SERVICING AND STORMWATER MANAGEMENT REPORT
71 RUSSELL AVENUE

Project No.: CP-18-0176

Prepared for:

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Prepared by:

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Revision 3 - August 31, 2018

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

This report will address the servicing (water, sanitary, and storm) and stormwater management requirements associated with the proposed development located at the 71 Russell Avenue within the City of Ottawa.

1.2 Site Description

The property is located at 71 Russell Avenue and is described as Lot 14, East Side of Russell Avenue, Registered Plan 58319, City of Ottawa. The land in question covers approximately 0.08 ha and is the second property southeast of the intersection of Osgoode Street and Russell Avenue.

The property currently consists of a three-storey single family dwelling, wooden porches/decks and a variety of retaining walls. The property drops off significantly towards the rear with an elevation difference of over 8.0m.

The proposed development will include a 312.8m², four-storey apartment building. Two tandem parking spots and eight bicycle parking spots will be included. The property will be landscaped to include walkways, outdoor staircases and an amenity area.

Figure 1: Key Map: 71 Russell Avenue, Ottawa

2.0 BACKGROUND STUDIES

As-built drawings of the existing services within the vicinity of the site were reviewed in order to determine proper servicing and stormwater management schemes for the site.

A topographic survey of the site was completed by Farley, Smith & Denis Surveying Ltd. #591-17, dated January 19, 2018.

A Geotechnical Investigation was completed by WSP #181-05178-00, dated July 2018 and can be found under separate cover.

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff have been pre-consulted regarding this proposed development on February 20, 2018. Specific design parameters to be incorporated within this design include the following:

- All flows up to the 100-year storm event are to be controlled to the 2-year storm event using a C-factor of 0.50 and a time of concentration (Tc) of 10 minutes.

Correspondence with the City can be found in ***Appendix A***.

4.0 EXISTING SERVICES

There is an existing 300mm diameter combined sewer in Russell Avenue.

There is also a 150mm diameter watermain located on the southwest side of the road. The watermain services the fire hydrants and existing dwellings.

Hydro, gas, cable and bell services are also available.

5.0 SERVICING PLAN

5.1 Water Service Design

A new 50mm diameter water lateral will be connected to the existing 150mm watermain within Russell Avenue, complete with a water valve located at the property line.

The proposed building will be equipped with a sprinkler system for fire protection. The required fire protection from the Ontario Building Code (OBC) is 2,700 L/min (See Appendix 'B' for calculation). The required fire protection from the Fire Underwriters Survey (FUS) is 9,000L/min (provided for information purposes only.)

The water demands for the new building have been calculated as per the Ottawa Design Guidelines – Water Distribution and are as follows: the average and maximum daily demands are 0.16L/s and 0.39L/s respectively. The maximum hourly demand was calculated as 0.86L/s refer to ***Appendix B*** for detailed flow calculations.

Boundary conditions have been provided by the City of Ottawa and are available in ***Appendix B***. A future 200mm diameter watermain will installed within Russell Ave. A water model was completed using Bentley's WaterCAD and the results determined that the future 200 mm watermain within Russell Avenue can adequately service the proposed development. The results are available in ***Appendix B*** of this report.

5.2 Sanitary Sewer Design

A new 135mm diameter gravity sanitary service will be connected to the existing 300mm diameter combined sewer within Russell Avenue. The sanitary service will slope at the City preferred 2.0% slope and tee into the combined sewer at the spring line.

The peak design flow for the proposed site was determined to be 0.23L/s. Calculations can be found in ***Appendix C***. The proposed 135mm diameter lateral has sufficient capacity to convey the flow to the combined sewer. It is anticipated that there will be no issues with capacity for the existing combined sewer within Russell Avenue as the amount of flow leaving the site is minimal.

5.3 Storm Sewer Design

The existing site has a grade difference in excess of 8.0m from the northwest corner to the southeast corner. Due to the large grade change the majority of the runoff from the site will sheet flow unrestricted to the rear of the property as in pre-development conditions. A small portion of the front of the site, including the roof, will be captured and directed towards Russell Avenue.

The proposed servicing method will provide a 100mm diameter storm sewer service to direct roof flows to the combined sewer. In the future if the sewer in Russell Avenue is upgraded or a dedicated storm sewer is added, than the proposed apartment building could be connected to the appropriate sewer. Until then the service lateral will connect to the combined sewer.

The stormwater management design will be further detailed in ***Section 6.0***.

6.0 STORMWATER MANAGEMENT

6.1 Design Criteria and Methodology

Stormwater management for this site will be maintained through positive drainage away from the proposed building and through a roof top drainage system. The restricted stormwater runoff from the roof will be directed to the existing combined sewer within Russell Avenue. As mentioned in ***Section 5.3***, a portion of the overland flow will be directed towards Russell Avenue and the majority will sheet flow to the rear of the property. The quantitative properties of the storm runoff for both the pre-development and post-development flows are further detailed below.

6.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA$$

Where C = Runoff coefficient

I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)

A = Drainage area in hectares

It is recognized that the rational method tends to overestimate runoff rates. As a by-product of using extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel	0.60
Undeveloped and Grass	0.20

As per the pre-consultation with the City of Ottawa the time of concentration (Tc) used for pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 10 minutes.

6.2.1 Pre-Development Drainage

The existing site has no control measures in place and currently directs the flow via overland sheet flow to the rear property line, see the Pre-Development Drainage Plan in ***Appendix D***. The pre-development runoff calculations are shown below. For further details the full calculations can be found in ***Appendix D***.

Table 1: Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C (2&5-Year)	C (100-Year)	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
A1	0.08	0.44	0.50	10	76.8	104.2	178.6	7.75	10.52	20.79
Total	**0.08**							**7.75**	**10.52**	**20.79**

6.2.2 Post-Development Drainage

The drainage scheme for the proposed development is similar to pre-development and consists of the majority of the site flowing via overland sheet flow towards the rear property line. Stormwater management is being proposed on the rooftop of the proposed apartment building and will be restricted with a roof drain. Post-development runoff calculations are shown below. For further details the full calculations can be found in ***Appendix E***.

Table 2: Post-Development Runoff Calculations

Drainage Area	Area (ha)	C (2&5-Year)	C (100-Year)	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	0.03	0.90	1.00	10	76.8	104.2	178.6	6.01	8.15	15.53
B2	0.01	0.56	0.63	10	76.8	104.2	178.6	0.64	0.87	1.70
B3	0.04	0.41	0.47	10	76.8	104.2	178.6	3.40	4.61	9.15
Total	**0.08**							**10.05**	**13.63**	**26.38**

Runoff from area B1 will be restricted before leaving the roof top and being directed to the existing combined sewer in Russell Avenue. Area B2 will sheet flow from the front of the proposed building to Russell Avenue and area B3 will sheet flow to the rear property line. Post-development runoff calculations can be found in ***Appendix E***.

6.3 Quantity Control

As per pre-consultation with the City, the allowable release rate up to a 100-year storm is to be controlled to match the pre-development 2-year flow using a time of concentration (Tc) of 10min and a maximum "C" value of 0.50.

The total flow leaving the roof will be controlled by an adjustable Accutrol Weir in the single roof drain. The restriction device will maximize roof storage to reduce the 5-year and 100-year post-development flows leaving the site. With the excessive grade difference on the property, capturing and controlling the site is difficult. The proposed design will control the post-development flows for the 2-year and 5-years storm events. The 100-year storm event will be releasing 11.51L/s from the site which is higher than the allowable 7.75L/s but less than the 20.79L/s that is currently leaving the site in pre-development conditions. However the additional 3.76L/s flow will have minimal effect on offsite systems and is a cost effective compared to the alternative pond/flow spreader that could be proposed to control the additional flow.

Table 3: Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)			Restricted Flow (L/s)		
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	6.01	8.15	15.53	0.36	0.42	0.78
B2	0.64	0.87	1.70	0.64	0.87	1.70
B3	3.40	4.61	9.15	3.40	4.61	9.15
Total	**10.05**	**13.63**	**26.38**	**4.40**	**5.90**	**11.63**

For more details on flows, restrictions and storage, detailed calculations can be found in ***Appendix F***.

7.0 SEDIMENT & EROSION CONTROL

The contractor is responsible for ensuring sediment & erosion control measures are installed in accordance with the Servicing, Grading & Drainage and Sediment & Erosion Control Plan. Silt fence barriers and CB filter socks should be installed on site where indicated before construction or earth-moving operations begin.

Any new structures should also be controlled immediately upon installation. The contractor will be responsible for inspecting and maintaining all sediment & control measures throughout construction of the proposed site. They are to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any sediment that has accumulated is properly handled and disposed of properly. Removal of sediment & control measures without prior removal of sediment shall not be permitted.

At the discretion of the project manager, municipal staff or conservation authority, additional sediment control devices shall be installed at designated locations.

8.0 SUMMARY

- A new 312.8m^2 apartment building will be constructed at 71 Russell Avenue.
- A new 135mm diameter sanitary service will be installed and connected to the existing 300mm diameter combined sewer within Russell Avenue.
- A new 50mm diameter water lateral will be extended from the existing 150mm diameter main within Russell Avenue.
- A new 100mm diameter storm service will be installed and connected to the existing 300mm diameter combined sewer within Russell Avenue.
- The site will restrict the 2-year and 5-year flows to the allowable release rate while leaving the 100-year flow to release 11.51L/s which is less than the 20.79L/s being generated in pre-development conditions.

9.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management Report in support of the proposed apartment building at 71 Russell Avenue.

The sediment and erosion control plan outlined in Section 7.0 and detailed on the Servicing, Grading & Drainage and Sediment & Erosion Control Plan notes are to be implemented by the contractor.

This report is respectfully being submitted for approval.

Peter Kirkimtzis, C.Tech.
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10.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Brent McElheran, Royal LePage Team Realty. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment and Climate Change, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
CITY OF OTTAWA PRE-CONSULTATION NOTES

McINTOSH PERRY

Peter Kirkimtzis

From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: Wednesday, April 4, 2018 8:33 AM
To: Curtis Melanson
Subject: RE: 71 Russell Avenue - SWM Criteria

Hi Curtis

All flows up to the 1:100 year storm event are to be controlled to a 1:2 year storm event using a C factor of 0.5 and a Tc of 10.

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Curtis Melanson [mailto:c.melanson@mcintoshperry.com]
Sent: Tuesday, April 03, 2018 10:11 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: 71 Russell Avenue - SWM Criteria

Hi Richard,
I believe you were at a pre-consultation meeting for the site above, I'd just like to confirm the SWM criteria for the site. Based on the developed site and the infrastructure in the street, I believe there is a combined sewer, so I assume the criteria would consist of the following:

- Match the 100 to 2 year storm event (assuming there is a combined sewer) with a combined C value of 0.5.
- Calculate the Tc but don't use less than 10minutes for pre and post.

Could you confirm this requirement when you get a moment?

Thanks for your time.

Cheers,

Curtis Melanson, C.E.T.
Practice Area Lead, Land Development
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2240) | **F.** 613.836.3742 | **C.** 613.857.0784
c.melanson@mcintoshperry.com | www.mcintoshperry.com

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APPENDIX B
EXISTING WATERMAIN FLOW AND FIRE PROTECTION CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CP-18-0176 - 71 Russell Avenue - Apartment Building - Water Demands

Project:	71 Russell Avenue - Apartment Building
Project No.:	CP-18-0176
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	Aug. 9, 2018
Site Area:	0.08 gross ha
Units	16 units
Population	39 people

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*350*	*L/c/d*
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Othe Commercial	28,000	L/gross ha/d
AVERAGE DAILY DEMAND	0.16	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.5 x avg. day*	*L/c/d*
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	1.5 x avg. day	L/gross ha/d
Institutional	1.5 x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	0.39	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.2 x max. day*	*L/c/d*
Industrial	1.8 x max. day	L/gross ha/d
Commercial	1.8 x max. day	L/gross ha/d
Institutional	1.8 x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	0.86	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

McINTOSH PERRY

CP-18-0176 - 71 Russell Avenue - Apartment Building - OBC Fire Calculations

Project:	71 Russell Avenue - Apartment Building
Project No.:	CP-18-0176
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	Aug. 9, 2018

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Store/Office & Warhouse Building

Building is classified as Group : C (from table 3.2.2.55)
Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearging walls, columns and arches.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	18	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	3,926	(Total building volume in m³.)
Stot	1.5	(From figure 1 pg A-32)
Q =	105,999.06 L	

→

			From Figure 1 (A-32)
Snorth	3.1	m	0.4
Seast	17.5	m	0.0
Ssouth	5.6	m	0.1
Swest	22.5	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

2,700 L/min (if Q ≤ 108,000 L)
713 gpm

McINTOSH PERRY

CP-18-0176 - 71 Russell Avenue - Apartment Building - Fire Underwriters Survey (FUS) Fire Calculations

Project:	71 Russell Avenue - Apartment Building
Project No.:	CP-18-0176
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	Aug. 9, 2018

From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

F = 220 x C x √A Where:

F = Required fire flow in liters per minute

C = Coefficient related to the type of construction.

A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

A. Determine The Coefficient Related To The Type Of Construction

The building is considered to be Class 2 (frame). Therefore,

C = 1.00

B. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 312.82 m²

A = 1,251.28 m²

This floor area represents the final build-out of the development; as outlined on the Site Plan drawing.

C. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 4

D. Calculate Required Fire Flow

F = 220 x C x √A

F = 220.00 X 1.00 X √ 1251.28

F = 7,782.16 L/min.

E. Determine Increase or Decrease Based on Occupancy

From note 2, Page 18 of the Fire Underwriter Survey:

Low Hazard - Hotel

No Change

Occupancy Decrease = 0.00 L/min.

F = 7,782.16 L/min.

F. Determine the Decrease, if any for Sprinkler Protection

From note 3, Page 18 of the Fire Underwriter Survey:

- The flow requirement may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system.
- The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.
- Additional credit of 10% if water supply is standard for both the system and fire department hose lines
- If sprinkler system is fully supervised system, an additional 10% credit is granted
- The entire building will be installed with a fully automated, standardized with the City of Ottawa Fire Department and fully supervised.
- Therefore the value obtained in Step E is reduced by 30% (The building is sprinklered with a standard system and fire department hose lines)

Reduction = 7,782.16 L/min. X 30%

Reduction = 2,334.65 L/min.

G. Determine the Total Increase for Exposures

From note 4, Page 18 of the Fire Underwriter Survey:

- Exposure distance to the existing buildings to the north & south of the proposed building is approximately 3.1m & 5.6m, respectively. (30%)
- Exposure distance to the existing buildings to the east of the proposed building is approximately 17.5m. (10%)
- Exposure distance to the existing buildings to the west of the proposed building is approximately 22.5m (6%)

Increase = 7,782.16 L/min. X 46%

Increase = 3,579.79 L/min.

H. Determine the Total Fire Demand

- To the answer obtained in E, substract the value obtained in F and add the value obtained in G
- Fire flow should be no less than 2,000L/min. and the maximum value shoul not exceed 45,000L/min.

F = 7,782.16 L/min. - 2,334.65 L/min. + 3,579.79 L/min.
F = 9,027.31 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 9,000 L/min (3,698 GPM).

Tyler Ferguson

From:	Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent:	August-10-18 9:57 AM
To:	Tyler Ferguson
Subject:	71 Russell Avenue
Attachments:	71 Russell July 2018.pdf

Hi Tyler,

As discussed I checked with Infrastructure Renewal and this watermain is up for renewal next year. It may not be completed next year so please consider that. The current watermain is an old 152mm UCI which would have poor conveyance. The replacement will be a 203mm. The following are the boundary conditions for the future watermain on Russell.

The following are boundary conditions, HGL, for hydraulic analysis at 71 Russell Ave (zone 1W) assumed to be connected to the FUTURE 203mm on Russell (see attached PDF for location).

Minimum HGL = 106.6m

Maximum HGL = 115.6m

Max Day + FF (150L/s) = 103.4m

Max Day + FF (233L/s) = 97.9m

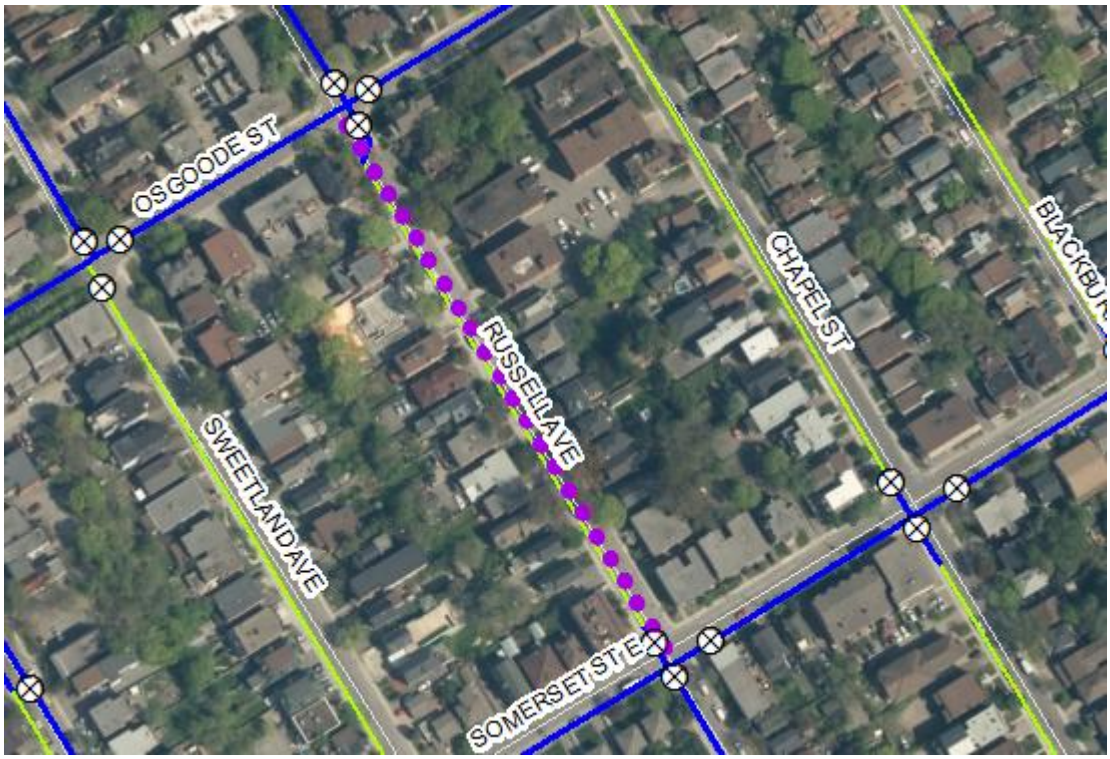
Please note the available flow in the current 152mm is 115L/s @ a residual 20psi, assuming a ground elevation of 66.2m.

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.

The watermain in Russell Ave from Somerset St E to Osgoode St is scheduled for renewal in 2019. The project is an integrated Road, Sewer and Watermain renewal.

WAT07016 is a 152mm, UCI, 1906 watermain, there has been 1 reported break.



Richard Buchanan, CET

Project Manager, Development Approvals
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ottawa.ca/planning / ottawa.ca/urbanisme

Office Alert: I will be away from the Office from August 13 till August 31, returning on September 4.

From: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Sent: Thursday, August 09, 2018 3:58 PM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Cc: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: RE: 71 Russell Avenue -

Hi Richard,

Would you be able to provide us with an HGL for the Max Day + Fire Flow? Please note the Fire Flow required is 9,000 L/min. All other demands listed below remain unchanged.

Thanks,

Tyler Ferguson, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2242) | **F.** 613.836.3742

t.ferguson@mcintoshperry.com | www.mcintoshperry.com

From: Buchanan, Richard [mailto:Richard.Buchanan@ottawa.ca]
Sent: July-31-18 10:59 AM
To: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: FW: 71 Russell Avenue -

Good Morning Peter,

The following are boundary conditions, HGL, for hydraulic analysis at 71 Russell Ave (zone 1W) assumed to be connected to the 152mm on Russell (see attached PDF for location).

Minimum HGL = 106.5m

Maximum HGL = 115.0m

Available Flow@20psi = 115 L/s assuming a ground elevation of 66.2m

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.

Richard Buchanan, CET

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Office Alert: I will be away from the Office from August 13 till August 31, returning on September 4.

From: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Sent: Monday, July 30, 2018 11:12 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: 71 Russell Avenue

Hi Richard,

We were hoping to get the boundary conditions for the proposed apartment building at 71 Russell Avenue. Below are the demands/fire flows for the proposed building. Attached is a preliminary drawing with the water connection at the centre of the lot.

Type of Development:	Residential
Amount of Fire Flow Required:	14,000 L/min

Population: 16 Units (39 people)
Average Daily Demand: 0.16 L/sec
Maximum Daily Demand: 0.39 L/sec
Maximum Hourly Demand: 0.86 L/sec

If you require additional information, please let me know.

Regards,

Peter Kirkimtzis
Civil Engineering Technologist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2262) | **F.** 613.836.3742
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McINTOSH PERRY

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Average Day

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-1	64.20	9.60	72.95	115.59

Peak Hourly

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-1	64.20	51.60	59.97	106.45

Max Day + Fire Flow

ID	Label	Is Fire Flow Run Balanced?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/min)	Fire Flow (Available) (L/min)	Pressure (psi)	Elevation (m)	Demand (L/min)
56	H-4	True	True	9,000.00	12,671.90	52.09	66.70	0.00
35	J-1	False	False	9,000.00	(N/A)	55.60	64.20	23.40

APPENDIX C
SANITARY SEWER CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

Project:	CP-18-0176 – 71 Russell Avenue
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	August 31, 2018

Re: Sanitary Flow Calculations

1. Building Occupancy

The proposed apartment building will consist of 16 units consisting of 11 two bedroom and 5 three bedroom apartments.

2. Daily Volume in Litres

As per the extract of the City of Ottawa Sewer Design Guidelines, Appendix 4-A; Daily Sewage Flow for Dwellings;

- Each Dwelling unit of 2 bedrooms
  = 1,100 Liters/Dwelling/Day
- Each Dwelling unit of 3 bedrooms
  = 1,600 Liters/Dwelling/Day

3. Peak Flow (Q/p)

- $Q_{2\text{-BED}}(p) = F_{2\text{-BED}} \times P_{2\text{-BED}}$

  Where:

  $F_{2\text{-BED}}$ = 1,100 Litres/Dwelling/Day
  $P_{2\text{-BED}}$ = 11 Units

  Therefore:

  $Q_{2\text{-BED}}(p)$ = 1,100 x 11
  = 12,100 L/Day or 0.14 L/s

- $Q_{3\text{-BED}}(p) = F_{3\text{-BED}} \times P_{3\text{-BED}}$

  Where:

  $F_{3\text{-BED}}$ = 1,600 Litres/Dwelling/Day
  $P_{3\text{-BED}}$ = 5 Units

  Therefore:

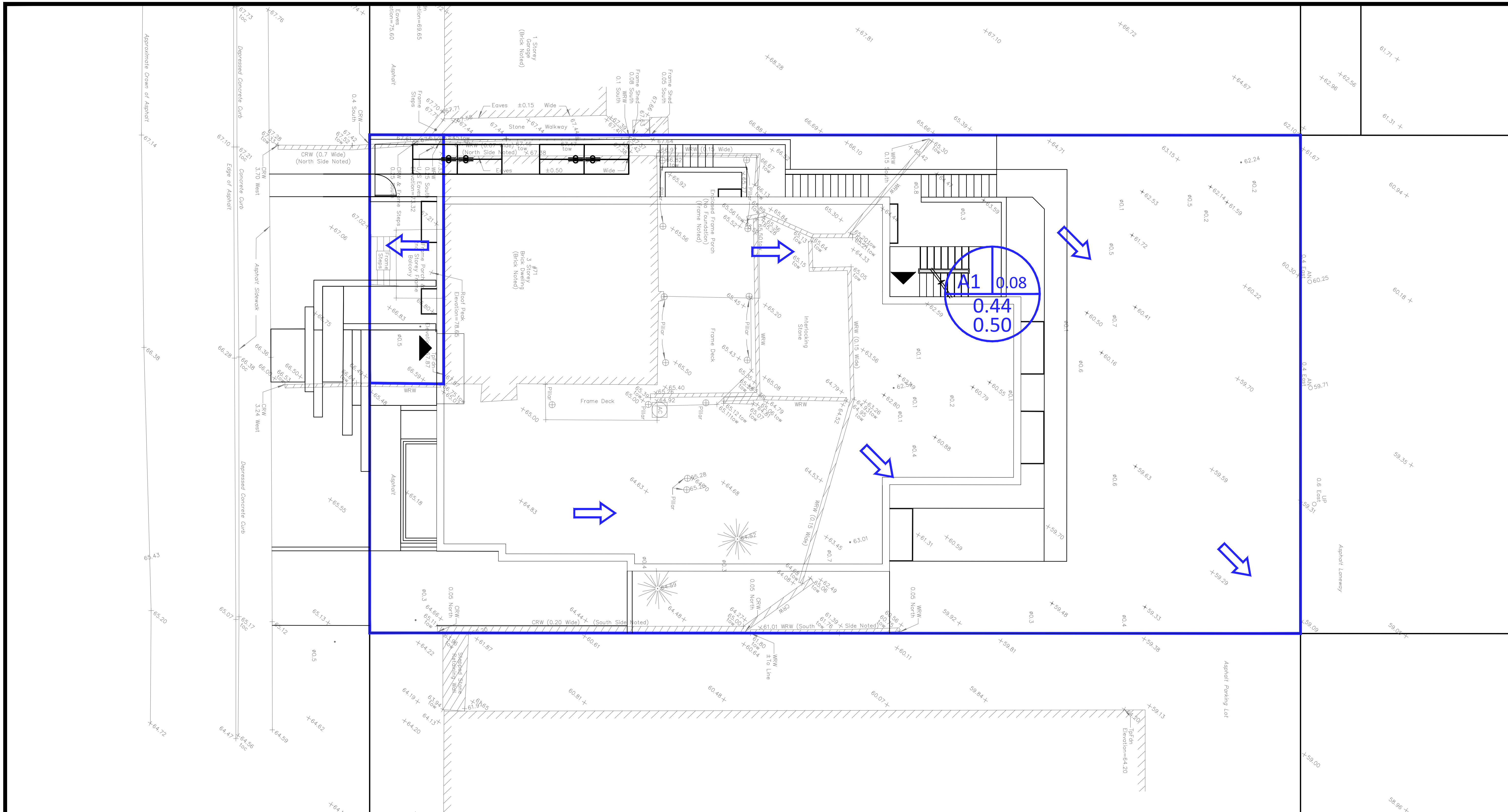
  $Q_{3\text{-BED}}(p)$ = 1,600 x 5
  = 8,000 L/Day or 0.09 L/s

- $Q_{TOTAL}(p)$ = 12,100 + 8,000
  = **20,100 L/Day or 0.23 L/s**

The difference in flow from a single family house compared to the proposed apartments is about 0.22L/s. The increase is minimal and should not impact the existing 300mm diameter combined sewer in a negative way.

APPENDIX D
PRE-DEVELOPMENT DRAINAGE AREA PLAN

McINTOSH PERRY

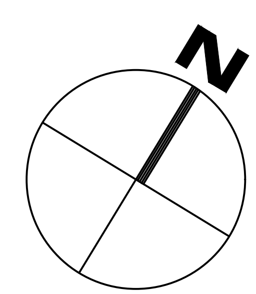


SCALE 1 : 150

0 5 15 Metres

LEGEND

AREA	A1
AREA SIZE (HECTARES)	6.81
5-YR RUNOFF COEFFICIENT (C-VALUE)	0.25
100-YR RUNOFF COEFFICIENT (C-VALUE)	0.31



McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: BRENT McELHERAN
200-1335 CARLING AVENUE, OTTAWA ON K1Z 8N8

Project: NEW APARTMENT BUILDING
71 RUSSELL AVE. OTTAWA, ON

Title: PRE-DEVELOPMENT DRAINAGE PLAN

Drawn by: P.G.K.
Scale: 1:150
Checked By: R.P.K.
Date: JUN. 4, 2018
Project Number: CP-18-0176

No.	Revision / Issue	Date
2	ISSUED FOR SITE PLAN CONTROL	2018-08-31
1	ISSUED FOR SITE PLAN CONTROL	2018-08-09

Drawing Number: PRE

APPENDIX E
POST-DEVELOPMENT DRAINAGE AREA PLAN

McINTOSH PERRY

RUSSELL AVENUE

PROPOSED BUILDING
312.82m²
F.F.L. = 65.57
U.S.F. = 59.77

B1 | 0.03
0.90
1.00

B2 | 0.01
0.56
0.63

B3 | 0.04
0.41
0.47

Approximate Crown of Asphalt
Depressed Concrete Curb
Edge of Asphalt
Concrete Curb
Asphalt Sidewalk
Asphalt
Asphalt Laneway
Asphalt Parking Lot
DC
MH—S
T/G=65.43
Inv N=62.96
Inv S=61.37
Existing
ANO 0.4 East
UP 0.6 East

SCALE 1 : 150
0 5 15 Metres

LEGEND

AREA — B1 | 4.10 — AREA SIZE (HECTARES)
0.46
0.53
100-YR RUNOFF COEFFICIENT (C-VALUE)
5-YR RUNOFF COEFFICIENT (C-VALUE)

N

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Drawn by: P.G.K.
Scale: 1:150
Checked By: R.P.K.
Date: JUN. 4, 2018
Project Number: CP-18-0176

Client: BRENT McELHERAN
200-1335 CARLING AVENUE, OTTAWA ON K1Z 8N8

Project: NEW APARTMENT BUILDING
71 RUSSELL AVE. OTTAWA, ON

Title: POST-DEVELOPMENT DRAINAGE PLAN

No.	Revision / Issue	Date
2	REVISED FOR SITE PLAN CONTROL	2018-08-31
1	ISSUED FOR SITE PLAN CONTROL	2018-08-09

Drawing Number: POST

FILENAME: H:\01 Project - Proposals\2018 Jobs\CP\OCP-18-0176 Brent McElheran_Apartment Building_71 Russell Avenue\Civil\12 - Drawings\04 - Production Drawings\01 - Design\CP-18-0176-00 Presentation.dwg
LAST SAVED: Monday, August 13, 2018 LAST SAVED BY: t.sellar
LAST PLOTTED: Friday, August 31, 2018 PLOTTED BY: t.sellar

APPENDIX F
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CP-18-0176 - 71 Russell Avenue - Runoff Calculations

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	Average C (2&5-Year)	Average C (100-Year)
A1	0.08	280.27	0.90	0.00	0.60	554.38	0.20	0.44	0.50

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C (2&5-Year)	C (100-Year)	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
A1	0.08	0.44	0.50	10	76.8	104.2	178.6	7.75	10.52	20.79
Total	**0.08**							**7.75**	**10.52**	**20.79**

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	Average C (2&5-Year)	Average C (100-Year)
B1	0.03	312.82	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B2	0.01	27.55	0.90	0.00	0.60	26.77	0.20	0.56	0.63
B3	0.04	115.87	0.90	0.00	0.60	273.64	0.20	0.41	0.47

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C (2&5-Year)	C (100-Year)	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	0.03	0.90	1.00	10	76.8	104.2	178.6	6.01	8.15	15.53
B2	0.01	0.56	0.63	10	76.8	104.2	178.6	0.64	0.87	1.70
B3	0.04	0.41	0.47	10	76.8	104.2	178.6	3.40	4.61	9.15
Total	**0.08**							**10.05**	**13.63**	**26.38**

Required Restricted Flow

Drainage Area	Area (ha)	C (2&5-Year)	C (100-Year)	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
A1	0.08	0.44	0.50	10	76.8	104.2	178.6	7.75	10.52	20.79

*City of Ottawa allowable 100-year flow to be controlled to 2-year event at Tc = 10min and maximum C = 0.50 as per pre-consultation meeting

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)			Restricted Flow (L/s)			
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	
B1	6.01	8.15	15.53	0.36	0.42	0.78	*RESTRICTED*
B2	0.64	0.87	1.70	0.64	0.87	1.70	*UNRESTRICTED*
B3	3.40	4.61	9.15	3.40	4.61	9.15	*UNRESTRICTED*
Total	**10.05**	**13.63**	**26.38**	**4.40**	**5.90**	**11.63**	

CP-18-0176 - 71 Russell Avenue - Runoff Calculations

Storage Requirements for Area B1

2-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	28.0	2.19	0.36	1.83	5.50
60	24.6	1.92	0.36	1.56	5.62
70	21.9	1.72	0.36	1.36	5.69
80	19.8	1.55	0.36	1.19	5.72
90	18.1	1.42	0.36	1.06	5.72
100	16.7	1.31	0.36	0.95	5.70

Maximum Storage Required 2-Year (m^3) =	5.72

5-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
80	26.6	2.08	0.42	1.66	7.96
90	24.3	1.90	0.42	1.48	8.00
100	22.4	1.75	0.42	1.33	8.00
110	20.8	1.63	0.42	1.21	7.98
120	19.5	1.52	0.42	1.10	7.95
130	18.3	1.43	0.42	1.01	7.89

Maximum Storage Required 5-Year (m^3) =	8.00

100-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
90	41.1	3.58	0.78	2.80	15.09
100	37.9	3.30	0.78	2.52	15.10
110	35.2	3.06	0.78	2.28	15.06
120	32.9	2.86	0.78	2.08	14.98
130	30.9	2.69	0.78	1.91	14.87
140	29.2	2.54	0.78	1.76	14.74

Maximum Storage Required 100-Year (m^3) =	15.10

Storage Occupied In Area B1

2-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m3)
Roof Drain	234.62	0.030	7.04
		Total	7.04

Storage Available (m^3) =	7.04
Storage Required (m^3) =	5.72

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m3)
Roof Drain	234.62	0.035	8.21
		Total	8.21

Storage Available (m^3) =	8.21
Storage Required (m^3) =	8.00

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m3)
Roof Drain	234.62	0.065	15.25
		Total	15.25

Storage Available (m^3) =	15.25
Storage Required (m^3) =	15.10

Roof Drain Flow (B1)

Roof Drains Summary			
Type of Control Device	Watts Drianage - Accutrol Weir		
Number of Roof Drians	1		
	2-Year	5-Year	100-Year
Rooftop Storage (m^3)	7.04	8.21	15.25
Storage Depth (m)	0.030	0.035	0.065
Flow (Per Roof Drain) (L/s)	0.36	0.42	0.78
Total Flow (L/s)	0.36	0.42	0.78

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

*Roof Drain model to be Accutrol Weirs, See attached sheets

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.18	15	0.18
	0.24	20	0.24
	0.30	25	0.30
2-Year	**0.36**	**30**	**0.36**
5-Year	**0.42**	**35**	**0.42**
	0.48	40	0.48
	0.54	45	0.54
	0.60	50	0.60
	0.66	55	0.66
	0.72	60	0.72
100-Year	**0.78**	**65**	**0.78**
	0.84	70	0.84
	0.90	75	0.90
	0.96	80	0.96
	1.02	85	1.02
	1.08	90	1.08
	1.14	95	1.14
	1.20	100	1.20
	1.26	105	1.26
	1.32	110	1.32
	1.38	115	1.38
	1.44	120	1.44
	1.50	125	1.50
	1.56	130	1.56
	1.62	135	1.62
	1.68	140	1.68
	1.74	145	1.74
	1.80	150	1.80

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

City of Ottawa

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	Cover Page
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Section 1.2
☐ Plan showing the site and location of all existing services.	Drawing C101
☐ 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Summary of Pre-consultation Meetings with City and other approval agencies.	Appendix A
☐ 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Statement of objectives and servicing criteria.	Appendix A

☐ Identification of existing and proposed infrastructure available in the immediate area.	Drawing C101
☐ 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).	Drawing C101
☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management 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.	Drawing C101
☐ 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.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0
☐ All preliminary and formal site plan submissions should have the following information: o Metric scale o North arrow (including construction North) o Key plan o Name and contact information of applicant and property owner o Property limits including bearings and dimensions o Existing and proposed structures and parking areas o Easements, road widening and rights-of-way o Adjacent street names	Drawing C101

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	N/A
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ 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 at locations throughout the development.	Appendix B
☐ 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.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the necessity of a pressure zone boundary modification.	N/A
☐ 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	N/A

☐ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
☐ 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.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix B
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ Summary of proposed design criteria (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).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ 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 condition of sewers.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.0

☐ 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)	N/A
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2
☐ 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).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Appendix D & E
☐ Water quantity 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.	Section 6.0
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A

☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Appendix F
☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Drawing C101
☐ 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.	Appendix F
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0
☐ 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.	Appendix A
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0
☐ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Drawing C101
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 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:

Criteria	Location (if applicable)
☐ 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 the 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.	N/A
☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐ Changes to Municipal Drains.	N/A
☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 8.0
☐ 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 are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped