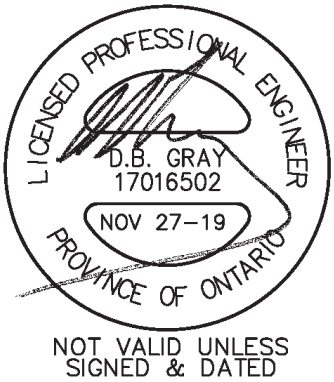
SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

1009-1011 Thomas Spratt Place
Ottawa, Ontario

Report No. 19035

August 30, 2019
Revised November 27, 2019



NOT VALID UNLESS
SIGNED & DATED

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

1009-1011 Thomas Spratt Place
Ottawa, Ontario

This report describes the services and addresses the stormwater management requirements of a 3873 sq.m. property at 1009-1011 Thomas Spratt Place in Ottawa. There is an existing one-storey office / warehouse building, with a 582 sq.m. footprint. A 527 sq.m. addition is proposed.

This report forms part of the stormwater management design for the proposed development. Refer to drawing C-1 to C-4 also prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

There is an existing municipal private fire hydrant on the opposite side of the street approximately 36 m to 53 m from front façade of the proposed building. Since they are less than 90 m a private on-site fire hydrant is not required.

A fire flow of 133.3 L/s (8,000 L/min) is required, as calculated as per the Fire Underwriter Survey "Water Supply For Fire Protection".

The boundary conditions for the 133.3 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 121.0 m during the above flow rate in the 300mm municipal watermain at the subject location which calculates to be 370 kPa (54 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:

An existing 25mm water service connects to an existing 300mm municipal watermain in Thomas Spratt Place.

Based on the City of Ottawa Design Guidelines the daily average consumption rate for a light industrial development is 35,000 litres per day per hectare. The maximum daily peaking factors is 1.5 of the daily average demand and maximum hourly peaking factor is 1.8 of the maximum daily demand. Based on this rate and peaking factors, and assuming an eight hour day, the maximum daily demand is calculated to be 0.5 L/s (28 L/min). Based on the peaking factors the maximum daily demand is 0.7 L/s (42 L/min) and maximum hourly demand is 1.8 L/s (176 L/min).

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 requested the boundary conditions for the subject area based on the following:

Average Daily Demand: 0.5 L/s.
Maximum Daily Demand: 0.7 L/s.
Maximum Hourly Demand: 1.3 L/s
Fire Flow Demand: 133.3 L/s
Maximum Daily + Fire Flow Demand: 134.0 L/s

Based on the boundary conditions received from the city, the minimum HGL (hydraulic grade line) is 125.0 m and the maximum is 130.3 m. With these HGLs the water pressure at the water meter is calculated to vary from 399 kPa to 451 kPa (58 to 65 psi). This is an acceptable range of water pressures in the municipal watermain for the proposed development.

Based on the AWWA water flow demand curve and an estimated water pressure at the meter of 427 kPa (62 psi), the peak demand is expected to be 2.7 L/s (161 L/min / 42 USgpm). The AWWA method calculates the instantaneous demand and is used to size the water service. This peak demand will produce a high velocity of 5.5 m/s in the existing 25 mm water service connection which may result in an unacceptably high pressure drop. The existing water service may have to be replaced with a 38 mm or 50 mm service (which would result in an acceptable velocity of 2.4 m/s and 1.4 m/s respectively. However, the peak demand for the proposed development is at the extreme low end of the AWWA demand curve and the actual peak demand is expected to be significantly lower. No water pressure issues are currently experienced. It is recommended that the existing water service remain and only replaced if water pressure is found to be unacceptably low after the end of construction.

SANITARY SERVICE:

Based on the City of Ottawa Sewer Design Guidelines for a light industrial property (35,000 L/ha/day; 1.5 peaking factor; 8 hour day and a 0.33 L/s/ha infiltration flow) the post development flow is calculated to be 0.83 L/s. This flow will be adequately handled by the existing 125 mm sanitary sewer service connection having an assumed slope of 1% to 2% (9.77 L/s capacity at 1%).

The 0.83 L/s in sanitary flows contributing to the existing 250mm sanitary sewer is expected to have an acceptable impact given its capacity of 43.9 L/s (250 mm at 0.50%).

STORMWATER MANAGEMENT:

Water Quality:

There are currently no quality control measures on the subject property

The Rideau Valley Conservation Authority (RVCA) has commented that *"… stormwater for this site is being directed to an existing storm sewer which is approximately 1100 metres upstream from the outlet to a watercourse. The proposal itself includes increasing the amount of parking spaces and drive isles. Based on the distance to the downstream outlet and the lack of any downstream facility for water quality treatment, water quality treatment on this site must be taken into consideration. The appropriate water quality target is 80% TSS Removal."*

An oil/grit separator (OGS) manhole is proposed to be located in the last pipe section that is wholly on the subject property. This pipe section conveys about 97% of the catchment area draining into storm sewer system. An AquaShield Aqua-Swirl Concentrator model AS-2 was selected to achieve a minimum 80% TSS removal. Based on software supplied by the manufacturer, the Aqua-Swirl AS-2 will remove approximately 86% of TSS from the runoff produced by the drainage area draining. Output from the manufacturer's software is attached to the report. The Aqua-Swirl model AS-2 has a sediment capacity of 0.28 cubic metres and an oil/debris capacity of 140 litres.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-2 and notes 2.1 to 2.5 on drawing C-3). In summary: to filter out construction sediment; a 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:

There are currently no quantity control measures on the subject property. It is proposed that quantity control measures consider only the 1,257 sq.m. of the subject property being re-developed. Specifically, the stormwater management criteria are to control the post development peak flows from the area to be re-developed, for the 5-year and 100-year storm events, to peak flows during the 5-year storm event using a pre-development runoff coefficient; and a calculated time of concentration (not less than 10 minutes). It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.23 and an 8.7 minute time of concentration. Therefore based on runoff coefficient of 0.23, a 10 minute time of concentration, and using the Rational Method; the maximum allowable release rate is 8.52 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 and on surface above two catch basins.

Drainage Area I
(Uncontrolled Flow Off Site – 75 sq.m.):
The runoff into an existing a catch basin at the front of the property near the entrance to 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:	3.72 L/s	1.96 L/s

Drainage Area II (Roof - 510 sq.m.):
The two roof drains on the addition roof will be a flow control type which will restrict the flow and cause the storm water to pond on the addition 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-A2 or equal. The roof drains discharge onto the surface and drain into Drainage Area III, therefore, the discharge from the roof is added to inflow into Drainage Area III.

	100-year	5-year
The maximum release rate:	3.28 L/s	2.50 L/s
The maximum ponding depth:	132 mm	101 mm
The maximum stored volume:	17.71 cu.m.	7.90 cu.m.

Drainage Area III (672 sq.m.):
An inlet control device (ICD) located at the outlet pipe of catch basin/manhole CB/MH-2 will control the release of stormwater from this drainage area. The ICD will restrict the flow and force the stormwater to back up to the asphalt parking area above catch basin CB/MH-2 and the grassed swale above ditch inlet DI-1. The ICD shall be a Hydrovex "VHV Vertical Vortex Flow Regulator" and shall be sized by the manufacturer for a discharge rate of 4.80 L/s at 1.14 m head. It is calculated that an orifice area of 4,418 sq.mm. (75 mm in diameter) and a discharge coefficient of 0.229 will restrict the outflow rate to 4.80 L/s at 1.14 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 4.67 L/s at 1.08 m.

	100-year	5-year
Maximum ICD release rate:	4.80 L/s	4.67 L/s
Maximum water elevation:	83.19 m	83.13 m
Maximum stored volume:	23.21 cu.m.	8.31 cu.m.

The Entire Re-developed Portion of the Site:

	100-year	5-year
Maximum permitted release rate:	8.52 L/s	8.52 L/s
Maximum release rate:	8.52 L/s	6.62 L/s
Maximum stored volume:	40.92 cu.m.	16.21 cu.m.

Therefore maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable at 8.52 L/s. The maximum post-development release rate for the 5-year storm event is calculated to be less than the maximum allowable at 6.62 L/s.

The 5-year unrestricted flowrate resulting from one in five-year storm event will produce a peak flow of 61.4 L/s in the last pipe segment of the existing storm sewer system which, at 81% capacity, is adequately sized (250 mm at 1.5% - 76.1 L/s capacity). The 5-year unrestricted flowrate in existing most upstream pipe segment is 37.5 L/s. This pipe segment is undersized (150 mm at 0.66% - 12.0 L/s capacity). However, the flow through the proposed control roof drains and inlet control device (ICD) will restrict the flow to 4.7 L/s during the 5-year storm event so that the flow in this segment will be only at 39% of its capacity.

The 29.7 L/s in stormwater flows contributing to the existing municipal storm sewer is expected to have a positive impact given the post-development flows from the site are calculated to be reduced during the 5-year event.

CONCLUSIONS:

1. There is an adequate water supply for firefighting from the existing municipal fire hydrant.

2. There is an acceptable range of water pressures in the municipal watermain for the proposed development.

3. The calculated peak demand may result in an unacceptably high pressure drop in the existing water service connection. However, the actual peak demand is expected to be significantly lower. No water pressure issues are currently experienced. It is recommended that the existing water service remain and only replaced if water pressure is found to be unacceptably low after the end of construction.

4. The calculated peak sanitary sewage flow will be adequately handled by the existing 125 mm sanitary sewer service connection.

5. The sanitary flows contributing to the existing 250mm sanitary sewer is expected to have an acceptable impact.

6. There are currently no quality control measures on the subject property. The RVCA requires 80% TSS removal. A proposed oil/grit separator (OGS) manhole will remove approximately 86% of TSS.

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

8. The maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable at 8.52 L/s and to achieve this release rate the total maximum required stored volume is 40.92 cu.m. The maximum post-development release rate for the 5-year storm event is calculated to be less than the maximum allowable, at 6.62 L/s and to achieve this release rate the total maximum required stored volume is 16.21 cu.m.

9. The last pipe segment of the existing storm sewer system is adequately sized for the unrestricted flow during the 5-year event.

10. There is an existing upstream pipe segment that is significantly undersized, however, the proposed flow through the flow control roof drains and ICD will restrict the flow so that this segment will be only at 39% of its capacity.

11. The stormwater flows contributing to the existing municipal storm sewer is expected to have a positive impact given the post-development flows from the site are calculated to be reduced during the 5-year event.

D.B. GRAY ENGINEERING INC.

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2-Apr-19
REVISED 10-Apr-19

1009 - 1011 Thomas Spratt Place
Ottawa, Ontario

Fire Flow Requirements
PROPOSED ADDITION + EXISTING BUILDING
NO FIREWALLS

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
= 0.8 Non-Combustible Construction (Unprotected structural components)

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

Existing Building:	Ground Floor	582	sq.m.
	Mezzanine	97	sq.m.
Proposed Addition:	Ground Floor	527	sq.m.
	TOTAL FIRE AREA:	1206	sq.m.

F = 6,112 L/min
= 6,000 L/min (rounded off to the nearest 1,000 L/min)

15% Charge for Combustible Occupancy

= 6,900 L/min

0% Reduction for No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height
			Constuction	Length m	Storeys	Factor
0%	North	>45m				0
5%	East	30.1 to 45m				0
0%	South	>45m				0
8%	West	20.1 to 30m	N-C	27	1	27
13%	Total Increase for Exposure (maximum 75%)					

= 897 L/min Increase

= 7,797 L/min
F = 8,000 L/min (rounded off to the nearest 1,000 L/min)
= 133.3 l/s

Elevation at Fire Hydrant: ± 83.25 m ASL

Static Pressure at Fire Hydrant

133 l/s FIRE FLOW: 121.0 m ASL 54 psi 370 kPa

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2-Apr-19

1009 - 1011 Thomas Spratt Place
Ottawa, Ontario

EXISTING BUILDING
2 HOUR FIREWALL BETWEEN ADDITION & EXISTING BUILDING

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
= 0.8 Non-Combustible Construction (Unprotected structural components)

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

Proposed Building:	Ground Floor	582	sq.m.
	Mezzanine	97	
	TOTAL FIRE AREA:	679	sq.m.

F = 4,586 L/min
= 5,000 L/min (rounded off to the nearest 1,000 L/min)

15% Change for Combustible Occupancy

= 5,750 L/min

0% Reduction for No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height
			Constuction	Length m	Storeys	Factor
0%	North	>45m				0
5%	East	30.1 to 45m				0
0%	South	>45m				0
10%	West	2 hr firewall				0
15%	Total Increase for Exposure (maximum 75%)					

= 863 L/min Increase

= 6,613 L/min
F = 7,000 L/min (rounded off to the nearest 1,000 L/min)
= 116.7 l/s

Elevation at Fire Hydrant: ± 83.25 m ASL

			Static Pressure at Fire Hydrant			
1177 l/s FIRE FLOW:	122.0	m ASL	55	psi	380	kPa

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2-Apr-19
REVISED 10-Apr-19

1009-1011 Thomas Spratt Place
Ottawa, Ontario

Water Demand

DAILY AVERAGE

COMMERCIAL:	35,000	l /gross ha / day (as per Ottawa Design Guidelines)				
	0.39	ha (land area)				
	13573	l / day				
	8	hour day				
	28.3	l/min	0.5	l/s	7.5	USgpm
MAXIMUM DAILY DEMAND	1.5	(Peaking Factor as per Ottawa Design Guidelines)				
	42.4	l/min	0.7	l/s	11.2	USgpm
MAXIMUM HOURLY DEMAND	1.8	(Peaking Factor as per Ottawa Design Guidelines)				
	76.3	l/min	1.3	l/s	20.2	USgpm

Elevation of Water Meter:	84.28	m ASL				
Finish Floor Elevation:	83.38	m ASL				
			Static Pressure at Water Meter			
MINIMUM HGL:	125.0	m ASL	58	psi	399	kPa
MAXIMUM HGL:	130.3	m ASL	65	psi	451	kPa

30-Aug-19

1009-1011 Thomas Spratt Place
Ottawa, Ontario

Peak Water Demand

WATER FIXTURE VALUE
(AWWA Manual M22 - Sizing Water Service Lines and Meters)

	No.	F.V.	Total
Bathtub	0	8	0
Tiolet - tank	6	6	36
Tiolet - flush valve	0	24	0
Lavs.	6	1.5	9
Bidet	0	2	0
Urinal - wall flush valve	0	10	0
Shower	0	2.5	0
K. Sink	0	1.8	0
Dishwasher	0	1.3	0
Clothes Washer	0	6	0
Commercial Sink	0	4	0
J. Sink	0	4	0
Commercial Dishwasher	0	4	0
Commercial Washer	0	4	0
Hose 1/2 in	0	5	0
Hose 3/4 in	0	12	0
			45

Peak Demand (fig 4-2 or 4-3 AWWA M22)			42	USgpm		
Pressure @ Meter	427	kPa	62	psi		
Pressure Factor (table 4-1 AWWA M22)			1.01			
Peak Demand			42	USgpm		
Irrigation - hose 1/2 in	0		0	USgpm (includes pressure factor)		
TOTAL PEAK DEMAND	161	l/min	42	USgpm	2.7	l/s
Existing Nominal Size			1.0	in	25	mm
			17.9	ft/s	5.5	m/s
TOTAL PEAK DEMAND	161	l/min	42	USgpm	2.7	l/s
Potentially Required Nominal Size			1.5	in	38	mm
			7.8	ft/s	2.4	m/s
TOTAL PEAK DEMAND	161	l/min	42	USgpm	2.7	l/s
Potentially Required Nominal Size			2.0	in	50	mm
			4.5	ft/s	1.4	m/s

Gmail by Google

Douglas Gray <d.gray@dbgrayengineering.com>

RE: 1101 Thomas Spratt Place

1 message

Baker, Adam <adam.baker@ottawa.ca> Wed, Apr 10, 2019 at 8:38 AM
To: Douglas Gray <d.gray@dbgrayengineering.com>
Cc: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>

Hi Doug,

Please find attached the water boundary conditions for 1011 Thomas Spratt:

The following are boundary conditions, HGL, for hydraulic analysis at 1011 Thomas Spratt (zone 2C) assumed to be connected to the 305mm on Thomas Spratt (see attached PDF for location).

Minimum HGL = 125.0m

Maximum HGL = 130.3m

MaxDay + FireFlow (117 L/s) = 122.0m

MaxDay + FireFlow (133 L/s) = 121.0m

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.

Thanks,

Adam Baker, EIT

Engineering Intern

Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique

Development Review - South Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Douglas Gray <d.gray@dbgrayengineering.com>
Sent: April 02, 2019 4:58 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>
Subject: 1101 Thomas Spratt Place

Hi Adam

Please provide the boundary conditions at 1101 Thomas Spratt Place . An addition is proposed. We have calculated the following expected demands.

Average daily demand: 0.5 l/s.

Maximum daily demand: 0.7 l/s.

Maximum hourly daily demand: 1.3 l/s

Fire Flow demand: 133.3 l/s

Fire Flow + Max Day: 134.0 l/s

We are looking at alternative designs so please also provide the boundary conditions for a fire flow demand of 133.3 l/s.

Average daily demand: 0.5 l/s.

Maximum daily demand: 0.7 l/s.

Maximum hourly daily demand: 1.3 l/s

Fire Flow demand: 116.7 l/s

Fire Flow + Max Day: 117.4 l/s

Calculations are attached. Also attached is the existing Site Servicing Plan showing the location of the existing water service connection.

Thanks, Doug

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700 Long Point Circle Tel: 613-425-8044

Ottawa, Ontario K1T 4E9 d.gray@dbgrayengineering.com

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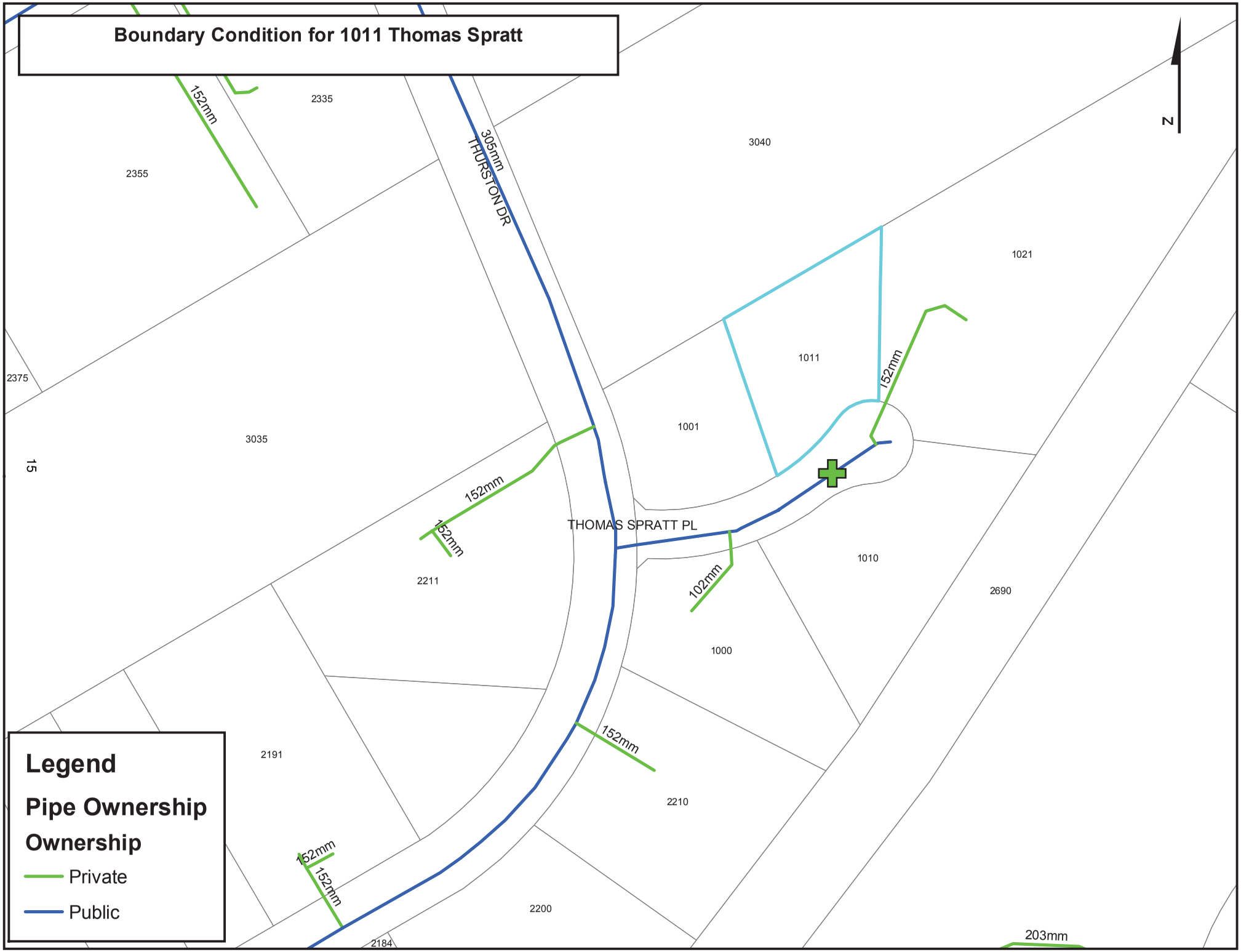
1011 Thomas Spratt April 2019.pdf
102K


Boundary Condition for 1011 Thomas Spratt
N
152mm
2335
2355
305mm
THURSTON DR
3040
1021
1011
152mm
2375
1001
3035
15
152mm
152mm
THOMAS SPRATT PL
1010
102mm
2690
2211
1000
152mm
2210
2191
152mm
152mm
2200
2184
203mm
Legend
Pipe Ownership
Ownership
Private
Public

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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: 1009-1011 thomas Spratt Place

Designed By: DBG

30-Aug-19

LOCATION			Section								Cumulative		Section			Cumulative					SEWER DATA								COMMENTS
			Single Family	Semi/Town house	Duplex / Triplex	Apartments (average)	Apartments (1 Bed.)	Apartments (2 Bed.)	Apartments (3 Bed.)	Resid-ential Area	Residential		Non-Residential								n = 0.013								
											Pop.	Peaking Factor	Area	Flow	Peaking Factor	Flow	Area	Sewage Flow	Infil-tration Flow	Total Flow	Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Ratio Q/Qfull	
STREET	FROM	TO	ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.8	ppu = 1.4	ppu = 2.1	ppu = 3.1																				
			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									
																						EXISTING SANITARY SERVICE CONNECTION							
										0	0	3.2	0.387	35000	4.5	0.7	0.4	0.71	0.13	0.83		127.0	125	1.00		9.77	0.77	0.09	Peaking Factor = 1.5 x 24 hrs/8 hrs Slope estimated to be 1 to 2%
																						EXISTING MUNICPAL SEWER IN THOMAS SPRATT PLACE							
																						254.0	250	0.5		43.9	0.87		

D.B. Gray Engineering Inc.

Douglas Gray <d.gray@dbgrayengineering.com>

FW: RVCA Preliminary Comments RE: D07-12-19-0159 1009-1011 Thomas Spratt Place

1 message

Chris Poirier <chris@cassidyewconstruction.com> Mon, Oct 28, 2019 at 9:51 AM
To: Douglas Gray <d.gray@dbgrayengineering.com>

HI Doug,

I received the following from RVCA for your action. Thanks,

CHRIS POIRIER, President

CASSIDY E.W. CONSTRUCTION CONSULTANT LTD.

1011 Thomas Spratt Place

Ottawa, Ontario K1G 5L5

T | 613-728-2112

C | 613-859-2129

E | chris@cassidyewconstruction.com

W | www.cassidyewconstruction.com

CASSIDY EST. 1980 CONSTRUCTION
Experts in commercial interiors finishing

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Monday, October 28, 2019 9:37 AM
To: sarah.ezzio@ottawa.ca
Cc: Chris Poirier <chris@cassidyewconstruction.com>
Subject: RVCA Preliminary Comments RE: D07-12-19-0159 1009-1011 Thomas Spratt Place

Good Morning Sarah,

The RVCA has completed its preliminary review of the above noted application and offers the following comments for your consideration:

Natural Hazards

There have been no natural hazards identified on the property which would preclude this application.

Natural Heritage

There have been no natural heritage features identified on this property which would preclude this application.

Stormwater Management

The report submitted "*Servicing Brief & Stormwater Management Report – 1009-1011 Thomas Spratt Place, Ottawa, Ontario*" dated August 30th, 2019, prepared by D.B. Gray Engineering Inc. indicates that there is no water quality control proposed for this site. We note that stormwater for this site is being directed to an existing storm sewer which is approximately 1100 metres upstream from the outlet to a watercourse. The proposal itself includes increasing the amount of parking spaces and drive isles. Based on the distance to the downstream outlet and the lack of any downstream facility for water quality treatment, water quality treatment on this site must be taken into consideration. The appropriate water quality target is 80% TSS Removal.

Conclusion

In conclusion, the RVCA recommends this application be place **on hold** until such time that water quality treatment for this site has been adequately addressed.

Jamie Batchelor, MCIP, RPP

Planner, ext. 1191

Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

AquaShield™ STORMWATER TREATMENT SOLUTIONS

Sizing Report

2733 Kanasita Drive • Suite 111 • Chattanooga, TN 37343 • Phone: (423) 870-8888 • Fax: (423) 826-2112 • www.aquashieldinc.com

Site Information

Project Name: **1009-1011 Thomas Spratt Place**

Site Area (hectacres): **.3873**

Unit Label: **Option 2**

Runoff Coeff. : **.7**

Unit Location: **Ottawa, ON**

Target Removal Efficiency(%): **80% based on NJDEP**

Product Recommendation

Aqua-Swirl™ Model	Net Annual TSS Removal Efficiency	Chamber Diameter	Maximum Inside Diameter (mm)		Oil/Debris Storage Capacity	Sediment Storage Capacity
			Offline	BYP[5]		
AS-2	**85.77 %**	763 mm.	205 mm.	381 mm.	140 L	0.28 m^3

Rainfall Information

NCDC Station[1]: **OTTAWA MACDONALD-CARTIER INT'L A**

Data Range[4]: **261,759 readings taken hourly between 1967 to 2007 (~40 years)**

Rainfall Event Range (mm/hre)	Rainfall Interval Point (mm/hre)	Operating Rate (Lps/m^2)	Total Rainfall (%)	Removal Efficiency (%)[2]	Relative Efficiency(%)
02.00 - 03.00	02.50	04.13	44.18	93.46	41.29
03.00 - 04.00	03.50	05.78	21.52	90.77	19.53
04.00 - 05.00	04.50	07.43	11.68	87.62	10.23
05.00 - 06.00	05.50	09.09	06.68	84.00	05.61
06.00 - 07.00	06.50	10.74	04.03	79.92	03.22
07.00 - 08.00	07.50	12.39	01.99	75.38	01.50
08.00 - 09.00	08.50	14.04	01.84	70.38	01.29
09.00 - 10.00	09.50	15.70	01.81	64.91	01.17
10.00 - 15.00	12.50	20.65	04.12	45.74	01.88
15.00 - 20.00	17.50	28.91	01.02	04.54	00.05
		Total Cumulative Rainfall %:	**98.87[3]**	**Net Annual %:**	**85.77**

Sales Agent Information

Agent Name: **Dave Kanters**

Phone: **416-347-2799**

Company Name: **Soleno**

Fax:

Address: **347, 15-75 Bayly St. W.**

E-mail: **dkanters@soleno.com**

City, State Zip: **Ajax, ON L1S7K7**

Footnotes

1. Recorded as hourly precipitation rainfall data (inches), National Climatic Data Center (NCDC)
2. Based on Tennessee Tech University laboratory testing of the AquaSwirl™ Model AS-3 for OK-110 silica particles 50-125 microns(Neary, 2002)
3. 90% Rainfall Event, calculated as a cumulative percentile of individual events, www.stormwatercenter.net, sizing criteria (Center for Watershed Protection)
4. NCDC data may not be consecutive, skipping days, months and/or years in the range of dates.
5. The Aqua-Swirl™ Internal Bypass (BYP) provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.
6. When applicable, the performance curve was adjusted via Peclet Scaling to provide estimated sizing per NJDEP PSD (d50 = 67 microns).

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

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)	-	3.72	-	-
AREA II (Roof)	-	3.28	17.71	17.71
AREA III	-	4.80	23.21	23.21
TOTAL	8.52	8.52	40.92	40.92

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)	-	1.96	-	-
AREA II (Roof)	-	2.50	7.90	7.90
AREA III	-	4.67	8.31	8.31
TOTAL	8.52	6.62	16.21	16.21

1009-1011 Thomas Spratt Place

Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS
Rational Method

5 Year Pre-Development Conditions
(The Re-developed Area Only)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	61	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	1196	sq.m	0.20
Total Catchment Area:	1257	sq.m	0.23

Airport Formula

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

Runoff Coefficient (C):	0.23	see above
Sheet Flow Distance (L):	15	m
Slope of Land (Sw):	2	%
Time of Concentration (Sheet Flow):	8.7	min
Area (A):	1257	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.23	
Maximum Allowable Release Rate (2.78AiC):	8.52	L/s

ONE HUNDRED YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	75	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	75	sq.m	1.00
Area (A):	75	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	1.00		
Flow Rate (2.78AiC):	3.72	L/s	

DRAINAGE AREA II (Roof)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	510	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:	510	sq.m	1.00

No. of Roof Drains: 2

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

Depth at Roof Drain: 132 mm

Maximum Release Rate: 3.28 L/s

Pond Area: 402 sq.m

Achieved Volume: 17.71 cu.m

Maximum Volume Required: 17.71 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	34.41	3.28	31.13	9.34
10	179	25.32	3.28	22.04	13.22
15	143	20.26	3.28	16.98	15.29
20	120	17.01	3.28	13.73	16.48
25	104	14.72	3.28	11.45	17.17
30	92	13.03	3.28	9.75	17.55
35	83	11.71	3.28	8.43	17.71
40	75	10.65	3.28	7.38	17.71
45	69	9.79	3.28	6.51	17.59
50	64	9.07	3.28	5.79	17.37
55	60	8.45	3.28	5.18	17.09
60	56	7.92	3.28	4.65	16.74
65	53	7.46	3.28	4.19	16.33
70	50	7.06	3.28	3.78	15.89
75	47	6.70	3.28	3.42	15.41
80	45	6.38	3.28	3.10	14.89
85	43	6.09	3.28	2.81	14.35
90	41	5.83	3.28	2.55	13.79
95	39	5.59	3.28	2.32	13.20
100	38	5.37	3.28	2.10	12.59
105	36	5.17	3.28	1.90	11.96
110	35	4.99	3.28	1.72	11.32
115	34	4.82	3.28	1.55	10.66
120	33	4.66	3.28	1.39	9.99
125	32	4.52	3.28	1.24	9.31
130	31	4.38	3.28	1.10	8.62
135	30	4.25	3.28	0.98	7.91
140	29	4.13	3.28	0.86	7.20
145	28	4.02	3.28	0.74	6.48
150	28	3.91	3.28	0.64	5.75
180	24	3.39	3.28	0.11	1.22
210	21	3.00	3.00	0.00	0.00
240	19	2.69	2.69	0.00	0.00
270	17	2.45	2.45	0.00	0.00
300	16	2.25	2.25	0.00	0.00

DRAINAGE AREA III

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	454	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	218	sq.m	0.25
Total Catchment Area:	672	sq.m	0.76

Water Elevation:	83.19	m
Invert of Outlet Pipe - CB/MH-2:	82.01	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-2)	82.05	m
Head:	1.14	m
Orifice Diameter:	75	mm
Orifice Area:	4418	sq.mm
Coefficient of Discharge:	0.229	
Maximum Release Rate:	4.80	L/s

Surface Storage Above Catch Basin/ Ditch Inlet

	Top Area (sq.m)	Depth (m)	Volume	
CB/MH-2	200	0.17	11.40	cu.m
DI-1	126	0.28	11.81	cu.m
Achieved Volume:			23.21	cu.m
Maximum Volume Required:			23.21	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Flow from Roof (L/s)	Total Inflow (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	34.31	3.28	37.59	4.80	32.78	9.84
10	179	25.24	3.28	28.52	4.80	23.72	14.23
15	143	20.20	3.28	23.48	4.80	18.68	16.81
20	120	16.96	3.28	20.23	4.80	15.43	18.52
25	104	14.68	3.28	17.96	4.80	13.16	19.73
30	92	12.99	3.28	16.26	4.80	11.46	20.63
35	83	11.67	3.28	14.95	4.80	10.15	21.31
40	75	10.62	3.28	13.90	4.80	9.10	21.84
45	69	9.76	3.28	13.04	4.80	8.24	22.24
50	64	9.04	3.28	12.32	4.80	7.52	22.55
55	60	8.43	3.28	11.70	4.80	6.90	22.78
60	56	7.90	3.28	11.18	4.80	6.38	22.96
65	53	7.44	3.28	10.72	4.80	5.92	23.08
70	50	7.04	3.28	10.31	4.80	5.51	23.16
75	47	6.68	3.28	9.96	4.80	5.16	23.20
80	45	6.36	3.28	9.64	4.80	4.84	23.21
85	43	6.07	3.28	9.35	4.80	4.55	23.19
90	41	5.81	3.28	9.09	4.80	4.29	23.15
95	39	5.57	3.28	8.85	4.80	4.05	23.08
100	38	5.36	3.28	8.63	4.80	3.83	23.00
105	36	5.16	3.28	8.44	4.80	3.63	22.90
110	35	4.98	3.28	8.25	4.80	3.45	22.78
115	34	4.81	3.28	8.08	4.80	3.28	22.65
120	33	4.65	3.28	7.93	4.80	3.13	22.50
125	32	4.50	3.28	7.78	4.80	2.98	22.34
130	31	4.37	3.28	7.64	4.80	2.84	22.18
135	30	4.24	3.28	7.52	4.80	2.72	22.00
140	29	4.12	3.28	7.40	4.80	2.60	21.81
145	28	4.01	3.28	7.28	4.80	2.48	21.61
150	28	3.90	3.28	7.18	4.80	2.38	21.40
180	24	3.38	3.28	6.65	4.80	1.85	20.02
210	21	2.99	3.00	5.99	4.80	1.19	14.95
240	19	2.69	2.69	5.38	4.80	0.58	8.36
270	17	2.44	2.45	4.90	4.80	0.10	1.56
300	16	2.25	2.25	4.50	4.50	0.00	0.00

FIVE YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	75	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	75	sq.m	0.90
Area (A):	75	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.90		
Flow Rate (2.78AiC):	1.96	L/s	

DRAINAGE AREA II (Roof)

(FIVE-YEAR EVENT)

			C
Roof Area:	510	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:	510	sq.m	0.90

No. of Roof Drains: 2

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

Depth at Roof Drain: 101 mm

Maximum Release Rate: 2.50 L/s

Pond Area: 235 sq.m

Achieved Volume: 7.90 cu.m

Maximum Volume Required: 7.90 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	18.01	2.50	15.51	4.65
10	104	13.30	2.50	10.79	6.48
15	84	10.66	2.50	8.16	7.34
20	70	8.96	2.50	6.46	7.75
25	61	7.77	2.50	5.27	7.90
30	54	6.88	2.50	4.38	7.88
35	49	6.19	2.50	3.69	7.74
40	44	5.64	2.50	3.13	7.52
45	41	5.18	2.50	2.68	7.24
50	38	4.80	2.50	2.30	6.90
55	35	4.48	2.50	1.98	6.53
60	33	4.20	2.50	1.70	6.12
65	31	3.96	2.50	1.46	5.69
70	29	3.75	2.50	1.24	5.23
75	28	3.56	2.50	1.06	4.75
80	27	3.39	2.50	0.89	4.25
85	25	3.24	2.50	0.73	3.74
90	24	3.10	2.50	0.60	3.22
95	23	2.97	2.50	0.47	2.68
100	22	2.86	2.50	0.36	2.14
105	22	2.75	2.50	0.25	1.58
110	21	2.66	2.50	0.15	1.02
115	20	2.57	2.50	0.06	0.44
120	19	2.48	2.48	0.00	0.00
125	19	2.41	2.41	0.00	0.00
130	18	2.33	2.33	0.00	0.00
135	18	2.27	2.27	0.00	0.00
140	17	2.20	2.20	0.00	0.00
145	17	2.14	2.14	0.00	0.00
150	16	2.09	2.09	0.00	0.00
180	14	1.81	1.81	0.00	0.00
210	13	1.60	1.60	0.00	0.00
240	11	1.44	1.44	0.00	0.00
270	10	1.31	1.31	0.00	0.00
300	9	1.21	1.21	0.00	0.00

DRAINAGE AREA III

(FIVE-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	454	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	218	sq.m	0.20
Total Catchment Area:	672	sq.m	0.67

Water Elevation:	83.13	m
Invert of Outlet Pipe - CB/MH-2:	82.01	m
Centroid of ICD Orifice:	82.05	m
(ICD in Outlet Pipe of CB/MH-2)		
Head:	1.08	m
Orifice Diameter:	75	mm
Orifice Area:	4418	sq.mm
Coefficient of Discharge:	0.229	
Maximum Release Rate:	4.67	L/s

Surface Storage Above Catch Basin/ Ditch Inlet

	Top Area (sq.m)	Depth (m)	Volume	
CB/MH-2	79	0.11	2.83	cu.m
DI-1	76	0.22	5.48	cu.m
Achieved Volume:			8.31	cu.m
Maximum Volume Required:			8.31	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Flow from Roof (L/s)	Total Inflow (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	17.75	2.50	20.25	4.67	15.59	4.68
10	104	13.10	2.50	15.60	4.67	10.94	6.56
15	84	10.50	2.50	13.01	4.67	8.34	7.51
20	70	8.83	2.50	11.33	4.67	6.67	8.00
25	61	7.66	2.50	10.16	4.67	5.49	8.24
30	54	6.78	2.50	9.28	4.67	4.62	8.31
35	49	6.10	2.50	8.60	4.67	3.94	8.27
40	44	5.55	2.50	8.06	4.67	3.39	8.14
45	41	5.11	2.50	7.61	4.67	2.95	7.95
50	38	4.73	2.50	7.24	4.67	2.57	7.71
55	35	4.42	2.50	6.92	4.67	2.25	7.44
60	33	4.14	2.50	6.64	4.67	1.98	7.12
65	31	3.90	2.50	6.41	4.67	1.74	6.79
70	29	3.69	2.50	6.20	4.67	1.53	6.43
75	28	3.51	2.50	6.01	4.67	1.34	6.05
80	27	3.34	2.50	5.84	4.67	1.18	5.65
85	25	3.19	2.50	5.69	4.67	1.03	5.24
90	24	3.05	2.50	5.56	4.67	0.89	4.81
95	23	2.93	2.50	5.43	4.67	0.77	4.37
100	22	2.82	2.50	5.32	4.67	0.65	3.93
105	22	2.71	2.50	5.22	4.67	0.55	3.47
110	21	2.62	2.50	5.12	4.67	0.46	3.01
115	20	2.53	2.50	5.03	4.67	0.37	2.53
120	19	2.45	2.48	4.93	4.67	0.27	1.91
125	19	2.37	2.41	4.78	4.67	0.11	0.84
130	18	2.30	2.33	4.63	4.63	0.00	0.00
135	18	2.23	2.27	4.50	4.50	0.00	0.00
140	17	2.17	2.20	4.37	4.37	0.00	0.00
145	17	2.11	2.14	4.26	4.26	0.00	0.00
150	16	2.06	2.09	4.14	4.14	0.00	0.00
180	14	1.78	1.81	3.59	3.59	0.00	0.00
210	13	1.58	1.60	3.18	3.18	0.00	0.00
240	11	1.42	1.44	2.86	2.86	0.00	0.00
270	10	1.29	1.31	2.61	2.61	0.00	0.00
300	9	1.19	1.21	2.40	2.40	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
dbgray@rogers.com

STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

n = 0.013

PROJECT: 1011 Thomas Spratt Place

Designed By: DBG

Date: 19-Jun-19

LOCATION			AREA (ha) 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)	SEWER DATA									COMMENTS
STREET	FROM	TO	R = 0.90	R = 0.70	R = 0.20	R = 0.90						Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (min)	Ratio Q/Qfull	
	DI	CB/MH-4	0.0454		0.0248	0.0510	0.255	0.255	10.00	104.2	26.6	PVC SDR 35	203.2	200	0.58	17.8	26.1	0.80	0.37	1.02	
	CB/MH-4	EX.CB-3	0.0428		0.0090		0.112	0.367	10.37	102.3	37.5		152.4	150	0.57	34.3	12.0	0.66	0.87	3.13	
											4.7		152.4	150	0.57	34.3	12.0	0.66	0.87	0.39	FLOW THROUGH ICD
	EX.CB-3	EX.CB-2	0.0703		0.0310		0.193	0.560	11.24	98.1	54.9		203.2	200	1.40	25.3	40.5	1.25	0.34	1.36	
											23.6		203.2	200	1.40	25.3	40.5	1.25	0.34	0.58	FLOW THROUGH ICD
	EX.CB-2	EX.CB/MH-0	0.0220		0.0097		0.060	0.621	11.58	96.5	59.9		203.2	200	1.30	26.2	39.0	1.20	0.36	1.54	
											29.4		203.2	200	1.30	26.2	39.0	1.20	0.36	0.75	FLOW THROUGH ICD
	EX.CB-1	EX.CB/MH-0	0.0093				0.023	0.023	10.00	104.2	2.4		152.4	150	2.66	13.9	25.9	1.42	0.16	0.09	
	EX.CB/MH-0	STREET			0.0051		0.003	0.647	11.94	95.0	61.4		254.2	250	1.50	17.3	76.1	1.50	0.19	0.81	
											29.7		254.2	250	1.50	17.3	76.1	1.50	0.19	0.39	FLOW THROUGH ICD

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-4

Plan showing the site and location of all existing services: see drawings C-1 to C-4

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 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-4

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-4

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-3

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 to 14 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 2 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 15 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 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 & C-4

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-1 to C-4 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-4 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 5 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 7of 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