

Appendix D

Traffic Assessment Report

Addendum

1.0 Singleton Bypass – Operational Assessment of the South Facing Ramps with Putty Road Roundabout

1.1 Introduction – Singleton bypass with Putty Road roundabout

Following the community consultation, an announcement was made by the Deputy Premier (16 April 2021) committing to providing a full interchange at Putty Road to make it easier to access Singleton town centre from the bypass. This additional option to be assessed was a new connection of the bypass with Putty Road and the connection would provide access to and from both the northbound and southbound lanes of the bypass from the western side of Putty Road, with an interchange connecting to Putty Road by a roundabout. Figure 1-1 below illustrates the network changes with an inset showing a closer view of the layout of the Putty Road interchange. The layout was assessed for the assumed opening year of 2026, and future years of 2036, and 2046 and compared against the modelling results of the previous bypass layout shown in Figure 1-2.

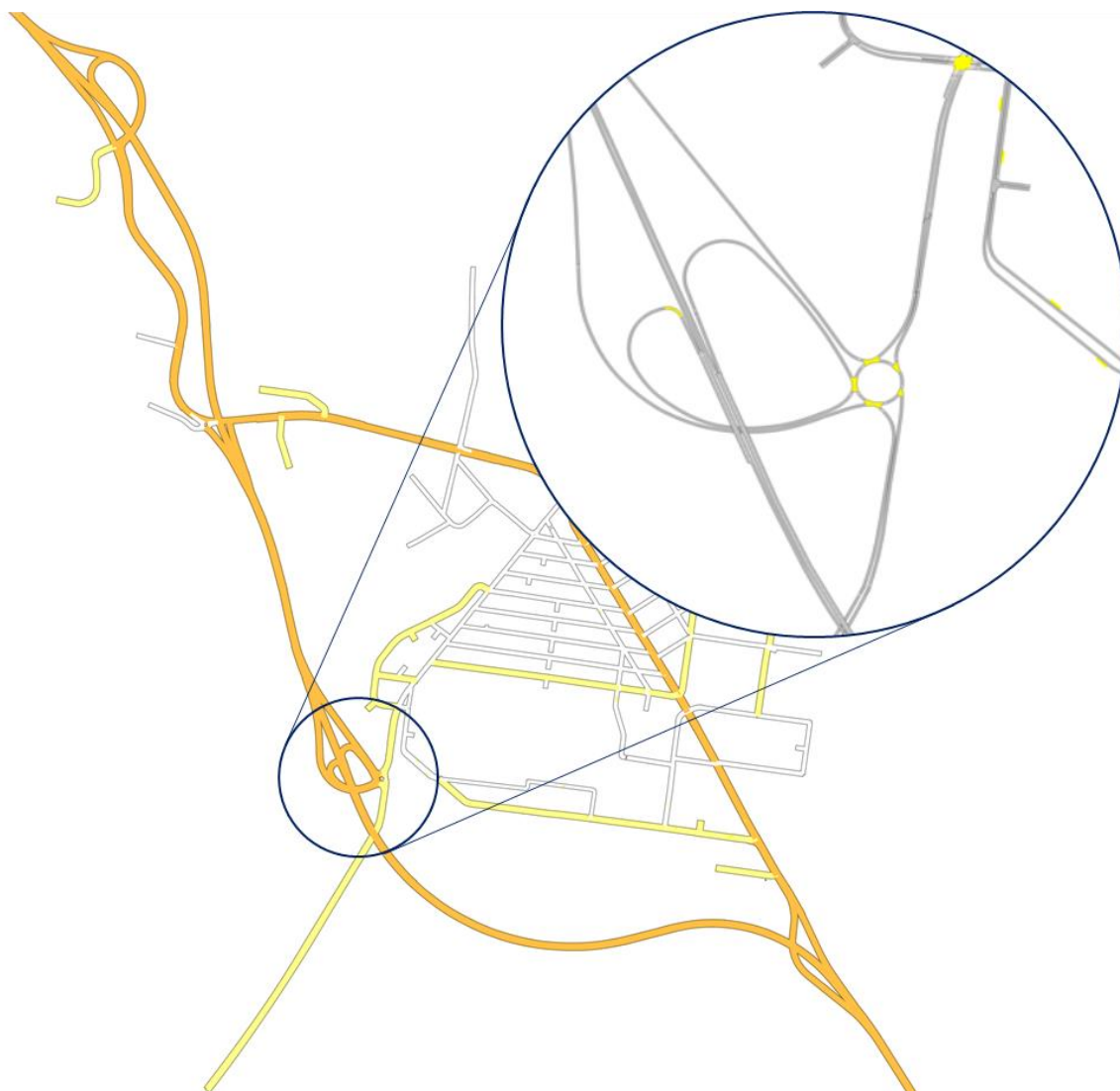


Figure 1-1 Singleton Bypass Alignment with roundabout interchange at Putty Road



Figure 1-2 Singleton Bypass Alignment with south facing ramps at Putty Road

Previous modelling results, as outlined in Section 6 of the report, indicate that the flows on the south facing ramps at Putty Road would be limited and will only serve a relatively small number of trips e.g. trips from the New England Highway (south) to the John Street shopping precinct during the peak periods.

1.2 2026 bypass results comparison

1.2.1 Traffic flows

In the main report, traffic flows were reported at 13 locations as per the following Figure 1-3. The modelling results of the bypass layout with a roundabout interchange at Putty road will be compared against the following modelling scenarios reported previously:

- Bypass with no south facing ramps (built on the Do Minimum Option 5) - named as “Year Bypass DMNR”
- Bypass with the old south facing ramps at Putty Road (built on the Do Minimum Option 5) - named as “Year Bypass DMWR”

The current bypass layout with a roundabout at Putty Road will be named as “Year Bypass Roundabout”

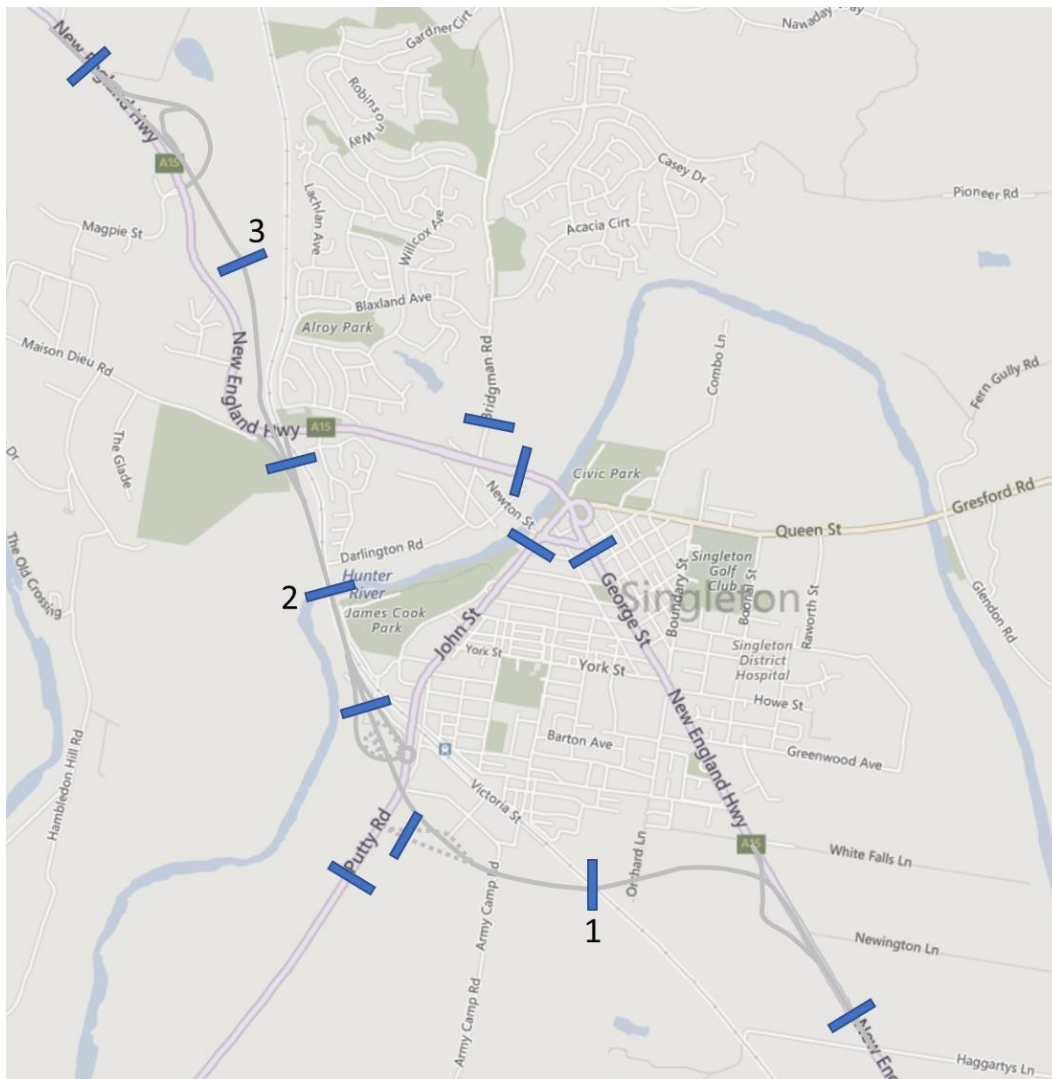


Figure 1-3 Mid-block locations along the bypass main alignment

The results in Table 1-1 and Table 1-2 show that traffic flows at the northern and the southern extents as well as on Putty Road and Bridgman Road are consistent in all bypass scenarios. Flow maps can be found in Appendix A.

The inclusion of a new roundabout interchange at Putty Road has minimum impacts on the overall network flows, with the majority of locations maintaining similar flows. An increase in flows was observed on the south facing ramps at Putty Road with northbound (off-ramp) traffic increase from 14 vehicles to 52 vehicles per hour in the 05:30 – 06:30 AM peak, and from 9 vehicles to 34 vehicles per hour during the 08:30 – 09:30 peak. The modelling results indicated that the closer proximity of the interchange to the Singleton CBD will result in a small increase of traffic on these ramps when compared to the previous configuration of the south facing ramps.

An increase is also seen along the Bypass (Location 1) with an increase of 6% in the northbound and 11% in the southbound during 05:30 – 06:30 peak and 22% northbound and 13% southbound during the 08:30 – 09:30 peak compared to the no south facing ramps scenario.

Table 1-1 Network Flows AM 05:30 – 06:30

Street	Mid-block position	Direction	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	1072	1076	1072
		Southbound	348	343	349
New England Highway	South of Campbell Street	Northbound	194	200	194
		Southbound	236	235	233
New England Highway	East of Bridgman Road	Northbound	213	221	213
		Southbound	312	305	312
New England Highway	North of Magpie Street	Northbound	1433	1446	1432
		Southbound	244	237	244
Bridgman Road	North of New England Highway	Northbound	181	187	181
		Southbound	575	579	575
Putty Road	South of Ryan Avenue	Northbound	91	89	91
		Southbound	420	415	419
John Street	South of Newton Street	Northbound	88	85	86
		Southbound	221	221	230
Bypass (Location 1)	East of Putty Road	Northbound	920	938	973
		Southbound	126	127	140
Bypass (Location 2)	South of Maison Dieu Road	Northbound	1075	1081	1076
		Southbound	294	285	285
Bypass (Location 3)	North of Maison Dieu Road	Northbound	858	866	858
		Southbound	194	185	194
New England Highway / Putty Road	South Facing Ramps	Northbound		14	52
		Southbound		9	14
New England Highway / Putty Road	North Facing Ramps	Northbound	150	152	150
		Southbound	166	166	157
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	217	215	218
		Southbound	103	103	95

Table 1-2 Network Flows AM 08:30 – 09:30

Street	Mid-block position	Direction	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	854	861	854
		Southbound	746	743	745
New England Highway	South of Campbell Street	Northbound	293	295	292
		Southbound	690	704	692
New England Highway	East of Bridgman Road	Northbound	406	405	406
		Southbound	1019	1022	1024
New England Highway	North of Magpie Street	Northbound	572	571	572
		Southbound	374	368	374
Bridgman Road	North of New England Highway	Northbound	539	527	539
		Southbound	924	921	924
Putty Road	South of Ryan Avenue	Northbound	187	190	187
		Southbound	353	359	353
John Street	South of Newton Street	Northbound	269	276	283
		Southbound	465	468	449
Bypass (Location 1)	South of Putty Road	Northbound	506	601	621
		Southbound	260	262	294
Bypass (Location 2)	South of Maison Dieu Road	Northbound	730	721	723
		Southbound	487	478	500
Bypass (Location 3)	North of Maison Dieu Road	Northbound	336	328	337
		Southbound	343	332	342
New England Highway / Putty Road	South Facing Ramps	Northbound		92	114
		Southbound		9	34
New England Highway / Putty Road	North Facing Ramps	Northbound	216	204	207
		Southbound	232	234	245
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	394	394	387
		Southbound	141	145	156

During the PM peak of 16:00 – 17:00 an increase from 37 vehicles to 110 vehicles per hour was observed for the south facing ramps at Putty Road for southbound (on-ramp) traffic. The Bypass (Location 1) traffic is observed to increase by 12% and 16% respectively for the northbound and southbound direction for the roundabout interchange scenario compared to the with no south facing ramps scenario. The rest of the locations maintain similar flows as the previous bypass results.

Table 1-3 Network Flows PM 16:00 – 17:00

Street	Mid-block position	Direction	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	795	795	795
		Southbound	1303	1304	1303
New England Highway	South of Campbell Street	Northbound	337	339	346
		Southbound	592	605	582
New England Highway	East of Bridgman Road	Northbound	633	634	612
		Southbound	898	900	899
New England Highway	North of Magpie Street	Northbound	423	423	423
		Southbound	1125	1125	1125
Bridgman Road	North of New England Highway	Northbound	1067	1069	1069
		Southbound	677	677	677
Putty Road	South of Ryan Avenue	Northbound	447	447	447
		Southbound	304	305	305
John Street	South of Newton Street	Northbound	538	537	528
		Southbound	390	378	393
Bypass (Location 1)	East of Putty Road	Northbound	486	517	546
		Southbound	652	686	757
Bypass (Location 2)	South of Maison Dieu Road	Northbound	906	898	917
		Southbound	913	916	919
Bypass (Location 3)	North of Maison Dieu Road	Northbound	285	284	289
		Southbound	857	857	862
New England Highway / Putty Road	South Facing Ramps	Northbound		35	59
		Southbound		37	110
New England Highway / Putty Road	North Facing Ramps	Northbound	419	415	431
		Southbound	254	257	260
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	622	616	629
		Southbound	53	57	56

1.2.2 Level of service

The intersection performances for the AM peak are presented in Table 1-4 and Table 1-5 below. The Putty Road roundabout would operate at Level of Service A in both AM peak. The other intersections were observed to perform at a similar level of service to the other bypass scenarios. To isolate the impacts of the bypass, the modelling has not included any revision to signal times. In practice, there will be opportunities to improve the signal timing on site.

Consequently, the New England Highway / Bridgman Road intersection, for example, appears to operate at a Level of Service F during the bypass scenarios despite there being almost 1,000 vehicles less on the New England Highway compared to the Do Minimum scenario. As discussed previously in Section 6.2.2 of the report, the removal of a large number of through traffic on the New England Highway means that the average delay is now highly influenced by the right turning traffic leaving Bridgman Road, and becomes the largest proportion of the total accumulated delay at the intersection. Signal timing changes would be able to improve the overall performance of this intersection.

Table 1-4 Intersection Performance AM 05:30 – 06:30

Ave Delay (sec / veh.)	2026 Bypass DMNR		2026 Bypass DMWR		2026 Bypass Roundabout	
	Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.
New England Highway & Bridgman Road	83	F	89	F	81	F
New England Highway & Howe Street	11	A	12	A	11	A
New England Highway & York Street	23	B	19	B	21	B
Putty Road & Ryan Ave	13	A	13	A	14	A
John Street & Hunter Street	9	A	9	A	9	A
John Street & Newton Street	1	A	1	A	1	A
Queen Street & New England Highway Ramp	4	A	4	A	5	A
Putty Road Northern Ramp / Roundabout	7	A	6	A	2	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	11	A	12	A	11	A

Table 1-5 Intersection Performance AM 08:30 – 09:30

Ave Delay (sec / veh.)	2026 Bypass DMNR		2026 Bypass DMWR		2026 Bypass Roundabout	
	Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.
New England Highway & Bridgman Road	35	C	36	C	35	C
New England Highway & Howe Street	10	A	10	A	10	A
New England Highway & York Street	28	B	29	C	26	B
Putty Road & Ryan Ave	13	A	12	A	16	B
John Street & Hunter Street	14	B	15	B	14	B
John Street & Newton Street	2	A	2	A	2	A
Queen Street & New England Highway Ramp	9	A	10	A	10	A
Putty Road Northern Ramp / Roundabout	9	A	12	A	4	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	9	A	9	A	9	A

During the PM peak (16:00 – 17:00) the Putty Road roundabout interchange is shown to operate at Level of Service A, as seen in Table 1-6. The other intersections in the network are shown to perform at a similar Level of Service. Delay plots can be found in Appendix A.

Table 1-6 Intersection Performance PM 16:00 – 17:00

Ave Delay (sec / veh.)	2026 Bypass DMNR		2026 Bypass DMWR		2026 Bypass Roundabout	
	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	49	D	48	D	49	D
New England Highway & Howe Street	13	A	15	B	15	B
New England Highway & York Street	28	B	28	C	24	B
Putty Road & Ryan Ave	13	A	13	A	18	B
John Street & Hunter Street	15	B	16	B	16	B
John Street & Newton Street	3	A	3	A	2	A
Queen Street & New England Highway Ramp	10	A	10	A	11	A
Putty Road Northern Ramp / Roundabout	10	A	11	A	5	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	9	A	9	A	9	A

1.2.3 Travel times

Three travel time routes were assessed during the modelling of the bypass scenarios. The routes are shown in Figure 1-4.



Figure 1-4 Travel Time Routes

The modelling results indicate that the Putty Road roundabout interchange has limited impacts on the travel times across Route 1 and Route 3 in 2026 when compared the results against the other bypass scenarios.

Route 2 encompasses Putty Road and has small increase in travel time of less than 15 seconds because of the new roundabout interchange when compared to the other bypass options.

Table 1-7 Travel Time (mins.) AM Northbound

Route	Time Period	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Route 1 – New England Highway	05.30 – 06.30	09:58	10:00	09:55
	08.30 – 09.30	10:11	10:09	10:12
Route 2 – John Street / Queen Street	05.30 – 06.30	04:56	04:57	05:04
	08.30 – 09.30	05:32	05:31	05:42
Route 5 – Singleton Bypass	05.30 – 06.30	06:14	06:13	06:11
	08.30 – 09.30	05:54	05:54	05:54

Table 1-8 Travel Time (mins.) AM Southbound

Route	Time Period	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Route 1 – New England Highway	05.30 – 06.30	09:11	09:11	09:08
	08.30 – 09.30	09:36	09:34	09:32
Route 2 – John Street / Queen Street	05.30 – 06.30	04:54	04:53	04:59
	08.30 – 09.30	05:12	05:12	05:18
Route 5 – Singleton Bypass	05.30 – 06.30	05:37	05:37	05:37
	08.30 – 09.30	05:40	05:40	05:41

Table 1-9 Travel Time (mins.) PM Northbound

Route	Time Period	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	10:21	10:16	10:18
Route 2 – John Street / Queen Street	16.00 – 17.00	05:23	05:25	05:38
Route 5 – Singleton Bypass	16.00 – 17.00	05:55	05:56	05:55

Table 1-10 Travel Time (mins.) PM Southbound

Route	Time Period	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	09:33	09:32	09:31
Route 2 – John Street / Queen Street	16.00 – 17.00	04:50	04:50	04:56
Route 5 – Singleton Bypass	16.00 – 17.00	05:46	05:46	05:46

1.2.4 Network performance

The introduction of the roundabout interchange at Putty Road for the bypass will have very minimal changes in the overall network performance. The average network speed and the unreleased trips would remain similar in both the AM and PM peaks when compared with the other bypass scenarios.

Table 1-11 Network Statistics AM

AM (4 Hours)	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	102,695	102,842	102,965
Vehicle Hours Travelled (hrs) - VHT	1,727	1,727	1,720
Average Network Speed (km/h)	55	55	55
Completed Trips (vehs)	19,005	19,029	19,002
Incomplete Trips (vehs)	387	392	387
Unreleased Trips (vehs)	-	-	-
Delay for Unreleased Trips (hrs)	-	-	-

Table 1-12 Network Statistics PM

PM (3 Hours)	2026 Bypass DMNR	2026 Bypass DMWR	2026 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	102,002	102,259	102,590
Vehicle Hours Travelled (hrs) - VHT	1,814	1,815	1,803
Average Network Speed (km/h)	51	52	52
Completed Trips (vehs)	21,629	21,628	21,634
Incomplete Trips (vehs)	584	584	576
Unreleased Trips (vehs)	-	-	-
Delay for Unreleased Trips (hrs)	-	-	-

1.3 2036 bypass results comparison

During the 2036 bypass with roundabout scenario the initial paths for the mesoscopic experiment were taken from the 2026 mesoscopic experiment. This was a change from the previous method in which the mesoscopic initial paths were taken from the static assignment. This change was implemented due to an irregular route choice which occurred for Bridgeman Road leading to an irregular increase in VHT, which had not occurred in previous scenarios.

1.3.1 Traffic flows

The introduction of the bypass with roundabout interchange at Putty Road can be seen to increase traffic flow along the south facing ramps, however it is only a small increase from 12 to 51 vehicles in the northbound (off-ramp) direction during the 05:30 – 06:30 peak hour and 107 to 138 vehicles during the 08:30 – 09:30 peak. For the Bypass (Location 1) during the 05:30 – 06:30 the northbound traffic is seen to increase by approximately 5% and the southbound increases by around 12%, during the 08:30 – 09:30 peak the northbound and southbound traffic are seen to increase by 23% and 12% respectively for the with roundabout scenario when compared to the without south facing ramps. Other traffic volume locations remain similar to other bypass scenarios.

Table 1-13 Network Flows AM 05:30 – 06:30

Street	Mid-block position	Direction	2036 Bypass DMNR	2036 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	1232	1232	1232
		Southbound	391	397	392
New England Highway	South of Campbell Street	Northbound	236	239	230
		Southbound	255	269	264
New England Highway	East of Bridgman Road	Northbound	253	253	251
		Southbound	335	363	335
New England Highway	North of Magpie Street	Northbound	1642	1649	1643
		Southbound	274	274	274
Bridgman Road	North of New England Highway	Northbound	200	200	201
		Southbound	643	643	643
Putty Road	South of Ryan Avenue	Northbound	95	95	95
		Southbound	425	429	427
John Street	South of Newton Street	Northbound	89	89	91
		Southbound	227	245	235
Bypass (Location 1)	East of Putty Road	Northbound	1069	1081	1119
		Southbound	136	143	153
Bypass (Location 2)	South of Maison Dieu Road	Northbound	1231	1231	1231
		Southbound	314	299	305
Bypass (Location 3)	North of Maison Dieu Road	Northbound	988	988	989
		Southbound	210	209	210
New England Highway / Putty Road	South Facing Ramps	Northbound		12	51
		Southbound		7	18
New England Highway / Putty Road	North Facing Ramps	Northbound	159	159	159
		Southbound	175	160	167
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	246	246	244
		Southbound	106	93	98

Table 1-14 Network Flows AM 08:30 – 09:30

Street	Mid-block position	Direction	2036 Bypass DMNR	2036 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	999	1000	1000
		Southbound	886	886	884
New England Highway	South of Campbell Street	Northbound	311	318	292
		Southbound	772	766	772
New England Highway	East of Bridgman Road	Northbound	395	392	378
		Southbound	1104	1116	1088
New England Highway	North of Magpie Street	Northbound	642	643	643
		Southbound	430	430	430
Bridgman Road	North of New England Highway	Northbound	582	582	583
		Southbound	992	992	992
Putty Road	South of Ryan Avenue	Northbound	205	206	205
		Southbound	367	366	368
John Street	South of Newton Street	Northbound	273	267	284
		Southbound	473	494	463
Bypass (Location 1)	East of Putty Road	Northbound	595	700	730
		Southbound	298	306	334
Bypass (Location 2)	South of Maison Dieu Road	Northbound	859	847	831
		Southbound	547	536	561
Bypass (Location 3)	North of Maison Dieu Road	Northbound	365	362	368
		Southbound	380	380	391
New England Highway / Putty Road	South Facing Ramps	Northbound		107	138
		Southbound		8	37
New England Highway / Putty Road	North Facing Ramps	Northbound	254	244	228
		Southbound	252	240	269
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	496	486	466
		Southbound	165	154	167

During the PM peak (16:00 – 17:00) an increase in traffic on the south facing ramps is observed, with an increase of from 37 to 67 vehicles in the northbound (off-ramp) and from 56 to 140 vehicles in the southbound (on-ramp) direction. For the with roundabout interchange the PM peak traffic on the Bypass (Location 1) is seen to increase by 11% and 18% for the northbound and southbound directions respectively. Other traffic volume locations remain similar to other bypass scenarios.

Table 1-15 Network Flows PM 16:00 – 17:00

Street	Mid-block position	Direction	2036 Bypass DMNR	2036 Bypass DMWR	2026 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	913	913	913
		Southbound	1497	1501	1500
New England Highway	South of Campbell Street	Northbound	338	328	341
		Southbound	638	663	604
New England Highway	East of Bridgman Road	Northbound	699	701	651
		Southbound	942	969	991
New England Highway	North of Magpie Street	Northbound	482	484	486
		Southbound	1301	1301	1301
Bridgman Road	North of New England Highway	Northbound	1136	1135	1137
		Southbound	739	739	739
Putty Road	South of Ryan Avenue	Northbound	467	467	467
		Southbound	317	320	321
John Street	South of Newton Street	Northbound	568	565	547
		Southbound	388	391	399
Bypass (Location 1)	East of Putty Road	Northbound	561	595	623
		Southbound	760	814	895
Bypass (Location 2)	South of Maison Dieu Road	Northbound	994	991	1004
		Southbound	1041	1034	1048
Bypass (Location 3)	North of Maison Dieu Road	Northbound	315	317	312
		Southbound	987	985	986
New England Highway / Putty Road	South Facing Ramps	Northbound		37	67
		Southbound		56	140
New England Highway / Putty Road	North Facing Ramps	Northbound	432	431	447
		Southbound	277	273	288
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	679	672	692
		Southbound	55	52	63

1.3.2 Level of service

The two AM peak periods show similar performance for the bypass with the roundabout interchange as to the other bypass scenarios previous results. The roundabout is shown to perform at level of service A during both the AM peak periods.

Table 1-16 Intersection Performance AM 05:30 – 06:30

Ave Delay (sec / veh.)	2036 Bypass DMNR		2036 Bypass DMWR		2036 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	151	F	104	F	146	F
New England Highway & Howe Street	13	A	13	A	12	A
New England Highway & York Street	20	B	20	B	24	B
Putty Road & Ryan Ave	14	B	14	B	15	B
John Street & Hunter Street	9	A	10	A	9	A
John Street & Newton Street	1	A	1	A	1	A
Queen Street & New England Highway Ramp	5	A	5	A	4	A
Putty Road Northern Ramp / Roundabout	6	A	7	A	2	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	14	A	14	B	14	A

Table 1-17 Intersection Performance AM 08:30 – 09:30

Ave Delay (sec / veh.)	2036 Bypass DMNR		2036 Bypass DMWR		2036 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	35	C	35	C	35	C
New England Highway & Howe Street	9	A	9	A	9	A
New England Highway & York Street	24	B	25	B	22	B
Putty Road & Ryan Ave	14	B	13	A	16	B
John Street & Hunter Street	13	A	13	A	14	B
John Street & Newton Street	2	A	2	A	2	A
Queen Street & New England Highway Ramp	7	A	8	A	9	A
Putty Road Northern Ramp / Roundabout	12	A	17	B	5	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	11	A	10	A	10	A

During the PM peak hour, the bypass with roundabout interchange sees the roundabout performing at level of service A and an overall similar level of performance for the other intersections across the network when compared to the previous bypass scenarios. The intersections of Putty Road / Ryan Avenue saw a small increase in delay of 6 seconds as a result of increased traffic on the western approach with additional traffic heading towards the bypass interchange and this results in a minor change from level of service A to B. Similarly, the intersection of John Street / Hunter Street sees an increase in delay of 3 seconds with additional traffic on the southern approach resulting in a minor change of level of service from A to B.

Table 1-18 Intersection Performance PM 16:00 – 17:00

Ave Delay (sec / veh.)	2036 Bypass DMNR		2036 Bypass DMWR		2036 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	58	E	56	D	53	D
New England Highway & Howe Street	12	A	13	A	14	A
New England Highway & York Street	24	B	22	B	22	B
Putty Road & Ryan Ave	13	A	13	A	19	B
John Street & Hunter Street	13	A	13	A	16	B
John Street & Newton Street	3	A	3	A	3	A
Queen Street & New England Highway Ramp	12	A	12	A	12	A
Putty Road Northern Ramp / Roundabout	10	A	11	A	6	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	10	A	10	A	9	A

1.3.3 Travel time

The Putty Road roundabout interchange has limited impact on travel times across Route 1 and Route 3 in 2036 when compared against the other bypass scenarios in the AM and PM peaks.

Route 2 has small increase in travel time of less than 25 seconds as a result of the new roundabout interchange when compared to the other bypass options.

Table 1-19 Travel Time (mins.) AM Northbound

Route	Time Period	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Route 1 – New England Highway	05.30 - 06.30	10:27	10:19	10:30
	08.30 – 09.30	10:20	10:17	10:22
Route 2 – John Street / Queen Street	05.30 - 06.30	05:00	04:59	05:06
	08.30 – 09.30	05:31	05:29	05:48
Route 5 – Singleton Bypass	05.30 - 06.30	06:25	06:25	06:24
	08.30 – 09.30	05:59	05:58	05:57

Table 1-20 Travel Time (mins.) AM Southbound

Route	Time Period	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Route 1 – New England Highway	05.30 - 06.30	09:14	09:10	09:11
	08.30 – 09.30	09:41	09:42	09:42
Route 2 – John Street / Queen Street	05.30 - 06.30	04:55	04:54	05:00
	08.30 – 09.30	05:19	05:17	05:23
Route 5 – Singleton Bypass	05.30 - 06.30	05:37	05:38	05:37
	08.30 – 09.30	05:42	05:42	05:42

Table 1-21 Travel Time (mins.) PM Northbound

Route	Time Period	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	10:32	10:30	10:29
Route 2 – John Street / Queen Street	16.00 – 17.00	05:18	05:20	05:40
Route 5 – Singleton Bypass	16.00 – 17.00	06:00	06:00	05:58

Table 1-22 Travel Time (mins.) PM Southbound

Route	Time Period	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	09:45	09:44	09:43
Route 2 – John Street / Queen Street	16.00 – 17.00	04:50	04:51	04:56
Route 5 – Singleton Bypass	16.00 – 17.00	05:48	05:48	05:48

1.3.4 Network performance

The introduction of the roundabout interchange at Putty Road for the bypass sees very minimal changes in the overall network performance. With average network speed remaining similar and no unreleased trips observed in both the AM and PM scenarios.

Table 1-23 Network Statistics AM

AM (4 Hours)	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	115,611	115,569	115,910
Vehicle Hours Travelled (hrs) - VHT	2,008	1,947	1,968
Average Network Speed (km/h)	55	55	55
Completed Trips (vehs)	20,811	20,813	20,820
Incomplete Trips (vehs)	419	417	415
Unreleased Trips (vehs)	-	-	-
Delay for Unreleased Trips (hrs)	-	-	-

Table 1-24 Network Statistics PM

PM (3 Hours)	2036 Bypass DMNR	2036 Bypass DMWR	2036 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	113,451	113,661	114,173
Vehicle Hours Travelled (hrs) - VHT	2,019	2,014	2,003
Average Network Speed (km/h)	52	52	52
Completed Trips (vehs)	23,388	23,389	23,389
Incomplete Trips (vehs)	665	660	658
Unreleased Trips (vehs)	-	-	-
Delay for Unreleased Trips (hrs)	-	-	-

1.4 2046 bypass results comparison

1.4.1 Traffic flows

The introduction of the bypass with roundabout interchange at Putty Road can be seen to increase traffic flow along the south facing ramps, however it is only a small increase from 11 to 53 vehicles in the northbound direction during the 05:30 – 06:30 peak hour and 117 to 153 vehicles during the 08:30 – 09:30 peak. During the roundabout scenario for the 05:30 – 06:30 peak the northbound traffic and southbound traffic for the Bypass (Location 1) are shown to increase by 5% and 12% respectively. Also, during the 08:30 – 09:30 peak the northbound and southbound traffic are shown to increase 22% and 13% respectively when compared to the without south facing ramps scenario. Other traffic volume locations remain similar to other bypass scenarios.

Table 1-25 Network Flows AM 05:30 – 06:30

Street	Mid-block position	Direction	2046 Bypass DMNR	2046 Bypass DMWR	2036 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	1404	1404	1404
		Southbound	439	438	436
New England Highway	South of Campbell Street	Northbound	223	222	221
		Southbound	285	284	277
New England Highway	East of Bridgman Road	Northbound	268	269	263
		Southbound	401	400	388
New England Highway	North of Magpie Street	Northbound	1763	1753	1739
		Southbound	308	308	308
Bridgman Road	North of New England Highway	Northbound	219	219	219
		Southbound	695	695	695
Putty Road	South of Ryan Avenue	Northbound	98	98	98
		Southbound	444	445	443
John Street	South of Newton Street	Northbound	91	94	89
		Southbound	471	476	264
Bypass (Location 1)	East of Putty Road	Northbound	1200	1210	1255
		Southbound	153	167	171
Bypass (Location 2)	South of Maison Dieu Road	Northbound	1389	1386	1391
		Southbound	305	303	303
Bypass (Location 3)	North of Maison Dieu Road	Northbound	1112	1110	1112
		Southbound	238	237	237
New England Highway / Putty Road	South Facing Ramps	Northbound		11	53
		Southbound		15	19
New England Highway / Putty Road	North Facing Ramps	Northbound	180	178	180
		Southbound	147	146	146
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	270	269	273
		Southbound	72	72	71

Table 1-26 Network Flows AM 08:30 – 09:30

Street	Mid-block position	Direction	2046 Bypass DMNR	2046 Bypass DMWR	2036 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	1111	1111	1111
		Southbound	980	981	981
New England Highway	South of Campbell Street	Northbound	282	265	291
		Southbound	831	840	819
New England Highway	East of Bridgman Road	Northbound	412	443	382
		Southbound	1192	1179	1178
New England Highway	North of Magpie Street	Northbound	719	718	719
		Southbound	481	481	481
Bridgman Road	North of New England Highway	Northbound	619	617	620
		Southbound	1072	1072	1072
Putty Road	South of Ryan Avenue	Northbound	218	219	218
		Southbound	373	374	375
John Street	South of Newton Street	Northbound	270	367	273
		Southbound	428	408	491
Bypass (Location 1)	East of Putty Road	Northbound	666	779	815
		Southbound	329	361	371
Bypass (Location 2)	South of Maison Dieu Road	Northbound	931	904	935
		Southbound	577	579	582
Bypass (Location 3)	North of Maison Dieu Road	Northbound	411	406	415
		Southbound	413	410	416
New England Highway / Putty Road	South Facing Ramps	Northbound		117	153
		Southbound		32	43
New England Highway / Putty Road	North Facing Ramps	Northbound	257	231	262
		Southbound	256	258	261
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	521	501	524
		Southbound	158	163	159

During the PM peak (16:00 – 17:00) an increase in traffic on the south facing ramps, with an increase of approximately 100% in both the northbound and southbound directions. During the roundabout interchange scenario, the northbound traffic is shown to increase by 14% and southbound traffic to increase by 19% on the Bypass (Location 1) when compared to the without south facing ramps scenario. Other traffic volume locations remain similar to the other bypass scenarios.

Table 1-27 Network Flows PM 16:00 – 17:00

Street	Mid-block position	Direction	2046 Bypass DMNR	2046 Bypass DMWR	2036 Bypass Roundabout
New England Highway	South of Waddells Lane	Northbound	1036	1036	1036
		Southbound	1697	1697	1698
New England Highway	South of Campbell Street	Northbound	370	349	378
		Southbound	675	655	645
New England Highway	East of Bridgman Road	Northbound	698	724	724
		Southbound	1045	1050	1036
New England Highway	North of Magpie Street	Northbound	530	531	531
		Southbound	1460	1460	1460
Bridgman Road	North of New England Highway	Northbound	1217	1216	1221
		Southbound	803	803	803
Putty Road	South of Ryan Avenue	Northbound	480	480	480
		Southbound	345	344	344
John Street	South of Newton Street	Northbound	388	435	588
		Southbound	416	511	429
Bypass (Location 1)	East of Putty Road	Northbound	593	636	676
		Southbound	854	929	1015
Bypass (Location 2)	South of Maison Dieu Road	Northbound	1048	1053	1043
		Southbound	1146	1138	1158
Bypass (Location 3)	North of Maison Dieu Road	Northbound	350	348	349
		Southbound	1096	1092	1096
New England Highway / Putty Road	South Facing Ramps	Northbound		43	83
		Southbound		77	164
New England Highway / Putty Road	North Facing Ramps	Northbound	449	454	445
		Southbound	288	281	301
New England Highway / Gowrie Gates	South Facing Ramps	Northbound	702	709	698
		Southbound	47	43	59

1.4.2 Intersection level of service

The two AM peak periods show similar performance for the bypass with the roundabout interchange as to the other bypass scenarios previously modelled. The roundabout is shown to perform at level of service A during both AM peak periods as seen in Table 1-28 and Table 1-29.

Table 1-28 Intersection Performance AM 05:30 – 06:30

Ave Delay (sec / veh.)	2046 Bypass DMNR		2046 Bypass DMWR		2046 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	114	F	113	F	121	F
New England Highway & Howe Street	13	A	13	A	13	A
New England Highway & York Street	26	B	20	B	20	B
Putty Road & Ryan Ave	14	A	14	B	15	B
John Street & Hunter Street	9	A	9	A	8	A
John Street & Newton Street	1	A	1	A	1	A
Queen Street & New England Highway Ramp	5	A	5	A	5	A
Putty Road Northern Ramp / Roundabout	7	A	7	A	3	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	17	B	17	B	16	B

Table 1-29 Intersection Performance AM 08:30 – 09:30

Ave Delay (sec / veh.)	2046 Bypass DMNR		2046 Bypass DMWR		2046 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	34	C	36	C	35	C
New England Highway & Howe Street	9	A	9	A	8	A
New England Highway & York Street	19	B	19	B	22	B
Putty Road & Ryan Ave	14	A	14	B	17	B
John Street & Hunter Street	15	B	16	B	15	B
John Street & Newton Street	3	A	3	A	3	A
Queen Street & New England Highway Ramp	10	A	12	A	11	A
Putty Road Northern Ramp / Roundabout	16	B	17	B	6	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	12	A	13	A	11	A

During the PM peak hour, the bypass with the roundabout interchange shows the roundabout to perform at level of service A. The other intersections are shown to perform at a similar level of service as previous bypass results.

Table 1-30 Intersection Performance PM 16:00 – 17:00

Ave Delay (sec / veh.)	2046 Bypass DMNR		2046 Bypass DMWR		2046 Bypass Roundabout	
Intersection	Ave Del.	LoS	Ave Del.	LoS	Ave Del.	LoS
New England Highway & Bridgman Road	62	E	64	E	61	E
New England Highway & Howe Street	11	A	11	A	12	A
New England Highway & York Street	21	B	21	B	22	B
Putty Road & Ryan Ave	13	A	15	B	19	B
John Street & Hunter Street	14	B	16	B	14	B
John Street & Newton Street	4	A	4	A	4	A
Queen Street & New England Highway Ramp	11	A	11	A	12	A
Putty Road Northern Ramp / Roundabout	13	A	17	B	6	A
New England Highway & Maison Dieu Road & Bypass Off Ramp	11	A	10	A	9	A

1.4.3 Travel time

The AM and PM peaks show limited impact on travel times in 2046 across Route 1 and Route 3 for the bypass with roundabout interchange when compared against the other bypass scenarios.

Route 2 has small increase in travel time of less than 20 seconds as a result of the new roundabout interchange when compared to the other bypass options.

Table 1-31 Travel Time (mins.) AM Northbound

Route	Time Period	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Route 1 – New England Highway	05.30 - 06.30	14:22	14:08	14:29
	08.30 – 09.30	10:28	10:25	10:20
Route 2 – John Street / Queen Street	05.30 - 06.30	04:58	04:58	05:07
	08.30 – 09.30	05:37	05:38	05:58
Route 5 – Singleton Bypass	05.30 - 06.30	07:37	07:48	07:56
	08.30 – 09.30	05:59	05:59	05:58

Table 1-32 Travel Time (mins.) AM Southbound

Route	Time Period	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Route 1 – New England Highway	05.30 - 06.30	09:16	09:14	09:15
	08.30 – 09.30	09:45	09:40	09:44
Route 2 – John Street / Queen Street	05.30 - 06.30	04:57	04:57	05:02
	08.30 – 09.30	05:18	05:23	05:22
Route 5 – Singleton Bypass	05.30 - 06.30	05:40	05:40	05:40
	08.30 – 09.30	05:45	05:45	05:45

Table 1-33 Travel Time (mins.) PM Northbound

Route	Time Period	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	10:37	10:48	10:47
Route 2 – John Street / Queen Street	16.00 – 17.00	05:22	05:31	05:35
Route 5 – Singleton Bypass	16.00 – 17.00	06:00	06:00	05:58

Table 1-34 Travel Time (mins.) PM Southbound

Route	Time Period	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Route 1 – New England Highway	16.00 – 17.00	09:52	09:44	09:47
Route 2 – John Street / Queen Street	16.00 – 17.00	04:50	04:53	04:57
Route 5 – Singleton Bypass	16.00 – 17.00	05:50	05:50	05:50

1.4.4 Network performance

The introduction of the roundabout interchange at Putty Road for the bypass sees very minimal changes in the overall network performance. With average network speed remaining similar and the same unreleased trips observed in both the AM and PM scenarios.

Table 1-35 Network Statistics AM

AM (4 Hours)	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	127,355	127,382	128,224
Vehicle Hours Travelled (hrs) - VHT	2,250	2,247	2,283
Average Network Speed (km/h)	55	55	55
Completed Trips (vehs)	21,986	21,983	21,991
Incomplete Trips (vehs)	484	483	479
Unreleased Trips (vehs)	-	-	-
Delay for Unreleased Trips (hrs)	-	-	-

Table 1-36 Network Statistics PM

PM (3 Hours)	2046 Bypass DMNR	2046 Bypass DMWR	2046 Bypass Roundabout
Vehicle Kilometres Travelled (km) – VKT	124,097	124,459	124,805
Vehicle Hours Travelled (hrs) - VHT	2,210	2,216	2,205
Average Network Speed (km/h)	52	52	53
Completed Trips (vehs)	24,715	24,700	24,712
Incomplete Trips (vehs)	727	723	714
Unreleased Trips (vehs)	2	2	2
Delay for Unreleased Trips (hrs)	-	-	-

2.0 Conclusions and Recommendations

The traffic modelling results demonstrated that the inclusion of the roundabout interchange in the bypass scenario will have minimal impacts on the overall network performance, intersection performance and travel time results. The updated interchange layout results in some additional traffic utilising the south facing ramps through the access of the roundabout when compared to the previous 'with south facing ramps' bypass scenario. According to the modelling results, the closer proximity of the interchange to the Singleton CBD will result in a small increase of traffic on the south facing ramps when compared to the previous configuration.

The roundabout at Putty Road is shown to perform at level of service A in all future year scenarios and in all AM and PM peaks. The modelling results indicated that the roundabout will have capacity to carry out the traffic from the bypass on and off ramps and along Putty Road.

Appendix A

Bypass with Roundabout Interchange Plots

Appendix A Bypass with Roundabout Interchange Plots



2026 Bypass AIMSUN Network Flows AM Peak (5.30 – 6.30)



2026 Bypass AIMSUN Network Flows AM Peak (8.30 – 9.30)



2026 Bypass AIMSUN Network Flows PM Peak (16.00 – 17.00)



2026 Bypass AIMSUN Delay Plots AM Peak (5.30 – 6.30)



2026 Bypass AIMSUN Delay Plots AM Peak (8.30 – 9.30)



2026 Bypass AIMSUN Delay Plot PM Peak (16.00 – 17.00)



2036 Bypass AIMSUN Network Flows AM Peak (5.30 – 6.30)



2036 Bypass AIMSUN Network Flows AM Peak (8.30 – 9.30)



2036 Bypass AIMSUN Network Flows PM Peak (16.00 – 17.00)



2036 Bypass AIMSUN Delay Plots AM Peak (5.30 – 6.30)



2036 Bypass AIMSUN Delay Plots AM Peak (8.30 – 9.30)



2036 Bypass AIMSUN Delay Plot PM Peak (16.00 – 17.00)



2046 Bypass AIMSUN Network Flows AM Peak (5.30 – 6.30)



2046 Bypass AIMSUN Network Flows AM Peak (8.30 – 9.30)



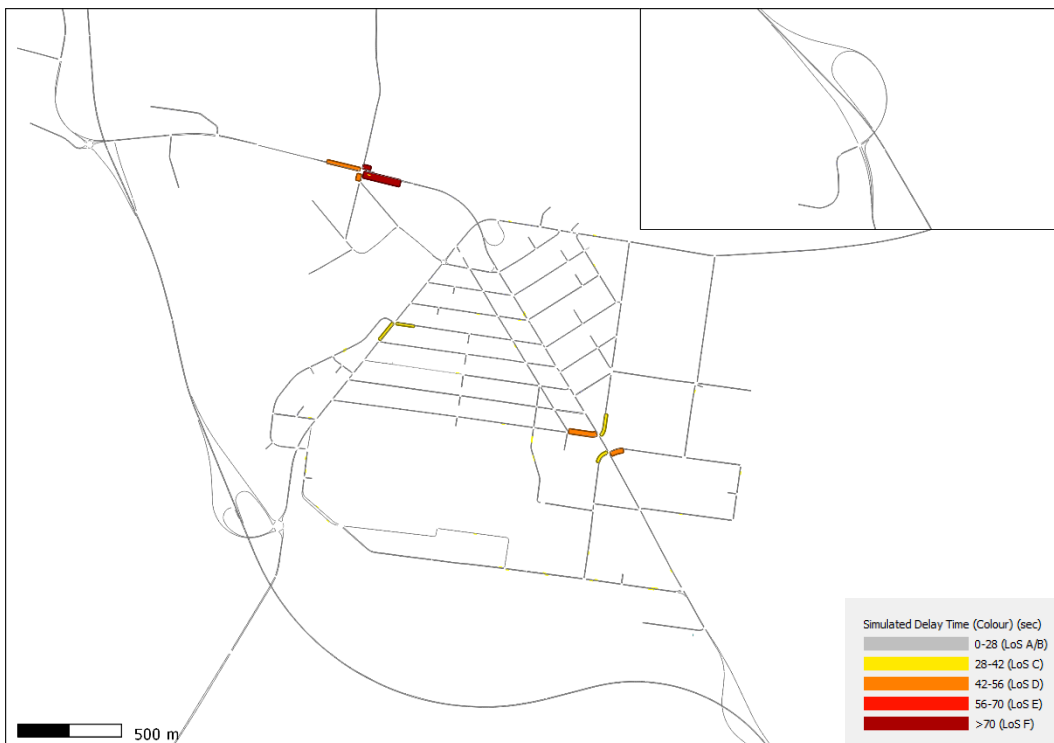
2046 Bypass AIMSUN Network Flows PM Peak (16.00 – 17.00)



2046 Bypass AIMSUN Delay Plots AM Peak (5.30 – 6.30)



2046 Bypass AIMSUN Delay Plots AM Peak (8.30 – 9.30)



2046 Bypass AIMSUN Delay Plot PM Peak (16.00 – 17.00)