



# ACTIVE TRANSPORTATION AND TRANSPORTATION MASTER PLANS

APPENDIX F  
2019 DEVELOPMENT CHARGES  
BACKGROUND STUDY -  
ENGINEERING SERVICE  
CATEGORY ANALYSIS



## 4 Transportation Infrastructure Improvements

### 4.1 Analysis Approach

The transportation infrastructure needed to service the demands of new development in the Township to the year 2031 was identified through a multi-step process, beginning with an assessment of future intersection requirements. An analysis of current and projected traffic operations at 13 stop-controlled intersections under the Township's jurisdiction within the Port Perry Urban Area provided the basis for the assessment. **Figure 4.1** shows the intersection locations.

### 4.2 Traffic Forecasts

Traffic forecasts were prepared for the 2031 horizon year at the 13 study area intersections as follows:

#### 4.2.1 Existing Traffic Volumes

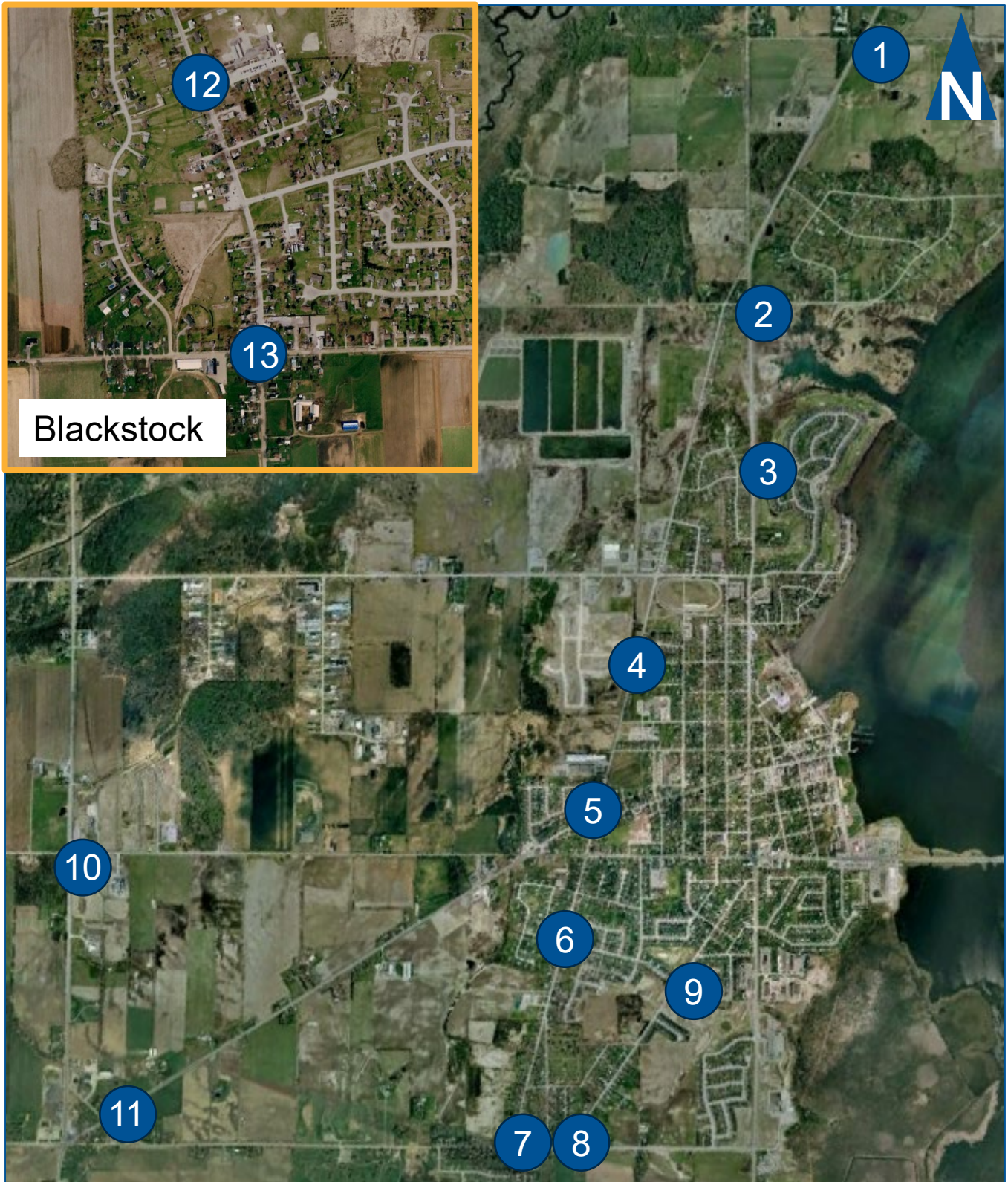
Turning movement counts were collected at the intersections on Thursday, January 21, 2018 during the morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak periods using Miovision Scout video collection units (VCUs). The weather during the data collection period was sunny and clear with a temperature of approximately -13°C.

**Figure 4.2** and **Figure 4.3** summarize the existing morning (8:00 to 9:00 AM) and afternoon (4:00 to 5:00 PM) peak hour traffic volumes, respectively. Network traffic volumes were not balanced between intersections due to the large number of driveways. **Appendix A** provides the count data for reference.

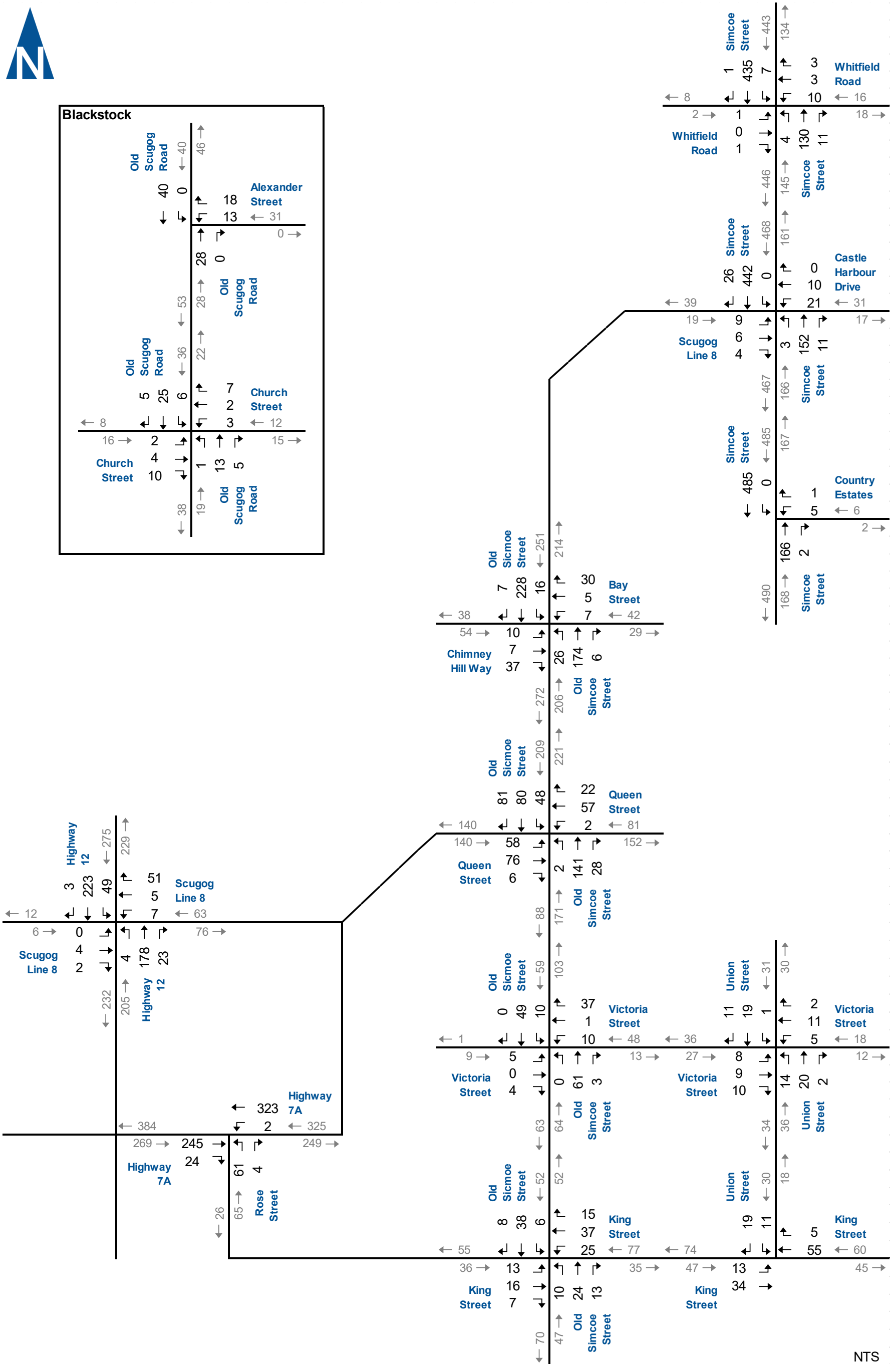
#### 4.2.2 Background Traffic Growth

In studies of this nature, a background traffic growth rate is typically applied to account for general population and employment growth within and external to the study area, which is the Township in this case. For this study, all potential growth within the Township is captured in the development forecasts. As well, traffic increases due to growth external to the Township will likely be served by provincial highways and regional roads since most of these vehicles will be passing through the municipality. For these reasons, a general background traffic growth rate was not applied in forecasting future volumes.





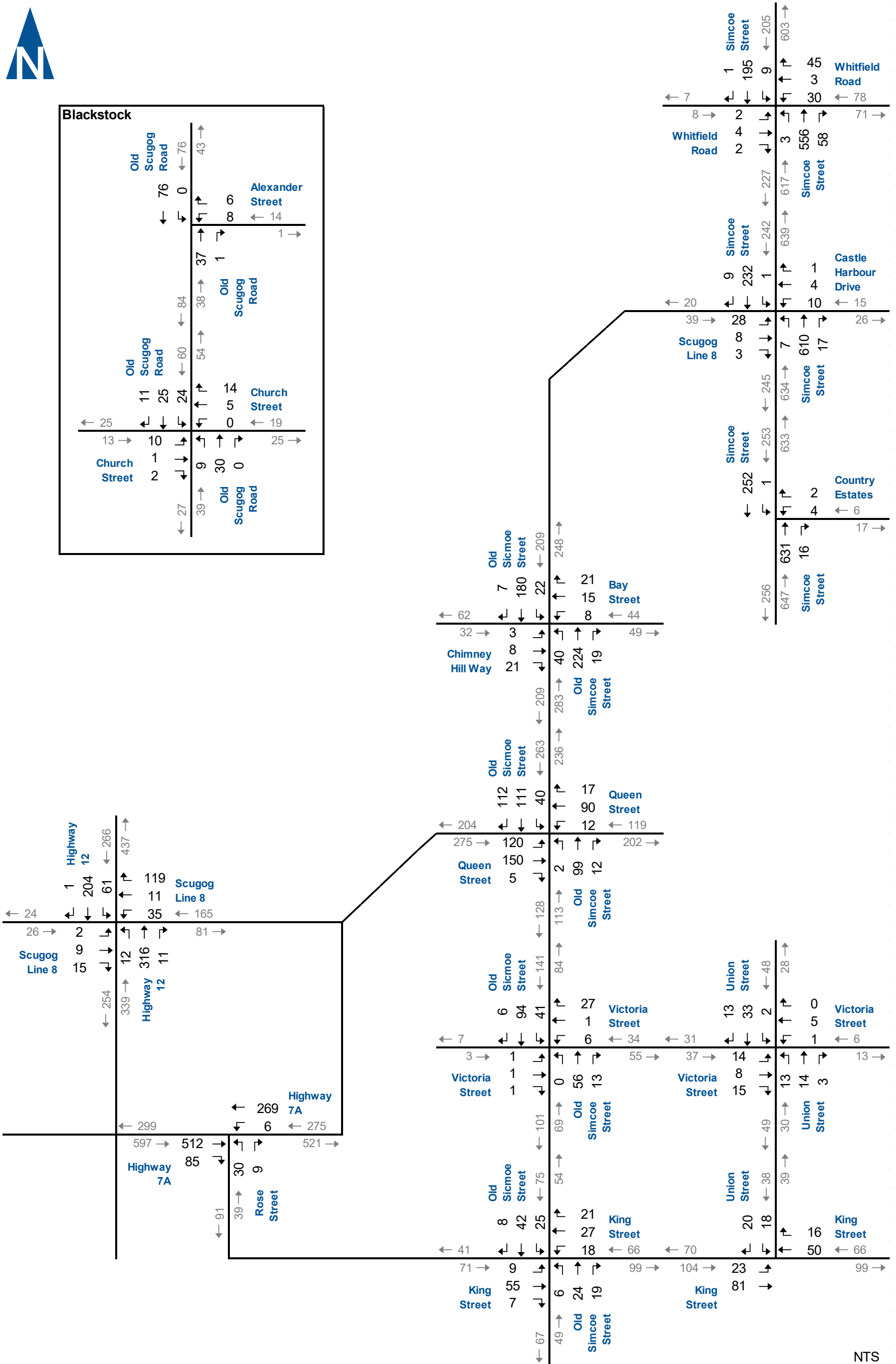
## Study Area Intersections



NTS



## Existing (2018) AM Peak Hour Traffic Volumes



## Existing (2019) PM Peak Hour Traffic Volumes

### 4.2.3 Trip Generation

Peak hour traffic volumes anticipated to be generated by the developments shown in **Figure 2.1** were estimated based on data contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*<sup>2</sup> (ITE Manual). The following Land Use Codes (LUC) were selected as most representative of the expected developments. **Appendix B** provides the ITE LUC descriptions and additional information used to estimate trip generation:

- ▶ **LUC 210 – Single-Family Detached Housing:** Single-family detached homes on individual lots;
- ▶ **LUC 220 – Multifamily Housing (Low Rise):** Apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors); and.
- ▶ **LUC 310 – Hotel:** Place of lodging that provides sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room) and/or other retail and service shops.

The trip generation estimates used in the study were based solely on the residential development forecast to avoid double counting.

Based on the information provided by Township staff, 16 development sites are expected to be built and occupied by 2031 within the Port Perry Urban Area. **Table 4.1** summarizes the estimated trip generation for the potential developments. A total of approximately 830 and 1,060 new vehicle trips are forecast to be generated during the AM and PM peak hours, respectively, by the 16 sites.

A further six development sites are expected to be built and occupied by 2031 within the rural area of the Township (in Epsom and on Scugog Island). **Table 4.2** summarizes the estimated trip generation for the potential developments. A total of about 240 and 300 new vehicle trips are forecast to be generated during the AM and PM peak hours, respectively, by the six sites.

**Table 4.3** summarizes the estimated trip generation for all potential developments in the Township to the year 2031. A total of 1,070 and 1,360 new vehicle trips are forecast to be generated during the AM and PM peak hours, respectively.

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<sup>2</sup> Institute of Transportation Engineers. *Trip Generation Manual 10<sup>th</sup> Edition*. September 2017.



**TABLE 4.1: TRIP GENERATION FOR POTENTIAL DEVELOPMENTS WITHIN THE PORT PERRY URBAN AREA**

Development	Land Use	Unit of Measure	Units/ GFA	AM Peak Hour			PM Peak Hour					
				Rate	In	Out	Total	Rate	In	Out	Total	
1	Antflick	LUC 220 - Multifamily Housing (Low-Rise)	Units	38	FCE <sup>1</sup>	4	15	19	FCE <sup>2</sup>	16	9	25
2	Canterbury Common	LUC 210 - Single Family Detached	Units	99	FCE <sup>3</sup>	19	56	75	FCE <sup>4</sup>	64	37	101
		LUC 220 - Multifamily Housing (Low-Rise)	Units	70	FCE <sup>1</sup>	8	26	34	FCE <sup>2</sup>	27	16	43
		<b>Total</b>		<b>169</b>		<b>27</b>	<b>82</b>	<b>109</b>		<b>91</b>	<b>53</b>	<b>144</b>
3	Cawker's Creek (Phase 3A and 3B)	LUC 210 - Single Family Detached	Units	133	FCE <sup>3</sup>	25	74	99	FCE <sup>4</sup>	84	50	134
4	CDM	LUC 210 - Single Family Detached	Units	20	FCE <sup>3</sup>	5	14	19	FCE <sup>4</sup>	14	8	22
5	Del Park (Jeffrey Farm)	LUC 210 - Single Family Detached	Units	172	FCE <sup>3</sup>	32	95	127	FCE <sup>4</sup>	108	63	171
		LUC 220 - Multifamily Housing (Low-Rise)	Units	129	FCE <sup>1</sup>	14	47	61	FCE <sup>2</sup>	47	27	74
		<b>Total</b>		<b>301</b>		<b>46</b>	<b>142</b>	<b>188</b>		<b>155</b>	<b>90</b>	<b>245</b>
6	EMBEE	LUC 210 - Single Family Detached	Units	10	FCE <sup>3</sup>	3	9	12	FCE <sup>4</sup>	7	4	11
7	Holland Homes (Homeland)	LUC 210 - Single Family Detached	Units	25	FCE <sup>3</sup>	6	17	23	FCE <sup>4</sup>	17	10	27
8	Homestead	LUC 220 - Multifamily Housing (Low-Rise)	Units	25	FCE <sup>1</sup>	3	10	13	FCE <sup>2</sup>	11	6	17
9	Oxnard Legion Property	LUC 210 - Single Family Detached	Units	18	FCE <sup>3</sup>	5	14	18	FCE <sup>4</sup>	13	7	20
10	Oxnard Old Simcoe	LUC 220 - Multifamily Housing (Low-Rise)	Units	40	FCE <sup>1</sup>	5	15	20	FCE <sup>2</sup>	16	10	26
11	King and Simcoe	LUC 220 - Multifamily Housing (Low-Rise)	Units	75	FCE <sup>1</sup>	8	28	36	FCE <sup>2</sup>	29	17	46
12	KIYA	LUC 210 - Single Family Detached	Units	5	FCE <sup>3</sup>	2	6	8	FCE <sup>4</sup>	4	2	6
13	Ribcor	LUC 210 - Single Family Detached	Units	124	FCE <sup>3</sup>	23	70	93	FCE <sup>4</sup>	79	46	125
14	Stockworth	LUC 220 - Multifamily Housing (Low-Rise)	Units	248	FCE <sup>1</sup>	26	87	113	FCE <sup>2</sup>	84	49	133
15	Chieftan	LUC 210 - Single Family Detached	Units	31	FCE <sup>3</sup>	7	20	27	FCE <sup>4</sup>	21	12	33
16	Infill Lots	LUC 210 - Single Family Detached	Units	42	FCE <sup>3</sup>	9	26	35	FCE <sup>4</sup>	28	16	44
<b>Total Urban New Trips</b>						<b>204</b>	<b>629</b>	<b>833</b>		<b>669</b>	<b>389</b>	<b>1058</b>



**TABLE 4.2: TRIP GENERATION FOR POTENTIAL DEVELOPMENTS WITHIN THE RURAL AREA**

Development	Land Use	Unit of Measure	Units/ GFA	AM Peak Hour			PM Peak Hour					
				Rate	In	Out	Total	Rate	In	Out	Total	
17	17300 Island Road	LUC 210 - Single Family Detached	Units	16	FCE <sup>3</sup>	4	12	16	FCE <sup>4</sup>	11	6	17
18	Henley/Storie (Humewood)	LUC 210 - Single Family Detached	Units	13	FCE <sup>3</sup>	4	11	14	FCE <sup>4</sup>	9	5	14
19	Marsh Forest Resort	LUC 310 - Hotel	Units	230	FCE <sup>5</sup>	65	45	110	FCE <sup>6</sup>	74	72	146
20	Oxford (Philo)	LUC 210 - Single Family Detached	Units	17	FCE <sup>3</sup>	4	13	17	FCE <sup>4</sup>	12	7	19
21	Spring Boulevard	LUC 210 - Single Family Detached	Units	14	FCE <sup>3</sup>	4	11	15	FCE <sup>4</sup>	9	6	15
22	Infill Lots	LUC 210 - Single Family Detached	Units	90	FCE <sup>3</sup>	17	52	69	FCE <sup>4</sup>	58	34	92
<b>Total Rural New Trips</b>						<b>98</b>	<b>144</b>	<b>242</b>		<b>173</b>	<b>130</b>	<b>303</b>

**TABLE 4.3: TOTAL TRIP GENERATION FOR POTENTIAL DEVELOPMENTS**

Location	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Port Perry Urban Area	204	629	833	669	389	1058
Rural Area	98	144	242	173	130	303
<b>Total New Trips</b>	<b>302</b>	<b>773</b>	<b>1,075</b>	<b>842</b>	<b>519</b>	<b>1,361</b>





#### 4.2.4 Traffic Assignment

The forecast trips generated by the potential developments were assigned to the adjacent roadway network based on existing traffic patterns and logical routing to/from the site location. **Figure 4.4** and **Figure 4.5** show the trip assignments for the potential developments for the AM and PM peak hours, respectively.

#### 4.2.5 Future Traffic Volumes

**Figure 4.6** and **Figure 4.7** show the total 2031 traffic volumes (existing + development) for the AM and PM peak hours, respectively.

### 4.3 Traffic Operations Analysis

#### 4.3.1 Methodology

Intersection level of service (LOS) is a recognized method of quantifying the delay experienced by drivers at intersections. The term “Level of Service” denotes how well a traffic movement operates under given traffic demands, lane arrangements, and traffic controls. Each level is determined by the average amount of control delay per vehicle. Control delay is the total delay associated with stopping for a signal or stop sign, and includes four components: deceleration delay, stopped delay, queue move up time and final acceleration delay.

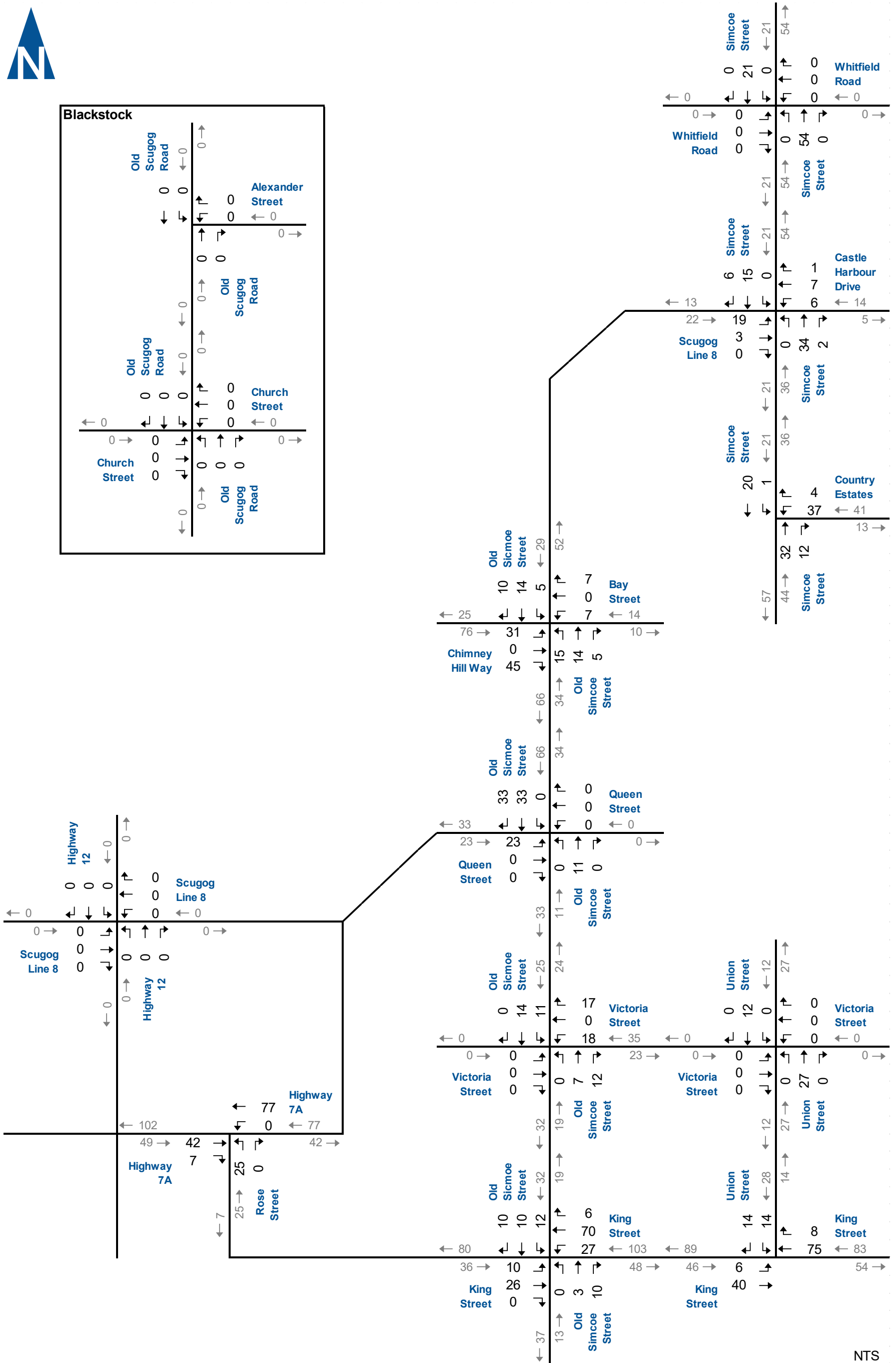
**Table 4.4** contains the level of service criteria for signalized and stop-controlled intersections per the Highway Capacity Manual. As shown, LOS A indicates small average control delays (less than 10 second per vehicle) whereas LOS F indicates intersection failure, which results in extensive vehicular queues and long delays (over 50 seconds per vehicle at an unsignalized intersection, and over 80 seconds per vehicle at a signalized intersection). LOS D is typically considered acceptable peak-hour performance in an urban setting, and lower LOS values are tolerable for short periods during peak hours when heavier traffic volumes are expected.

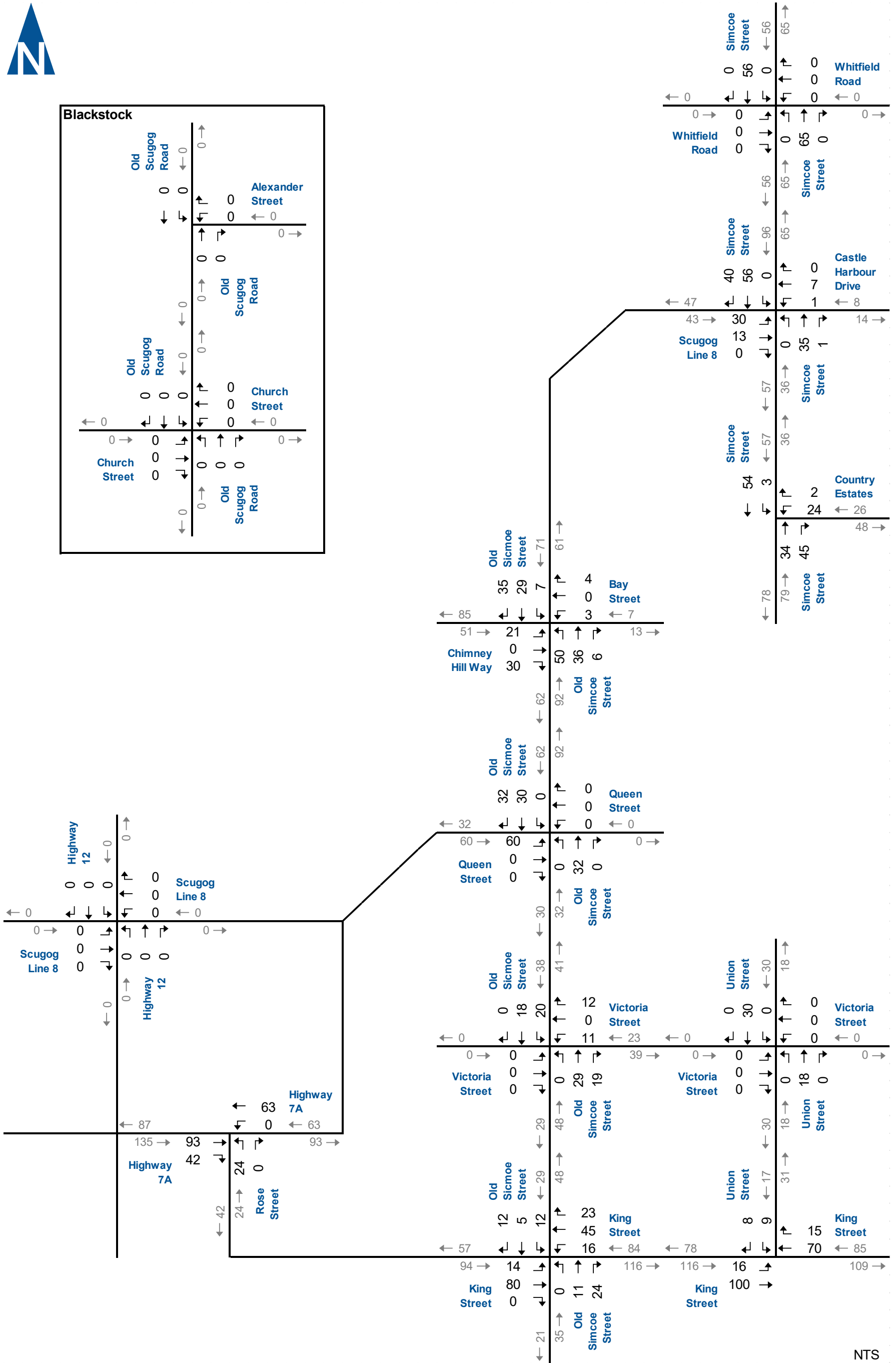
Per the Durham Region Traffic Impact Study Guidelines<sup>3</sup>, in an urban setting, the road network should operate at LOS “D” or better.

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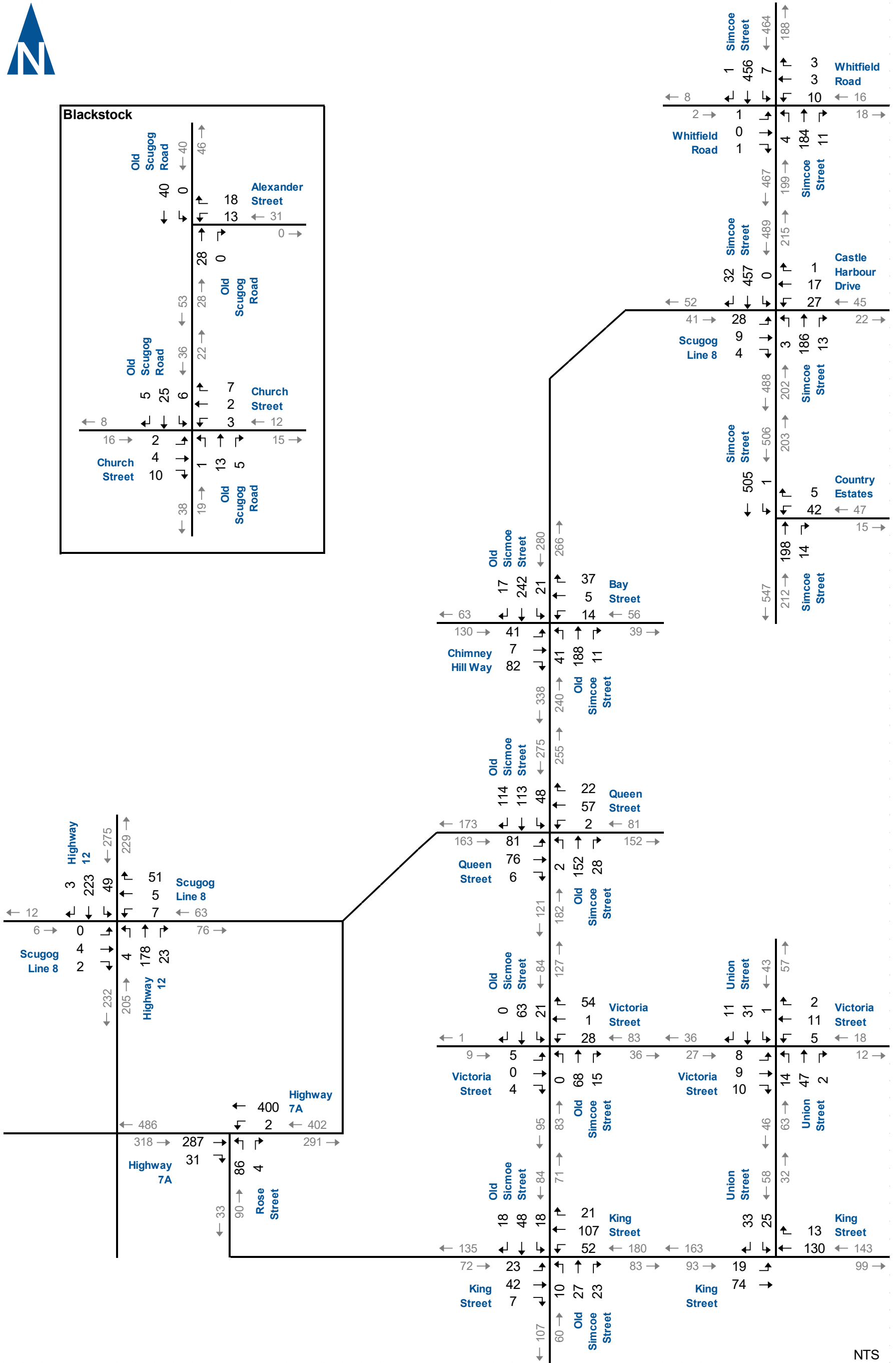
<sup>3</sup> Regional Municipality of Durham. *Traffic Impact Study Guidelines*. October 2011.

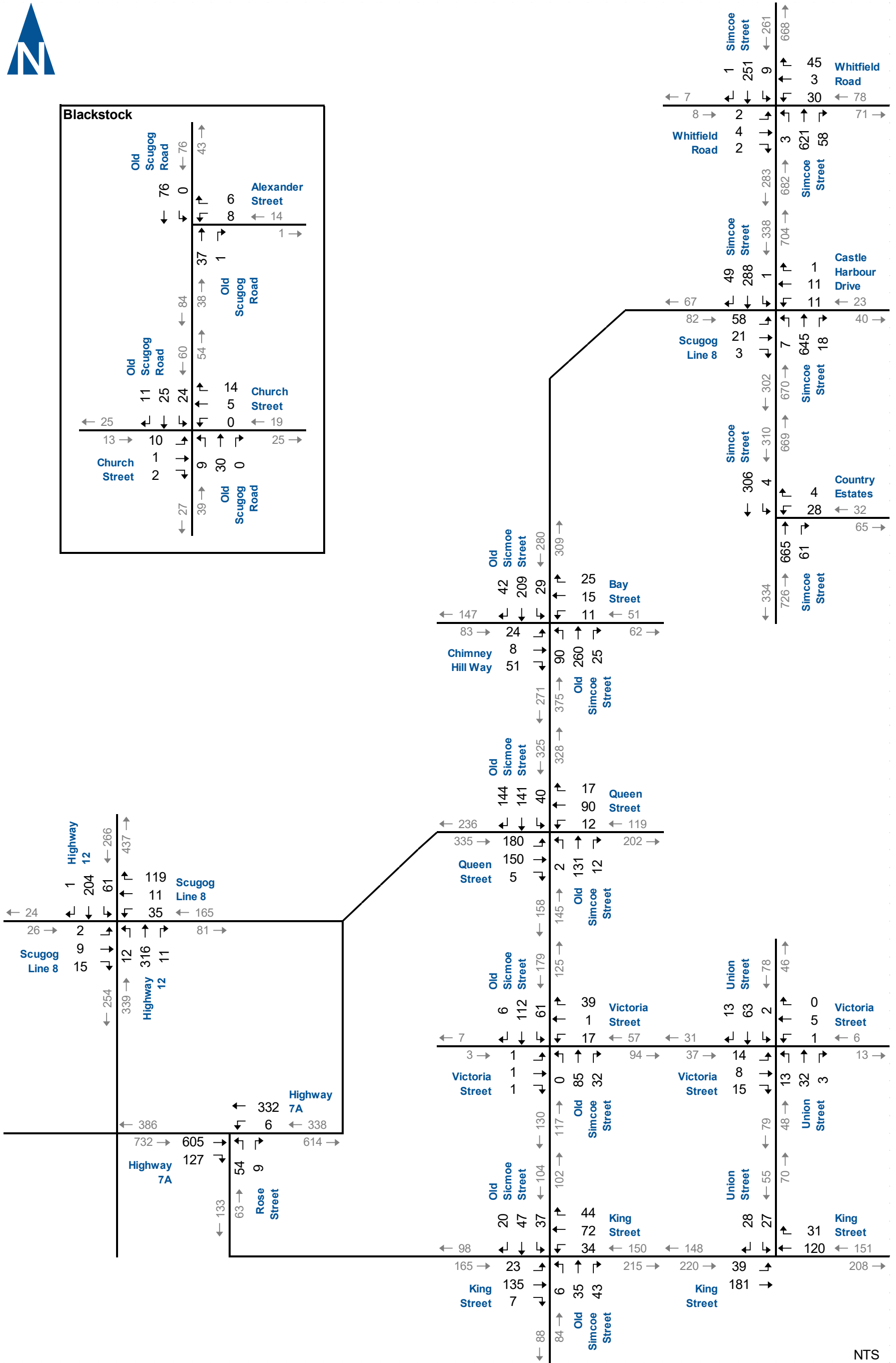






# PM Peak Hour Development Traffic Forecasts





## Future (2031) PM Peak Hour Traffic Forecasts

**TABLE 4.4: VEHICLE LEVEL OF SERVICE DEFINITIONS**

Level of Service	Signalized Intersections Average Total Delay (sec/veh)	Unsignalized Intersections Average Total Delay (sec/veh)
A	$\leq 10$	$\leq 10$
B	$> 10 \text{ \& } \leq 20$	$> 10 \text{ \& } \leq 15$
C	$> 20 \text{ \& } \leq 35$	$> 15 \text{ \& } \leq 25$
D	$> 35 \text{ \& } \leq 55$	$> 25 \text{ \& } \leq 35$
E	$> 55 \text{ \& } \leq 80$	$> 35 \text{ \& } \leq 50$
F	$> 80$	$> 50$



### 4.3.2 Existing (2019) Traffic Conditions

Operation of the study area intersections under existing (2019) traffic conditions were evaluated using Synchro 9 with HCM 2000 procedures. The following parameters were adjusted to better reflect existing conditions:

- ▶ Speed limits as posted in the field; and
- ▶ Heavy vehicle percentages as determined from the turning movement counts.

**Table 4.5** and **Table 4.6** summarize existing traffic operations for the study area intersections, highlighting LOS, v/c ratios and 95% percentile queues experienced during the AM and PM peak hours, respectively. **Appendix C** provides the detailed Synchro 9 output reports.

The tables illustrate all intersections currently operate at acceptable levels of service with no problem movements during both peak hours.

### 4.3.3 Future (2031) Traffic Conditions

Operation of the study area intersections under future (2031) traffic conditions were evaluated using Synchro 9 with HCM 2000 procedures. No changes were made to any parameters used in the existing conditions assessment in performing the analyses.

**Table 4.7** and **Table 4.8** summarize future traffic operations for the study area intersections, highlighting LOS, v/c ratios and 95% percentile queues forecast for the AM and PM peak hours, respectively. **Appendix D** provides the detailed Synchro 9 output reports.

The tables illustrate all intersections are forecast to operate at acceptable levels of service with no problem movements during both peak hours except at the intersection of Simcoe Street and Scugog Line 8/Castle Harbour Drive. The eastbound left-through-right movement is expected to operate at LOS E with a v/c ratio of 0.44 during the PM peak hour. The low v/c ratio on Scugog Line 8 indicates delay to this movements is due to the volume of through traffic on Simcoe Street and not demand on Scugog Line 8.



**TABLE 4.5: EXISTING (2019) AM PEAK HOUR TRAFFIC OPERATIONS SUMMARY**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
			Eastbound				Westbound				Northbound				Southbound				
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
1 - Simcoe Street & Whitfield Road	TWSC	LOS Delay V/C Q	< 0	B 13	> 0	B 13	< 0	B 14	> 0	B 14	< 0	A 0	> 0	A 0	< 0	A 0	> 0	A 0	1
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS Delay V/C Q	< 0	B 15	> 0	B 15	< 0	C 16	> 0	C 16	< 0	A 0	> 0	A 0	< 0	A 0	> 0	A 0	1
3 - Simcoe Street & County Estates	TWSC	LOS Delay V/C Q					B 13		B 13		A 0		A 0		A 0		A 0		0
4 - Old Simcoe Street & Chimney Hill Way/ Bay Street	TWSC	LOS Delay V/C Q	< 0	B 12	> 0	B 12	< 0	B 11	> 0	B 11	< 0	A 1	> 0	A 1	< 0	A 1	> 0	A 1	3
5 - Old Simcoe Street & Queen Street	AWSC	LOS Delay V/C Q	< 0	A 10	> 0	A 10	< 0	A 9	> 0	A 9	< 0	A 9	> 0	A 9	< 0	A 10	> 0	A 10	9
6 - Old Simcoe Street & Victoria Street	AWSC	LOS Delay V/C Q	< 0	A 7	> 0	A 7	< 0	A 7	> 0	A 7	< 0	A 7	> 0	A 7	< 0	A 8	> 0	A 8	7
7 - Old Simcoe Street & King Street	TWSC	LOS Delay V/C Q	< 0	A 3	> 0	A 3	< 0	A 3	> 0	A 3	< 0	A 10	> 0	A 10	< 0	B 10	> 0	B 10	6
8 - King Street & Union Street	TWSC	LOS Delay V/C Q	< 0	A 2	> 0	A 2	< 0	A 0	> 0	A 0					A 9		A 9	3	
9 - Union Street & Victoria Street	TWSC	LOS Delay V/C Q	< 0	A 9	> 0	A 9	< 0	A 9	> 0	A 9	< 0	A 3	> 0	A 3	< 0	A 0	> 0	A 0	5
10 - Highway 12 & Scugog Line 6	TWSC	LOS Delay V/C Q	< 0	B 12	> 0	B 12	< 0	B 11	> 0	B 11	< 0	A 0	> 0	A 0	< 0	A 8	> 0	A 1	2
11 - Highway 7A & Rose Street	TWSC	LOS Delay V/C Q		A 0		A 0	< 0	A 0		A 0	< 0	B 15		B 15					1
12 - Old Scugog Road & Alexander Street	TWSC	LOS Delay V/C Q					A 9		A 9		A 0		A 0		A 0		A 0		3
13 - Old Scugog Road & Church Street	AWSC	LOS Delay V/C Q	< 0	A 7	> 0	A 7	< 0	A 7	> 0	A 7	< 0	A 7	> 0	A 7	< 0	A 7	> 0	A 7	7

MOE - Measure of Effectiveness  
 LOS - Level of Service  
 Delay - Average Delay per Vehicle in Seconds  
 Q - 95th Percentile Queue Length  
 Ex - Existing Available Storage  
 Avail. - Available Storage  
 TCS - Traffic Control Signal  
 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane





**TABLE 4.6: EXISTING (2019) PM PEAK HOUR TRAFFIC OPERATIONS SUMMARY**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
			Eastbound				Westbound				Northbound				Southbound				
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
1 - Simcoe Street & Whitfield Road	TWSC	LOS Delay V/C Q	< 18	C 0.03	> 1	C 18	< 18	C 0.23	> 7	C 18	A 0	A 0	> 0	A 0	A 1	A 0	> 0	A 1	2
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS Delay V/C Q	< 22	C 0.17	> 5	C 22	< 21	C 0.07	> 2	C 21	< 0	A 0	> 0	A 0	A 0	A 0	> 0	A 0	1
3 - Simcoe Street & County Estates	TWSC	LOS Delay V/C Q					C 17	0.02	1	C 17		A 0	> 0	A 0	A 0	A 0	> 0	A 0	0
4 - Old Simcoe Street & Chimney Hill Way/ Bay Street	TWSC	LOS Delay V/C Q	< 11	B 0.06	> 2	B 11	< 13	B 0.09	> 3	B 13	< 1	A 0	> 1	A 1	A 1	A 0	> 0	A 1	3
5 - Old Simcoe Street & Queen Street	AWSC	LOS Delay V/C Q	< 12	B 0.44	> -	B 12	< 10	A 0.20	> -	A 10	< 10	A 0.19	> -	A 10	A 12	B 0.40	> -	B 12	11
6 - Old Simcoe Street & Victoria Street	AWSC	LOS Delay V/C Q	< 7	A 0.00	> -	A 7	< 7	A 0.04	> -	A 7	< 7	A 0.08	> -	A 7	A 8	A 0.17	> -	A 8	8
7 - Old Simcoe Street & King Street	TWSC	LOS Delay V/C Q	< 1	A 0.01	> 0	A 1	< 2	A 0.01	> 0	A 2	< 10	A 0.07	> 2	A 10	A 11	B 0.11	> 3	B 11	6
8 - King Street & Union Street	TWSC	LOS Delay V/C Q	< 2	A 0.02	> 0	A 2	< 0	A 0.04	> 0	A 0				A 9	A 0.05		> 1	A 9	3
9 - Union Street & Victoria Street	TWSC	LOS Delay V/C Q	< 9	A 0.04	> 1	A 9	< 10	A 0.01	> 0	A 10	< 3	A 0.01	> 0	A 3	A 0	A 0.00	> 0	A 0	4
10 - Highway 12 & Scugog Line 6	TWSC	LOS Delay V/C Q	< 13	B 0.06	> 2	B 13	< 16	C 0.35	> 12	C 16	A 8	A 0.01	A 0	A 0	A 8	A 0.06	A 0.13	A 0	4
11 - Highway 7A & Rose Street	TWSC	LOS Delay V/C Q	A 0	A 0.33	A 0.05	A 0	< 0	A 0.01	> 0	A 0	C 16	A 0.12		C 16					1
12 - Old Scugog Road & Alexander Street	TWSC	LOS Delay V/C Q					A 9	0.02		A 9		A 0	> 0	A 0	A 0	A 0.05	> 0	A 0	1
13 - Old Scugog Road & Church Street	AWSC	LOS Delay V/C Q	< 7	A 0.02	> -	A 7	< 7	A 0.02	> -	A 7	< 7	A 0.05	> -	A 7	A 7	A 0.07	> -	A 7	7

MOE - Measure of Effectiveness  
 LOS - Level of Service  
 Delay - Average Delay per Vehicle in Seconds  
 Q - 95th Percentile Queue Length  
 Ex - Existing Available Storage  
 Avail. - Available Storage  
 TCS - Traffic Control Signal  
 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane

**TABLE 4.7: FUTURE (2031) AM PEAK HOUR TRAFFIC OPERATIONS SUMMARY**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall			
			Eastbound				Westbound				Northbound				Southbound							
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach				
1 - Simcoe Street & Whitfield Road	TWSC	LOS Delay V/C Q	< < <	B 14 0.00 0	> > >	B 14	< < <	B 15 0.04 1	> > >	B 15	A 0 0.00 0	A 0 0.01 >	> > >	A 0 0 0	A 0 0.01 0	A 0 0.00 >	A 0 0 >	A 0 0 >	1			
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS Delay V/C Q	< < <	C 17 0.13 4	> > >	C 17	< < <	C 18 0.14 4	> > >	C 18	A 0 0.00 0	A 0 0 >	> > >	A 0 0 0	A 0 0.00 0	A 0 0 >	A 0 0 >	A 0 0 >	2			
3 - Simcoe Street & County Estates	TWSC	LOS Delay V/C Q					C 16 0.13 4	> > >	C 16					A 0 0.14 0	> > >	A 0 0 0	A 0 0.00 0	A 0 0 >	A 0 0 >	1		
4 - Old Simcoe Street & Chimney Hill Way/ Bay Street	TWSC	LOS Delay V/C Q	< < <	B 14 0.27 9	> > >	B 14	< < <	B 13 0.12 3	> > >	B 13	< < <	A 2 0.03 1	> > >	A 2 0 0	< < <	A 1 0.02 0	> > >	A 1 0 >	A 1 0 >	5		
5 - Old Simcoe Street & Queen Street	AWSC	LOS Delay V/C Q	< < <	B 10 0.27 -	> > >	B 10	< < <	A 9 0.13 -	> > >	A 9	< < <	A 10 0.27 -	> > >	A 10 0.39 -	< < <	B 11 0 -	> > >	B 11 0 -	B 11 0 -	10		
6 - Old Simcoe Street & Victoria Street	AWSC	LOS Delay V/C Q	< < <	A 7 0.01 -	> > >	A 7	< < <	A 7 0.10 -	> > >	A 7	< < <	A 8 0.10 -	> > >	A 8 0.11 -	< < <	A 8 0 -	> > >	A 8 0 -	A 8 0 -	8		
7 - Old Simcoe Street & King Street	TWSC	LOS Delay V/C Q	< < <	A 3 0.02 0	> > >	A 3	< < <	A 2 0.04 1	> > >	A 2	< < <	B 11 0.10 3	> > >	B 11 0.16 5	< < <	B 13 0 -	> > >	B 13 0 -	B 13 0 -	6		
8 - King Street & Union Street	TWSC	LOS Delay V/C Q	< < <	A 2 0.02 0	> > >	A 2	< < <	A 0 0.09 0	> > >	A 0					A 10 0.08 2	> > >	A 10 0 -	A 10 0 -	3			
9 - Union Street & Victoria Street	TWSC	LOS Delay V/C Q	< < <	A 9 0.03 1	> > >	A 9	< < <	A 10 0.02 1	> > >	A 10	< < <	A 2 0.01 0	> > >	A 2 0 0	< < <	A 0 0.00 0	> > >	A 0 0 -	A 0 0 -	4		
10 - Highway 12 & Scugog Line 6	TWSC	LOS Delay V/C Q	< < <	B 12 0.01 0	> > >	B 12	< < <	B 11 0.10 3	> > >	B 11	A 8 0.00 0	A 0 0.11 0	A 0 0.01 0	A 0 0 0	A 8 0.04 1	A 0 0.14 0	A 0 0.00 0	A 1 0 0	A 1 0 0	2		
11 - Highway 7A & Rose Street	TWSC	LOS Delay V/C Q					A 0 0.18 0	A 0 0.02 0	> > >	A 0	< < <	A 0 0.00 0	C 18 0.26 8	> > >	C 18					A 0 0 -	A 0 0 -	2
12 - Old Scugog Road & Alexander Street	TWSC	LOS Delay V/C Q					A 9 0.03 1	> > >	A 9	< < <	A 0 0.02 0	> > >	A 0 0 0	> > >	A 0 0.03 0	< < <	A 0 0 0	> > >	A 0 0 -	A 0 0 -	3	
13 - Old Scugog Road & Church Street	AWSC	LOS Delay V/C Q	< < <	A 7 0.02 -	> > >	A 7	< < <	A 7 0.01 -	> > >	A 7	< < <	A 7 0.02 -	> > >	A 7 0 -	< < <	A 7 0.04 -	> > >	A 7 0 -	A 7 0 -	7		

MOE - Measure of Effectiveness  
 LOS - Level of Service  
 Delay - Average Delay per Vehicle in Seconds  
 Q - 95th Percentile Queue Length  
 Ex - Existing Available Storage  
 Avail. - Available Storage  
 TCS - Traffic Control Signal  
 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane

**TABLE 4.8: FUTURE (2031) PM PEAK HOUR TRAFFIC OPERATIONS SUMMARY**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall	
			Eastbound				Westbound				Northbound				Southbound					
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
1 - Simcoe Street & Whitfield Road	TWSC	LOS Delay V/C Q	< < <	C 20 0.03	> > >	C 20	< < <	C 21 0.27	> > >	C 21	A 0 0.00	A 0 0.04	> > >	A 0 0	A 0 0.01	A 0 0.00	> > >	A 0	2	
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS Delay V/C Q	< < <	E 37 0.44	> > >	E 37	< < <	D 26 0.13	> > >	D 26	A 0 0.01	A 0 0	> > >	A 0 0	A 0 0.00	A 0 0	> > >	A 0	3	
3 - Simcoe Street & County Estates	TWSC	LOS Delay V/C Q					C 22 0.14	> > >	C 22	A 0 0.46	A 0 0	> > >	A 0 0	A 0 0.00	A 0 0	> > >	A 0	1		
4 - Old Simcoe Street & Chimney Hill Way/ Bay Street	TWSC	LOS Delay V/C Q	< < <	C 16 0.21	> > >	C 16	< < <	C 16 0.15	> > >	C 16	A 3 0.08	A 3 0	> > >	A 3 0.03	A 1 0	A 1 0	> > >	A 1	4	
5 - Old Simcoe Street & Queen Street	AWSC	LOS Delay V/C Q	< < <	C 16 0.58	> > >	C 16	< < <	B 11 0.22	> > >	B 11	A 2 0.26	A 2 0	> > >	B 11 0.54	B 15 0	B 15 0	> > >	B 15	14	
6 - Old Simcoe Street & Victoria Street	AWSC	LOS Delay V/C Q	< < <	A 8 0.00	> > >	A 8	< < <	A 8 0.07	> > >	A 8	A 8 0.14	A 8 0	> > >	A 8 0.23	A 9 0	A 9 0	> > >	A 9	8	
7 - Old Simcoe Street & King Street	TWSC	LOS Delay V/C Q	< < <	A 1 0.02	> > >	A 1	< < <	A 2 0.03	> > >	A 2	A 4 0.14	A 4 0	> > >	B 11 0.21	B 13 0.06	B 13 0	> > >	B 13	6	
8 - King Street & Union Street	TWSC	LOS Delay V/C Q	< < <	A 2 0.03	> > >	A 2	A 0 0.10	> > >	A 0					B 11 0.09	B 11 0.09	B 11 0.09	> > >	B 11	2	
9 - Union Street & Victoria Street	TWSC	LOS Delay V/C Q	< < <	A 9 0.05	> > >	A 9	< < <	A 10 0.01	> > >	A 10	A 2 0.01	A 2 0	> > >	A 2 0.00	A 0 0	A 0 0	> > >	A 0	3	
10 - Highway 12 & Scugog Line 6	TWSC	LOS Delay V/C Q	< < <	B 13 0.06	> > >	B 13	< < <	C 16 0.35	> > >	C 16	A 8 0.01	A 0 0.20	A 0 0.01	A 0 0	A 8 0.06	A 0 0.13	A 0 0.00	> > >	A 2	4
11 - Highway 7A & Rose Street	TWSC	LOS Delay V/C Q					A 0 0.39	A 0 0.08	> > >	A 0	A 0 0.01	C 22 0.25	C 22 0.25	> > >	C 22					1
12 - Old Scugog Road & Alexander Street	TWSC	LOS Delay V/C Q					A 9 0.02	A 9 0.02	> > >	A 9	A 0 0.02	A 0 0	A 0 0	> > >	A 0 0.05	A 0 0	A 0 0	> > >	A 0	1
13 - Old Scugog Road & Church Street	AWSC	LOS Delay V/C Q	< < <	A 7 0.02	> > >	A 7	< < <	A 7 0.02	> > >	A 7	A 7 0.05	A 7 0	> > >	A 7 0.07	A 7 0	A 7 0	> > >	A 7	7	

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 Ex - Existing Available Storage  
 Avail. - Available Storage  
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 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane



## 4.4 Intersection Improvements

### 4.4.1 Traffic Control Signals

Book 12 of the Ontario Traffic Manual (OTM)<sup>4</sup> provides warrants for the installation of traffic control signals. Justification 7 is used to determine the need for signals based on projected volumes at existing or planned intersections. With the increased uncertainty of volume projections for proposed new developments, the warrant must be fulfilled 120% for existing intersections and 150% for future intersections to justify signal installation.

Traffic signal control warrants were calculated for the following study area intersections under future (2031) traffic conditions. These locations were identified either in the 2014 Development Charges Background Study or through field investigations conducted for this report. The warrants are fulfilled as noted in parentheses:

- ▶ Old Simcoe Road and Chimney Hill Way/Bay Street (47%)
- ▶ Old Simcoe Road and Queen Street (56%)
- ▶ Old Simcoe Road and King Street (31%)
- ▶ Old Scugog Road and Church Street (7%)

**Appendix E** contains the signal warrant justification worksheets.

Based on the analyses, none of the intersections will meet the warrant criteria for the installation of traffic control signals by the 2031 horizon.

### 4.4.2 Left-Turn Lanes

The MTO Design Supplement for the TAC GDGCR<sup>5</sup> provides direction in assessing the need for auxiliary left-turn lanes at intersections.

The need for left-turn lanes was assessed at the Old Simcoe Road and Chimney Hill Way/Bay Street intersection based on forecast future (2031) traffic volumes. The analysis was completed using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 60 kilometres per hour (10 kilometres per hour over the posted speed limit). **Appendix F** provides the warrant nomographs.

<sup>4</sup> Queen's Printer for Ontario. *Ontario Traffic Manual – Book 12 – Traffic Signals*. March 2012.

<sup>5</sup> Ministry of Transportation Ontario. *Design Supplement for TAC Geometric Design Guide for Canadian Roads*. June 2017.



The analysis indicates a northbound left-turn lane with 15 metres of storage will be warranted on Old Simcoe Road at Chimney Hill Way/Bay Street by the 2031 horizon. Although southbound left-turn volumes would not justify the provision of an exclusive lane, proper runout lane treatment required to offset the northbound left-turn would almost result in an opposing lane. The preferred solution can be addressed at design.

On this basis, improvement of the Old Simcoe Road and Chimney Hill Way/Bay Street intersection was included in the 2019 Engineering – Development Related Capital Program.

#### 4.4.3 Other Capacity and Operational Deficiencies

The analysis detailed in Section 4.3 illustrates all study area intersections are forecast to operate at acceptable levels of service with no problem movements during both peak hours under existing and future traffic volumes. The intersection of Simcoe Street and Scugog Line 8/Castle Harbour Drive is the exception, with the eastbound left-through-right movement expected to operate at LOS E with a v/c ratio of 0.44 during the PM peak hour in 2031. With the forecast operational deficiency due to the volume of through traffic on Simcoe Street, a Regional Road, intersection improvements, such as the installation of traffic control signals, would be at the discretion of Durham Region.

Based on the analysis, none of the study area intersections require improvement to address a projected capacity deficiency. However, the increased traffic volumes at the intersections of Old Simcoe Road with Queen Street and King Street are expected to cause operational and safety issues due to their poor geometric alignments. On this basis, improvements to the intersections were included in the 2019 Engineering – Development Related Capital Program.

#### 4.5 Road Work

The road section improvements needed to service the demands of new development to the year 2031 were identified beginning with a review of the *Township Engineering – Development-Related Capital Program* contained in Table 2 of Appendix C of the 2014 Township Development Charge Background Study. **Appendix G** contains the 2014 program for reference.

The prior list was first updated to remove road work projects completed since 2014, which include:

- ▶ Ashburn Road from Townline Road to Scugog Line 4 (Item 6.1.1);



- ▶ Old Simcoe Road from Simcoe Street to 600 metres north of Scugog Line 4 (Item 6.1.5);
- ▶ Old Simcoe Road from Jeffrey Street to Victoria Street (part of Item 6.1.6);
- ▶ Old Simcoe Road from Scugog Street to Queen Street (Item 6.1.7); and
- ▶ Old Simcoe Road from Edinborough Avenue to Scugog Line 8 (Item 6.1.8).

The remaining projects from the 2014 Engineering – Development Related Capital Program were reassessed and confirmed as still needed to service the demands of new development.

A field investigation was then undertaken to assess the roadway infrastructure within and serving the potential development locations shown in **Figure 2.1. Table 4.9** identifies the sections added to the list of road works needed to service the demands of new development based on this review and other analyses completed.

## 4.6 Impact of Seasonal Traffic Fluctuations

### 4.6.1 Rationale and Approach

As noted in Section 4.2.1, the turning movement counts for the intersection analysis were collected during the winter (January 2018). Roads in the Township can experience traffic fluctuations in the summer with seasonal volumes increasing due to tourist activity and other factors.

To assess the potential impact of summer traffic conditions on the recommended road works program, an alternative volume scenario was tested for the following three critical intersections. The rationale for selecting these locations is explained below:

- ▶ Scugog Line 8/Castle Harbour Drive and Simcoe Street – The eastbound left-through-right movement is forecast to operate at LOS E during the 2031 PM peak hour;
- ▶ Old Simcoe Road and Queen Street – This intersection is forecast to experience the highest delay of all intersections analyzed; and
- ▶ Old Simcoe Road and King Street – The highest volume of development traffic is forecast for this intersection of all locations reviewed.



**TABLE 4.9: ADDITIONAL ROAD WORKS NEEDED TO SERVICE NEW DEVELOPMENT**

Road Section	Limits	Length (m)	Rationale for Inclusion
Old Simcoe Road	Queen Street to Chimney Hill Way/Bay Street	850	<ul style="list-style-type: none"> <li>▶ Narrow platform</li> <li>▶ Pavement structure needs to be upgraded to serve increased traffic volume/loads</li> <li>▶ Sidewalk required on west side of road</li> <li>▶ Road work in conjunction with intersection improvements</li> </ul>
Old Simcoe Road	Chimney Hill Way/Bay Street to Reach Street	470	<ul style="list-style-type: none"> <li>▶ Narrow platform</li> <li>▶ Pavement structure needs to be upgraded to serve increased traffic volume/loads</li> <li>▶ Road work in conjunction with intersection improvements</li> </ul>
Old Simcoe Road	Reach Street to Edinborough Avenue	290	<ul style="list-style-type: none"> <li>▶ Narrow platform</li> <li>▶ Pavement structure needs to be upgraded to serve increased traffic volume/loads</li> <li>▶ Road work in conjunction with sidewalk</li> </ul>
Queen Street	Simcoe Street (R.R. 2) to Water Street	440	<ul style="list-style-type: none"> <li>▶ Upgrades to on-street parking, access management, streetscaping, storm water drainage and illumination to serve increased traffic volume</li> <li>▶ Improvements to service anticipated development in Downtown Port Perry resulting from implementation of Community Improvement Plan</li> </ul>
Water Street	Scugog Street (Highway 7A) to Queen Street	550	<ul style="list-style-type: none"> <li>▶ Upgrades to on-street parking, access management, streetscaping, storm water drainage and illumination to serve increased traffic volume</li> <li>▶ Improvements to service anticipated development in Downtown Port Perry resulting from implementation of Community Improvement Plan</li> </ul>



#### 4.6.2 Future (2031) Summer Traffic Volumes

Future (2031) summer PM peak hour traffic volumes were estimated for the three critical intersections using the following methods. The analysis focussed on PM peak hour conditions as volumes are highest in the afternoon:

- ▶ For the Scugog Line 8/Castle Harbour Drive and Simcoe Street intersection, future summer volumes were derived by adding forecast development traffic to PM peak hour intersection volumes reported in a turning movement count collected by Durham Region on Friday, June 9, 2017 (Friday); and
- ▶ For the intersections of Old Simcoe Road with Queen Street and King Street, future summer volumes were derived by:
  - Dividing summer average daily traffic (SADT) volumes collected by the Township prior to 2019 for each leg of the intersection by 10 to estimate the PM peak hour two-way volume. The afternoon peak hour typically accounts for about 10% of daily traffic volumes;
  - Calculating the variance between the January 2019 turning movement counts and the SADT traffic volumes for each leg of the intersection. The winter counts were approximately 30% to 40% lower than the historical summer volumes on average;
  - Factoring (up) the intersection turning movement counts by the average variance (increase) in the volumes for the subject movement; and
  - Adding the development traffic forecasts.

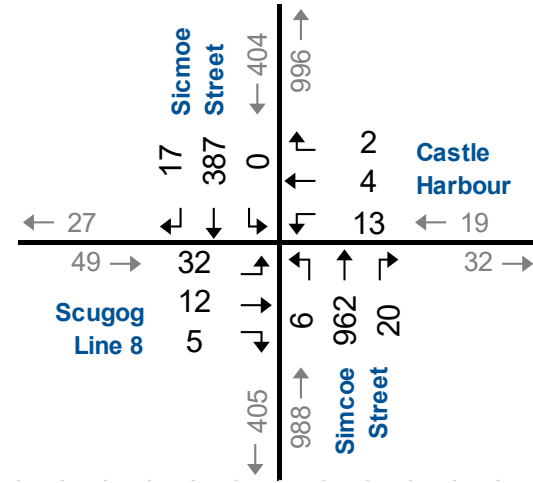
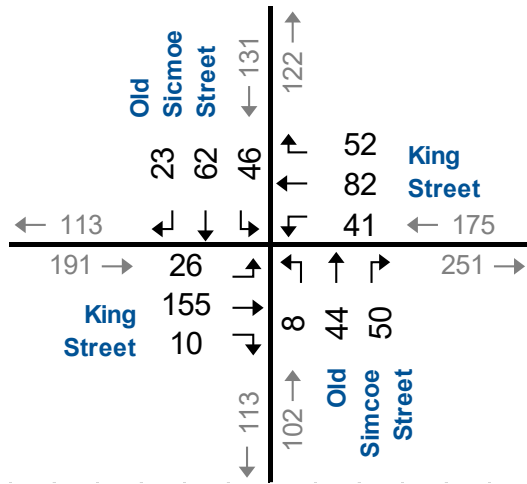
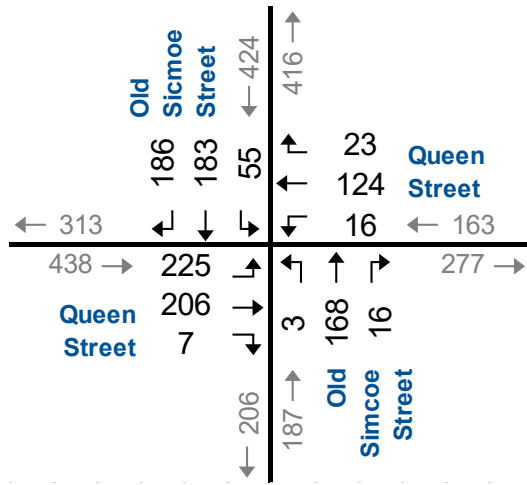
**Figure 4.8** summarizes the future (2031) summer PM peak hour traffic volumes forecast for the critical intersections.

#### 4.6.3 Future (2031) Summer Traffic Operations

Operation of the three critical intersections under future (2031) summer PM peak hour traffic volumes were evaluated using Synchro 9 with HCM 2000 procedures. The same parameters used in the future (2031) traffic operations assessment summarized in Section 4.3.3 were applied in this analysis.







\*Only Critical Intersections identified in Section 4.6.1 are shown.



## Future (2031) Summer PM Peak Hour Traffic Forecasts

**Table 4.10** summarizes traffic operations for the study area intersections, highlighting LOS, v/c ratios and 95% percentile queues forecast under future summer PM peak hour conditions. **Appendix H** provides the detailed Synchro 9 output reports.

The critical intersections are forecast to operate at acceptable levels of service with no problem movements during the PM peak hour under projected future summer traffic conditions, except at:

- ▶ Simcoe Street and Scugog Line 8/Castle Harbour Drive. The eastbound and westbound left-through-right movements are forecast to operate at LOS F with v/c ratios of 0.48 and 0.20, respectively. The low v/c ratios indicate delay to these movements are due to the higher volume of through traffic on Simcoe Street and not demand on Scugog Line 8 or Castle Harbour Road.
- ▶ Old Simcoe Road and Queen Street. The eastbound and southbound left-through-right movements are forecast to operate at LOS E with v/c ratios of 0.91 and 0.86, respectively. Additionally, the overall intersection is forecast to operate with delays of 35 seconds.

#### 4.6.4 Intersection Improvements Under Future Summer Conditions

The need for intersection improvements to address the critical movements identified under future (2031) summer PM peak hour traffic conditions was assessed as follows:

##### Traffic Control Signals

Warrants for the installation of traffic control signals were calculated using OTM Book 12 Justification 7 for the critical intersections. The warrants are fulfilled as noted in parentheses:

- ▶ Scugog Line 8/Castle Harbour Road and Simcoe Street (30%)
- ▶ Old Simcoe Road and Queen Street (84%)
- ▶ Old Simcoe Road and King Street (42%)

**Appendix I** contains the signal warrant justification worksheets.

Based on the analyses, none of the intersections will meet the warrant criteria for the installation of traffic control signals.



**TABLE 4.10: FUTURE (2031) SUMMER PM PEAK HOUR TRAFFIC OPERATIONS SUMMARY**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
			Eastbound				Westbound				Northbound				Southbound				
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS Delay V/C Q	< < < <	F 64 0.48 17	> > > >	F 64	< < < <	F 51 0.20 6	> > > >	F 51	< < < <	A 0 0.01 0	> > > >	A 0	< < < <	A 0 0.00 0	> > > >	A 0	3
5 - Old Simcoe Street & Queen Street	AWSC	LOS Delay V/C Q	< < < <	E 47 0.91 -	> > > >	E 47	< < < <	C 15 0.38 -	> > > >	C 15	< < < <	C 16 0.43 -	> > > >	C 16	< < < <	E 37 0.86 -	> > > >	E 37	35
7 - Old Simcoe Street & King Street	TWSC	LOS Delay V/C Q	< < < <	A 1 0.02 1	> > > >	A 1	< < < <	A 2 0.03 1	> > > >	A 2	< < < <	B 12 0.19 5	> > > >	B 12	< < < <	C 15 0.29 10	> > > >	C 15	6

MOE - Measure of Effectiveness  
 LOS - Level of Service  
 Delay - Average Delay per Vehicle in Seconds  
 Q - 95th Percentile Queue Length  
 Ex. - Existing Available Storage  
 Avail. - Available Storage  
 TCS - Traffic Control Signal  
 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane



### Other Capacity and Operational Deficiencies

The analysis detailed in Section 4.6.3 indicates the intersections of Simcoe Street and Scugog Line 8/Castle Harbour Drive and Old Simcoe Road and Queen Street are forecast to operate with critical movements. With traffic control signals not justified at either intersection based on the warrant calculations, exclusive left-turn lanes were considered to alleviate the forecast delay.

Operation of the two intersections were evaluated using Synchro 9 with HCM 2000 procedures assuming exclusive left-turn lanes on:

- ▶ The minor approaches at Scugog Line 8/Castle Harbour Drive and Simcoe Street (eastbound and westbound); and
- ▶ All approaches at Old Simcoe Road and Queen Street.

**Table 4.11** summarizes traffic operations for the study area intersections, highlighting LOS, v/c ratios and 95% percentile queues forecast under future summer PM peak hour conditions. **Appendix J** provides the detailed Synchro 9 output reports.

The Old Simcoe Road and Queen Street intersection is forecast to operate at acceptable levels of service with no problem movements with the turn lanes. However, the Simcoe Street and Scugog Line 8/Castle Harbour Drive intersection is still expected to experience problem conditions, with the eastbound and westbound left-turn movements forecast to operate at LOS F with v/c ratios of 0.36 and 0.16, respectively. The low v/c ratios on Scugog Line 8/Castle Harbour Drive indicates delay to these movements are due to the volume of through traffic on Simcoe Street and not demand on Scugog Line 8 or Castle Harbour Drive.

#### **4.6.5 Summary of Impacts**

Analysis of the future summer traffic scenario indicates the critical intersections are expected to operate consistent with the results presented in **Section 4.3.3**.

The addition of exclusive left-turn lanes on the minor approaches at Scugog Line 8/Castle Harbour Drive and Simcoe Street would help alleviate projected delay for through and right movements. However, the left-turn movements would still operate at a poor level of service. With the forecast operational deficiency due to the volume of through traffic on Simcoe Street, which is a Regional Road, the timing and extent of any intersection improvements would be at the discretion of Durham Region.



**TABLE 4.11: FUTURE (2031) SUMMER PM PEAK HOUR TRAFFIC OPERATIONS SUMMARY WITH INTERSECTION IMPROVEMENTS**

Intersection	Control Type	MOE	Direction / Movement / Approach																Overall	
			Eastbound				Westbound				Northbound				Southbound					
			Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
2 - Simcoe Street & Scugog Line 8/ Castle Harbour Drive	TWSC	LOS	F	D	>	F	F	D	>	E	<	A	>	A	<	A	>	A	2	
		Delay	62	31	>	51	55	30	>	48	<	0	>	0	<	0	>	0	>	0
		V/C	0.36	0.12	>		0.16	0.04	>		<	0.01	>		<	0.00	>			
		Q	11	3	>		4	1	>		<	0	>		<	0	>			
5 - Old Simcoe Street & Queen Street	AWSC	LOS	C	B	>	C	A	B	>	B	A	B	>	B	B	C	>	C	17	
		Delay	17	14	>	15	10	13	>	12	10	14	>	14	10	24	>	22		
		V/C	0.50	0.44	>		0.04	0.33	>		0.01	0.40	>		0.12	0.73	>			
		Q	-	-	>		-	-	>		-	>		-	-	>				

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 Avail. - Available Storage  
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 TWSC - Two-Way Stop Control  
 AWSC - All-Way Stop Control  
 RBT - Roundabout  
 < - Shared Left Lane  
 > - Shared Right Lane



Improvements to the Old Simcoe Road and Queen Street intersection were already identified to be included in the 2019 Engineering – Development Related Capital Program. It is noted that the addition of exclusive left-turn lanes on all approaches to the all-way stop intersection would help alleviate the forecast critical movements but could be confusing for motorists trying to determine who has the right-of-way. The preferred design for the intersection will be determined through future study.

With the operation of the critical intersections not expected to deteriorate significantly, it is unlikely additional road works would be required at the other study area locations in the alternative traffic volume scenario. These intersections are still expected to operate at acceptable levels of service even if traffic volumes fluctuate upwards of 30% to 40% seasonally.



Improvements to the Old Simcoe Road and Queen Street intersection were already identified to be included in the 2019 Engineering – Development Related Capital Program. It is noted that the addition of exclusive left-turn lanes on all approaches to the all-way stop intersection would help alleviate the forecast critical movements but could be confusing for motorists trying to determine who has the right-of-way. The preferred design for the intersection will be determined through future study.

With the operation of the critical intersections not expected to deteriorate significantly, it is unlikely additional road works would be required at the other study area locations in the alternative traffic volume scenario. These intersections are still expected to operate at acceptable levels of service even if traffic volumes fluctuate upwards of 30% to 40% seasonally.

