2WAYextW1	01	81	135	117
	02	0	0	0

Turn No 1 is:

- Banned under the one way system
- Banned under the future two-way systems for heavy vehicles

Turn No 2 is:

- Banned under the one way system and future two-way systems.

4. CONCLUSIONS

The traffic modelling undertaken thus far including varying road network systems, option testing and sensitivity testing indicates that both the one-way system and variants of the two-way system perform very similarly traffic operation wise.

When comparing the performance measures of both one and two-way systems it is evident each will have slightly varying locations where the road network will perform only satisfactorily, but in the main, general good performance for intersection overall LoS is achieved. Having said this, there are several locations where certain approaches at intersections perform poorly whilst still maintaining a good level of service overall.

Under the dynamic feedback application, where vehicles are provided more route choice in the model, improved results are recorded for the two-way system when compared to the one-way system. The two-way system offers better accessibility, route choice, reduced travel times, reduced stops and very similar travel speeds.

In terms of infrastructure requirements, costs, local community impacts, the two-way system will have far greater benefits when compared to the one-way system. The one-way system will require an additional four sets of traffic signals, requires bus re-routing, complex intersections, lack of flexibility for traffic routes, reduced accessibility, not to mention construction impacts/construction duration and implementation logistics.

Based on the marginal difference in performance of the two schemes, the two way system with the addition of the following modifications is the preferred layout:

- a two-way New Link Road
- one way northbound or two-way Woolworths Lane
- upgrades to the Pittwater Road, Howard Avenue and St David Avenue intersection including three westbound lanes and one eastbound lane on Howard Avenue
- banned left turn out of Fisher Road into Pittwater Road
- banned left turn from Pittwater Road into Howard Avenue for heavy vehicles
- retaining right turn out of Pacific Parade into Pittwater Road
- Extending the right turn bay on Pittwater Road into Oaks Avenue further south to Pacific Parade.

Ryan Miller
Senior Traffic Engineer

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.