

**PROJECT** SH1 PAPAURA TO BOMBAY, STAGE 2  
**SUBJECT** RESPONSE TO SECTION 92 REQUESTS  
**TO** DUNCAN GIBSON, AURECON  
**FROM** JERRY QIAN YANG AND IAN CLARK  
**DATE** 29 MAY 2024

---

## 1 SUMMARY

This technical note provides a response to a Section 92 request from Auckland Council.

The Assessment of Transport Effects report for the SH1 Papakura to Bombay Stage 2 project included SIDRA model results for the Drury South interchange (plus other interchanges) at Appendix C. These models for the Drury South interchange included three roundabouts, at the intersections of Great South Road with the new interchange road (and the Pukekohe Link), the western interchange roundabout (serving the northbound on/off ramps) and the eastern interchange roundabout (serving the southbound on/off ramps).

Auckland Council's Transport Expert requested that this SIDRA model be extended to include the intersection of the new east-west road with Quarry Road.

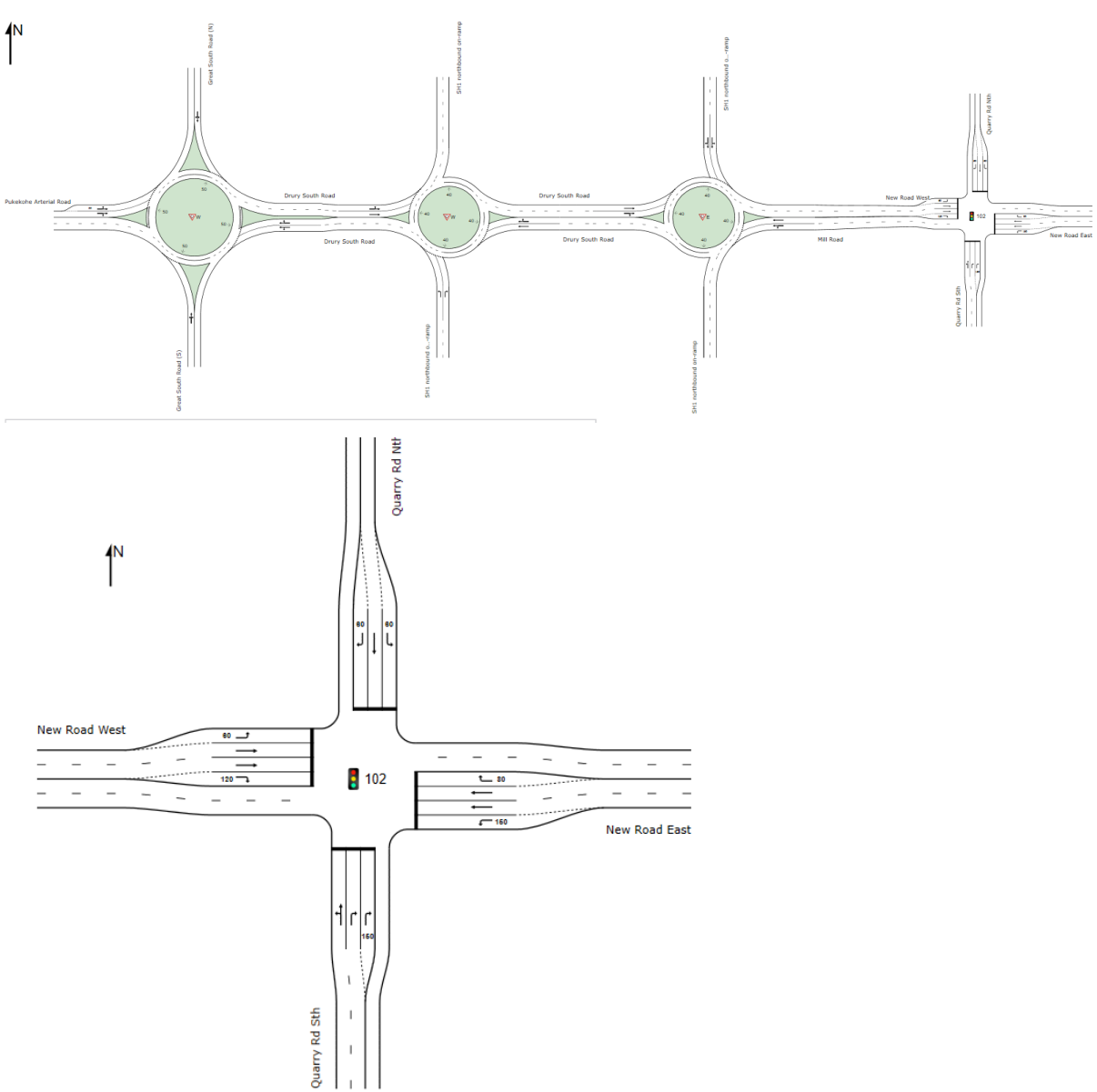
This technical note therefore provides results for the extended SIDRA model, for the same traffic flow scenario as was used for Appendix C of the Assessment of Transport Effects, namely demands for the 2048 scenario with the P to B Stage 2 project.

We understand that the layout of the proposed intersection of the east-west road with Quarry Road has yet to be determined, and we have assumed the same signalised layout as was assumed in the SATURN models provided by SGA.

The following pages set out the layouts assumed, and the SIDRA results. The results indicate that the proposed intersection of the east-west road with Quarry Road will be operating at practical capacity in the 2048 weekday morning peak. Given the level of development assumed in the models in this area by 2048, this is considered acceptable.

## 2 SIDRA LAYOUT

Figure 1: SIDRA Layout of New Drury South Interchange with the Project



### 3 SIDRA OUTPUTS

Figure 2: 2048 forecast Morning Peak SIDRA results: Great South Road/Pukekohe Arterial Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			
South: Great South Road (S)															
1	L2	All MCs	131	2.3	131	2.3	0.347	5.2	LOS A	1.6	11.6	0.61	0.70	0.61	52.4
2	T1	All MCs	40	2.5	40	2.5	0.347	4.5	LOS A	1.6	11.6	0.61	0.70	0.61	52.8
3	R2	All MCs	130	9.2	130	9.2	0.347	12.3	LOS B	1.6	11.6	0.61	0.70	0.61	48.0
Approach			301	5.3	301	5.3	0.347	8.2	LOS A	1.6	11.6	0.61	0.70	0.61	51.1
East: Drury South Road															
4	L2	All MCs	78	5.1	78	5.1	0.263	3.6	LOS A	1.7	12.6	0.40	0.32	0.40	54.7
5	T1	All MCs	611	7.9	611	7.9	0.263	2.9	LOS A	1.7	12.6	0.41	0.36	0.41	54.8
6	R2	All MCs	63	1.6	63	1.6	0.263	10.5	LOS B	1.6	12.0	0.43	0.40	0.43	53.2
Approach			752	7.0	752	7.0	0.263	3.6	LOS A	1.7	12.6	0.41	0.36	0.41	54.6
North: Great South Road (N)															
7	L2	All MCs	98	3.1	98	3.1	0.317	6.9	LOS A	1.5	10.8	0.75	0.81	0.78	47.4
8	T1	All MCs	49	2.0	49	2.0	0.317	6.2	LOS A	1.5	10.8	0.75	0.81	0.78	52.4
9	R2	All MCs	54	1.9	54	1.9	0.317	13.7	LOS B	1.5	10.8	0.75	0.81	0.78	51.4
Approach			201	2.5	201	2.5	0.317	8.6	LOS A	1.5	10.8	0.75	0.81	0.78	50.3
West: Pukekohe Arterial Road															
10	L2	All MCs	27	3.7	27	3.7	0.472	3.9	LOS A	3.8	28.1	0.52	0.34	0.52	54.3
11	T1	All MCs	1189	6.7	1189	6.7	0.472	3.3	LOS A	3.8	28.1	0.54	0.38	0.54	50.7
12	R2	All MCs	104	2.9	104	2.9	0.472	11.0	LOS B	3.6	26.6	0.56	0.44	0.56	52.8
Approach			1320	6.4	1320	6.4	0.472	3.9	LOS A	3.8	28.1	0.54	0.39	0.54	51.1
All Vehicles			2574	6.1	2574	6.1	0.472	4.7	LOS A	3.8	28.1	0.53	0.45	0.53	52.3

Figure 3: 2048 forecast Morning Peak SIDRA results: Drury South Interchange Western Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			
South: SH1 northbound off-ramp															
1	L2	All MCs	96	4.2	96	4.2	0.140	6.5	LOS A	0.5	3.6	0.52	0.66	0.52	49.8
3	R2	All MCs	621	0.3	621	0.3	0.539	12.3	LOS B	3.2	22.4	0.61	0.81	0.72	44.3
Approach			717	0.8	717	0.8	0.539	11.6	LOS B	3.2	22.4	0.60	0.79	0.69	44.9
East: Drury South Road															
5	T1	All MCs	657	7.6	657	7.6	0.213	2.5	LOS A	0.0	0.0	0.00	0.29	0.00	50.8
6	R2	All MCs	34	11.8	34	11.8	0.213	9.5	LOS A	0.0	0.0	0.00	0.32	0.00	53.5
Approach			691	7.8	691	7.8	0.213	2.8	LOS A	0.0	0.0	0.00	0.29	0.00	51.1
West: Drury South Road															
10	L2	All MCs	214	0.9	214	0.9	0.860	17.9	LOS B	15.9	116.5	1.00	1.21	1.82	45.7
11	T1	All MCs	1219	7.6	1219	7.6	0.860	18.5	LOS B	15.9	116.5	1.00	1.22	1.85	36.9
Approach			1433	6.6	1433	6.6	0.860	18.4	LOS B	15.9	116.5	1.00	1.22	1.85	38.9
All Vehicles			2841	5.5	2841	5.5	0.860	12.9	LOS B	15.9	116.5	0.66	0.88	1.11	41.9

Figure 4: 2048 forecast Morning Peak SIDRA results: Drury South Interchange Eastern Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total veh/h ]	[ HV % ]	[ Total veh/h ]	[ HV % ]				[ Veh. veh ]	[ Dist ] m				
East: Mill Road															
4	L2	All MCs	182	0.5	182	0.5	0.288	4.9	LOS A	1.4	10.4	0.42	0.52	0.42	54.5
5	T1	All MCs	412	8.3	412	8.3	0.288	4.5	LOS A	1.4	10.4	0.43	0.51	0.43	47.8
Approach			594	5.9	594	5.9	0.288	4.6	LOS A	1.4	10.4	0.43	0.52	0.43	51.4
North: SH1 northbound off-ramp															
7	L2	All MCs	181	9.9	181	9.9	0.342	11.9	LOS B	1.5	11.6	0.75	0.89	0.88	43.5
8	T1	All MCs	1	0.0	1	0.0	0.342	10.3	LOS B	1.5	11.6	0.75	0.89	0.88	51.5
9	R2	All MCs	286	7.0	286	7.0	0.354	15.5	LOS B	1.8	13.5	0.75	0.90	0.85	41.8
Approach			468	8.1	468	8.1	0.354	14.1	LOS B	1.8	13.5	0.75	0.90	0.86	42.4
West: Drury South Road															
11	T1	All MCs	1691	5.2	1691	5.2	0.560	2.5	LOS A	0.0	0.0	0.00	0.31	0.00	50.3
12	R2	All MCs	144	4.9	144	4.9	0.560	9.4	LOS A	0.0	0.0	0.00	0.36	0.00	54.7
Approach			1835	5.2	1835	5.2	0.560	3.0	LOS A	0.0	0.0	0.00	0.31	0.00	51.3
All Vehicles			2897	5.8	2897	5.8	0.560	5.1	LOS A	1.8	13.5	0.21	0.45	0.23	49.0

Figure 5: 2048 forecast Morning Peak SIDRA results: East -West Road/Quarry Road

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total veh/h ]	[ HV % ]	[ Total veh/h ]	[ HV % ]				[ Veh. veh ]	[ Dist ] m				
South: Quarry Rd Sth															
1	L2	All MCs	111	9.0	111	9.0	0.419	28.8	LOS C	8.4	63.6	0.90	0.78	0.90	24.1
2	T1	All MCs	56	10.7	56	10.7	0.419	80.7	LOS F	8.4	63.6	0.90	0.78	0.90	34.2
3	R2	All MCs	584	12.3	584	12.3	* 0.892	70.8	LOS E	19.7	152.7	1.00	1.02	1.33	27.2
Approach			751	11.7	751	11.7	0.892	65.3	LOS E	19.7	152.7	0.98	0.97	1.23	27.4
East: New Road East															
4	L2	All MCs	304	9.9	304	9.9	0.429	21.9	LOS C	9.1	69.4	0.76	0.79	0.76	42.5
5	T1	All MCs	431	5.6	431	5.6	0.529	45.2	LOS D	11.3	82.7	0.94	0.78	0.94	24.4
6	R2	All MCs	124	2.4	124	2.4	* 0.815	71.2	LOS E	7.9	56.4	1.00	0.93	1.28	27.2
Approach			859	6.6	859	6.6	0.815	40.7	LOS D	11.3	82.7	0.88	0.80	0.92	31.3
North: Quarry Rd Nth															
7	L2	All MCs	133	6.0	133	6.0	0.427	33.4	LOS C	4.9	35.8	0.94	0.78	0.94	37.6
8	T1	All MCs	144	4.2	144	4.2	* 0.827	65.2	LOS E	9.2	66.5	1.00	0.96	1.28	29.1
9	R2	All MCs	18	11.1	18	11.1	0.114	61.3	LOS E	1.0	7.7	0.95	0.70	0.95	20.3
Approach			295	5.4	295	5.4	0.827	50.6	LOS D	9.2	66.5	0.97	0.86	1.10	32.0
West: New Road West															
10	L2	All MCs	134	3.0	134	3.0	0.123	33.9	LOS C	3.3	23.8	0.46	0.69	0.46	47.6
11	T1	All MCs	1418	5.6	1418	5.6	* 0.901	57.3	LOS E	45.9	336.7	0.99	1.04	1.16	37.1
12	R2	All MCs	320	7.2	320	7.2	0.543	46.6	LOS D	15.3	113.3	0.87	0.82	0.87	37.8
Approach			1872	5.7	1872	5.7	0.901	53.8	LOS D	45.9	336.7	0.93	0.98	1.06	34.5
All Vehicles			3777	7.1	3777	7.1	0.901	52.9	LOS D	45.9	336.7	0.93	0.93	1.07	32.3

**Figure 6: 2048 forecast Evening peak SIDRA results: Great South Road/Pukekohe Arterial Roundabout**

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: Great South Road (S)															
1	L2	All MCs	203	2.5	203	2.5	0.542	8.3	LOS A	3.2	23.0	0.78	0.92	1.00	51.0
2	T1	All MCs	62	3.2	62	3.2	0.542	7.7	LOS A	3.2	23.0	0.78	0.92	1.00	51.4
3	R2	All MCs	119	3.4	119	3.4	0.542	15.2	LOS B	3.2	23.0	0.78	0.92	1.00	45.8
Approach			384	2.9	384	2.9	0.542	10.4	LOS B	3.2	23.0	0.78	0.92	1.00	50.0
East: Drury South Road															
4	L2	All MCs	92	6.5	92	6.5	0.439	3.5	LOS A	3.3	23.7	0.40	0.31	0.40	54.7
5	T1	All MCs	1170	1.5	1170	1.5	0.439	2.8	LOS A	3.3	23.7	0.41	0.34	0.41	55.0
6	R2	All MCs	87	1.1	87	1.1	0.439	10.5	LOS B	3.2	23.0	0.43	0.37	0.43	53.4
Approach			1349	1.8	1349	1.8	0.439	3.3	LOS A	3.3	23.7	0.41	0.34	0.41	54.8
North: Great South Road (N)															
7	L2	All MCs	109	1.8	109	1.8	0.211	5.3	LOS A	0.9	6.6	0.62	0.66	0.62	49.7
8	T1	All MCs	39	2.6	39	2.6	0.211	4.7	LOS A	0.9	6.6	0.62	0.66	0.62	53.9
9	R2	All MCs	23	4.3	23	4.3	0.211	12.3	LOS B	0.9	6.6	0.62	0.66	0.62	52.8
Approach			171	2.3	171	2.3	0.211	6.1	LOS A	0.9	6.6	0.62	0.66	0.62	51.6
West: Pukekohe Arterial Road															
10	L2	All MCs	64	1.6	64	1.6	0.310	3.8	LOS A	2.2	15.9	0.49	0.35	0.49	54.6
11	T1	All MCs	700	4.4	700	4.4	0.310	3.2	LOS A	2.2	15.9	0.50	0.39	0.50	50.8
12	R2	All MCs	92	2.2	92	2.2	0.310	10.9	LOS B	2.1	14.9	0.52	0.45	0.52	51.6
Approach			856	4.0	856	4.0	0.310	4.0	LOS A	2.2	15.9	0.50	0.39	0.50	51.6
All Vehicles			2760	2.6	2760	2.6	0.542	4.7	LOS A	3.3	23.7	0.50	0.45	0.53	53.1

**Figure 7: 2048 forecast Evening Peak SIDRA results: Drury South Interchange Western Roundabout**

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: SH1 northbound off-ramp															
1	L2	All MCs	26	0.0	26	0.0	0.041	8.3	LOS A	0.2	1.1	0.64	0.75	0.64	47.4
3	R2	All MCs	263	0.4	263	0.4	0.287	13.6	LOS B	1.3	9.3	0.70	0.84	0.70	43.3
Approach			289	0.3	289	0.3	0.287	13.1	LOS B	1.3	9.3	0.69	0.83	0.69	43.6
East: Drury South Road															
5	T1	All MCs	1324	1.9	1324	1.9	0.499	2.4	LOS A	0.0	0.0	0.00	0.34	0.00	49.1
6	R2	All MCs	333	5.7	333	5.7	0.499	9.4	LOS A	0.0	0.0	0.00	0.48	0.00	51.6
Approach			1657	2.7	1657	2.7	0.499	3.8	LOS A	0.0	0.0	0.00	0.37	0.00	50.1
West: Drury South Road															
10	L2	All MCs	254	0.8	254	0.8	0.493	6.8	LOS A	3.7	26.2	0.73	0.67	0.79	52.7
11	T1	All MCs	674	5.2	674	5.2	0.493	6.7	LOS A	3.7	26.2	0.73	0.68	0.81	48.2
Approach			928	4.0	928	4.0	0.493	6.8	LOS A	3.7	26.2	0.73	0.68	0.80	50.1
All Vehicles			2874	2.9	2874	2.9	0.499	5.7	LOS A	3.7	26.2	0.31	0.51	0.33	49.2

Figure 8: 2048 forecast Evening Peak SIDRA results: Drury South Interchange Eastern Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%				[ Veh. veh	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: Mill Road															
4	L2	All MCs	248	0.0	248	0.0	0.860	18.4	LOS B	13.9	99.0	0.88	1.24	1.69	47.9
5	T1	All MCs	1122	3.2	1122	3.2	0.860	19.0	LOS B	13.9	99.0	0.88	1.25	1.72	42.3
Approach			1370	2.6	1370	2.6	0.860	18.9	LOS B	13.9	99.0	0.88	1.24	1.71	43.7
North: SH1 northbound off-ramp															
7	L2	All MCs	140	11.4	140	11.4	0.229	7.7	LOS A	0.8	6.3	0.59	0.72	0.59	48.2
8	T1	All MCs	1	0.0	1	0.0	0.229	6.3	LOS A	0.8	6.3	0.59	0.72	0.59	53.0
9	R2	All MCs	552	1.4	552	1.4	0.512	12.9	LOS B	2.9	20.5	0.64	0.85	0.78	43.9
Approach			693	3.5	693	3.5	0.512	11.9	LOS B	2.9	20.5	0.63	0.83	0.74	44.7
West: Drury South Road															
11	T1	All MCs	725	4.3	725	4.3	0.286	2.5	LOS A	0.0	0.0	0.00	0.34	0.00	48.9
12	R2	All MCs	218	2.3	218	2.3	0.286	9.4	LOS A	0.0	0.0	0.00	0.51	0.00	51.2
Approach			943	3.8	943	3.8	0.286	4.1	LOS A	0.0	0.0	0.00	0.38	0.00	50.0
All Vehicles			3006	3.2	3006	3.2	0.860	12.6	LOS B	13.9	99.0	0.55	0.88	0.95	44.9

Figure 9: 2048 forecast Evening Peak SIDRA results: East -West Road/Quarry Road

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%				[ Veh. veh	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Quarry Rd Sth															
1	L2	All MCs	388	4.9	388	4.9	*0.772	33.9	LOS C	28.3	205.0	0.94	0.87	0.95	26.7
2	T1	All MCs	161	1.9	161	1.9	0.772	50.7	LOS D	28.3	205.0	0.94	0.87	0.95	36.7
3	R2	All MCs	357	14.3	357	14.3	0.303	36.1	LOS D	7.6	59.5	0.77	0.77	0.77	36.6
Approach			906	8.1	906	8.1	0.772	37.8	LOS D	28.3	205.0	0.87	0.83	0.88	33.2
East: New Road East															
4	L2	All MCs	861	5.9	861	5.9	*0.734	13.3	LOS B	20.5	150.9	0.71	0.82	0.71	47.4
5	T1	All MCs	910	1.9	910	1.9	0.788	45.9	LOS D	26.0	184.8	0.98	0.90	1.03	25.1
6	R2	All MCs	185	3.2	185	3.2	0.764	69.7	LOS E	11.2	80.5	1.00	0.89	1.13	28.7
Approach			1956	3.8	1956	3.8	0.788	33.8	LOS C	26.0	184.8	0.86	0.86	0.90	34.3
North: Quarry Rd Nth															
7	L2	All MCs	190	5.3	190	5.3	*0.579	31.3	LOS C	5.6	40.8	0.96	0.80	0.96	38.4
8	T1	All MCs	68	2.9	68	2.9	0.711	66.4	LOS E	4.3	30.8	1.00	0.84	1.18	28.8
9	R2	All MCs	45	0.0	45	0.0	0.485	69.8	LOS E	2.8	19.3	1.00	0.74	1.00	18.5
Approach			303	4.0	303	4.0	0.711	44.9	LOS D	5.6	40.8	0.98	0.80	1.02	32.9
West: New Road West															
10	L2	All MCs	46	8.7	46	8.7	0.067	35.4	LOS D	1.7	12.4	0.65	0.70	0.65	41.5
11	T1	All MCs	696	4.2	696	4.2	0.618	41.7	LOS D	17.7	128.6	0.92	0.79	0.92	39.3
12	R2	All MCs	123	12.2	123	12.2	0.576	60.9	LOS E	7.0	54.4	0.99	0.80	0.99	32.2
Approach			865	5.5	865	5.5	0.618	44.1	LOS D	17.7	128.6	0.91	0.79	0.91	37.4
All Vehicles			4030	5.1	4030	5.1	0.788	37.7	LOS D	28.3	205.0	0.89	0.83	0.91	34.8