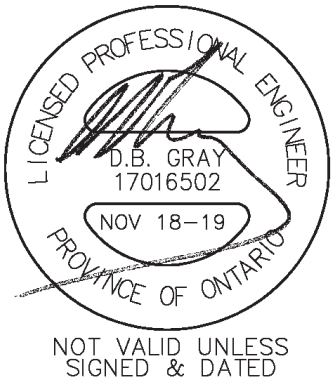
SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

3025 Carp Road
Ottawa, Ontario

Report No. 19048

November 18, 2019



NOT VALID UNLESS
SIGNED & DATED

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SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

3025 Carp Road
Ottawa, Ontario

This Servicing Brief & Stormwater Management Report is a description of the services for a 1,204 sq.m. office / garage building and addresses the stormwater management requirements of 1.83 hectare of land located at 3025 Carp Rideau Road in Ottawa. The land immediately to the west of the proposed development is a pond. The area was excavated for mineral extraction and has since filled in with groundwater.

This report forms part of the stormwater management design for the proposed development. Also refer to drawings C-1 to C-5 prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

We understand that the proposed building design will incorporate a 4-hour masonry fire wall that will create two Part 9 buildings which will exempt the building from requiring an on-site water supply for firefighting.

ON-SITE WELL:

A drilled well has been constructed approximately 3.5 m from the west façade of the proposed building.

ON-SITE SEWAGE SYSTEM:

An on-site septic system is proposed. It will be is a Class 4 system consisting of a 6,525 L (minimum) septic tank, a 700 L dosing reservoir, an ECOFLO ST-650PR biofilter treatment unit and an area bed. An application for a septic permit will be submitted to the Ottawa Septic System Office (OSSO) shortly.

STORMWATER MANAGEMENT:

Water Quality:

The Mississippi Valley Conservation Authority (MVCA) recommends a quality target of enhanced treatment which is removal of 80% total suspended solids (TSS).

Rainfall runoff from approximately 87% of the developed portion of the site (and virtually all of the hard surfaces) will drain to a grassed stormwater detention area. The grassed detention areas and the swales leading to the detention areas will have minimal slopes that will keep flow velocities low making them effective for pre-treatment and they will tend to increase the removal of TSS. The low flow conditions in these grassed areas will filter out coarse sediment from runoff and the grass will take up nutrients.

Two infiltration trenches located at the bottom of the stormwater detention area have been sized to remove 80% TSS as per the MOE Design Manual. Based on the geotechnical report the underlying soil is silty sand and has an estimated infiltration rate of 30 to 75 mm /hr. To be conservative 30 mm/hr was used. The two infiltration trenches have a total storage volume of 54.0 cu.m. and each has a draw down time of 25 hours. Based on the water level in the pond, the water table is estimated to be 2.4m below the bottom of the detention area and about 1.5 m below the bottom of the infiltration trench. It is estimated that the depth to bedrock is approximately the same as the water table. Therefore, since both are expected to be greater than 1 m below the bottom of the infiltration trench, bedrock and water table are not expected an issue.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-3 and notes 2.1 to 2.8 on drawing C-4). In summary: to filter out construction sediment a silt fence barrier will be installed around the perimeter of the site; and straw bale check dams will be installed at the outlet of the culverts at the stormwater detention areas.

Water Quantity:

The stormwater quantity control measures detailed in this report are based on the following criteria: The post development release rate for the 5 and 100-year storm events shall be controlled to equal to or less than the flow produced by the pre-development (existing) conditions.

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 0.30 and 0.38 for the 100-year. Using the Airport Formula for sheet flow, it is calculated that the existing time of concentration is 23 minutes for the 5-year event and 21 minutes for the 100-year. Using the Rational Method; the pre-development (existing) 5-year peak flow is 97.13 L/s and 220.70 L/s for the 100-year. Therefore, the maximum allowable release rate is 97.13 L/s and 220.70 L/s for the 5 and 100-year respectively.

Stormwater will be stored within the development in a stormwater detention area (depressed grassed areas). The stormwater released from the detention area will discharge into the existing pond immediately to the west. The surveyor has verified that there are no visible connections between the pond and any ditches or watercourses.

Drainage Area I (Uncontrolled Flow Off Site – 2,440 sq.m.):
The runoff from the perimeter of the site will be allowed to flow uncontrolled off the site.

	100-year	5-year
The maximum flow rate:	36.91 L/s	17.74 L/s

Drainage Area II (15,841 sq.m.):
During five-year event two inlet control devices (ICDs) located in the inlet of each of two culverts in the stormwater detention area will control the release of stormwater from Drainage Area II. During the one hundred-year event, in addition to the ICD, a broad-crested weir will control the release of stormwater. The ICD and weir will restrict the flow and force the stormwater to back up into the detention area. The broad-crested weir will be a concrete curb with a 3.88 m long depressed section. The top of the depressed portion of the curb will be at the 100-year ponding elevation and will release 73.99 L/s. The ICD shall be a plug style with a 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 109.80 L/s at 0.32 m head. It is calculated that an orifice area of 36,136 sq.mm. (±215mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 109.80 L/s at a head of 0.32 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 79.38 L/s at 0.17 m.

	100-year	5-year
The maximum ICD release rate:	109.80 L/s	79.38 L/s
The maximum weir release rate:	73.99 L/s	0.00 L/s
The maximum release rate:	183.79 L/s	79.38 L/s
The maximum ponding elevation:	118.44 m	118.29 m
The maximum ponding depth:	0.42 m	0.27 m
The maximum stored volume:	217.59 cu.m.	110.26 cu.m.

The maximum allowable release rate (pre-development flow rate) for the 100-year storm event for the site is 220.70 L/s. The maximum post-development release rate for the 100-year storm event is calculated to be 220.70 L/s, equal to the maximum allowable. To achieve this release rate the total maximum required storage capacity for the 1:100-year event is 217.59 cu.m.

The maximum allowable release rate (pre-development flow rate) for the 5-year storm event for the site is 97.13 L/s. The maximum post-development release rate for the 5-year storm event is calculated to be 97.13 L/s, equal to the maximum allowable. To achieve this release rate the total maximum required storage capacity for the 1:5-year event is 110.26 cu.m.

CONCLUSIONS:

1. We understand that the proposed building design will incorporate a 4-hour masonry fire wall that will create two Part 9 buildings which will exempt the building from requiring an on-site water supply for firefighting.

2. A drilled well has been constructed approximately 3.5 m from the west façade of the proposed building.

3. An on-site Class 4 septic system is proposed; an application for a septic permit will be submitted to the Ottawa Septic System Office (OSSO) shortly.

4. Two infiltration trenches at the bottom of the stormwater detention area have been sized to remove at least 80% TSS.

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

6. With the proposed stormwater management design the 5-year post-development storm event is equal to the 5-year flow produced by the (existing) pre-development and the 100-year post-development storm event is equal to the 100-year flow produced by the (existing) pre-development.

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/s2
- h = head above orifice in meters

Storage calculations for the stormwater detention area are based on the following formula for volume of a prismodal 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

3025 Carp Road

Ottawa, Ontario

INFILTRATION CALCULATIONS

DRAINAGE AREA II

Roof Area:	1204	sq.m
Asphalt/Concrete Area:	11	sq.m
Gravel Area:	9346	sq.m
Landscaped Area:	5280	sq.m
Total Catchment Area	15841	sq.m.

Require Storage Volume *: 67% Impervious Level 33.9 cu.m./ha (extrapolated from Table 3.2 *)
(for 80% TSS removal) 53.7 cu.m. (1.58) ha

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench

	Depth m	Area sq.m.	Total Volume cu.m.	Void Volume 40% cu.m.
Trench #1	0.75	90	67.5	27.0
Trench #2	0.75	90	67.5	27.0
			TOTAL	54.0

Percolation Rate: 30 mm/hr (silty sand)

Time to Draw Down: 25 Hours

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)	-	36.91	-	-
AREA II	-	183.79	217.59	217.59
TOTAL	220.70	220.70	217.59	217.59

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)	-	17.74	-	-
AREA II	-	79.38	110.26	110.26
TOTAL	97.13	97.13	110.26	110.26

3025 Carp Road

Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS
Rational Method

ONE HUNDRED YEAR EVENT

100-Year Pre-Development Conditions

Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Exisitng Conditions:	18281	sq.m	0.375
Total Catchment Area:	18281	sq.m	0.38

Airport Formula

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

Runoff Coefficient (C):	0.38	see above	
Sheet Flow Distance (L):	80	m	
Slope of Land (Sw):	1.0	%	
Time of Concentration (Sheet Flow):	21.1	min	
Area (A):	18281	sq.m	
Time of Concentration:	21.1	min	11
Rainfall Intensity (i):	116	mm/hr (100-year event)	
Runoff Coeficient (C):	0.38		
100 Year Release Rate (2.78AiC):	220.70	L/s	

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE HUNDRED YEAR EVENT)

	Roof Area:	0	sq.m	1.00
	Asphalt/Concrete Area:	178	sq.m	1.00
	Gravel Area:	0	sq.m	0.875
	Landscaped Area:	2262	sq.m	0.25
2417	Total Catchment Area:	2440	sq.m	0.30
	Area (A):	2440	sq.m	
	Time of Concentration:	10.0	min	
	Rainfall Intensity (i):	179	mm/hr (100-year event)	
	Runoff Coeficient (C):	0.30		
	Flow Rate (2.78AiC):	36.91	L/s	

DRAINAGE AREA II

(ONE HUNDRED YEAR EVENT)

Roof Area:	1204	sq.m	1.00
Asphalt/Concrete Area:	11	sq.m	1.00
Gravel Area:	9346	sq.m	0.875
Landscaped Area:	5280	sq.m	0.25
Total Catchment Area:	15841	sq.m	0.68

Water Elevation:	118.44	m
Invert of Outlet Culvert (both):	118.02	m
Centroid of ICD Orifice (both):	118.13	m
Head:	0.32	m
Orifice Diameter (both):	215	mm
Orifice Area:	36136	sq.mm
Coefficient of Discharge:	0.61	
Maximum ICD Release Rate (total from both):	109.80	L/s
Maximum Weir Release Rate:	73.99	L/s
Maximum Total Release Rate	183.79	L/s

Stormwater Detention Area

Ave. Ponding Depth m	Ponding Area sq.m.		
0.32	732	217.59	cu.m
	Achieved Volume:	217.59	cu.m
	Maximum Volume Required:	217.59	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Weir Release Rate (L/s)	TOTAL Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	722.81	109.80	0.00	109.80	613.01	183.90
10	179	531.77	109.80	59.32	169.12	362.65	217.59
15	143	425.56	109.80	73.99	183.79	241.77	217.59
20	120	357.23	109.80	66.10	175.90	181.33	217.59
25	104	309.27	109.80	54.41	164.21	145.06	217.59
30	92	273.60	109.80	42.91	152.71	120.88	217.59
35	83	245.93	109.80	32.51	142.32	103.61	217.59
40	75	223.79	109.80	23.33	133.13	90.66	217.59
45	69	205.64	109.80	15.25	125.05	80.59	217.59
50	64	190.46	109.80	8.13	117.93	72.53	217.59
55	60	177.57	109.80	1.83	111.63	65.94	217.59
60	56	166.46	109.80	0.00	109.80	56.66	203.98
65	53	156.79	109.80	0.00	109.80	46.99	183.25
70	50	148.28	109.80	0.00	109.80	38.48	161.61
75	47	140.73	109.80	0.00	109.80	30.93	139.19
80	45	133.99	109.80	0.00	109.80	24.19	116.10
85	43	127.92	109.80	0.00	109.80	18.12	92.42
90	41	122.43	109.80	0.00	109.80	12.63	68.21
95	39	117.44	109.80	0.00	109.80	7.64	43.55
100	38	112.88	109.80	0.00	109.80	3.08	18.47
105	36	108.69	108.69	0.00	108.69	0.00	0.00
110	35	104.84	104.84	0.00	104.84	0.00	0.00
115	34	101.27	101.27	0.00	101.27	0.00	0.00
120	33	97.97	97.97	0.00	97.97	0.00	0.00
125	32	94.89	94.89	0.00	94.89	0.00	0.00
130	31	92.02	92.02	0.00	92.02	0.00	0.00
135	30	89.34	89.34	0.00	89.34	0.00	0.00
140	29	86.82	86.82	0.00	86.82	0.00	0.00
145	28	84.45	84.45	0.00	84.45	0.00	0.00
150	28	82.23	82.23	0.00	82.23	0.00	0.00
180	24	71.19	71.19	0.00	71.19	0.00	0.00
210	21	62.97	62.97	0.00	62.97	0.00	0.00
240	19	56.60	56.60	0.00	56.60	0.00	0.00
270	17	51.51	51.51	0.00	51.51	0.00	0.00
300	16	47.33	47.33	0.00	47.33	0.00	0.00

FIVE-YEAR EVENT

5-Year Pre-Development Conditions

Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Exisitng Conditions:	18281	sq.m	0.30
Total Catchment Area:	18281	sq.m	0.30

Airport Formula

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

Runoff Coefficient (C):	0.30	see above
Sheet Flow Distance (L):	80	m
Slope of Land (Sw):	1.0	%
Time of Concentration (Sheet Flow):	23.3	min
Area (A):	18281	sq.m
Time of Concentration:	23.3	min
Rainfall Intensity (i):	64	mm/hr (5-year event)
Runoff Coeficient (C):	0.30	
100 Year Release Rate (2.78AiC):	97.13	L/s

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE-YEAR EVENT)

	Roof Area:	0	sq.m	0.90
	Asphalt/Concrete Area:	178	sq.m	0.90
	Gravel Area:	0	sq.m	0.70
	Landscaped Area:	2262	sq.m	0.20
2417	Total Catchment Area:	2440	sq.m	0.25

Area (A):	2440	sq.m
Time of Concentration:	10.0	min
Rainfall Intensity (i):	104	mm/hr (5-year event)
Runoff Coeficient (C):	0.25	
Flow Rate (2.78AiC):	17.74	L/s

DRAINAGE AREA II

(FIVE-YEAR EVENT)

Roof Area:	1204	sq.m	0.90
Asphalt/Concrete Area:	11	sq.m	0.90
Gravel Area:	9346	sq.m	0.70
Landscaped Area:	5280	sq.m	0.20
Total Catchment Area:	15841	sq.m	0.55

Water Elevation:	118.29	m
Invert of Outlet Culvert (both):	118.02	m
Centroid of ICD Orifice (both):	118.13	m
Head:	0.17	m
Orifice Diameter (both):	215	mm
Orifice Area:	36136	sq.mm
Coefficient of Discharge:	0.61	
Maximum Release Rate (total from both):	79.38	L/s
Maximum Weir Release Rate:	0.00	L/s
Maximum Total Release Rate	79.38	L/s

Stormwater Detention Area

Ave. Ponding Depth m	Ponding Area sq.m.		
0.17	681	110.26	cu.m
	Achieved Volume:	110.26	cu.m
	Maximum Volume Required:	110.26	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Weir Release Rate (L/s)	TOTAL Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	341.13	79.38	0.00	79.38	261.74	78.52
10	104	251.76	79.38	0.00	79.38	172.38	103.43
15	84	201.90	79.38	0.00	79.38	122.51	110.26
20	70	169.75	79.38	0.00	79.38	90.36	108.43
25	61	147.14	79.38	0.00	79.38	67.76	101.64
30	54	130.30	79.38	0.00	79.38	50.92	91.66
35	49	117.23	79.38	0.00	79.38	37.85	79.48
40	44	106.76	79.38	0.00	79.38	27.38	65.71
45	41	98.17	79.38	0.00	79.38	18.79	50.72
50	38	90.98	79.38	0.00	79.38	11.60	34.79
55	35	84.87	79.38	0.00	79.38	5.48	18.10
60	33	79.60	79.38	0.00	79.38	0.22	0.78
65	31	75.01	75.01	0.00	75.01	0.00	0.00
70	29	70.97	70.97	0.00	70.97	0.00	0.00
75	28	67.39	67.39	0.00	67.39	0.00	0.00
80	27	64.18	64.18	0.00	64.18	0.00	0.00
85	25	61.30	61.30	0.00	61.30	0.00	0.00
90	24	58.69	58.69	0.00	58.69	0.00	0.00
95	23	56.31	56.31	0.00	56.31	0.00	0.00
100	22	54.14	54.14	0.00	54.14	0.00	0.00
105	22	52.15	52.15	0.00	52.15	0.00	0.00
110	21	50.31	50.31	0.00	50.31	0.00	0.00
115	20	48.61	48.61	0.00	48.61	0.00	0.00
120	19	47.04	47.04	0.00	47.04	0.00	0.00
125	19	45.57	45.57	0.00	45.57	0.00	0.00
130	18	44.21	44.21	0.00	44.21	0.00	0.00
135	18	42.93	42.93	0.00	42.93	0.00	0.00
140	17	41.73	41.73	0.00	41.73	0.00	0.00
145	17	40.60	40.60	0.00	40.60	0.00	0.00
150	16	39.54	39.54	0.00	39.54	0.00	0.00
180	14	34.26	34.26	0.00	34.26	0.00	0.00
210	13	30.34	30.34	0.00	30.34	0.00	0.00
240	11	27.29	27.29	0.00	27.29	0.00	0.00
270	10	24.85	24.85	0.00	24.85	0.00	0.00
300	9	22.85	22.85	0.00	22.85	0.00	0.00

13-Nov-19

3025 Carp Road

Ottawa, Ontario

BROAD CRESTED WEIR CALCULATIONS

1:100 YEAR EVENT

DRAINAGE AREA II

Length of Weir based on an assumed coefficient of discharge (Cd):

if Q =	73.99	L/s	(maximum permited flow)	assumes Cd= 0.577
=	0.07399	cu.m/s		(assumes P/H is large)
& H =	0.05	m	(max. depth of water above top of weir)	
then L =	3.88	m	(length of weir) L = Q / ((1.705) x H^(3/2))	

Length of Weir based on a calculated coefficient of discharge (Cd):

if P =	0.32	m	(depth of pond)
& Lp =	32.0	m	(width of pond perpendicular to direction of flow)
then Vp =	0.01	m/s	(velocity in pond) Vp = Q / ((P+H) / Lp
& E =	0.05	m	(energy) E = H + V^2/2g
& Cd =	0.577		= 0.577 x (E/H)^(3/2)

if Q =	73.99	L/s	(maximum permited flow)
=	0.07399	cu.m/s	
& H =	0.05	m	(depth of water above top of weir)
then L =	3.88	m	(length of weir) L = Q / (Cd^(2/3) x (2x9.81)^(1/2) x H^(3/2))

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: 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: not applicable

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 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: 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 2 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 2 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. not applicable

Description of proposed sewer network including sewers, pumping stations, and forcemains: see 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 4 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-1

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 has not 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-1 to C-5 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 3 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 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