

# SANITARY ANALYSIS

290-302 GEORGIAN DRIVE

CITY OF BARRIE

COUNTY OF SIMCOE



(Revised September 2021)

April 2021

18037



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# **SANITARY ANALYSIS**

## **290-302 GEORGIAN DRIVE**

### **1. INTRODUCTION**

PEARSON Engineering Ltd. (PEARSON) has been retained by TMD-Atria Corporation (Client) to prepare a Sanitary Analysis (Analysis) for the proposed Georgian Apartments (Project) located on the north side of Georgian Drive in the City of Barrie (City). The subject lands are located west of Johnson Street and east of Gallie Court and can be seen on Figure 1.

A meeting was held with the City in January 2020 to discuss the sanitary conveyance system as well as the Analysis scope which is to assess the sanitary sewer capacity from the proposed Project to the existing Grove Street Pump Station (PS1). The Royal Victoria Hospital (RVH) currently produces a large percentage of the sanitary flows draining to the existing Grove Street Pump Station (PS1) and is expected to double in size in the future.

#### **1.1. DEVELOPMENT CONCEPT**

The Project site is approximately 1.68 ha in size, consisting of four existing residential lots with a common driveway into the adjacent townhouse development with a forested area on the northern portion of the site. The Project site slopes from south to north at an average gradient of 6% towards a steep slope on the northern side of the site with an average gradient of 25%. The Project proposes the development of a 375-unit apartment building with 350m<sup>2</sup> of commercial space.

### **2. ANALYSIS**

#### **2.1. PRE-DEVELOPMENT CONDITIONS**

The Analysis will include the 250 mm municipal gravity sanitary sewer located on Georgian Drive servicing the Project site and draining west to Johnson Street, south to Hickling trail and west to sanitary pump station PS1 on Penetanguishene Road.

The Project has a design population of 1276 people (including an equivalent population of 4 people for the commercial area) and will generate 12.40 L/s of peak sanitary flow – refer for Appendix A for detailed Sanitary Design Sheet for flow calculations and Figure 2 for sanitary manhole locations.

The existing RVH generates a large percentage of the existing sanitary sewer flow in this system. Based on flow monitoring data provided by the City, the hospital contributes an average flow of approximately 15 L/s at sanitary manhole SAL08156, with a maximum recorded flow of 34.25 L/s. The analysis utilized the larger number of 34.25 L/s to analyze the worst case scenario in the sanitary trunk sewer.

The Sanitary Sewer Design Sheet shows a pre-development calculated design peak flow of 107.91 L/s at PS1. But the city completed a sanitary flow monitoring at manhole SAL08099 located near PS1 which shows a maximum peak flow of 45.99 L/s. Therefore, the monitored flow is approximately 43% of the design peak.



## **2.2. POST-DEVELOPMENT CONDITIONS**

The proposed Georgian Apartments' Sewer Design Sheet flow, based on City Design Standards, show six lengths of sewer exceed the City criteria of d/D of 0.70, with a maximum percent full of 97%.

The proposed Georgian Apartments' Calibrated Sewer Design Sheet flow, based on monitored flow, show 43% reduced design peak flow and all sewers meet the City criteria of d/D of 0.70, with a maximum percent full of 52%. A summary of results can be found in Appendix B.

## **2.3. FUTURE CONDITIONS**

The City has indicated that there is a planned RVH expansion which will generate future peak sanitary flow of about 60 L/s. under this condition and based City Design Standards, many lengths of sewer exceed the City criteria of d/D of 0.70, with a maximum percent full exceed 100% in many sewer lengths also.

Under this future planned RVH expansion, the Calibrated Sewer Design Sheet flow, based on monitored flow, shows that all sewers meet the City criteria of d/D of 0.70, with a maximum percent full of 82%.

A summary of results can be found in Appendix C.

## **2.4. HYDRAULIC DEFICIENCY**

The City has informed us that a hydraulic deficiency exists at sanitary manhole SAL08153 located at the intersection of Dunsmore Line and Johnson Street. it is believed that the RVH flow converging with the Johnson Street flow at this location creates turbulence which causes blockage at this location.

We do not believe that the addition of the Atria Project's sanitary flow will make this condition better or worse and that the city should explore ways of remediating this condition independent of this Project.

## **3. CONCLUSIONS**

As per the enclosed the existing sanitary sewer system from our Project site to pump station PS1 has adequate capacity to service our Project and future RVH expansion and meet City of Barrie hydraulic design standards.

All of which is respectfully submitted,

**PEARSON ENGINEERING LTD.**

Taylor Arkell, P. Eng.  
Senior Project Manager

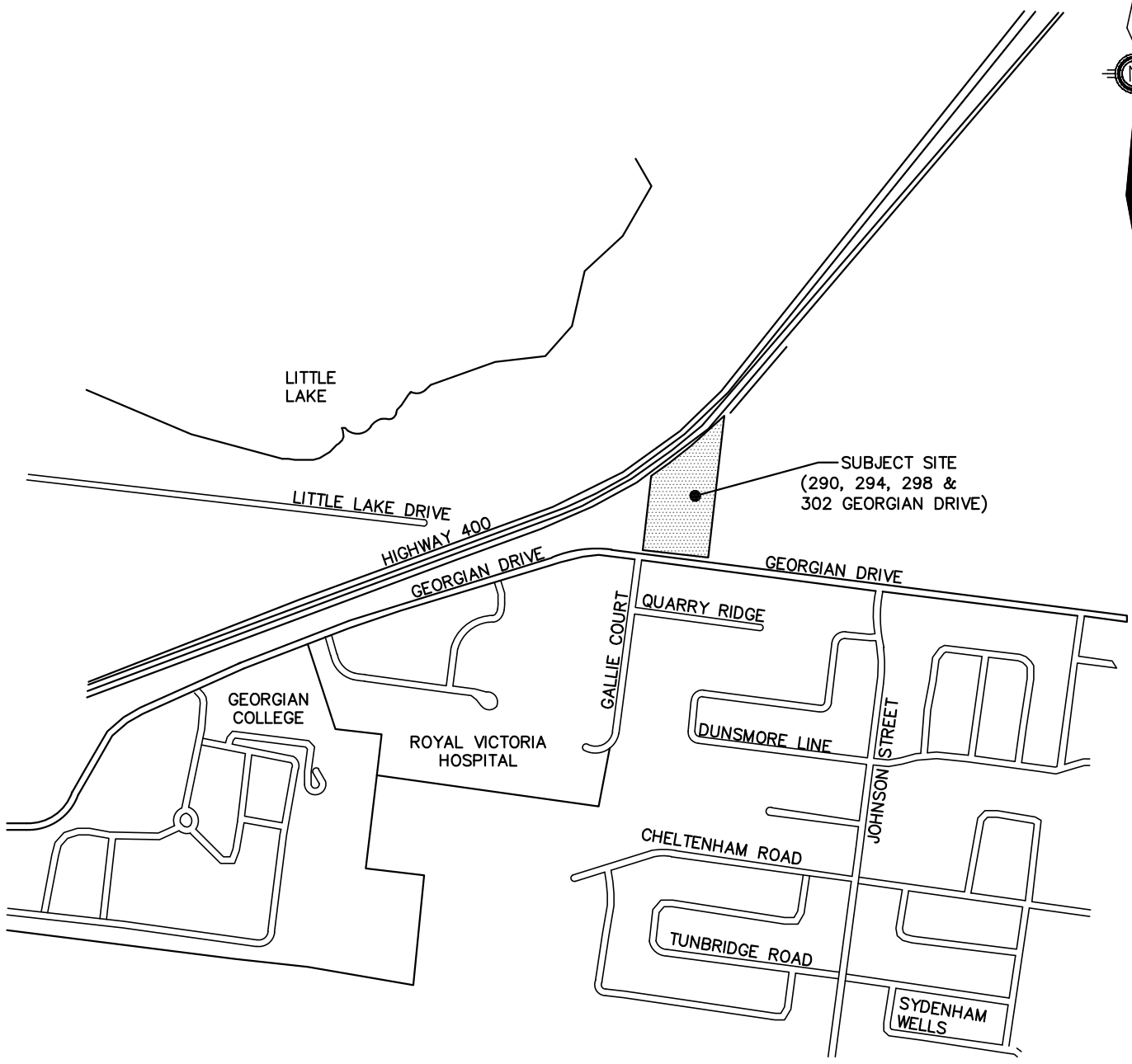
Gary Pearson, P. Eng.  
Principal



# APPENDIX A

## FIGURES

P:\Autodesk Vault\Working Folders\18037 - TMD, 290-302 Georgian Dr., Barrie\Engineering\18037-BASE.dwg Layout:FIG-1 Plotted Feb 20, 2019 @ 9:54am by mwhymot @ PEARSON ENGINEERING LTD.



**CASCADE RENTAL APARTMENTS  
290,294,298,&302 GEORGIAN DRIVE  
BARRIE, ONTARIO**

**SITE LOCATION PLAN**



**PEARSON  
ENGINEERING LTD.**  
PEARSONENG.COM PH. 705.719.4785

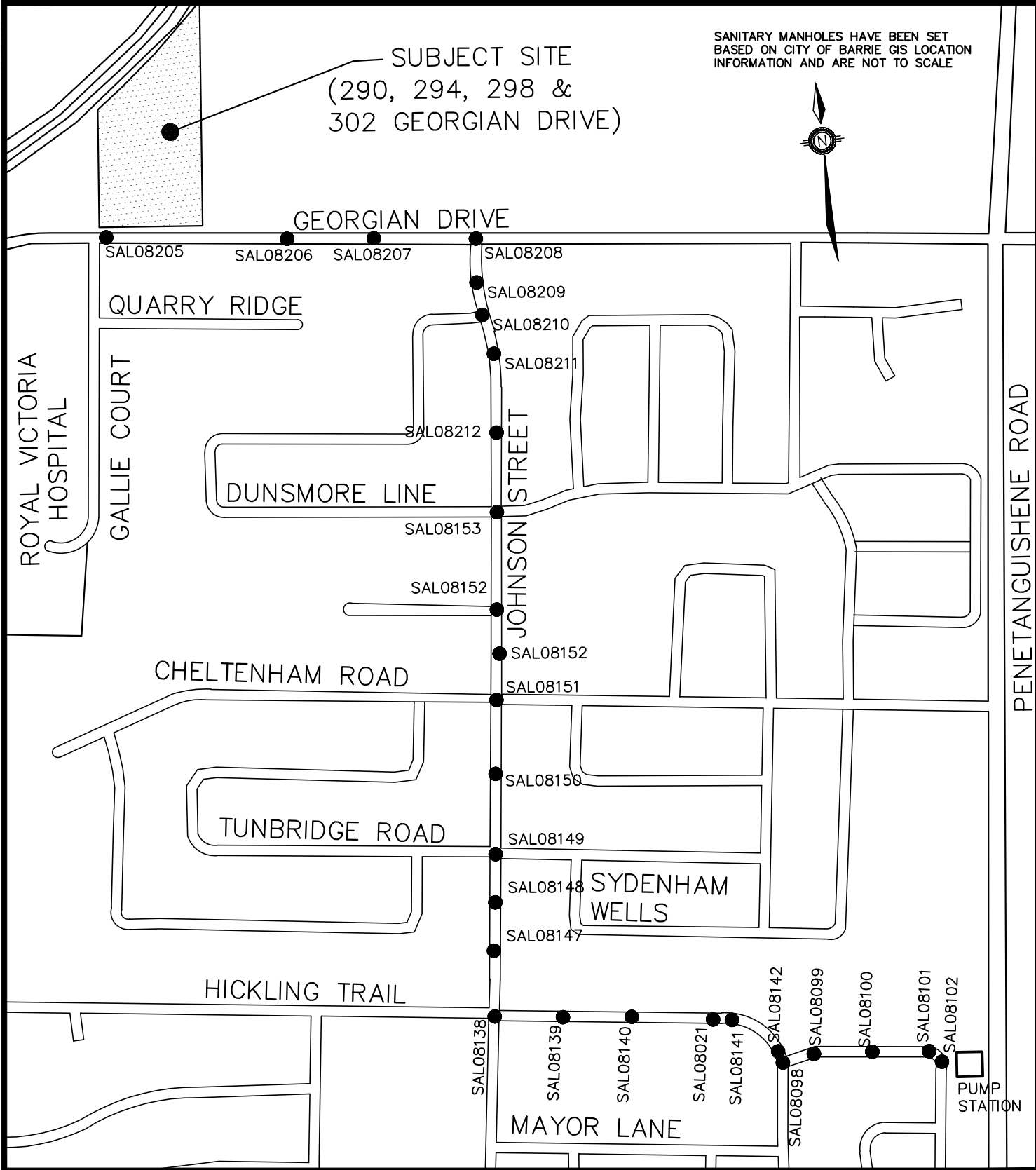
DESIGNED BY	PCO	HORIZ SCALE	NTS	PROJECT #	18037
DRAWN BY	MKRW	VERT SCALE		DRAWING #	FIG-1
CHECKED BY	GMP	DATE	SEPTEMBER 2018	REVISION #	0

P:\Autodesk Vault\Working Folders\18037 - TMD, 290-302 Georgian Dr., Barrie\Engineering\18037-BASE.dwg Layout:FIG-2 Plotted Jun 09, 2020 @ 4:35pm by tarkell @ PEARSON ENGINEERING LTD.

SANITARY MANHOLES HAVE BEEN SET  
BASED ON CITY OF BARRIE GIS LOCATION  
INFORMATION AND ARE NOT TO SCALE



SUBJECT SITE  
(290, 294, 298 &  
302 GEORGIAN DRIVE)



THE GEORGIAN APARTMENTS  
290,294,298,&302 GEORGIAN DRIVE  
BARRIE, ONTARIO

SANITARY MANHOLE  
LOCATION PLAN



**PEARSON**  
ENGINEERING LTD.

PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	TJCA	HORIZ SCALE	NTS	PROJECT #	18037
DRAWN BY	JPE	VERT SCALE		DRAWING #	FIG-2
CHECKED BY	GMP	DATE	JUNE 2020	REVISION #	0



## **APPENDIX B**

# **PRE-DEVELOPMENT CONDITIONS SANITARY SEWER DESIGN SHEET**

n=0.013

M=1+(14/(4+(P/1000)^0.5))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(I=180 l/day/mm(dia.)/km)

(includes peaking factor)

### CITY OF BARRIE SANITARY SEWER DESIGN PRE-DEVELOPMENT CONDITIONS

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Op (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES	
	FROM	TO																		
	SAL08203	SAL08204	2	3.50	7.00	7.00	4.00	0.07	40.50	40.50	0.02	0.09	250	1.31	68.08	1.39	YES	0.14	Sanitary Design Sheet information from SAL08203 to SAL08153 taken from City of Barrie for the Dunsmore Subdivision	
GEORGIAN DRIVE	SAL08204	SAL08205	4	3.50	14.00	21.00	4.00	0.22	101.40	141.90	0.07	0.29	250	0.37	36.18	0.74	YES	0.81		
	SAL08205	SAL08206	2	1.00	2.00	23.00	4.00	0.24	110.10	252.00	0.13	0.37	250	0.36	35.69	0.73	YES	1.04		
	SAL08206	SAL08207	374	1.00	374.00	397.00	4.00	4.14	109.10	361.10	0.19	4.32	250	0.39	37.14	0.76	YES	11.64		Existing Georgian Residences Development
	SAL08207	SAL08208	7	3.50	24.50	421.50	4.00	4.39	109.30	470.40	0.25	4.64	250	0.48	41.21	0.84	YES	11.25		
	ADD 2.0Ha EXTERNAL AREA @ 84cu.m/day/Ha = 1.94 L/s																			
JOHNSON STREET	SAL08208	SAL08209	4	3.50	14.00	435.50	4.00	4.54	50.10	520.50	0.27	6.75	250	2.42	92.53	1.88	YES	7.29		
	SAL08209	SAL08210	2	3.50	7.00	442.50	4.00	4.61	38.80	559.30	0.29	6.84	250	2.55	94.98	1.93	YES	7.20		
DUNSMORE LANE	SAL08219	SAL08220	6	3.50	21.00	21.00	4.00	0.22	53.00	53.00	0.03	0.25	250	0.98	58.88	1.20	YES	0.42		
	SAL08220	SAL08221	13	3.50	45.50	66.50	4.00	0.69	67.10	120.10	0.06	0.76	250	0.97	58.58	1.19	YES	1.29		
	SAL08221	SAL08222	8	3.50	28.00	94.50	4.00	0.98	68.30	188.40	0.10	1.08	250	0.81	53.53	1.09	YES	2.02		
	SAL08222	SAL08223	9	3.50	31.50	126.00	4.00	1.31	53.70	242.10	0.13	1.44	250	0.65	47.95	0.98	YES	3.00		
	SAL08223	SAL08210	0	3.50	0.00	126.00	4.00	1.31	24.00	266.10	0.14	1.45	250	0.63	47.21	0.96	YES	3.07		
JOHNSON STREET	SAL08210	SAL08211	5	3.50	17.50	586.00	3.94	6.01	48.00	873.40	0.45	8.40	250	0.54	43.71	0.89	YES	19.23		
	SAL08211	SAL08212	12	3.50	42.00	628.00	3.92	6.41	93.80	967.20	0.50	8.86	250	0.77	52.19	1.06	YES	16.97		
	SAL08212	SAL08153	6	3.50	21.00	649.00	3.91	6.61	90.30	1057.50	0.55	9.10	250	0.60	46.07	0.94	YES	19.76		
DUNSMORE LANE	SAL08219	SAL08217	22	3.20	70.40	70.40	4.00	0.73	104.00	104.00	0.05	0.79	250	1.05	60.95	1.24	YES	1.29		
	ADD 3.43 L/S FROM BUSINESS PARK (10A TO 14A)																			
DUNSMORE LANE	SAL08217	SAL08218	19	3.20	60.80	131.20	4.00	1.37	83.40	187.40	0.10	4.89	250	0.70	49.76	1.01	YES	9.84		
	SAL08218	SAL08156	58	3.20	185.60	316.80	4.00	3.30	84.30	271.70	0.14	6.87	250	0.70	49.76	1.01	YES	13.81		
	ADD 34.25 L/S FROM HOSPITAL (SAL081157 TO SAL08156)																			
DUNSMORE LANE	SAL08156	SAL08155	37	3.20	118.40	435.20	4.00	4.53	109.80	381.50	0.30	42.51	375	0.23	84.10	0.76	YES	50.55	Peak flow for RVH taken from flow monitoring data provided by City of Barrie.	
	SAL08155	SAL08154	21	3.20	67.20	502.40	3.97	5.20	105.30	486.80	0.38	43.26	375	0.23	84.10	0.76	YES	51.44		
	SAL08154	SAL08153	17	3.50	59.50	561.90	3.95	5.78	117.30	604.10	0.47	43.93	375	0.25	87.68	0.79	YES	50.10		
AMBLER BAY	SAL08246	SAL08254	12	3.50	42.00	42.00	4.00	0.44	91.60	91.60	0.05	0.49	250	2.69	97.55	1.99	YES	0.50		
	SAL08254	SAL08255	12	3.50	42.00	84.00	4.00	0.88	90.60	182.20	0.09	0.97	250	2.81	99.70	2.03	YES	0.97		
	SAL08255	SAL08257	0	3.50	0.00	84.00	4.00	0.88	22.50	204.70	0.11	0.98	250	0.67	48.69	0.99	YES	2.02		
DUNSMORE LANE	SAL08253	SAL08256	10	3.20	32.00	32.00	4.00	0.33	43.00	43.00	0.02	0.36	250	0.70	49.76	1.01	YES	0.71		
	SAL08256	SAL08257	10	3.20	32.00	64.00	4.00	0.67	40.10	83.10	0.04	0.71	250	0.65	47.95	0.98	YES	1.48		
DUNSMORE LANE	SAL08257	SAL08258	9	3.50	31.50	179.50	4.00	1.87	69.10	356.90	0.19	2.06	250	0.48	41.21	0.84	YES	4.99		
	SAL08258	SAL08153	2	3.50	7.00	186.50	4.00	1.94	27.90	384.80	0.20	2.14	250	0.29	32.03	0.65	YES	6.69		
	Length, slope, diameter of sanitary sewer from SAL08153 to PS1 taken from City of Barrie PCSWMM Model. Peak flows between SAL08153 and PS1 taken from PCSWMM model inflows and added at the corresponding manhole in the sanitary sewer design sheet.																			
JOHNSON STREET	SAL08153	SAL08152	4	3.50	14.00	1411.40	3.70	13.59	101.60	2148.00	1.68	54.89	375	0.30	95.29	0.86	YES	57.61		
	SAL08152	SAL08151							95.81	2243.81	1.75	54.97	375	0.47	120.18	1.09	YES	45.74		
	SAL08151	SAL08150							15.20	73.78	2317.59	1.81	70.22	375	0.28	93.55	0.85	YES	75.06	
	SAL08150	SAL08149							102.43	2420.02	1.89	70.30	375	0.27	91.68	0.83	YES	76.68		

n=0.013

M=1+(14/(4+(P/1000)^0.5))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(I=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**PRE-DEVELOPMENT CONDITIONS**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Op (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES	
	FROM	TO																		
	SAL08149	SAL08148						4.40	63.74	2483.76	1.94	74.75	375	0.25	87.86	0.80	NO	85.09		
	SAL08148	SAL08147							60.56	2544.32	1.99	74.80	375	0.30	95.60	0.87	YES	78.24		
	SAL08147	SAL08138							53.70	2598.02	2.44	75.25	450	0.11	95.31	0.60	YES	78.95		
HICKLING TRAIL	SAL08138	SAL08139								93.78	2691.80	2.52	75.34	450	0.32	161.28	1.01	YES	46.71	
	SAL08139	SAL08140								95.00	2786.80	2.61	75.43	450	0.31	157.55	0.99	YES	47.88	
	SAL08140	SAL08021								64.53	3518.47	3.30	76.11	450	0.33	162.67	1.02	YES	46.79	
	SAL08021	SAL08141						17.20	34.32	3552.79	3.33	93.34	450	0.17	119.23	0.75	YES	78.29		
	SAL08141	SAL08142							40.92	3593.71	3.37	93.38	450	0.44	189.12	1.19	YES	49.38		
	SAL08142	SAL08098							30.43	3624.14	3.40	93.41	450	0.72	242.45	1.52	YES	38.53		
ROSENFELD DRIVE	SAL08098	SAL08099						13.50	40.11	3828.48	3.59	107.10	450	0.57	215.93	1.36	YES	49.60		
	SAL08099	SAL08100							61.69	3890.17	3.65	107.16	450	0.45	192.11	1.21	YES	55.78	Peak flow at manhole SAL08099 is 45.99 L/s according to flow monitoring data provided by City of Barrie, which is approximately 43% of the calculated peak flow. The larger peak flow was utilized to be conservative.	
	SAL08100	SAL08101							69.41	3959.58	3.71	107.23	450	0.33	164.14	1.03	YES	65.32		
	SAL08101	SAL08102							18.02	3977.60	3.73	107.24	450	0.44	189.99	1.19	YES	56.45		
	SAL08102	SAL08103							36.08	4013.68	3.76	107.28	450	0.30	157.45	0.99	YES	68.14		
	SAL08103	PS1							7.05	4020.73	4.40	107.91	525	33.48	2488.58	11.50	YES	4.34		



## APPENDIX C

# POST-DEVELOPMENT CONDITIONS SANITARY SEWER DESIGN SHEET

## 290, 294, 298, & 302 Georgian Drive Sanitary Flow Calculations

### Design Criteria

Flow per capita (Q): 225 L/cap/day  
 Peak Flow  $Q_p = P * Q * M / 86400$   
 Peaking Factor (Harmon Formula)  $M = 1 + ( 14 / ( 4 + ( P / 1(2 <= "M" <= 4$

### Site Data

Description	Density	Units	Flow Rate
1 Bedroom/Studio	2.0 person/unit	179 Units	225 L/cap/d
2 Bedroom	4.0 person/unit	146 Units	225 L/cap/d
3 Bedroom	6.0 person/unit	50 Units	225 L/cap/d
Town Houses	6.0 person/unit	5 Units	255 L/person
Commercial	350.0 m <sup>2</sup>		28 m <sup>3</sup> /day/ha

Equivalent Population  
for Commercial =  
 =  $\frac{350.0 \text{ m}^2 \times 28 \text{ m}^3/\text{day/ha}}{980.0 \text{ L/day}}$   
 =  $\frac{9800 \text{ L/day}}{225.0 \text{ L/cap/d}}$   
 = 4 cap

### Calculate Population

Pop. =  $2.0 \times 179 + 4.0 \times 146 + 6.0 \times 50 + 6.0 \times 5$   
 Pop. = 1272 people

Equivalent Population Including Commerc = 1276 people

### Calculate Average Daily Flows

ADF =  $\frac{225 \times 1272 + 350.0 \times 28}{86400}$   
 ADF = 3.32 L/s

### Calculate Peaking Factor

M =  $1 + \frac{14}{4 + \frac{1272^{0.5}}{1,000}}$   
 M = 3.73

### Calculate Peak Flow

Qp =  $3.32 \times 3.73$   
 = 12.40 L/s

Sanitary Pipe Capacity - 200mm @ 1.0% = 33 L/s

n=0.013

$M=1+(14/(4+(P/1000)^{0.5}))$

$(2 \leq "M" \leq 4)$

$Q_p=P^*Q^*M/86400$

$(Q=225 \text{ l/day/person})$

$Q_i=L/1000^*I^*DIAMETER/86400$

$(I=180 \text{ l/day/mm(dia.)/km})$

(includes peaking factor)

### CITY OF BARRIE SANITARY SEWER DESIGN POST-DEVELOPMENT CONDITIONS CALCULATED PEAK FLOW

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

$Q_{tot}=Q_p+Q_i$

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08203	SAL08204	2	3.50	7.00	7.00	4.00	0.07	40.50	40.50	0.02	0.09	250	1.31	68.08	1.39	YES	0.14	Sanitary Design Sheet information from SAL08203 to SAL08153 taken from City of Barrie for the Dunsmore Subdivision
GEORGIAN DRIVE	SAL08204	SAL08205	4	3.50	14.00	21.00	4.00	0.22	101.40	141.90	0.07	0.29	250	0.37	36.18	0.74	YES	0.81	
	SAL08205	SAL08206	1276	1.00	1276.00	1297.00	3.72	12.58	110.10	252.00	0.13	12.71	250	0.36	35.69	0.73	YES	35.62	Proposed Georgian Apartments Development. Highlighted rows represent the travel path of the additional flow from the proposed development.
	SAL08206	SAL08207	374	1.00	374.00	1671.00	3.65	15.86	109.10	361.10	0.19	16.05	250	0.39	37.14	0.76	YES	43.21	Existing Georgian Residences Development
	SAL08207	SAL08208	7	3.50	24.50	1695.50	3.64	16.07	109.30	470.40	0.25	16.32	250	0.48	41.21	0.84	YES	39.60	
	ADD 2.0Ha EXTERNAL AREA @ 84cu.m/day/Ha = 1.94 L/s																		
JOHNSON STREET	SAL08208	SAL08209	4	3.50	14.00	1709.50	3.64	16.19	50.10	520.50	0.27	18.41	250	2.42	92.53	1.88	YES	19.89	
	SAL08209	SAL08210	2	3.50	7.00	1716.50	3.64	16.26	38.80	559.30	0.29	18.49	250	2.55	94.98	1.93	YES	19.46	
DUNSMORE LANE	SAL08219	SAL08220	6	3.50	21.00	21.00	4.00	0.22	53.00	53.00	0.03	0.25	250	0.98	58.88	1.20	YES	0.42	
	SAL08220	SAL08221	13	3.50	45.50	66.50	4.00	0.69	67.10	120.10	0.06	0.76	250	0.97	58.58	1.19	YES	1.29	
	SAL08221	SAL08222	8	3.50	28.00	94.50	4.00	0.98	68.30	188.40	0.10	1.08	250	0.81	53.53	1.09	YES	2.02	
	SAL08222	SAL08223	9	3.50	31.50	126.00	4.00	1.31	53.70	242.10	0.13	1.44	250	0.65	47.95	0.98	YES	3.00	
	SAL08223	SAL08210	0	3.50	0.00	126.00	4.00	1.31	24.00	266.10	0.14	1.45	250	0.63	47.21	0.96	YES	3.07	
JOHNSON STREET	SAL08210	SAL08211	5	3.50	17.50	1860.00	3.61	17.49	48.00	873.40	0.45	19.88	250	0.54	43.71	0.89	YES	45.49	
	SAL08211	SAL08212	12	3.50	42.00	1902.00	3.60	17.84	93.80	967.20	0.50	20.29	250	0.77	52.19	1.06	YES	38.87	
	SAL08212	SAL08153	6	3.50	21.00	1923.00	3.60	18.02	90.30	1057.50	0.55	20.51	250	0.60	46.07	0.94	YES	44.53	
DUNSMORE LANE	SAL08219	SAL08217	22	3.20	70.40	70.40	4.00	0.73	104.00	104.00	0.05	0.79	250	1.05	60.95	1.24	YES	1.29	
	ADD 3.43 L/S FROM BUSINESS PARK (10A TO 14A)																		
DUNSMORE LANE	SAL08217	SAL08218	19	3.20	60.80	131.20	4.00	1.37	83.40	187.40	0.10	4.89	250	0.70	49.76	1.01	YES	9.84	
	SAL08218	SAL08156	58	3.20	185.60	316.80	4.00	3.30	84.30	271.70	0.14	6.87	250	0.70	49.76	1.01	YES	13.81	
	ADD 34.25.0 L/S FROM HOSPITAL (SAL081157 TO SAL08156)																		
DUNSMORE LANE	SAL08156	SAL08155	37	3.20	118.40	435.20	4.00	4.53	109.80	381.50	0.30	42.51	375	0.23	84.10	0.76	YES	50.55	
	SAL08155	SAL08154	21	3.20	67.20	502.40	3.97	5.20	105.30	486.80	0.38	43.26	375	0.23	84.10	0.76	YES	51.44	
	SAL08154	SAL08153	17	3.50	59.50	561.90	3.95	5.78	117.30	604.10	0.47	43.93	375	0.25	87.68	0.79	YES	50.10	
AMBLER BAY	SAL08246	SAL08254	12	3.50	42.00	42.00	4.00	0.44	91.60	91.60	0.05	0.49	250	2.69	97.55	1.99	YES	0.50	
	SAL08254	SAL08255	12	3.50	42.00	84.00	4.00	0.88	90.60	182.20	0.09	0.97	250	2.81	99.70	2.03	YES	0.97	
	SAL08255	SAL08257	0	3.50	0.00	84.00	4.00	0.88	22.50	204.70	0.11	0.98	250	0.67	48.69	0.99	YES	2.02	
DUNSMORE LANE	SAL08253	SAL08256	10	3.20	32.00	32.00	4.00	0.33	43.00	43.00	0.02	0.36	250	0.70	49.76	1.01	YES	0.71	
	SAL08256	SAL08257	10	3.20	32.00	64.00	4.00	0.67	40.10	83.10	0.04	0.71	250	0.65	47.95	0.98	YES	1.48	
DUNSMORE LANE	SAL08257	SAL08258	9	3.50	31.50	179.50	4.00	1.87	69.10	356.90	0.19	2.06	250	0.48	41.21	0.84	YES	4.99	
	SAL08258	SAL08153	2	3.50	7.00	186.50	4.00	1.94	27.90	384.80	0.20	2.14	250	0.29	32.03	0.65	YES	6.69	
	Length, slope, diameter of sanitary sewer from SAL08153 to PS1 taken from City of Barrie PCSWMM Model. Peak flows between SAL08153 and PS1 taken from PCSWMM model inflows and added at the corresponding manhole in the sanitary sewer design sheet.																		
JOHNSON STREET	SAL08153	SAL08152	4	3.50	14.00	2685.40	3.48	24.36	101.60	2148.00	1.68	65.65	375	0.30	95.29	0.86	YES	68.90	
	SAL08152	SAL08151							95.81			65.65	375	0.47	120.18	1.09	YES	54.63	

n=0.013

$M=1+(14/(4+(P/1000)^{0.5}))$

( $2 \leq M \leq 4$ )

$Q_p=P \cdot Q \cdot M/86400$

( $Q=225$  l/day/person)

$Q_i=L/1000 \cdot I \cdot \text{DIAMETER}/86400$

( $I=180$  l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**POST-DEVELOPMENT CONDITIONS**  
**CALCULATED PEAK FLOW**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

$Q_{tot}=Q_p+Q_i$

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08151	SAL08150						15.20	73.78			80.85	375	0.28	93.55	0.85	NO	86.42	
	SAL08150	SAL08149							102.43			80.85	375	0.27	91.68	0.83	NO	88.19	
	SAL08149	SAL08148					4.40		63.74			85.25	375	0.25	87.86	0.80	NO	97.04	
	SAL08148	SAL08147							60.56			85.25	375	0.30	95.60	0.87	NO	89.18	
	SAL08147	SAL08138							53.70			85.25	450	0.11	95.31	0.60	NO	89.45	
HICKLING TRAIL	SAL08138	SAL08139							93.78			85.25	450	0.32	161.28	1.01	YES	52.96	
	SAL08139	SAL08140							95.00			85.25	450	0.31	157.55	0.99	YES	54.11	
	SAL08140	SAL08021							64.53			85.25	450	0.33	162.67	1.02	YES	52.41	
	SAL08021	SAL08141					17.20		34.32			102.45	450	0.17	119.23	0.75	NO	85.93	
	SAL08141	SAL08142							40.92			102.45	450	0.44	189.12	1.19	YES	54.17	
	SAL08142	SAL08098							30.43			102.45	450	0.72	242.45	1.52	YES	42.26	
ROSENFELD DRIVE	SAL08098	SAL08099						13.50	40.11			115.95	450	0.57	215.93	1.36	YES	53.70	
	SAL08099	SAL08100							61.69			115.95	450	0.45	192.11	1.21	YES	60.36	Peak flow at manhole SAL08099 is 45.99 L/s according to flow monitoring data provided by City of Barrie, which is approximately 43% of the calculated peak flow. The larger peak flow was utilized to be conservative.
	SAL08100	SAL08101							69.41			115.95	450	0.33	164.14	1.03	YES	70.64	
	SAL08101	SAL08102							18.02			115.95	450	0.44	189.99	1.19	YES	61.03	
	SAL08102	SAL08103							36.08			115.95	450	0.30	157.45	0.99	YES	73.65	
	SAL08103	PS1							7.05			115.95	525	33.48	2488.58	11.50	YES	4.66	

n=0.013

$M=1+(14/(4+(P/1000)^{0.5}))$

$(2 \leq "M" \leq 4)$

$Q_p=P^Q \cdot M/86400$

$(Q=225 \text{ l/day/person})$

$Q_i=L/1000 \cdot I \cdot \text{DIAMETER}/86400$

$(I=180 \text{ l/day/mm(dia.)/km})$

(includes peaking factor)

### CITY OF BARRIE SANITARY SEWER DESIGN POST-DEVELOPMENT CONDITIONS CALIBRATED USING FLOW MONITORING DATA

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

$Q_{tot}=Q_p+Q_i$

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08203	SAL08204	2	3.50	7.00	7.00	4.00	0.07	40.50	40.50	0.02	0.09	250	1.31	68.08	1.39	YES	0.14	Sanitary Design Sheet information from SAL08203 to SAL08153 taken from City of Barrie for the Dunsmore Subdivision
GEORGIAN DRIVE	SAL08204	SAL08205	4	3.50	14.00	21.00	4.00	0.22	101.40	141.90	0.07	0.29	250	0.37	36.18	0.74	YES	0.81	
	SAL08205	SAL08206	1276	1.00	1276.00	1297.00	3.72	12.58	110.10	252.00	0.13	12.71	250	0.36	35.69	0.73	YES	35.62	Proposed Georgian Apartments Development. Highlighted rows represent the travel path of the additional flow from the proposed development.
	SAL08206	SAL08207	374	1.00	374.00	1671.00	3.65	15.86	109.10	361.10	0.19	16.05	250	0.39	37.14	0.76	YES	43.21	Existing Georgian Residences Development
	SAL08207	SAL08208	7	3.50	24.50	1695.50	3.64	16.07	109.30	470.40	0.25	16.32	250	0.48	41.21	0.84	YES	39.60	
			ADD 2.0Ha EXTERNAL AREA @ 84cu.m/day/Ha = 1.94 L/s																
JOHNSON STREET	SAL08208	SAL08209	4	3.50	14.00	1709.50	3.64	16.19	50.10	520.50	0.27	18.41	250	2.42	92.53	1.88	YES	19.89	
	SAL08209	SAL08210	2	3.50	7.00	1716.50	3.64	16.26	38.80	559.30	0.29	18.49	250	2.55	94.98	1.93	YES	19.46	
DUNSMORE LANE	SAL08219	SAL08220	6	3.50	21.00	21.00	4.00	0.22	53.00	53.00	0.03	0.25	250	0.98	58.88	1.20	YES	0.42	
	SAL08220	SAL08221	13	3.50	45.50	66.50	4.00	0.69	67.10	120.10	0.06	0.76	250	0.97	58.58	1.19	YES	1.29	
	SAL08221	SAL08222	8	3.50	28.00	94.50	4.00	0.98	68.30	188.40	0.10	1.08	250	0.81	53.53	1.09	YES	2.02	
	SAL08222	SAL08223	9	3.50	31.50	126.00	4.00	1.31	53.70	242.10	0.13	1.44	250	0.65	47.95	0.98	YES	3.00	
	SAL08223	SAL08210	0	3.50	0.00	126.00	4.00	1.31	24.00	266.10	0.14	1.45	250	0.63	47.21	0.96	YES	3.07	
JOHNSON STREET	SAL08210	SAL08211	5	3.50	17.50	1860.00	3.61	17.49	48.00	873.40	0.45	19.88	250	0.54	43.71	0.89	YES	45.49	
	SAL08211	SAL08212	12	3.50	42.00	1902.00	3.60	17.84	93.80	967.20	0.50	20.29	250	0.77	52.19	1.06	YES	38.87	
	SAL08212	SAL08153	6	3.50	21.00	1923.00	3.60	18.02	90.30	1057.50	0.55	20.51	250	0.60	46.07	0.94	YES	44.53	
DUNSMORE LANE	SAL08219	SAL08217	22	3.20	70.40	70.40	4.00	0.73	104.00	104.00	0.05	0.79	250	1.05	60.95	1.24	YES	1.29	
			ADD 3.43 L/S FROM BUSINESS PARK (10A TO 14A)																
DUNSMORE LANE	SAL08217	SAL08218	19	3.20	60.80	131.20	4.00	1.37	83.40	187.40	0.10	4.89	250	0.70	49.76	1.01	YES	9.84	
	SAL08218	SAL08156	58	3.20	185.60	316.80	4.00	3.30	84.30	271.70	0.14	6.87	250	0.70	49.76	1.01	YES	13.81	
			ADD 34.25.0 L/S FROM HOSPITAL (SAL081157 TO SAL08156)																
DUNSMORE LANE	SAL08156	SAL08155	37	3.20	118.40	435.20	4.00	4.53	109.80	381.50	0.30	42.51	375	0.23	84.10	0.76	YES	50.55	
	SAL08155	SAL08154	21	3.20	67.20	502.40	3.97	5.20	105.30	486.80	0.38	43.26	375	0.23	84.10	0.76	YES	51.44	
	SAL08154	SAL08153	17	3.50	59.50	561.90	3.95	5.78	117.30	604.10	0.47	43.93	375	0.25	87.68	0.79	YES	50.10	
AMBLER BAY	SAL08246	SAL08254	12	3.50	42.00	42.00	4.00	0.44	91.60	91.60	0.05	0.49	250	2.69	97.55	1.99	YES	0.50	
	SAL08254	SAL08255	12	3.50	42.00	84.00	4.00	0.88	90.60	182.20	0.09	0.97	250	2.81	99.70	2.03	YES	0.97	
	SAL08255	SAL08257	0	3.50	0.00	84.00	4.00	0.88	22.50	204.70	0.11	0.98	250	0.67	48.69	0.99	YES	2.02	
DUNSMORE LANE	SAL08253	SAL08256	10	3.20	32.00	32.00	4.00	0.33	43.00	43.00	0.02	0.36	250	0.70	49.76	1.01	YES	0.71	
	SAL08256	SAL08257	10	3.20	32.00	64.00	4.00	0.67	40.10	83.10	0.04	0.71	250	0.65	47.95	0.98	YES	1.48	
DUNSMORE LANE	SAL08257	SAL08258	9	3.50	31.50	179.50	4.00	1.87	69.10	356.90	0.19	2.06	250	0.48	41.21	0.84	YES	4.99	
	SAL08258	SAL08153	2	3.50	7.00	186.50	4.00	1.94	27.90	384.80	0.20	2.14	250	0.29	32.03	0.65	YES	6.69	
			Length, slope, diameter of sanitary sewer from SAL08153 to PS1 taken from City of Barrie PCSWMM Model. Peak flows between SAL08153 and PS1 taken from PCSWMM model inflows and added at the corresponding manhole in the sanitary sewer design sheet.																
JOHNSON STREET	SAL08153	SAL08152	4	3.50	14.00	2685.40	3.48		101.60	2148.00	1.68	45.99	375	0.30	95.29	0.86	YES	48.26	
	SAL08152	SAL08151							95.81			45.99	375	0.47	120.18	1.09	YES	38.27	

n=0.013

M=1+(14/(4+(P/1000)<sup>0.5</sup>))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(l=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**POST-DEVELOPMENT CONDITIONS**  
**CALIBRATED USING FLOW MONITORING DATA**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08151	SAL08150							73.78			45.99	375	0.28	93.55	0.85	YES	49.16	
	SAL08150	SAL08149							102.43			45.99	375	0.27	91.68	0.83	YES	50.16	
	SAL08149	SAL08148							63.74			45.99	375	0.25	87.86	0.80	YES	52.35	
	SAL08148	SAL08147							60.56			45.99	375	0.30	95.60	0.87	YES	48.11	
	SAL08147	SAL08138							53.70			45.99	450	0.11	95.31	0.60	YES	48.25	
HICKLING TRAIL	SAL08138	SAL08139							93.78			45.99	450	0.32	161.28	1.01	YES	28.52	
	SAL08139	SAL08140							95.00			45.99	450	0.31	157.55	0.99	YES	29.19	
	SAL08140	SAL08021							64.53			45.99	450	0.33	162.67	1.02	YES	28.27	
	SAL08021	SAL08141							34.32			45.99	450	0.17	119.23	0.75	YES	38.57	
	SAL08141	SAL08142							40.92			45.99	450	0.44	189.12	1.19	YES	24.32	
	SAL08142	SAL08098							30.43			45.99	450	0.72	242.45	1.52	YES	18.97	
ROSENFELD DRIVE	SAL08098	SAL08099							40.11			45.99	450	0.57	215.93	1.36	YES	21.30	
	SAL08099	SAL08100							61.69			45.99	450	0.45	192.11	1.21	YES	23.94	Peak flow at manhole SAL08099 is 45.99 L/s according to flow monitoring data provided by City of Barrie, which was applied to the trunk sewer between manholes SAL08153 and SAL08099.
	SAL08100	SAL08101							69.41			45.99	450	0.33	164.14	1.03	YES	28.02	
	SAL08101	SAL08102							18.02			45.99	450	0.44	189.99	1.19	YES	24.21	
	SAL08102	SAL08103							36.08			45.99	450	0.30	157.45	0.99	YES	29.21	
	SAL08103	PS1							7.05			45.99	525	33.48	2488.58	11.50	YES	1.85	



## APPENDIX D

# FUTURE CONDITIONS SANITARY SEWER DESIGN SHEET

n=0.013

M=1+(14/(4+(P/1000)^0.5))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(I=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**FUTURE CONDITIONS (DOUBLE HOSPITAL FLOW)**  
**CALCULATED PEAK FLOW**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08203	SAL08204	2	3.50	7.00	7.00	4.00	0.07	40.50	40.50	0.02	0.09	250	1.31	68.08	1.39	YES	0.14	Sanitary Design Sheet information from SAL08203 to SAL08153 taken from City of Barrie for the Dunsmore Subdivision
GEORGIAN DRIVE	SAL08204	SAL08205	4	3.50	14.00	21.00	4.00	0.22	101.40	141.90	0.07	0.29	250	0.37	36.18	0.74	YES	0.81	
	SAL08205	SAL08206	1276	1.00	1276.00	1297.00	3.72	12.58	110.10	252.00	0.13	12.71	250	0.36	35.69	0.73	YES	35.62	Proposed Georgian Apartments Development. Highlighted rows represent the travel path of the additional flow from the proposed development.
	SAL08206	SAL08207	374	1.00	374.00	1671.00	3.65	15.86	109.10	361.10	0.19	16.05	250	0.39	37.14	0.76	YES	43.21	
	SAL08207	SAL08208	7	3.50	24.50	1695.50	3.64	16.07	109.30	470.40	0.25	16.32	250	0.48	41.21	0.84	YES	39.60	Existing Georgian Residences Development
	ADD 2.0Ha EXTERNAL AREA @ 84cu.m/day/Ha = 1.94 L/s																		
JOHNSON STREET	SAL08208	SAL08209	4	3.50	14.00	1709.50	3.64	16.19	50.10	520.50	0.27	18.41	250	2.42	92.53	1.88	YES	19.89	
	SAL08209	SAL08210	2	3.50	7.00	1716.50	3.64	16.26	38.80	559.30	0.29	18.49	250	2.55	94.98	1.93	YES	19.46	
DUNSMORE LANE	SAL08219	SAL08220	6	3.50	21.00	21.00	4.00	0.22	53.00	53.00	0.03	0.25	250	0.98	58.88	1.20	YES	0.42	
	SAL08220	SAL08221	13	3.50	45.50	66.50	4.00	0.69	67.10	120.10	0.06	0.76	250	0.97	58.58	1.19	YES	1.29	
	SAL08221	SAL08222	8	3.50	28.00	94.50	4.00	0.98	68.30	188.40	0.10	1.08	250	0.81	53.53	1.09	YES	2.02	
	SAL08222	SAL08223	9	3.50	31.50	126.00	4.00	1.31	53.70	242.10	0.13	1.44	250	0.65	47.95	0.98	YES	3.00	
	SAL08223	SAL08210	0	3.50	0.00	126.00	4.00	1.31	24.00	266.10	0.14	1.45	250	0.63	47.21	0.96	YES	3.07	
JOHNSON STREET	SAL08210	SAL08211	5	3.50	17.50	1860.00	3.61	17.49	48.00	873.40	0.45	19.88	250	0.54	43.71	0.89	YES	45.49	
	SAL08211	SAL08212	12	3.50	42.00	1902.00	3.60	17.84	93.80	967.20	0.50	20.29	250	0.77	52.19	1.06	YES	38.87	
	SAL08212	SAL08153	6	3.50	21.00	1923.00	3.60	18.02	90.30	1057.50	0.55	20.51	250	0.60	46.07	0.94	YES	44.53	
DUNSMORE LANE	SAL08219	SAL08217	22	3.20	70.40	70.40	4.00	0.73	104.00	104.00	0.05	0.79	250	1.05	60.95	1.24	YES	1.29	
	ADD 3.43 L/S FROM BUSINESS PARK (10A TO 14A)																		
DUNSMORE LANE	SAL08217	SAL08218	19	3.20	60.80	131.20	4.00	1.37	83.40	187.40	0.10	4.89	250	0.70	49.76	1.01	YES	9.84	
	SAL08218	SAL08156	58	3.20	185.60	316.80	4.00	3.30	84.30	271.70	0.14	6.87	250	0.70	49.76	1.01	YES	13.81	
	ADD 60.0 L/S FROM HOSPITAL (SAL081157 TO SAL08156)																		
DUNSMORE LANE	SAL08156	SAL08155	37	3.20	118.40	435.20	4.00	4.53	109.80	381.50	0.30	68.26	375	0.23	84.10	0.76	YES	81.17	Peak flow for RVH taken as double the value from flow monitoring data provided by City of Barrie.
	SAL08155	SAL08154	21	3.20	67.20	502.40	3.97	5.20	105.30	486.80	0.38	69.01	375	0.23	84.10	0.76	YES	82.06	
	SAL08154	SAL08153	17	3.50	59.50	561.90	3.95	5.78	117.30	604.10	0.47	69.68	375	0.25	87.68	0.79	YES	79.47	
AMBLER BAY	SAL08254	SAL08255	12	3.50	42.00	84.00	4.00	0.88	90.60	182.20	0.09	0.97	250	2.81	99.70	2.03	YES	0.97	
	SAL08255	SAL08257	0	3.50	0.00	84.00	4.00	0.88	22.50	204.70	0.11	0.98	250	0.67	48.69	0.99	YES	2.02	
DUNSMORE LANE	SAL08253	SAL08256	10	3.20	32.00	32.00	4.00	0.33	43.00	43.00	0.02	0.36	250	0.70	49.76	1.01	YES	0.71	
	SAL08256	SAL08257	10	3.20	32.00	64.00	4.00	0.67	40.10	83.10	0.04	0.71	250	0.65	47.95	0.98	YES	1.48	
DUNSMORE LANE	SAL08257	SAL08258	9	3.50	31.50	179.50	4.00	1.87	69.10	356.90	0.19	2.06	250	0.48	41.21	0.84	YES	4.99	
	SAL08258	SAL08153	2	3.50	7.00	186.50	4.00	1.94	27.90	384.80	0.20	2.14	250	0.29	32.03	0.65	YES	6.69	
	Length, slope, diameter of sanitary sewer from SAL08153 to PS1 taken from City of Barrie PCSWMM Model. Peak flows between SAL08153 and PS1 taken from PCSWMM model inflows and added at the corresponding manhole in the sanitary sewer design sheet.																		

n=0.013

M=1+(14/(4+(P/1000)<sup>0.5</sup>))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(I=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**FUTURE CONDITIONS (DOUBLE HOSPITAL FLOW)**  
**CALCULATED PEAK FLOW**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
JOHNSON STREET	SAL08153	SAL08152	4	3.50	14.00	2685.40	3.48	24.36	101.60	2148.00	1.68	91.40	375	0.30	95.29	0.86	NO	95.92	
	SAL08152	SAL08151							95.81			91.40	375	0.47	120.18	1.09	YES	76.06	
	SAL08151	SAL08150						15.20	73.78			106.60	375	0.28	93.55	0.85	NO	113.95	
	SAL08150	SAL08149							102.43			106.60	375	0.27	91.68	0.83	NO	116.27	
	SAL08149	SAL08148					4.40		63.74			111.00	375	0.25	87.86	0.80	NO	126.35	
	SAL08148	SAL08147							60.56			111.00	375	0.30	95.60	0.87	NO	116.11	
	SAL08147	SAL08138							53.70			111.00	450	0.11	95.31	0.60	NO	116.46	
HICKLING TRAIL	SAL08138	SAL08139							93.78			111.00	450	0.32	161.28	1.01	YES	68.83	
	SAL08139	SAL08140							95.00			111.00	450	0.31	157.55	0.99	YES	70.46	
	SAL08140	SAL08021							64.53			111.00	450	0.33	162.67	1.02	YES	68.24	
	SAL08021	SAL08141					17.20		34.32			128.20	450	0.17	119.23	0.75	NO	107.53	
	SAL08141	SAL08142							40.92			128.20	450	0.44	189.12	1.19	YES	67.79	
	SAL08142	SAL08098							30.43			128.20	450	0.72	242.45	1.52	YES	52.88	
ROSENFELD DRIVE	SAL08098	SAL08099						13.50	40.11			141.70	450	0.57	215.93	1.36	YES	65.63	
	SAL08099	SAL08100							61.69			141.70	450	0.45	192.11	1.21	YES	73.76	Peak flow at manhole SAL08099 is 45.99 L/s according to flow monitoring data provided by City of Barrie, which is approximately 43% of the calculated peak flow. The larger peak flow was utilized to be conservative.
	SAL08100	SAL08101							69.41			141.70	450	0.33	164.14	1.03	NO	86.33	
	SAL08101	SAL08102							18.02			141.70	450	0.44	189.99	1.19	YES	74.58	
	SAL08102	SAL08103							36.08			141.70	450	0.30	157.45	0.99	NO	90.00	
	SAL08103	PS1							7.05			141.70	525	33.48	2488.58	11.50	YES	5.69	

n=0.013

M=1+(14/(4+(P/1000)<sup>0.5</sup>))

(2<= "M" <=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(I=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**FUTURE CONDITIONS (DOUBLE HOSPITAL FLOW)**  
**CALIBRATED USING FLOW MONITORING DATA**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08203	SAL08204	2	3.50	7.00	7.00	4.00	0.07	40.50	40.50	0.02	0.09	250	1.31	68.08	1.39	YES	0.14	Sanitary Design Sheet information from SAL08203 to SAL08153 taken from City of Barrie for the Dunsmore Subdivision
GEORGIAN DRIVE	SAL08204	SAL08205	4	3.50	14.00	21.00	4.00	0.22	101.40	141.90	0.07	0.29	250	0.37	36.18	0.74	YES	0.81	
	SAL08205	SAL08206	1276	1.00	1276.00	1297.00	3.72	12.58	110.10	252.00	0.13	12.71	250	0.36	35.69	0.73	YES	35.62	Proposed Georgian Apartments Development. Highlighted rows represent the travel path of the additional flow from the proposed development.
	SAL08206	SAL08207	374	1.00	374.00	1671.00	3.65	15.86	109.10	361.10	0.19	16.05	250	0.39	37.14	0.76	YES	43.21	Existing Georgian Residences Development
	SAL08207	SAL08208	7	3.50	24.50	1695.50	3.64	16.07	109.30	470.40	0.25	16.32	250	0.48	41.21	0.84	YES	39.60	
	ADD 2.0Ha EXTERNAL AREA @ 84cu.m/day/Ha = 1.94 L/s																		
JOHNSON STREET	SAL08208	SAL08209	4	3.50	14.00	1709.50	3.64	16.19	50.10	520.50	0.27	18.41	250	2.42	92.53	1.88	YES	19.89	
	SAL08209	SAL08210	2	3.50	7.00	1716.50	3.64	16.26	38.80	559.30	0.29	18.49	250	2.55	94.98	1.93	YES	19.46	
DUNSMORE LANE	SAL08219	SAL08220	6	3.50	21.00	21.00	4.00	0.22	53.00	53.00	0.03	0.25	250	0.98	58.88	1.20	YES	0.42	
	SAL08220	SAL08221	13	3.50	45.50	66.50	4.00	0.69	67.10	120.10	0.06	0.76	250	0.97	58.58	1.19	YES	1.29	
	SAL08221	SAL08222	8	3.50	28.00	94.50	4.00	0.98	68.30	188.40	0.10	1.08	250	0.81	53.53	1.09	YES	2.02	
	SAL08222	SAL08223	9	3.50	31.50	126.00	4.00	1.31	53.70	242.10	0.13	1.44	250	0.65	47.95	0.98	YES	3.00	
	SAL08223	SAL08210	0	3.50	0.00	126.00	4.00	1.31	24.00	266.10	0.14	1.45	250	0.63	47.21	0.96	YES	3.07	
JOHNSON STREET	SAL08210	SAL08211	5	3.50	17.50	1860.00	3.61	17.49	48.00	873.40	0.45	19.88	250	0.54	43.71	0.89	YES	45.49	
	SAL08211	SAL08212	12	3.50	42.00	1902.00	3.60	17.84	93.80	967.20	0.50	20.29	250	0.77	52.19	1.06	YES	38.87	
	SAL08212	SAL08153	6	3.50	21.00	1923.00	3.60	18.02	90.30	1057.50	0.55	20.51	250	0.60	46.07	0.94	YES	44.53	
DUNSMORE LANE	SAL08219	SAL08217	22	3.20	70.40	70.40	4.00	0.73	104.00	104.00	0.05	0.79	250	1.05	60.95	1.24	YES	1.29	
	ADD 3.43 L/S FROM BUSINESS PARK (10A TO 14A)																		
DUNSMORE LANE	SAL08217	SAL08218	19	3.20	60.80	131.20	4.00	1.37	83.40	187.40	0.10	4.89	250	0.70	49.76	1.01	YES	9.84	
	SAL08218	SAL08156	58	3.20	185.60	316.80	4.00	3.30	84.30	271.70	0.14	6.87	250	0.70	49.76	1.01	YES	13.81	
	ADD 60.0 L/S FROM HOSPITAL (SAL081157 TO SAL08156)																		
DUNSMORE LANE	SAL08156	SAL08155	37	3.20	118.40	435.20	4.00	4.53	109.80	381.50	0.30	68.26	375	0.23	84.10	0.76	YES	81.17	
	SAL08155	SAL08154	21	3.20	67.20	502.40	3.97	5.20	105.30	486.80	0.38	69.01	375	0.23	84.10	0.76	YES	82.06	
	SAL08154	SAL08153	17	3.50	59.50	561.90	3.95	5.78	117.30	604.10	0.47	69.68	375	0.25	87.68	0.79	YES	79.47	
AMBLER BAY	SAL08246	SAL08254	12	3.50	42.00	42.00	4.00	0.44	91.60	91.60	0.05	0.49	250	2.69	97.55	1.99	YES	0.50	
	SAL08254	SAL08255	12	3.50	42.00	84.00	4.00	0.88	90.60	182.20	0.09	0.97	250	2.81	99.70	2.03	YES	0.97	
	SAL08255	SAL08257	0	3.50	0.00	84.00	4.00	0.88	22.50	204.70	0.11	0.98	250	0.67	48.69	0.99	YES	2.02	
DUNSMORE LANE	SAL08253	SAL08256	10	3.20	32.00	32.00	4.00	0.33	43.00	43.00	0.02	0.36	250	0.70	49.76	1.01	YES	0.71	
	SAL08256	SAL08257	10	3.20	32.00	64.00	4.00	0.67	40.10	83.10	0.04	0.71	250	0.65	47.95	0.98	YES	1.48	
DUNSMORE LANE	SAL08257	SAL08258	9	3.50	31.50	179.50	4.00	1.87	69.10	356.90	0.19	2.06	250	0.48	41.21	0.84	YES	4.99	
	SAL08258	SAL08153	2	3.50	7.00	186.50	4.00	1.94	27.90	384.80	0.20	2.14	250	0.29	32.03	0.65	YES	6.69	
	Length, slope, diameter of sanitary sewer from SAL08153 to PS1 taken from City of Barrie PCSWMM Model.																		
JOHNSON STREET	SAL08153	SAL08152	4	3.50	14.00	2685.40	3.48		101.60	2148.00	1.68	71.74	375	0.30	95.29	0.86	YES	75.29	
	SAL08152	SAL08151							95.81			71.74	375	0.47	120.18	1.09	YES	59.69	
	SAL08151	SAL08150							73.78			71.74	375	0.28	93.55	0.85	YES	76.68	
	SAL08150	SAL08149							102.43			71.74	375	0.27	91.68	0.83	YES	78.25	
	SAL08149	SAL08148							63.74			71.74	375	0.25	87.86	0.80	YES	81.65	

n=0.013

M=1+(14/(4+(P/1000)<sup>0.5</sup>))

(2<="M"<=4)

Qp=P\*Q\*M/86400

(Q=225 l/day/person)

Qi=L/1000\*I\*DIAMETER/86400

(l=180 l/day/mm(dia.)/km)

(includes peaking factor)

**CITY OF BARRIE**  
**SANITARY SEWER DESIGN**  
**FUTURE CONDITIONS (DOUBLE HOSPITAL FLOW)**  
**CALIBRATED USING FLOW MONITORING DATA**

DATE:

03-Sep-21

FILE:

18037

CONTRACT/PROJECT:

GEORGIAN APARTMENTS

Qtot=Qp+Qi

STREETS	MANHOLE		DWELLING UNITS	DENSITY P.P.U	POP. (P)	POP. (ACC.)	M	Qp (L/s)	LENGTH (m)	LENGTH (ACC.) (m)	Qi (L/s)	TOTAL Q (L/s)	D (mm)	S (%)	Q FULL (L/s)	V FULL (m/s)	d/D < 0.5 for D < 375 mm < 0.7 for D > 375 mm	PERCENT FULL (%)	NOTES
	FROM	TO																	
	SAL08148	SAL08147							60.56			71.74	375	0.30	95.60	0.87	YES	75.04	
	SAL08147	SAL08138							53.70			71.74	450	0.11	95.31	0.60	YES	75.27	
HICKLING TRAIL	SAL08138	SAL08139							93.78			71.74	450	0.32	161.28	1.01	YES	44.48	
	SAL08139	SAL08140							95.00			71.74	450	0.31	157.55	0.99	YES	45.54	
	SAL08140	SAL08021							64.53			71.74	450	0.33	162.67	1.02	YES	44.10	
	SAL08021	SAL08141							34.32			71.74	450	0.17	119.23	0.75	YES	60.17	
	SAL08141	SAL08142							40.92			71.74	450	0.44	189.12	1.19	YES	37.93	
	SAL08142	SAL08098							30.43			71.74	450	0.72	242.45	1.52	YES	29.59	
ROSENFELD DRIVE	SAL08098	SAL08099							40.11			71.74	450	0.57	215.93	1.36	YES	33.22	
	SAL08099	SAL08100							61.69			71.74	450	0.45	192.11	1.21	YES	37.34	Peak flow at manhole SAL08099 is 45.99 L/s according to flow monitoring data provided by City of Barrie, which was applied to the trunk sewer between manholes SAL08153 and SAL08099.
	SAL08100	SAL08101							69.41			71.74	450	0.33	164.14	1.03	YES	43.71	
	SAL08101	SAL08102							18.02			71.74	450	0.44	189.99	1.19	YES	37.76	
	SAL08102	SAL08103							36.08			71.74	450	0.30	157.45	0.99	YES	45.56	
	SAL08103	PS1							7.05			71.74	525	33.48	2488.58	11.50	YES	2.88	