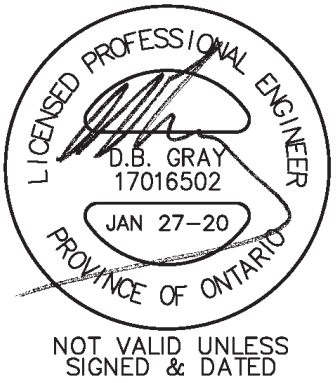
SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

114-122 Russell Avenue
Ottawa, Ontario

Report No. 19078

October 30, 2019
Revised January 27, 2020



D.B. Gray Engineering Inc.

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

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SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

114-122 Russell Avenue
Ottawa, Ontario

This report describes the services and addresses the stormwater management requirements of two properties totally 1237 sq.m. in area located 114-122 Russell Avenue in Ottawa. The property is currently has three single dwellings that will be demolished. Two three-storey (plus a basement) 14-unit apartment buildings are proposed. Russell Avenue is proposed to be re-constructed in 2020

This report forms part of the stormwater management design for the proposed development. Refer to drawing C-1 to C-6 also prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

There is an existing fire hydrant in the municipal road right-of-way located directly in front of the proposed development; therefore, a private on-site fire hydrant is not required. When Russell Avenue is re-constructed in 2020, the existing fire hydrant is currently proposed to be relocated about 2.8m south; however, this location will be too close to the proposed access. The new hydrant will have to be located close to where is currently located.

A fire flow of 233.3 L/s (14,000 L/min) is required, as calculated as per the Fire Underwriter Survey "Water Supply For Fire Protection".

The boundary conditions for the 233.3 L/s fire flow (based on the city's computer model of the municipal water distribution system) were received from the City. They include a HGL (hydraulic grade line) of 98.0 m during the above flow rate in the 200mm municipal watermain at the subject location which calculates to be 392 kPa (57 psi). Since the pressure is above 138 kPa (20 psi) there is an adequate water supply for firefighting from the existing municipal fire hydrant.

WATER SERVICE:

As part of the Russell Avenue re-construction the existing 150mm municipal watermain will be replaced with a 200mm PVC watermain. A 25 mm water service is proposed for each building.

Based on the City of Ottawa Water Distribution Design Guidelines for residential properties (18 one-bedroom apartment units / 1.4 person per unit; and 4 two-bedroom apartment units / 2.1 persons per unit; and 6 four-bedroom apartment units (used value for single family dwelling) / 3.4 persons per unit – 350 L/person/day) and Ministry of the

Environment Design Guidelines for peaking factors the daily average flow is 0.2 L/s with a maximum daily and maximum hourly demand of 1.8 and 2.8 L/s respectively.

To determine water pressure under these demands, boundary conditions, based on the City of Ottawa computer simulation of the water distribution system, at the subject location, are required. In summary, we required the boundary conditions for the subject area based on the following:

Average Daily Demand: 0.2 L/s.
Maximum Daily Demand: 1.8 L/s.
Maximum Hourly Demand: 2.8 L/s
Fire Flow Demand: 233.3 L/s
Maximum Daily + Fire Flow Demand: 235.1 L/s

Based on the boundary conditions received from the City, the minimum HGL (hydraulic grade line) is 105.0 m and the maximum is 115.0 m. With these HGLs the water pressure at the water meter is calculated to vary from 464 kPa to 562 kPa (67 to 81 psi). This is an acceptable range of water pressures for the proposed development. However, since it is calculated that the water pressure can be above 80 psi at times an on-site pressure check is recommended to determine if a pressure reducing valve (PRV) is required.

SANITARY SERVICE:

As part of the Russell Avenue re-construction the existing 300mm municipal combined sewer will be replaced with a 450mm combined sewer.

Based on the City of Ottawa Sewer Design Guidelines for a residential property (9 one-bedroom apartment units / 1.4 person per unit; and 2 two-bedroom apartment units / 2.1 persons per unit; and 6 four-bedroom apartment units (used value for single family dwelling) / 3.4 persons per unit – 280 l/person/day – 3.2 peaking factor); and based on a 0.33 l/s/ha infiltration flow; the post development flow is calculated to be 0.30 L/s for each building. This flow will be adequately handled by the proposed sanitary sewer service connections (150mm at 2% - 22.5 L/s capacity) since, at the design flow, it will only be about 1% full.

The proposed 150mm sanitary service connections will connect to the 450mm municipal combined sewer which, with a 2.00% slope, has a capacity of 420.6 l/s. The 0.60 L/s in sanitary flows contributing to the existing 250mm sanitary sewer is expected to have a negligible impact.

STORMWATER MANAGEMENT:

Water Quality:

The Rideau Valley Conservation Authority (RVCA) provided the following comment: *"The stormwater management report for this site indicates that the stormwater from this site will be directed to an existing combined sewer. Therefore, the RVCA accepts that no additional onsite water quality treatment is required as there is a downstream facility which treats the water from the combined sewer."* Therefore, no permanent quality control measures are proposed.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-3 and notes 2.1 to 2.6 on drawing C-4). In summary: to filter out construction sediment a silt fence barrier will be installed adjacent to the south property line; and sediment capture filter sock inserts will be installed in all existing catch basins adjacent to the site and all new catch basins as they are installed.

Water Quantity:

The stormwater management criteria for quantity control are to control the post development peak flows for the 5-year and 100-year storm events to peak flows during the 5-year storm event using a pre-development runoff coefficient or runoff coefficient of 0.40, whichever is less; and a 10 minute time of concentration. It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.54 and a time of concentration of 7.5 minutes. Therefore, based on runoff coefficient of 0.40, a 10 minute time of concentration; and using the Rational Method; the maximum allowable release rate is 14.33 L/s for all storm events. The runoff coefficients for the 100 year event are increased by 25% to maximum 1.00.

Stormwater will be stored within the development on the roof of the proposed buildings and on the parking area above a catch basin.

Drainage Area I
(Uncontrolled Flow Off Site – 309 sq.m.):
The runoff from front of the site will be allowed to flow uncontrolled off the site. The flow from is calculated at 10 minutes concentration.

	100-year	5-year
Maximum flow rate:	8.07 L/s	4.05 L/s

Drainage Area II (122 Russell Avenue - Roof 1 / Phase 1 – 261 sq.m.):
The roof drain will be a flow control type which will restrict the flow and cause the storm water to pond on the roof. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (1 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100-A1 or equal. The roof drain will be installed at the low point of the roof which will be 145mm lower than the perimeter of the roof. Two scuppers, 400mm wide and installed 145 mm

above the roof drains, are required so that the maximum depth of water on the roof cannot exceed 150 mm as per the Ontario Building Code.

	100-year	5-year
The maximum release rate:	1.66 L/s	1.27 L/s
The maximum ponding depth:	134 mm	102 mm
The maximum stored volume:	9.10 cu.m.	4.06 cu.m.

Drainage Area III (114 Russell Avenue - Roof 2 / Phase 2 – 261 sq.m.):
The roof drain will be a flow control type which will restrict the flow and cause the storm water to pond on the roof. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (1 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100-A1 or equal. The roof drain will be installed at the low point of the roof which will be 145mm lower than the perimeter of the roof. Two scuppers, 400mm wide and installed 145 mm above the roof drains, are required so that the maximum depth of water on the roof cannot exceed 150 mm as per the Ontario Building Code.

	100-year	5-year
The maximum release rate:	1.65 L/s	1.26 L/s
The maximum ponding depth:	133 mm	102 mm
The maximum stored volume:	8.63 cu.m.	3.84 cu.m.

Drainage Area IV (416 sq.m.):
An inlet control device (ICD) located at the outlet pipe of catch basin CB-1 will control the release of stormwater from Drainage Area IV. The ICD will restrict the flow and force the stormwater to back up onto the asphalt surface above the catch basin. The ICD shall be a Hydrovex "VHV Vertical Vortex Flow Regulator" and shall be sized by the manufacturer for a discharge rate of 3.06 L/s at 1.77 m head. It is calculated that an orifice area of 1,963 sq.mm. (50 mm diameter) and a discharge coefficient of 0.26 will restrict the outflow rate to 3.06 L/s at a head of 1.77 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 2.98 L/s at 1.69 m.

	100-year	5-year
Maximum release rate:	2.94 L/s	2.87 L/s
Maximum water elevation:	57.86 m	57.77 m
Maximum stored volume:	6.82 cu.m.	2.09 cu.m.

The Entire Site:

	100-year	5-year
Maximum permitted release rate:	14.33 L/s	14.33 L/s
Maximum release rate:	14.33 L/s	9.45 L/s
Maximum stored volume:	24.55 cu.m.	10.00 cu.m.

Therefore, the maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable of 14.33 L/s and to achieve this release rate the total maximum required capacity is 24.55 cu.m. For the 5-year event the maximum post-development release is calculated to be less than the maximum

allowable at 9.45 L/s and to achieve this release rate the total maximum required capacity is 10.00 cu.m.

The unrestricted flowrate resulting from one in five-year storm event will produce a peak flow of 8.5 L/s which will be adequately by the proposed storm sewer system with the last pipe segment (150mm at 0.85% - 14.6 L/s capacity) being only at 58% of its capacity. The 8.5 l/s in stormwater flows contributing to the 450 mm municipal combined sewer is expected to have a positive impact given the post-development flows from the site are being reduced by 27% (from 17.92 to 13.04 L/s) during the 5-year event (during the 100-year event the flows remain the same).

Ministry Of Environment, Conservation, and Parks (MECP) Environmental Compliance Approval (ECA):

Since the stormwater discharges to a combined sewer it is expected that a MECP ECA will be required.

CONCLUSIONS:

1. There will be an adequate water supply for firefighting.

2. When Russell Avenue is re-constructed in 2020, the existing fire hydrant is currently proposed to be relocated about 2.8m south; however, this location will be too close to the proposed access. The new hydrant will have to be located close to where is currently located.

3. The water pressure in the municipal watermain is adequate for the proposed development. However, since it is calculated that the water pressure can be above 80 psi at times an on-site pressure check is recommended to determine if a pressure reducing valve (PRV) is required.

4. The expected sanitary sewage flow rate will be adequately handled by the proposed sanitary sewer service connection.

5. The sanitary flow contributing to the existing municipal combined sewer is expected to have a negligible impact.

6. The RVCA has stated that no additional onsite water quality treatment is required, therefore, no permanent quality control measures are proposed.

7. An erosion and sediment control plan has been developed to be implemented during construction.

8. The stormwater management criteria for quantity control are to control the post development peak flows for the 5-year and 100-year storm events to peak flows during the 5-year storm event using a pre-development runoff coefficient or runoff coefficient of 0.40, whichever is less; and a 10 minute time of concentration. To achieve quantity control stormwater will be stored within the development on the roof and in the parking area above a catch basin.

9. The maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable at 14.33 L/s and to achieve this release rate the total maximum required capacity is 24.55 cu.m. For the 5-year event the maximum post-development release is calculated to be equal to be less than the maximum allowable at 9.45 L/s and to achieve this release rate the total maximum required capacity is 10.00 cu.m.

10. The unrestricted flowrate resulting from one in five-year storm event will produce a peak flow will be adequately by the proposed storm sewer system.

11. The stormwater flows contributing to the 450 mm municipal combined sewer is expected to have a positive impact given the post-development flows from the site are being reduced by 27% during the 5-year event (during the 100-year event the flows remain the same).

12. Since the stormwater discharges to a combined sewer it is expected that a MOE ECA will be required.

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2-Oct-19

REVISED 23-Oct-19

114-122 Russell Avenue
Ottawa, Ontario

Fire Flow Requirements

Proposed 4-Storey 14-Unit Apartment Building (122 Russell Ave)

Fire flow requirement as calculated as per Fire Undewriter Survey "Water Supply For Fire Protection".

F = 220 C $A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
= 1.5 Wood Frame Construction

A = total floor area (all storeys excluding basements at least 50% below grade)

4th Floor	261
3rd Floor	261
2nd Floor	261
Ground Floor	261

A (TOTAL FIRE AREA) = 1044 sq.m.

F = 10,663 L/min
= 11,000 L/min (rounded off to the nearest 1,000 L/min)

-15% Charge for Limited-combustible Occupancy

= 9,350 L/min

0% Reduction - No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height
			Constuction	Length m	Storeys	Factor
20%	North	3.1 to 10m	W-F	23.3	4	93
8%	East	20.1 to 30m	Ordinary	13.2	2	26
19%	South	3.1 to 10m	W-F	23.3	3	70
8%	West	20.1 to 30m	W-F	13.2	2	26
55%	Total Increase for Exposure (maximum 75%)					

= 5,143 L/min Increase

= 14,493 L/min
F = 14,000 L/min (rounded off to the nearest 1,000 L/min)
= 233.3 L/s

Elevation at Fire Hydrant	58.00	m ASL				
			Static Pressure at Fire Hydrant			
233.3 l/s FIRE FLOW:	105.0	m ASL	67	psi	461	kPa

Fire Flow Requirements
(continued)

Proposed 4-Storey 14-Unit Apartment Building (114 Russell Ave)

Fire flow requirement as calculated as per Fire Undewriter Survey "Water Supply For Fire Protection".

F = 220 C $A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
= 1.5 Wood Frame Construction

A = total floor area (all storeys excluding basements at least 50% below grade)

4th Floor	261
3rd Floor	261
2nd Floor	261
Ground Floor	261

A (TOTAL FIRE AREA) = 1044 sq.m.

F = 10,663 L/min
= 11,000 L/min (rounded off to the nearest 1,000 L/min)

-15% Charge for Limited-combustible Occupancy

= 9,350 L/min

0% Reduction - No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height
			Constuction	Length m	Storeys	Factor
15%	North	3.1 to 10m	Ordinary	15	2	30
8%	East	20.1 to 30m	Ordinary	13.2	2	26
20%	South	3.1 to 10m	W-F	23.3	4	93
8%	West	20.1 to 30m	W-F	13.2	2	26
51%	Total Increase for Exposure (maximum 75%)					

= 4,769 L/min Increase

= 14,119 L/min
F = 14,000 L/min (rounded off to the nearest 1,000 L/min)
= 233.3 l/s

Elevation at Fire Hydrant	58.00	m ASL				
			Static Pressure at Fire Hydrant			
233.3 l/s FIRE FLOW:	98.0	m ASL	57	psi	392	kPa

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2-Oct-19
REVISED 30-Oct-19

Two Proposed 4 Storey 14-Unit Apartment Buildings
114-122 Russell Avenue
Ottawa, Ontario

Water Demand

	Number of Units	Persons Per Unit	Population	
APARTMENTS:				
1 Bedroom:	18	1.4	25	
2 Bedroom:	4	2.1	8	
4 Bedroom:	6	3.4	20	(based on single family)
Average Aptarment:	0	1.8	0	
		TOTAL:	54	

DAILY AVERAGE

350 litres / person / day

13.1	l/min	0.2	l/s	3 USgpm

MAXIMUM DAILY DEMAND 8.6 (Peaking Factor for a population of 52: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

112.6	l/min	1.9	l/s	30 USgpm

MAXIMUM HOURLY DEMAND 12.9 (Peaking Factor for a population of 52: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

169.6	l/min	2.8	l/s	45 USgpm

Elevation of Water Meter: 57.7 m ASL
Basement Floor Elevation: 56.8 m ASL

			Static Pressure at Water Meter		
MINIMUM HGL:	105.0	m ASL	67	psi	464 kPa
MAXIMUM HGL:	115.0	m ASL	81	psi	562 kPa

Gmail by Google

Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>

RE: 114-122 Russell Ave - Boundary Condition Request

Wu, John <John.Wu@ottawa.ca> Wed, Oct 23, 2019 at 9:24 AM
To: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>

Here is the result:

The following are boundary conditions, HGL, for hydraulic analysis at 114-122 Russell (zone 1W) assumed to be connected to a future 203mm watermain on Russell (see attached PDF for location).

Minimum HGL = 105.0m

Maximum HGL = 115.0m, the maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MaxDay + FireFlow (233 L/s) = 98.0m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Please make sure if the new constructed new water main is 200mm, if it is different, you have to let us know.

John

From: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>
Sent: October 23, 2019 8:20 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Douglas Gray <doug@dbgrayengineering.com>; Gauthier, Steve <Steve.Gauthier@ottawa.ca>
Subject: Fwd: 114-122 Russell Ave - Boundary Condition Request

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Good morning ,

Just a quick reminder that we are looking for boundary conditions for the site at 114-122 Russell.

Please see below.

Thanks

Caoimhin Kennedy

---------- Forwarded message ---------
From: **Caoimhin Kennedy** <c.kennedy@dbgrayengineering.com>
Date: Wed, Oct 2, 2019 at 3:54 PM
Subject: 114-122 Russell Ave - Boundary Condition Request
To: <John.Wu@ottawa.ca>
Cc: Douglas Gray <doug@dbgrayengineering.com>, <Steve.Gauthier@ottawa.ca>

Good afternoon,

We are working on project that consist of two four-storey 14-unit apartment buildings at 114-122 Russell Rd.

We understand that the Russell Ave will be reconstructed (including the watermain) next year. Please provide the boundary conditions after reconstruction.

We have calculated the following expected demands.

Average daily demand: 0.2 L/s.

Maximum daily demand: 1.8 L/s.

Maximum hourly daily demand: 2.8 L/s

Fire Flow demand: 233.3 L/s

Fire Flow + Max Day: 235.1 L/s

Calculations are attached. Also attached is sketch showing the approximately location of the proposed service connections.

Thanks,

Caoimhin Kennedy

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114-122 Russell Oct 2019.pdf
1405K


Boundary Condition for 114-122 Russell
Assumed future 203mm between Somerset and Osgoode
Unknown (researched)
Legend
Pipe Ownership
Ownership
Private
Public
City of Ottawa

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SANITARY SEWER DESIGN FORM

Average Daily Flows:

Residential:	280	l / capita / day
Commercial:	28,000	l / ha / day
Instituational:	28,000	l / ha / day
Light Industrial:	35,000	l / ha / day
Heavy Industrial:	55,000	l / ha / day

Infiltration Allowance: 0.33 l / s / ha

Peaking Factor:

Residential (Harmon Equation): $P.F. = 1 + \frac{14}{4 + P^{0.5}}$

P = Population / 1000

Harmon Correction Factor 0.8

Commercial & Institutional: 1.5 If contrinbution > 20%

Commercial & Institutional: 1.0 If contrinbution < 20%

Industrial: As per Ottawa Guidelines Appendix 4-B

PROJECT: 114-122 Russell Ave

Designed By: DBG

30-Oct-19

LOCATION			Section								Cumulative Residential		Section Non-Residential			Cumulative					SEWER DATA								COMMENTS
			Single Family	Semi/Townhouse	Duplex / Triplex	Apartments (average)	Apartments (1 Bed.)	Apartments (2 Bed.)	Apartments (3 Bed.)	Residential Area	Pop.	Peaking Factor	Area	Flow	Peaking Factor	Flow	Area	Sewage Flow	Infiltration Flow	Total Flow	n = 0.013								
STREET	FROM	TO	ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.8	ppu = 1.4	ppu = 2.1	ppu = 3.1												Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Ratio Q/Qfull	
			No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	ha			ha	l/ha/day		l/s	ha	l/s	l/s	l/s								
			Apartments (4 Bed.)																										
	114 Russell Ave	EXIST. 200 PVC SAN	3				9	2		0.062	27	3.2					0.062	0.28	0.02	0.30	PVC SDR 28	152.4	150	2.0	19	22.5	1.23	0.01	
	122 Russell Ave	EXIST. 200 PVC SAN	3				9	2		0.062	27	3.2					0.062	0.28	0.02	0.30	PVC SDR 28	152.4	150	2.0	19	22.5	1.23	0.01	
																					MUNICIPAL COMBINED SEWER IN RUSSELL AVE								
																					CONCRETE	457.2	450	2.00		420.6	2.56	0.00	

STORMWATER MANAGEMENT CALCULATIONS

The orifice calculations are based on the following formula:

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

where:

Q = flowrate in litres per second
C_d = coefficient of discharge
A_o = orifice area in sq.m.
g = 9.81 m/s2
h = head above orifice in meters

Flow control roof drain calculations are based on the following formula:

$$Q = N \times S \times d \times F$$

where:

Q = flowrate in litres per second
N = number of roof drains
S = slots per weir
d = pond depth at roof drain in mm
F = flowrate through each slot
0.0124 litres per second per mm pond depth (5 USgpm per inch)

Storage calculations on the roof and 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

Summary Tables

ONE HUNDRED YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	8.07	-	-
AREA II (122 Ruseel Rd - Roof 1 / Phase 1)	-	1.66	9.10	9.10
AREA III (114 Russell Rd - Roof 2 / Phase 2)	-	1.65	8.63	8.63
AREA IV	-	2.94	6.82	6.82
TOTAL	14.33	14.33	24.55	24.55

FIVE YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	4.05	-	-
AREA II (Roof 1 / Phase 1)	-	1.27	4.06	4.06
AREA III (Roof 2 / Phase 2)	-	1.26	3.84	3.84
AREA IV	-	2.87	2.09	2.09
TOTAL	14.33	9.45	10.00	10.00

October 24, 2019
REVISED January 27, 2020

114-122 Russell Avenue

Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS
Rational Method

5 Year Pre-Development Conditions

Roof Area:	329	sq.m	0.90
Asphalt/Concrete Area:	275	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	633	sq.m	0.20
Total Catchment Area:	1237	sq.m	0.54

Airport Formula

$$Tc = \frac{3.26\,(1.1 - C)\,(L)^{1/2}}{Sw^{0.33}} \text{ min}$$

Runoff Coefficient (C):	0.54	see above
Sheet Flow Distance (L):	33	m
Slope of Land (Sw):	2.7	%
Time of Concentration (Sheet Flow):	7.5	min
Area (A):	1237	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.40	
Maximum Allowable Release Rate (2.78AiC):	14.33	L/s

ONE HUNDRED YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	98	sq.m	1.00
Gravel Area:	19	sq.m	0.875
Landscaped Area:	192	sq.m	0.25
Total Catchment Area:	309	sq.m	0.53
Area (A):	309	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.53		
Flow Rate (2.78AiC):	8.07	L/s	

DRAINAGE AREA II (122 Russell Rd - Roof 1 / Phase 1)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	261	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	261	sq.m	1.00

No. of Roof Drains: 1

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 134 mm

Maximum Release Rate: 1.66 L/s

Pond Area: 204 sq.m

Achieved Volume: 9.10 cu.m

Maximum Volume Required: 9.10 cu.m

Time	i	2.78AiC	Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	cu.m
5	243	17.61	1.66	15.95	4.78
10	179	12.96	1.66	11.30	6.78
15	143	10.37	1.66	8.71	7.84
20	120	8.70	1.66	7.04	8.45
25	104	7.53	1.66	5.87	8.81
30	92	6.67	1.66	5.01	9.01
35	83	5.99	1.66	4.33	9.10
40	75	5.45	1.66	3.79	9.10
45	69	5.01	1.66	3.35	9.04
50	64	4.64	1.66	2.98	8.94
55	60	4.33	1.66	2.67	8.80
60	56	4.06	1.66	2.39	8.62
65	53	3.82	1.66	2.16	8.42
70	50	3.61	1.66	1.95	8.20
75	47	3.43	1.66	1.77	7.96
80	45	3.26	1.66	1.60	7.70
85	43	3.12	1.66	1.46	7.43
90	41	2.98	1.66	1.32	7.14
95	39	2.86	1.66	1.20	6.84
100	38	2.75	1.66	1.09	6.54
105	36	2.65	1.66	0.99	6.22
110	35	2.55	1.66	0.89	5.90
115	34	2.47	1.66	0.81	5.57
120	33	2.39	1.66	0.73	5.23
125	32	2.31	1.66	0.65	4.88
130	31	2.24	1.66	0.58	4.53
135	30	2.18	1.66	0.52	4.18
140	29	2.12	1.66	0.45	3.82
145	28	2.06	1.66	0.40	3.45
150	28	2.00	1.66	0.34	3.08
180	24	1.73	1.66	0.07	0.80
210	21	1.53	1.53	0.00	0.00
240	19	1.38	1.38	0.00	0.00

DRAINAGE AREA III (114 Russell Rd - Roof 2 / Phase 2)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	251	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	251	sq.m	1.00

No. of Roof Drains: 1

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 133 mm

Maximum Release Rate: 1.65 L/s

Pond Area: 194 sq.m

Achieved Volume: 8.63 cu.m

Maximum Volume Required: 8.63 cu.m

Time	i	2.78AiC	Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	cu.m
5	243	16.94	1.65	15.28	4.58
10	179	12.46	1.65	10.81	6.48
15	143	9.97	1.65	8.32	7.49
20	120	8.37	1.65	6.72	8.06
25	104	7.25	1.65	5.59	8.39
30	92	6.41	1.65	4.76	8.56
35	83	5.76	1.65	4.11	8.63
40	75	5.24	1.65	3.59	8.62
45	69	4.82	1.65	3.17	8.55
50	64	4.46	1.65	2.81	8.43
55	60	4.16	1.65	2.51	8.28
60	56	3.90	1.65	2.25	8.09
65	53	3.67	1.65	2.02	7.88
70	50	3.47	1.65	1.82	7.65
75	47	3.30	1.65	1.64	7.40
80	45	3.14	1.65	1.49	7.14
85	43	3.00	1.65	1.34	6.86
90	41	2.87	1.65	1.22	6.57
95	39	2.75	1.65	1.10	6.27
100	38	2.64	1.65	0.99	5.95
105	36	2.55	1.65	0.89	5.63
110	35	2.46	1.65	0.80	5.31
115	34	2.37	1.65	0.72	4.97
120	33	2.30	1.65	0.64	4.63
125	32	2.22	1.65	0.57	4.28
130	31	2.16	1.65	0.50	3.93
135	30	2.09	1.65	0.44	3.57
140	29	2.03	1.65	0.38	3.21
145	28	1.98	1.65	0.33	2.84
150	28	1.93	1.65	0.27	2.47
180	24	1.67	1.65	0.02	0.17
210	21	1.48	1.48	0.00	0.00
240	19	1.33	1.33	0.00	0.00

DRAINAGE AREA IV

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	123	sq.m	1.00
Gravel Area:	100	sq.m	0.875
Landscaped Area:	193	sq.m	0.25
Total Catchment Area:	416	sq.m	0.62

Water Elevation:	57.86	m
Invert of Outlet Pipe - CB-1:	56.06	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB-1)	56.09	m
Head:	1.77	m
Orifice Diameter:	50	mm
Orifice Area:	1963	sq.mm
Coefficient of Discharge:	0.25	
Maximum Release Rate:	2.94	L/s

Surface Storage Above Catch Basin

CB	Top Area (sq.m)	Depth (m)	Volume	
CB-1	103	0.20	6.82	cu.m

Achieved Volume: 6.82 cu.m

Maximum Volume Required: 6.82 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	17.46	2.94	14.52	4.35
10	179	12.84	2.94	9.90	5.94
15	143	10.28	2.94	7.34	6.60
20	120	8.63	2.94	5.69	6.82
25	104	7.47	2.94	4.53	6.79
30	92	6.61	2.94	3.67	6.60
35	83	5.94	2.94	3.00	6.30
40	75	5.41	2.94	2.46	5.91
45	69	4.97	2.94	2.03	5.47
50	64	4.60	2.94	1.66	4.98
55	60	4.29	2.94	1.35	4.45
60	56	4.02	2.94	1.08	3.88
65	53	3.79	2.94	0.85	3.30
70	50	3.58	2.94	0.64	2.69
75	47	3.40	2.94	0.46	2.06
80	45	3.24	2.94	0.29	1.41
85	43	3.09	2.94	0.15	0.75
90	41	2.96	2.94	0.02	0.08
95	39	2.84	2.84	0.00	0.00
100	38	2.73	2.73	0.00	0.00
105	36	2.63	2.63	0.00	0.00
110	35	2.53	2.53	0.00	0.00
115	34	2.45	2.45	0.00	0.00
120	33	2.37	2.37	0.00	0.00
125	32	2.29	2.29	0.00	0.00
130	31	2.22	2.22	0.00	0.00
135	30	2.16	2.16	0.00	0.00
140	29	2.10	2.10	0.00	0.00
145	28	2.04	2.04	0.00	0.00
150	28	1.99	1.99	0.00	0.00
180	24	1.72	1.72	0.00	0.00
210	21	1.52	1.52	0.00	0.00
240	19	1.37	1.37	0.00	0.00

FIVE YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	98	sq.m	0.90
Gravel Area:	19	sq.m	0.70
Landscaped Area:	192	sq.m	0.20
Total Catchment Area:	309	sq.m	0.45
Area (A):	309	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.45		
Flow Rate (2.78AiC):	4.05	L/s	

DRAINAGE AREA II (122 Russell Rd - Roof 1 / Phase 1)

(FIVE YEAR EVENT)

			C
Roof Area:	261	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	261	sq.m	0.90

No. of Roof Drains: 1

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 102 mm

Maximum Release Rate: 1.27 L/s Pond Area: 119 sq.m

Achieved Volume: 4.06 cu.m

Maximum Volume Required: 4.06 cu.m

Time	i	2.78AiC	Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	cu.m
5	141	9.22	1.27	7.95	2.39
10	104	6.80	1.27	5.53	3.32
15	84	5.46	1.27	4.19	3.77
20	70	4.59	1.27	3.32	3.98
25	61	3.98	1.27	2.71	4.06
30	54	3.52	1.27	2.25	4.05
35	49	3.17	1.27	1.90	3.99
40	44	2.89	1.27	1.62	3.88
45	41	2.65	1.27	1.38	3.74
50	38	2.46	1.27	1.19	3.57
55	35	2.29	1.27	1.02	3.38
60	33	2.15	1.27	0.88	3.18
65	31	2.03	1.27	0.76	2.96
70	29	1.92	1.27	0.65	2.73
75	28	1.82	1.27	0.55	2.48
80	27	1.73	1.27	0.47	2.23
85	25	1.66	1.27	0.39	1.98
90	24	1.59	1.27	0.32	1.71
95	23	1.52	1.27	0.25	1.44
100	22	1.46	1.27	0.19	1.16
105	22	1.41	1.27	0.14	0.88
110	21	1.36	1.27	0.09	0.60
115	20	1.31	1.27	0.04	0.31
120	19	1.27	1.27	0.00	0.02
125	19	1.23	1.23	0.00	0.00
130	18	1.19	1.19	0.00	0.00
135	18	1.16	1.16	0.00	0.00
140	17	1.13	1.13	0.00	0.00
145	17	1.10	1.10	0.00	0.00
150	16	1.07	1.07	0.00	0.00
180	14	0.93	0.93	0.00	0.00
210	13	0.82	0.82	0.00	0.00
240	11	0.74	0.74	0.00	0.00

DRAINAGE AREA III (114 Russell Rd - Roof 2 / Phase 2)

(FIVE YEAR EVENT)

			C
Roof Area:	251	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	251	sq.m	0.90

No. of Roof Drains: 1

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 102 mm

Maximum Release Rate: 1.26 L/s Pond Area: 113 sq.m

Achieved Volume: 3.84 cu.m

Maximum Volume Required: 3.84 cu.m

Time	i	2.78AiC	Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	cu.m
5	141	8.87	1.26	7.60	2.28
10	104	6.54	1.26	5.28	3.17
15	84	5.25	1.26	3.99	3.59
20	70	4.41	1.26	3.15	3.78
25	61	3.82	1.26	2.56	3.84
30	54	3.39	1.26	2.12	3.82
35	49	3.05	1.26	1.79	3.75
40	44	2.77	1.26	1.51	3.63
45	41	2.55	1.26	1.29	3.48
50	38	2.36	1.26	1.10	3.31
55	35	2.21	1.26	0.94	3.11
60	33	2.07	1.26	0.81	2.91
65	31	1.95	1.26	0.69	2.68
70	29	1.84	1.26	0.58	2.45
75	28	1.75	1.26	0.49	2.20
80	27	1.67	1.26	0.41	1.95
85	25	1.59	1.26	0.33	1.69
90	24	1.53	1.26	0.26	1.42
95	23	1.46	1.26	0.20	1.15
100	22	1.41	1.26	0.15	0.87
105	22	1.36	1.26	0.09	0.59
110	21	1.31	1.26	0.05	0.30
115	20	1.26	1.26	0.00	0.01
120	19	1.22	1.22	0.00	0.00
125	19	1.18	1.18	0.00	0.00
130	18	1.15	1.15	0.00	0.00
135	18	1.12	1.12	0.00	0.00
140	17	1.08	1.08	0.00	0.00
145	17	1.06	1.06	0.00	0.00
150	16	1.03	1.03	0.00	0.00
180	14	0.89	0.89	0.00	0.00
210	13	0.79	0.79	0.00	0.00
240	11	0.71	0.71	0.00	0.00

DRAINAGE AREA IV

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	123	sq.m	0.90
Gravel Area:	100	sq.m	0.70
Landscaped Area:	193	sq.m	0.20
Total Catchment Area:	416	sq.m	0.53

Water Elevation:	57.77	m
Invert of Outlet Pipe - CB-1:	56.06	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB-1)	56.09	m
Head:	1.69	m
Orifice Diameter:	50	mm
Orifice Area:	1963	sq.mm
Coefficient of Discharge:	0.25	
Maximum Release Rate:	2.87	L/s

Surface Storage Above Catch Basin

CB	Top Area (sq.m)	Depth (m)	Volume	
CB-1	56	0.11	2.09	cu.m

Achieved Volume: 2.09 cu.m

Maximum Volume Required: 2.09 cu.m

Time	i	2.78AiC	Release Rate	Stored Rate	Stored Volume
min	mm/hr	L/s	L/s	L/s	cu.m
5	141	8.61	2.87	5.74	1.72
10	104	6.35	2.87	3.48	2.09
15	84	5.09	2.87	2.23	2.00
20	70	4.28	2.87	1.41	1.70
25	61	3.71	2.87	0.84	1.27
30	54	3.29	2.87	0.42	0.75
35	49	2.96	2.87	0.09	0.19
40	44	2.69	2.69	0.00	0.00
45	41	2.48	2.48	0.00	0.00
50	38	2.30	2.30	0.00	0.00
55	35	2.14	2.14	0.00	0.00
60	33	2.01	2.01	0.00	0.00
65	31	1.89	1.89	0.00	0.00
70	29	1.79	1.79	0.00	0.00
75	28	1.70	1.70	0.00	0.00
80	27	1.62	1.62	0.00	0.00
85	25	1.55	1.55	0.00	0.00
90	24	1.48	1.48	0.00	0.00
95	23	1.42	1.42	0.00	0.00
100	22	1.37	1.37	0.00	0.00
105	22	1.32	1.32	0.00	0.00
110	21	1.27	1.27	0.00	0.00
115	20	1.23	1.23	0.00	0.00
120	19	1.19	1.19	0.00	0.00
125	19	1.15	1.15	0.00	0.00
130	18	1.12	1.12	0.00	0.00
135	18	1.08	1.08	0.00	0.00
140	17	1.05	1.05	0.00	0.00
145	17	1.02	1.02	0.00	0.00
150	16	1.00	1.00	0.00	0.00
180	14	0.86	0.86	0.00	0.00
210	13	0.77	0.77	0.00	0.00
240	11	0.69	0.69	0.00	0.00

D.B. GRAY ENGINEERING INC.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
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STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

n = 0.013

Project: 114-122 Russell Ave

Designed By: DBG

Date: October 24, 2019

26 LOCATION			AREA (ha)				Individual 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity i (mm/hr)	Peak Flow Q (L/s)	SEWER DATA									COMMENTS
			Hard	Gravel	Landscape	Roof						Type of Pipe	Dia. Actual (mm)	Dia. Nominal (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Time of Flow (min)	Ratio Q/Qfull	
STREET	FROM	TO	R = 0.90	R = 0.70	R = 0.20	R = 0.90															
	CB-1	CB/MH-2	0.0123	0.0100	0.0193		0.061	0.061	10.00	104.2	6.4	PVC SDR-35	152.4	150	0.850	16.5	14.6	0.80	0.34	0.43	
	CB/MH-2	450 COMBINED	0.0073	0.0011	0.0007		0.021	0.021	10.34	102.4	8.5	PVC SDR-35	152.4	150	0.850	25.2	14.6	0.80	0.52	0.58	
													EXISTING 450 COMBINED IN RUSSELL AVE								
													457.2	450	2.00		420.6	2.56			

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-5

Plan showing the site and location of all existing services: see drawings C-1 to C-5

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 defendable design criteria: not applicable

Statement of objectives and servicing criteria: see page 2 of Servicing Brief and Stormwater Management Report

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-5

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-5

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-4

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: see page 2 of Servicing Brief

Identification of system constraints: see page 2 of Servicing Brief

Confirmation of adequate domestic supply and pressure: see page 2 of Servicing Brief

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 2, 8 & 9 of Servicing Brief

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: see page 3 of Servicing Brief

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 feedermains, 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: see page 2 of Servicing Brief

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: see page 3 of Servicing Brief

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. see page 9 of Servicing Brief

Description of proposed sewer network including sewers, pumping stations, and forcemains: see page 3 of Servicing Brief

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 4 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 Stormwater Management Report 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-waterched 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-2 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-5 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 4 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 2.7 on drawing C-4

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 4 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 7 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