

# SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

2980 Colonial Road  
Sarsfield (Ottawa), Ontario

Report No. 16033

June 15, 2017



NOT VALID UNLESS  
SIGNED & DATED

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# SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

2980 Colonial Road  
Sarsfield (Ottawa), Ontario

This Servicing Brief & Stormwater Management Report is a description of the services of an existing apartment building and proposed addition and addresses the stormwater management requirements of 1.6 hectares of land at 2980 Colonial Road in Sarsfield. The existing apartment building is two storeys with a 1009 sq.m. footprint. A two-storey addition with a 665 sq.m. footprint and a two-storey link with a 110 sq.m. footprint are proposed.

This report forms part of the stormwater management design for the proposed development. Also refer to drawing C-1 to C-3 prepared by D. B. Gray Engineering Inc.

## WATER SUPPLY FOR FIREFIGHTING:

The property is in a rural area with no municipal water supply.

The existing building requires a water supply of 190,297 litres as per "Required Minimum Water Supply Flow Rate" as calculated using the Ontario Building Code (OBC) - Appendix A - Article A-3.2.5.7 "Water Supply For Fire Fighting". There is an existing on-site 10,000 gallon (45,460 litre) underground tank with a water chute and draw pipe located near the entrance to the parking area.

A 2 hour firewall is proposed between the link and addition. There are two options that are being considered. Option #1 the firewall is the width of the link. Option #2 the fire wall is wider, the width of the addition. Using the OBC method to calculate the water supply for firefighting we have calculated the following requirements:

Option #1:

Existing Building + Link:	309,089 L
Addition:	164,498 L

Option #2:

Existing Building + Link:	206,059 L
Addition:	109,665 L

The mechanical engineer has stated the following:

*"The existing building does not have a fire pump but relies on the 10,000 gallon storage tank and the domestic cold water system. The housing complex is dependent upon the fire department responding and should a sprinkler be activated it is supplied by the domestic cold water system, i.e. the local well pump and domestic water booster pump."*

*“As for the minimum water requirement, our response at the time of the meeting was that should the addition be sprinklered then we would have required that minimum water demand. However, since the addition is not being sprinklered under Part 9 of the OBC then there is no need for that demand.”*

We have requested the fire department to determine whether the existing 10,000 gal tank is sufficient for both the existing building and new addition for Option #1 or alternatively for Option #2 and, if it is not, sufficient determine the size of the additional tank. We have been advised by the fire department, that the 20,000 gallon tank at the nearby community centre should be taken into consideration in their determination. We are waiting for their response.

#### ON-SITE WELL:

There is an existing on-site well located near the south-west corner of the existing building. No issues have been reported with the water supply. No alteration to the well, are proposed. The mechanical engineer is investigating whether alterations are required to the well pump, pressure tank and/or treatment system.

#### ON-SITE SEWAGE SYSTEM:

The existing on-site septic system will be replaced. An application has been submitted to the Ministry of the Environment and Climate Change (MOECC). Reference drawings and documents prepared by Green In Tents Inc. and Morey Associates Ltd.

#### STORMWATER MANAGEMENT:

##### Water Quality:

There are no existing quality control measures. The South Nation Conservation Authority normally asks for 80% total suspended solids (TSS) removal. However, drainage from about 84% of the site will be considered clean as it originates from roofs or grassed and landscaped areas. And about another 6% are asphalt walkways and other asphalted surfaces that drain across grassed areas and swales before entering the storm sewer system or off-site ditches. Therefore no permanent on-site quality control measures should be required and none are proposed.

An erosion and sediment control plan has been developed to be implemented during construction, (see notes 2.1 to 2.4 on drawing C-3). In summary: to filter out construction sediment; sediment capture filter sock inserts will be installed in all existing catch basins and ditch inlets adjacent to the site and new catch basin as they are installed.

## Water Quantity:

The stormwater quantity control measures detailed in this report are based on the criteria that the release rate for post-development storm events is equal to or less than the flow produced by the (existing) pre-development.

Calculations are based on the Rational Method. The runoff coefficients for the 100 year event are increased by 25% to maximum 1.00.

It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.33 and 0.39 for the 100-year. Using the Airport Formula for sheet flow, it is calculated that the existing time of concentration is 17 minutes for the 5-year event and 16 minutes for the 100-year. Using the Rational Method; the pre-development (existing) 5-year peak flow is 113.10 l/s and 215.72 l/s for the 100-year.

To calculate the required storage volume a release rate equal to 100% of the maximum release rate is used but all potential underground storage is ignored. Stormwater will be stored within the development on the surface above catch basins in grassed areas and car park area.

### Drainage Area I (Uncontrolled Flow Off Site – 12,968 sq.m.):

The runoff from about 80% of the site will continue to be allowed to flow uncontrolled off the site.

	100-year	5-year
The maximum flow rate:	193.00 l/s	91.23 l/s

### Drainage Area II (1,423 sq.m.):

An inlet control device (ICD) located at the outlet pipe of manhole CB/MH-6 will control the release of stormwater from Drainage Area II. The ICD will restrict the flow and force the stormwater to back up into the upstream sewer pipes and onto the grassed areas above catch basins CB-3, CB/MH-5 and CB/mh-6. The ICD shall be a plug style with a trash basket and round orifice design manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 10.84 l/s at 1.08 m head. It is calculated that an orifice area of 3,850 sq.mm. ( $\pm 70$  mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 10.84 l/s at a head of 1.08 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 10.51 l/s at 1.02 m.

	100-year	5-year
The maximum release rate:	10.84 l/s	10.51 l/s
The maximum ponding elevation:	85.82 m	85.76 m
The maximum ponding depth:	270 mm	210 mm
The maximum stored volume:	28.84 cu.m.	9.87 cu.m.

### Drainage Area III (646 sq.m.):

An ICD located at the outlet pipe of manhole CB/MH-10 will control the release of stormwater from Drainage Area III. The ICD will restrict the flow and force the

stormwater to back up into the upstream sewer pipes and onto the grassed areas above catch basin CB/MH-10. The ICD shall be a plug style with a trash basket and round orifice design manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 5.52 l/s at 1.08 m head. It is calculated that an orifice area of 1,963 sq.mm. (50 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 5.52 l/s at a head of 1.08 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 5.18 l/s at 0.96 m.

	100-year	5-year
The maximum release rate:	5.52 l/s	5.18 l/s
The maximum ponding elevation:	85.66 m	85.53 m
The maximum ponding depth:	310 mm	180 mm
The maximum stored volume:	12.95 cu.m.	4.26 cu.m.

Drainage Area IV (1,046 sq.m.):

An ICD located at the outlet pipe of manhole CB-11 will control the release of stormwater from Drainage Area IV. The ICD will restrict the flow and force the stormwater to back up into the upstream sewer pipes and onto the parking area above catch basin CB-11. The ICD shall be a plug style with a trash basket and round orifice design manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 6.36 l/s at 1.14 m head. It is calculated that an orifice area of 2,206 sq.mm. (±53 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 6.36 l/s at a head of 1.14 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 6.14 l/s at 1.06 m.

	100-year	5-year
The maximum release rate:	6.36 l/s	6.14 l/s
The maximum ponding elevation:	85.66 m	85.58 m
The maximum ponding depth:	230 mm	150 mm
The maximum stored volume:	23.82 cu.m.	9.03 cu.m.

The maximum allowable release rate (pre-development flow rate) for the 100-year storm event for the site is 239.27 l/s. The maximum post-development release rate for the 100-year storm event is calculated to be 215.72 l/s, less than maximum allowable. To achieve this release rate the total maximum required storage capacity for the 1:100-year event is 65.61 cu.m.

The maximum allowable release rate (pre-development flow rate) for the 5-year storm event for the site is 113.10 l/s. The maximum post-development release rate for the 5-year storm event is calculated to be 113.07 l/s, slightly less than maximum allowable. To achieve this release rate the total maximum required storage capacity for the 1:5-year event is 23.15 cu.m.

## Storm Sewer System:

Stormwater released through the ICDs will be conveyed off the site via a new and existing storm sewer system which discharges to a 450mm municipal storm sewer located in an easement adjacent to a property fronting on Colonial Road. The 450mm storm sewer connects to 675 mm municipal storm sewer in Colonial Road.

During the five-year event all but one segment of the existing storm sewer system is calculated to be flowing 20% to 56% full based on the existing conditions. One pipe segment is 250mm storm sewer at 0.1% that is calculated to be 191% full. The restricted post-development flow during the five-year event in this segment is calculated to be reduced to 168%. Overland flow, as a result of this undersized pipe segment, would be at an elevation of approximately 85.75 m, 0.37 m below the floor level of the existing building and proposed addition. The restricted flow in the remainder of the storm sewer system is calculated to be 13% to 55% full. The flow rate from the on-site storm sewer system discharging into the 450mm municipal storm is reduced from the current 71.2 l/s during the five-year event to a restricted flow of 69.5 l/s.

## CONCLUSIONS:

1. We are waiting for a response from the fire department to determine if the volume of water in the existing 10,000 gallon tank will provide an adequate supply of water for firefighting.
2. The existing well, with the possible modifications to the well pump, pressure tank and/or treatment system, if recommended by the mechanical engineer, is expected to continue to provide a sufficient supply of water.
3. The existing septic system will be replaced. An application has been submitted to the MOECC.
4. No permanent on-site quality control measures are proposed.
5. An erosion and sediment control plan has been developed to be implemented during construction.
6. With the proposed stormwater management design the post-development storm events are less than the flow produced by the (existing) pre-development.
7. The restricted flowrate produced by a one in five year storm event will be adequately handled by the proposed storm sewer system and will reduce the flow in the existing storm sewer system.

## 2980 COLONIAL ROAD PROPOSED 2 STOREY ADDITION Sarsfield (Ottawa), Ontario

### Water Supply for Fire-Fighting Calculations:

#### WATER SUPPLY REQUIREMENTS OF THE EXISTING BUILDING

Fire Protection Water Supply  $Q = KVS_{Tot}$

$$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$$

Spatial Coefficient	Exposure Distance m	
$S_{Side1}$	0.0	12 (to east property line)
$S_{Side2}$	0.0	39 (to south property line)
$S_{Side3}$	0.0	30 (to west property line)
$S_{Side4}$	0.0	76 (to north property line)
$S_{Tot}$	1.0	

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group B-2 Occupancy / Combustible construction with fire separations and no fire resistance ratings)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Existing Building	1,009	8.20	8,274
			8,274

$$Q = KVS_{Tot}$$

$$Q_1 = 190,297 \text{ L}$$

Required Minimum Water Supply Flow Rate (As per A-3.2.5.7. Table 2)      6,300 L/min      105 L/sec

**OPTION #1**

**WATER SUPPLY REQUIREMENTS OF THE EXISTING BUILDING + LINK  
WITH A FIREWALL THE WIDTH OF THE LINK BETWEEN THE LINK & ADDITION**

Fire Protection Water Supply  $Q = KVS_{Tot}$

$$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$$

Spatial Coefficient	Exposure Distance m	
$S_{Side1}$	0	12 (to east property line)
$S_{Side2}$	0	39 (to south property line)
$S_{Side3}$	0.5	0 (to new 2 storey addition)
$S_{Side4}$	0	76 (to north property line)
$S_{Tot}$	1.5	

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group B-2 Occupancy / Combustible construction with fire separations and no fire resistance ratings)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Existing Building	1,009	8.20	8,274
Link	110	6.23	685
			8,959

$$Q = KVS_{Tot}$$

$$Q_1 = 309,089 \text{ L}$$

Required Minimum Water Supply Flow Rate 9,000 L/min 150 L/sec  
(As per A-3.2.5.7. Table 2)

**WATER SUPPLY REQUIREMENTS OF THE ADDITION  
WITH FIREWALL THE WIDTH OF THE LINK BETWEEN THE LINK & ADDITION**

Fire Protection Water Supply  $Q = KVS_{Tot}$

$$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$$

Spatial Coefficient	Exposure Distance m	
$S_{Side1}$	0.5	0 (to link line)
$S_{Side2}$	0.0	19 (to south property line)
$S_{Side3}$	0.0	31 (to west property line)
$S_{Side4}$	0.0	76 (to north property line)
$S_{Tot}$	1.5	

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group B-2 Occupancy / Combustible construction with fire separations and no fire resistance ratings)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Addition	665	7.17	4,768

$$Q = KVS_{Tot}$$

$$Q_1 = 164,498 \text{ L}$$

Required Minimum Water Supply Flow Rate 5,400 L/min 90 L/sec  
(As per A-3.2.5.7. Table 2)



**OPTION #2**

**WATER SUPPLY REQUIREMENTS OF THE EXISTING BUILDING + LINK  
WITH A FIREWALL THE WIDTH OF THE ADDITION BETWEEN THE LINK & ADDITION**

Fire Protection Water Supply  $Q = KVS_{Tot}$

$$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$$

Spatial Coefficient	Exposure Distance m	
$S_{Side1}$	0.0	12 (to east property line)
$S_{Side2}$	0.0	39 (to south property line)
$S_{Side3}$	0.0	10 (to new 2 storey addition)
$S_{Side4}$	0.0	76 (to north property line)
$S_{Tot}$	1.0	

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group B-2 Occupancy / Combustible construction with fire separations and no fire resistance ratings)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Existing Building	1,009	8.20	8,274
Link	110	6.23	685
			8,959 cu.m.

$$Q = KVS_{Tot}$$

$$Q_1 = 206,059 \text{ L}$$

Required Minimum Water Supply Flow Rate 6,300 L/min 105 L/sec  
(As per A-3.2.5.7. Table 2)

**WATER SUPPLY REQUIREMENTS OF THE EXISTING BUILDING + LINK  
WITH A FIREWALL THE WIDTH OF THE ADDITION BETWEEN THE LINK & ADDITION**

Fire Protection Water Supply  $Q = KVS_{Tot}$

$$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$$

Spatial Coefficient	Exposure Distance m	
$S_{Side1}$	0.0	10 (to link line)
$S_{Side2}$	0.0	19 (to south property line)
$S_{Side3}$	0.0	31 (to west property line)
$S_{Side4}$	0.0	76 (to north property line)
$S_{Tot}$	1.0	

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group B-2 Occupancy / Combustible construction with fire separations and no fire resistance ratings)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Addition	665	7.17	4,768

$$Q = KVS_{Tot}$$

$$Q_1 = 109,665 \text{ L}$$

Required Minimum Water Supply Flow Rate 3,600 L/min 60 L/sec  
(As per A-3.2.5.7. Table 2)

## STORMWATER MANAGEMENT CALCULATIONS

The orifice calculations are based on the following formula:

$$Q = C_d \times A_o \sqrt{2gh} \times 1000$$

where:

Q = flowrate in litres per second

$C_d$  = coefficient of discharge

$A_o$  = orifice area in sq.m.

g = 9.81 m/s<sup>2</sup>

h = head above orifice in meters

Storage calculations on the in the parking area are based on the following formula for volume of a cone:

$$V = (A \times d)/3$$

where:

V = volume in cu.m.

A = ponding area in sq.m.

d = ponding depth in meters

Storage calculations in the grassed area are based on the above formula for volume of a cone and the following formula for volume of a prismoidal shape (the formula is accurate if both length and width are changing proportionally):

$$V = (A_{top} + A_{bottom} + (A_{top} \times A_{bottom})^{0.5}) / 3 \times d$$

where:

V = volume in cu.m.

$A_{top}$  = area of pond in sq.m.

$A_{bottom}$  = area of bottom of depressed area

d = ponding depth in meters

## Summary Table

ONE HUNDRED YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Required	Maximum Volume Stored
	l/s	l/s	cu.m.	cu.m.
AREA I (Uncontrolled flow off site)	-	193.00	-	-
AREA III	-	10.84	28.84	28.84
AREA IV	-	5.52	12.95	12.95
AREA V	-	6.36	23.82	23.82
TOTAL	239.27	215.72	65.61	65.61

FIVE YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Required	Maximum Volume Stored
	l/s	l/s	cu.m.	cu.m.
AREA I (Uncontrolled flow off site)	-	91.23	-	-
AREA III	-	10.51	9.87	9.87
AREA IV	-	5.18	4.26	4.26
AREA V	-	6.14	9.03	9.03
TOTAL	113.10	113.07	23.15	23.15

2980 Colonial Road  
Sarsfield, (Ottawa), Ontario

STORM WATER MANAGEMENT CALCULATIONS  
Rational Method

ONE HUNDRED YEAR EVENT

Maximum Allowable Release Rate  
Pre-development Conditions

			C
Roof Area:	1132	sq.m.	1.00
Asphalt/Concrete Area:	1840	sq.m.	1.00
Grassed & Landscaped Areas:	13111	sq.m.	0.25
Total Catchment Area	16083	sq.m.	0.39

Area (A):	16083	sq.m.	
Time of Concentration:	16.0	min.	(see below - use not less than 10 min.)
Rainfall Intensity (i):	138	mm/hr	(100 year event)
Runoff Coefficient (C):	0.39		(see above)
Flow Rate (2.78AiC):	239.27	l/s	

Time of Concentration: Sheet Flow  
Airport Formula

$$T_c = \frac{3.26 (1.1 - C) (L)^{1/2}}{S_w^{0.33}} \quad \text{min}$$

Runoff Coefficient (C):	0.39	(see above)
Sheet Flow Distance (L):	30	m
Slope of Land (Sw):	0.5	%
Time of Concentration (Sheet Flow):	16.0	min

DRAINAGE AREA I (Uncontrolled Flow Off Site):

			C
Roof Area:	766	sq.m.	1.00
Asphalt/Concrete Area:	1633	sq.m.	1.00
Grassed & Landscaped Areas:	10569	sq.m.	0.25
Total Catchment Area	12968	sq.m.	0.39
Area (A):	12968	sq.m.	
Time of Concentration:	16.0	min.	
Rainfall Intensity (i):	138	mm/hr	(100 year event)
Runoff Coefficient (C):	0.39		
Flow Rate (2.78AiC):	193.00	l/s	

# DRAINAGE AREA II

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	525	sq.m.	1.00
Asphalt/Concrete Area:	389	sq.m.	1.00
Landscaped Areas:	509	sq.m.	0.25
<b>Total Catchment Area</b>	<b>1423</b>	<b>sq.m.</b>	<b>0.73</b>

Water Elevation:	85.82	m					
Invert of Outlet Pipe - CB/MH-6:	84.70	m					
Centroid of ICD Orifice:	84.74	m					
(ICD in Outlet Pipe of CB/MH-46:							
Head:	1.08	m					
Orifice Diameter	70	mm	CB/MH-6	125	0.27	9.48	cu.m.
Orifice Area:	3850	sq.mm.	CB/MH-5	88	0.22	6.64	cu.m.
			CB-3	216	0.21	12.72	cu.m.
Coefficient of Discharge:	0.610						
Maximum Release Rate:	10.84	l/s				Achieved Vol:	28.84 cu.m.

Max. Vol. Required: 28.84 cu.m.

Time	i	2.78AiC	Release	Stored	Stored
min.	mm/hr	l/s	l/s	l/s	cu.m.
5	243	70.25	10.84	59.42	17.83
10	179	51.69	10.84	40.85	24.51
15	143	41.36	10.84	30.53	27.48
20	120	34.72	10.84	23.89	28.66
25	104	30.06	10.84	19.23	28.84
30	92	26.59	10.84	15.76	28.36
35	83	23.90	10.84	13.07	27.44
40	75	21.75	10.84	10.92	26.20
45	69	19.99	10.84	9.15	24.71
50	64	18.51	10.84	7.68	23.03
55	60	17.26	10.84	6.42	21.20
60	56	16.18	10.84	5.34	19.24
65	53	15.24	10.84	4.40	17.18
70	50	14.41	10.84	3.58	15.02
75	47	13.68	10.84	2.84	12.80
80	45	13.02	10.84	2.19	10.50
85	43	12.43	10.84	1.60	8.15
90	41	11.90	10.84	1.06	5.75
95	39	11.42	10.84	0.58	3.30
100	38	10.97	10.84	0.14	0.82
105	36	10.56	10.56	0.00	0.00
110	35	10.19	10.19	0.00	0.00
115	34	9.84	9.84	0.00	0.00
120	33	9.52	9.52	0.00	0.00
125	32	9.22	9.22	0.00	0.00
130	31	8.94	8.94	0.00	0.00
135	30	8.68	8.68	0.00	0.00
140	29	8.44	8.44	0.00	0.00
145	28	8.21	8.21	0.00	0.00
150	28	7.99	7.99	0.00	0.00
180	24	6.92	6.92	0.00	0.00
210	21	6.12	6.12	0.00	0.00
240	19	5.50	5.50	0.00	0.00
270	17	5.01	5.01	0.00	0.00
300	16	4.60	4.60	0.00	0.00
330	15	4.26	4.26	0.00	0.00
360	14	3.97	3.97	0.00	0.00

# DRAINAGE AREA III

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	339	sq.m.	1.00
Asphalt/Concrete Area:	82	sq.m.	1.00
Landscaped Areas:	225	sq.m.	0.25
<b>Total Catchment Area</b>	<b>646</b>	<b>sq.m.</b>	<b>0.74</b>

Water Elevation:	85.66	m					
Invert of Outlet Pipe - CB/MH-10 :	84.55	m					
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-10):	84.58	m					
Head:	1.08	m					
				Surface Storage Above Catch Basin			
				Area	Depth		
Orifice Diameter	50	mm		sq.m.	m		
Orifice Area:	1963	sq.mm.		CB/MH-10	95	0.31	12.95 cu.m.
Coefficient of Discharge:	0.610						
Maximum Release Rate:	5.52	l/s				Achieved Vol:	12.95 cu.m.
						Max. Vol. Required:	12.95 cu.m.

Time	i	2.78AiC	Overflow	Release	Stored	Stored
min.	mm/hr	l/s	to III	Rate	Rate	Volume
			l/s	l/s	l/s	cu.m.
5	243	32.20	0.00	5.52	26.68	8.00
10	179	23.69	0.00	5.52	18.17	10.90
15	143	18.96	0.00	5.52	13.44	12.10
20	120	15.91	0.00	5.52	10.40	12.48
25	104	13.78	0.37	5.52	8.63	12.95
30	92	12.19	0.41	5.52	7.08	12.75
35	83	10.96	0.28	5.52	5.72	12.00
40	75	9.97	0.08	5.52	4.53	10.87
45	69	9.16	0.00	5.52	3.64	9.84
50	64	8.49	0.00	5.52	2.97	8.90
55	60	7.91	0.00	5.52	2.39	7.89
60	56	7.42	0.00	5.52	1.90	6.83
65	53	6.98	0.00	5.52	1.47	5.72
70	50	6.61	0.00	5.52	1.09	4.57
75	47	6.27	0.00	5.52	0.75	3.38
80	45	5.97	0.00	5.52	0.45	2.16
85	43	5.70	0.00	5.52	0.18	0.92
90	41	5.45	0.00	5.45	0.00	0.00
95	39	5.23	0.00	5.23	0.00	0.00
100	38	5.03	0.00	5.03	0.00	0.00
105	36	4.84	0.00	4.84	0.00	0.00
110	35	4.67	0.00	4.67	0.00	0.00
115	34	4.51	0.00	4.51	0.00	0.00
120	33	4.36	0.00	4.36	0.00	0.00
125	32	4.23	0.00	4.23	0.00	0.00
130	31	4.10	0.00	4.10	0.00	0.00
135	30	3.98	0.00	3.98	0.00	0.00
140	29	3.87	0.00	3.87	0.00	0.00
145	28	3.76	0.00	3.76	0.00	0.00
150	28	3.66	0.00	3.66	0.00	0.00
180	24	3.17	0.00	3.17	0.00	0.00
210	21	2.81	0.00	2.81	0.00	0.00
240	19	2.52	0.00	2.52	0.00	0.00
270	17	2.29	0.00	2.29	0.00	0.00
300	16	2.11	0.00	2.11	0.00	0.00
330	15	1.95	0.00	1.95	0.00	0.00
360	14	1.82	0.00	1.82	0.00	0.00

# DRAINAGE AREA IV

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	250	sq.m.	1.00
Asphalt/Concrete Area:	446	sq.m.	1.00
Landscaped Areas:	350	sq.m.	0.25
<hr/>			
Total Catchment Area	1046	sq.m.	0.75

Water Elevation:	85.66	m				
Invert of Outlet Pipe - CB-11 :	84.49	m				
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB-11):	84.52	m				
Head:	1.14	m				
			Surface Storage Above Catch Basin			
			Area	Depth		
Orifice Diameter	53	mm	sq.m.	m		
			CB-11	238	0.23	23.82 cu.m.
Orifice Area:	2206	sq.mm.				
Coefficient of Discharge:	0.610					
Maximum ICD Release Rate:	6.36	l/s			Achieved Vol:	23.82 cu.m.
					Max. Vol. Required:	23.82 cu.m.

Time	i	2.78AiC	Release	Overflow	Stored	Stored
min.	mm/hr	l/s	Rate	to III	Rate	Volume
			l/s	l/s	l/s	cu.m.
5	243	52.86	6.36	0.00	46.50	13.95
10	179	38.89	6.36	0.00	32.53	19.52
15	143	31.12	6.36	0.00	24.76	22.28
20	120	26.13	6.36	0.00	19.76	23.72
25	104	22.62	6.36	0.37	15.88	23.82
30	92	20.01	6.36	0.41	13.24	23.82
35	83	17.99	6.36	0.28	11.34	23.82
40	75	16.37	6.36	0.08	9.93	23.82
45	69	15.04	6.36	0.00	8.68	23.43
50	64	13.93	6.36	0.00	7.57	22.70
55	60	12.99	6.36	0.00	6.62	21.86
60	56	12.17	6.36	0.00	5.81	20.92
65	53	11.47	6.36	0.00	5.10	19.91
70	50	10.84	6.36	0.00	4.48	18.82
75	47	10.29	6.36	0.00	3.93	17.68
80	45	9.80	6.36	0.00	3.44	16.49
85	43	9.36	6.36	0.00	2.99	15.26
90	41	8.95	6.36	0.00	2.59	13.99
95	39	8.59	6.36	0.00	2.23	12.69
100	38	8.26	6.36	0.00	1.89	11.36
105	36	7.95	6.36	0.00	1.59	9.99
110	35	7.67	6.36	0.00	1.30	8.61
115	34	7.41	6.36	0.00	1.04	7.20
120	33	7.16	6.36	0.00	0.80	5.77
125	32	6.94	6.36	0.00	0.58	4.33
130	31	6.73	6.36	0.00	0.37	2.86
135	30	6.53	6.36	0.00	0.17	1.38
140	29	6.35	6.35	0.00	0.00	0.00
145	28	6.18	6.18	0.00	0.00	0.00
150	28	6.01	6.01	0.00	0.00	0.00
180	24	5.21	5.21	0.00	0.00	0.00
210	21	4.61	4.61	0.00	0.00	0.00
240	19	4.14	4.14	0.00	0.00	0.00
270	17	3.77	3.77	0.00	0.00	0.00
300	16	3.46	3.46	0.00	0.00	0.00
330	15	3.21	3.21	0.00	0.00	0.00
360	14	2.99	2.99	0.00	0.00	0.00

# FIVE YEAR EVENT

## Maximum Allowable Release Rate Pre-development Conditions

			C
Roof Area:	1132	sq.m.	0.90
Asphalt/Concrete Area:	1840	sq.m.	0.90
Grassed & Landscaped Areas:	13111	sq.m.	<u>0.20</u>
Total Catchment Area	16083	sq.m.	0.33

Area (A):	16083	sq.m.
Time of Concentration:	17.3	min. (see below - use not less than 10 min.)
Rainfall Intensity (i):	77	mm/hr (5 year event)
Runoff Coefficient (C):	0.33	(see above)

Flow Rate (2.78AiC): 113.10 l/s

Time of Concentration: Sheet Flow  
Airport Formula

$$T_c = \frac{3.26 (1.1 - C) (L)^{1/2}}{S_w^{0.33}} \quad \text{min}$$

Runoff Coefficient (C):	0.33	(see above)
Sheet Flow Distance (L):	30	m
Slope of Land (Sw):	0.5	%
Time of Concentration (Sheet Flow):	17.3	min

## DRAINAGE AREA I (Uncontrolled Flow Off Site):

			C
Roof Area:	766	sq.m.	0.90
Asphalt/Concrete Area:	1633	sq.m.	0.90
Grassed & Landscaped Areas:	10569	sq.m.	<u>0.20</u>
Total Catchment Area	12968	sq.m.	0.33

Area (A):	12968	sq.m.
Time of Concentration:	17.3	min.
Rainfall Intensity (i):	77	mm/hr (5 year event)
Runoff Coefficient (C):	0.33	

Flow Rate (2.78AiC): 91.23 l/s



# DRAINAGE AREA II

(FIVE YEAR EVENT)

			C
Roof Area:	525	sq.m.	0.90
Asphalt/Concrete Area:	389	sq.m.	0.90
Landscaped Areas:	509	sq.m.	0.20
<hr/>			
Total Catchment Area	1423	sq.m.	0.65

Water Elevation:	85.76	m					
Invert of Outlet Pipe - CB/MH-6:	84.70	m					
Centroid of ICD Orifice:	84.74	m					
(ICD in Outlet Pipe of CB/MH-6:							
Head:	1.02	m					
Orifice Diameter	70	mm	CB/MH-6	58	0.21	3.80	cu.m.
			CB/MH-5	35	0.16	2.38	cu.m.
Orifice Area:	3850	sq.mm.	CB-3	86	0.15	3.69	cu.m.
Coefficient of Discharge:	0.610						
Maximum Release Rate:	10.51	l/s				Achieved Vol:	9.87 cu.m.

Max. Vol. Required: 9.87 cu.m.

Time	i	2.78AiC	Release	Stored	Stored
min.	mm/hr	l/s	Rate	Rate	Volume
			l/s	l/s	cu.m.
5	141	36.28	10.51	25.77	7.73
10	104	26.78	10.51	16.26	9.76
15	84	21.47	10.51	10.96	9.87
20	70	18.05	10.51	7.54	9.05
25	61	15.65	10.51	5.14	7.71
30	54	13.86	10.51	3.35	6.03
35	49	12.47	10.51	1.96	4.11
40	44	11.35	10.51	0.84	2.02
45	41	10.44	10.44	0.00	0.00
50	38	9.68	9.68	0.00	0.00
55	35	9.03	9.03	0.00	0.00
60	33	8.47	8.47	0.00	0.00
65	31	7.98	7.98	0.00	0.00
70	29	7.55	7.55	0.00	0.00
75	28	7.17	7.17	0.00	0.00
80	27	6.83	6.83	0.00	0.00
85	25	6.52	6.52	0.00	0.00
90	24	6.24	6.24	0.00	0.00
95	23	5.99	5.99	0.00	0.00
100	22	5.76	5.76	0.00	0.00
105	22	5.55	5.55	0.00	0.00
110	21	5.35	5.35	0.00	0.00
115	20	5.17	5.17	0.00	0.00
120	19	5.00	5.00	0.00	0.00
125	19	4.85	4.85	0.00	0.00
130	18	4.70	4.70	0.00	0.00
135	18	4.57	4.57	0.00	0.00
140	17	4.44	4.44	0.00	0.00
145	17	4.32	4.32	0.00	0.00
150	16	4.20	4.20	0.00	0.00
180	14	3.64	3.64	0.00	0.00
210	13	3.23	3.23	0.00	0.00
240	11	2.90	2.90	0.00	0.00
270	10	2.64	2.64	0.00	0.00
300	9	2.43	2.43	0.00	0.00
330	9	2.25	2.25	0.00	0.00
360	8 <sup>17</sup>	2.10	2.10	0.00	0.00

# DRAINAGE AREA III

(FIVE YEAR EVENT)

			C
Roof Area:	339	sq.m.	0.90
Asphalt/Concrete Area:	82	sq.m.	0.90
Landscaped Areas:	225	sq.m.	0.20
<b>Total Catchment Area</b>	<b>646</b>	<b>sq.m.</b>	<b>0.66</b>

Water Elevation:	85.53	m				
Invert of Outlet Pipe - CB/MH-10 :	84.55	m				
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-10):	84.58	m				
Head:	0.96	m				
			Surface Storage Above Catch Basin			
			Area	Depth		
Orifice Diameter	50	mm	sq.m.	m		
Orifice Area:	1963	sq.mm.	CB/MH-10	50	0.18	4.26 cu.m.
Coefficient of Discharge:	0.610					
Maximum Release Rate:	5.18	l/s			Achieved Vol:	4.26 cu.m.
					Max. Vol. Required:	4.26 cu.m.

Time min.	i mm/hr	2.78AiC l/s	Release Rate l/s	Stored Rate l/s	Stored Volume cu.m.
5	141	16.64	5.18	11.45	3.44
10	104	12.28	5.18	7.09	4.26
15	84	9.85	5.18	4.66	4.20
20	70	8.28	5.18	3.09	3.71
25	61	7.18	5.18	1.99	2.99
30	54	6.36	5.18	1.17	2.11
35	49	5.72	5.18	0.53	1.12
40	44	5.21	5.18	0.02	0.05
45	41	4.79	4.79	0.00	0.00
50	38	4.44	4.44	0.00	0.00
55	35	4.14	4.14	0.00	0.00
60	33	3.88	3.88	0.00	0.00
65	31	3.66	3.66	0.00	0.00
70	29	3.46	3.46	0.00	0.00
75	28	3.29	3.29	0.00	0.00
80	27	3.13	3.13	0.00	0.00
85	25	2.99	2.99	0.00	0.00
90	24	2.86	2.86	0.00	0.00
95	23	2.75	2.75	0.00	0.00
100	22	2.64	2.64	0.00	0.00
105	22	2.54	2.54	0.00	0.00
110	21	2.45	2.45	0.00	0.00
115	20	2.37	2.37	0.00	0.00
120	19	2.29	2.29	0.00	0.00
125	19	2.22	2.22	0.00	0.00
130	18	2.16	2.16	0.00	0.00
135	18	2.09	2.09	0.00	0.00
140	17	2.03	2.03	0.00	0.00
145	17	1.98	1.98	0.00	0.00
150	16	1.93	1.93	0.00	0.00
180	14	1.67	1.67	0.00	0.00
210	13	1.48	1.48	0.00	0.00
240	11	1.33	1.33	0.00	0.00
270	10	1.21	1.21	0.00	0.00
300	9	1.11	1.11	0.00	0.00
330	9	1.03	1.03	0.00	0.00
360	8 <sup>18</sup>	0.96	0.96	0.00	0.00

# DRAINAGE AREA IV

(FIVE YEAR EVENT)

			C
Roof Area:	250	sq.m.	0.90
Asphalt/Concrete Area:	446	sq.m.	0.90
Landscaped Areas:	350	sq.m.	0.20
<b>Total Catchment Area</b>	<b>1046</b>	<b>sq.m.</b>	<b>0.67</b>

Water Elevation:	85.58	m				
Invert of Outlet Pipe - CB-11 :	84.49	m				
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB-11):	84.52	m				
Head:	1.06	m				
			Surface Storage Above Catch Basin			
			Area	Depth		
Orifice Diameter	53	mm	sq.m.	m		
			CB-11	145	0.15	9.03 cu.m.
Orifice Area:	2206	sq.mm.				
Coefficient of Discharge:	0.610					
Maximum ICD Release Rate:	6.14	l/s			Achieved Vol:	9.03 cu.m.
					Max. Vol. Required:	9.03 cu.m.

Time min.	i mm/hr	2.78AiC l/s	Release Rate l/s	Stored Rate l/s	Stored Volume cu.m.
5	141	27.33	6.14	21.19	6.36
10	104	20.17	6.14	14.03	8.42
15	84	16.18	6.14	10.03	9.03
20	70	13.60	6.14	7.46	8.95
25	61	11.79	6.14	5.65	8.47
30	54	10.44	6.14	4.30	7.73
35	49	9.39	6.14	3.25	6.82
40	44	8.55	6.14	2.41	5.78
45	41	7.87	6.14	1.72	4.65
50	38	7.29	6.14	1.15	3.44
55	35	6.80	6.14	0.66	2.16
60	33	6.38	6.14	0.23	0.84
65	31	6.01	6.01	0.00	0.00
70	29	5.69	5.69	0.00	0.00
75	28	5.40	5.40	0.00	0.00
80	27	5.14	5.14	0.00	0.00
85	25	4.91	4.91	0.00	0.00
90	24	4.70	4.70	0.00	0.00
95	23	4.51	4.51	0.00	0.00
100	22	4.34	4.34	0.00	0.00
105	22	4.18	4.18	0.00	0.00
110	21	4.03	4.03	0.00	0.00
115	20	3.90	3.90	0.00	0.00
120	19	3.77	3.77	0.00	0.00
125	19	3.65	3.65	0.00	0.00
130	18	3.54	3.54	0.00	0.00
135	18	3.44	3.44	0.00	0.00
140	17	3.34	3.34	0.00	0.00
145	17	3.25	3.25	0.00	0.00
150	16	3.17	3.17	0.00	0.00
180	14	2.75	2.75	0.00	0.00
210	13	2.43	2.43	0.00	0.00
240	11	2.19	2.19	0.00	0.00
270	10	1.99	1.99	0.00	0.00
300	9	1.83	1.83	0.00	0.00
330	9	1.70	1.70	0.00	0.00
360	8 <sup>9</sup>	1.58	1.58	0.00	0.00

**D.B. GRAY ENGINEERING INC.**

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle  
Ottawa, Ontario KIT 4E9

613-425-8044  
dbgray@rogers.com

STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

Designed By: DBG

n = 0.013

Date: #####

PROJECT: 2980 Colonial Rd

Hard Surface Gravel Grass / Landscape Roof

Page: 1 of 1

STREET	LOCATION		AREA (ha)	Individual Conc. 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity I (mm/hr)	Peak Flow Q (l/s)	Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	SEWER DATA			COMMENTS		
	FROM	TO											R = 0.90	R = 0.70	R = 0.50		Length (m)	Capacity (l/s)
	EXIST. North CB	EXIST. CB	0.1300	0.180	0.180	15.00	83.6	15.0	CONCRETE	254.0	250	0.70	50.0	51.9	1.02	0.81	0.29	EXIST. North CB to be removed EXIST. CB to be replaced by MH-8
	EXIST. West CB	EXIST. CB	0.1223	0.068	0.068	15.00	83.6	5.7	CONCRETE	203.2	200	0.70	48.5	28.6	0.88	0.92	0.20	EXIST. West CB to remain EXIST. CB to be replaced by MH-8
	EXIST. CB	EXIST. Parking Lot CB/MH	0.1242	0.216	0.464	15.92	80.7	37.4	CONCRETE	254.0	250	0.10	39.3	19.6	0.39	1.69	1.91	EXIST. CB to be replaced by MH-8 EXIST. Parking Lot CB/MH to remain
	EXIST. cul de sac CB	EXIST. Parking Lot CB/MH	0.0458	0.199	0.199	10.00	104.2	20.7	CONCRETE	304.8	300	0.50	54.0	71.3	0.98	0.92	0.29	EXIST. Cul de sac CB and EXIST. Parking Lot CB/MH to remain
	EXIST. Parking Lot CB/MH	EXISTING DI	0.0329	0.274	0.937	17.61	76.0	71.2	CONCRETE	304.8	300	1.56	20.5	126.0	1.73	0.20	0.56	EXIST. Parking Lot CB/MH and EXIST. DI to remain

**EXISTING SYSTEM**

# D.B. GRAY ENGINEERING INC.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle  
Ottawa, Ontario K1T 4E9  
613-425-8044  
dbrgray@rogers.com

STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

PROJECT: 2980 Colonial Rd

Designed By: DBG

Date: #####

n = 0.013

Hard Surface Gravel Grass / Landscape Roof

STREET	LOCATION		Hard Surface		Gravel		Grass / Landscape		Roof		Individual 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity I (mm/hr)	Peak Flow Q (l/s)	Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (min)	Ratio C/Dtotal	COMMENTS
	FROM	TO	R = 0.90	R = 0.70	R = 0.20	R = 0.90	R = 0.20																		

## PROPOSED SYSTEM

	MH-1	CB/MH-2	0.0000				0.0000				0.000	0.000	15.00	83.6	0.0	PVC SDR 35	381.0	375	0.25	32.6	91.5	0.80	0.68	0.00	
	CB-4	CB/MH-5	0.0043			0.0120	0.0191				0.065	0.065	15.00	83.6	5.4	PVC SDR 35	254.0	250	0.43	12.0	40.7	0.80	0.25	0.13	
		CB-3	0.0210			0.0098	0.0120				0.088	0.088	15.00	83.6	7.4	PVC SDR 35	254.0	250	0.43	14.1	40.7	0.80	0.29	0.18	
		CB/MH-5	0.0044			0.0121	0.0110				0.198	0.198	15.29	82.6	16.4	PVC SDR 35	304.8	300	0.34	14.7	58.8	0.81	0.30	0.28	
		CB/MH-6	0.0092			0.0170	0.0104				0.058	0.257	15.60	81.7	21.0	PVC SDR 35	304.8	300	0.34	16.2	58.8	0.81	0.33	0.26	
															10.5	PVC SDR 36	304.8	300	0.34	16.2	58.8	0.81	0.33	0.18	EST. FLOW THROUGH ICD
		CB/MH-2	0.007			0.046	0.009				0.065	0.322	15.93	80.7	26.0	PVC SDR 35	381.0	375	0.25	35.8	91.5	0.80	0.74	0.28	
			0.0063			0.058	0.011				0.065	0.065	15.93	80.7	15.8	PVC SDR 35	381.0	375	0.25	35.8	91.5	0.80	0.74	0.17	EST. RESTRICTED FLOW
		CB/MH-7	0.0063			0.058	0.011				0.075	0.398	16.68	78.5	31.2	PVC SDR 35	381.0	375	0.25	24.7	91.5	0.80	0.51	0.34	
			0.0063			0.058	0.011				0.075	0.075	16.68	78.5	21.7	PVC SDR 35	381.0	375	0.25	24.7	91.5	0.80	0.51	0.24	EST. RESTRICTED FLOW
		CB-9	0.0000			0.011	0.023				0.139	0.139	15.00	83.6	11.6	PVC SDR 35	254.0	250	0.43	12.0	40.7	0.80	0.25	0.29	
		CB/MH-10	0.0082			0.012	0.011				0.055	0.194	15.25	82.8	16.0	PVC SDR 35	254.0	250	0.43	13.1	40.7	0.80	0.27	0.39	
															5.2	PVC SDR 35	254.0	250	0.43	13.1	40.7	0.80	0.27	0.13	EST. FLOW THROUGH ICD
		CB-11	0.045			0.035	0.025				0.194	0.194	10.00	104.2	20.2	PVC SDR 35	254.0	250	0.43	6.1	40.7	0.80	0.13	0.50	
															6.1	PVC SDR 35	254.0	250	0.43	6.1	40.7	0.80	0.13	0.15	EST. FLOW THROUGH ICD
		EXIST. West CB	0.000			0.077	0.000				0.043	0.043	15.00	84	3.6	CONCRETE	203.2	200	0.68	48.5	28.2	0.87	0.9	0.13	
		EXIST. Parking Lot CB/MH	0.000			0.000	0.000				0.000	0.828	17.19	77	63.8	CONCRETE	254.0	250	0.10	39.3	19.6	0.39	1.69	3.25	
			0.000			0.000	0.000				0.000	0.043	17.19	77	33.0	CONCRETE	254.0	250	0.10	39.3	19.6	0.39	1.69	1.68	EST. RESTRICTED FLOW
		EXIST. cul de sac CB	0.054			0.011	0.029				0.215	0.215	10.00	104	22.4	CONCRETE	304.8	300	0.50	54.0	71.3	0.98	0.92	0.31	
		EXIST. Parking Lot CB/MH	0.107			0.032	0.000				0.287	1.329	18.88	73	96.8	CONCRETE	304.8	300	1.56	20.5	126.0	1.73	0.20	0.77	
			0.107			0.032	0.000				0.287	0.501	18.88	73	69.5	CONCRETE	304.8	300	1.56	20.5	126.0	1.73	0.20	0.55	EST. RESTRICTED FLOW

## City of Ottawa Servicing Study Checklist

### General Content

**Executive Summary (for large reports only):** not applicable

**Date and revision number of the report:** see page 1 of Servicing Brief and Stormwater Management Report

**Location map and plan showing municipal address, boundary, and layout of proposed development:** see drawings C-1 to C-3

**Plan showing the site and location of all existing services:** see drawings C-1 to C-3

**Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere:** not applicable

**Summary of Pre-consultation Meetings with City and other approval agencies:** not available

**Reference and confirm conformance to higher level studies and reports ( Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defensible design criteria:** not applicable

**Statement of objectives and servicing criteria:** see page 1 of Servicing Brief and Stormwater Management Report

**Identification of existing and proposed infrastructure available in the immediate area:** see drawings C-1 to C-3

**Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development ( Reference can be made to the Natural Heritage Studies, if available).** see drawings C-1 to C-3

**Concept level master grading plan to confirm existing and proposed grades in the development and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths:** not applicable

**Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts:** not applicable

**Proposed phasing of the development, if applicable:** not applicable

**Reference to geotechnical studies and recommendations concerning servicing:** see note 1.5 on drawing C-2

**All preliminary and formal site plan submissions should have the following information:**

- **Metric scale:** included
- **North arrow:** included
  - **(including construction North):** not included
- **Key Plan:** included

- **Name and contact information of applicant and property owner:** not available
- **Property limits:** included
  - **including bearings and dimensions:** not included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

**Development Servicing Report: Water**

**Confirm consistency with Master Servicing Study, if available:** not applicable

**Availability of public infrastructure to service proposed development:** not applicable

**Identification of system constraints:** not applicable

**Confirmation of adequate domestic supply and pressure:** not applicable

**Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow locations throughout the development:** see page 3, 7 & 8 of Servicing Brief and Stormwater Management Report

**Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves:** not applicable

**Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design:** not applicable

**Address reliability requirements such as appropriate location of shut-off valves:** not applicable

**Check on the necessity of a pressure zone boundary modification:.** not applicable

**Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range:** not applicable

**Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions:** not applicable

**Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation:** not applicable

**Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines:** not applicable

**Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference:** not applicable

## **Development Servicing Report: Wastewater**

**Summary of proposed design criteria:** see page 3 of Servicing Brief

**(Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure):** not applicable

**Confirm consistency with Master Servicing Study and /or justification for deviations:** not applicable

**Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and conditions of sewers:** not applicable

**Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development:** not applicable

**Verify available capacity in downstream sanitary sewer and / or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable):** not applicable

**Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format.** not applicable

**Description of proposed sewer network including sewers, pumping stations, and forcemains:** not applicable

**Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality):** not applicable

**Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development:** not applicable

**Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity:** not applicable

**Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding:** not applicable

**Special considerations such as contamination, corrosive environment etc:** not applicable

## **Development Servicing Report: Stormwater Checklist**

**Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property):** see page 3 to 6 of Servicing Brief and Stormwater Management Report

**Analysis of available capacity in existing public infrastructure.** not applicable



**A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern:** see drawing C-2

**Water quality control objective (e/g/ controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects:** see Servicing Brief and Stormwater Management Report

**Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements:** Servicing Brief and Stormwater Management Report

**Descriptions of the references and supporting information.**  
**Set-back from private sewage disposal systems.** not applicable

**Watercourse and hazard lands setbacks:** not applicable

**Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed:** the pre-application consultation record is not yet been issued

**Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists:** not applicable

**Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).** see drawings C-1 to C-3 and Servicing Brief and Stormwater Management Report

**Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals.** see drawings C-1 to C-3 and Servicing Brief and Stormwater Management Report

**Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions:** see Servicing Brief and Stormwater Management Report

**Any proposed diversion of drainage catchment areas from one outlet to another. :** not applicable

**Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. :** not applicable

**If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event:** not applicable

**Identification of potential impacts to receiving watercourses:** Servicing Brief and Stormwater Management Report

**Identification of municipal drains and related approval requirements. :** not applicable

**Descriptions of how the conveyance and storage capacity will be achieved for the development:** see page 2 to 6 of Servicing Brief and Stormwater Management Report

**100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:**

**Inclusion of hydraulic analysis including hydraulic grade line elevations. :** not applicable

**Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors:** see notes 2.1 to 2.5 on drawing C-2

**Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current:** not applicable

**Identification of fill constraints related to floodplain and geotechnical investigation. :** not applicable

#### **Approval and Permit Requirements: Checklist**

**The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:**

**Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act: see page 19 of Servicing Brief and Stormwater Management Report**

**Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:**

**Changes to Municipal Drains. :** not applicable

**Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) :** not applicable

#### **Conclusion Checklist**

**Clearly stated conclusions and recommendations:** see page 4 of Servicing Brief

**Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.**

**All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario:** included