NOVATECH

Engineers, Planners & Landscape Architects

Engineering

- Land / Site Development
- Municipal Infrastructure
- Environmental / Water Resources
- Traffic / Transportation
- Structural
- Recreational

Planning

- Land / Site Development
- Planning Application Management
- Municipal Planning Documents & Studies
- Expert Witness (OMB)
- Wireless Industry

Landscape Architecture

- Urban Design & Streetscapes
- Open Space, Parks & Recreation Planning
- Community & Residential Developments
- Commercial & Institutional Sites
- Environmental Restoration

36 Years

180 Metcalfe Street
Ottawa, Ontario

Servicing &

Stormwater Management Report

Engineering excellence. Planning precision. Inspired landscapes.

SERVICING AND STORMWATER MANAGEMENT REPORT

180 METCALFE STREET
OTTAWA, ONTARIO

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

Prepared: August 17, 2018
Revised: December 14, 2018

Novatech File: 118103
Ref No. R-2018-109

NOVATECH
Engineers, Planners & Landscape Architects

December 14, 2018

Planning and Infrastructure Approvals
City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario, K1P 1J1

Attention:

Dear Ms. Kimberley Baldwin, MCIP/MICU, RPP/UPC

Reference: 180 Metcalfe Street, Ottawa
Servicing and Stormwater Management Report
Our File No. : 118103

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted project. This report has been revised as per City of Ottawa comments and has been resubmitted for review approval in support of the Site Plan Application.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

Cara Ruddle, P.Eng.
Senior Project Manager | Land Development Engineering

cc: Simon Labelle , Jadco Corporation

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICIES

LIST OF ENGINEERING DRAWINGS

1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed development located at 180 Metcalfe Street, Ottawa, Ontario. This report will support a Site Plan Application for the subject development. **Figure 1** Key Plan shows the site location.

2.0 EXISTING CONDITIONS

The site is currently developed with an existing six storey office building with surface parking. The site is bounded by Nepean Street to the north, Metcalfe Street to the east, Algonquin Hotel Apartments to the south and a small 3 storey apartment building to the west. The topography of the site is flat, and the majority of the site generally drains to the north onto the Nepean Street right-of-way. There are existing municipal services in both Nepean and Metcalfe Street that will service the proposed development. **Figure 2** shows the existing site conditions.

3.0 PROPOSED DEVELOPMENT

The site is 0.183 hectares in size and it is proposed to develop a 27 storey, 303-unit apartment building with underground parking. There will be amenity areas for the residents provided in the building and a commercial retail space on the ground floor. The proposed development will incorporate the existing 6 storey building into the proposed six storey podium of the new building. The total building footprint including the existing 6 storey building is approximately 1450m^2 at the ground floor level. Access to the underground parking and commercial retail space is proposed from Nepean Street while residential access will be provided from the existing building entrance on Metcalfe Street. A loading bay and a small landscape area is proposed at the rear of the building on top of the proposed underground parking garage roof. Refer to **Figure 3** for the proposed site layout.

4.0 SITE CONSTRAINTS

A geotechnical investigation was also completed for the subject development. A report entitled 'Geotechnical Investigation Proposed Multi-Storey Building 180 Metcalfe Street Ottawa, Ontario' prepared by Paterson Group Inc. dated July 18, 2018 indicates that bedrock is present through the site at varying depths between 12.9m to 15.3m below surface. A temporary Category 3 permit to take water (PTTW) may be required during construction if pumping volumes exceed 400,000L/day.

5.0 WATER SERVICING

The proposed development is in the 1W pressure zone of the City of Ottawa water distribution network. There is an existing 400mm diameter watermain in Metcalfe Street and an existing 300mm diameter watermain on Nepean Street. As per the City of Ottawa Technical Bulletin ISDTB-2014-02, the proposed development will require two service connections separated by an isolation valve as the domestic water demands are greater than 50 cubic meters per day.

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

180 METCALFE STREET

KEY PLAN

SCALE: N.T.S

DATE: AUG 2018 | JOB: 118103 | FIGURE: 1

SHT8X11.DWG - 216mmx279mm

M:\2018\118103\CAD\Design\Drawing1.dwg, Sheet 8x11 portrait, Aug 01, 2018 - 1:55pm, channa

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

180 METCALFE STREET

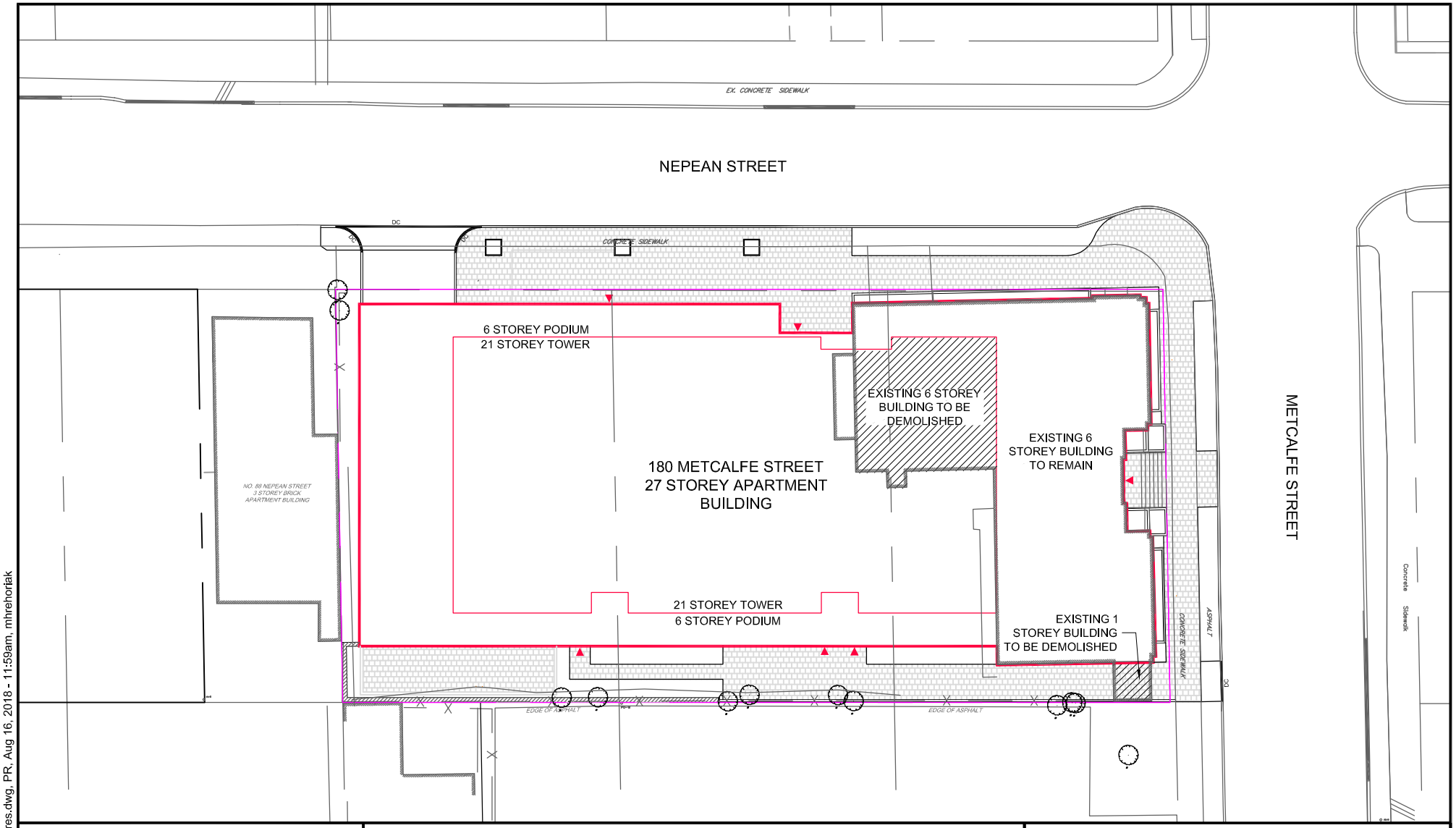
EXISTING CONDITIONS PLAN

SCALE 1 : 400 (0, 4, 8, 12, 16)

DATE AUG 2018 | JOB 118103 | FIGURE FIG 2

SHT8X11.DWG - 216mmx279mm

M:\2018\118103\CAD\Design\Drawing1.dwg, EX, Aug 01, 2018 - 1:55pm, mhrehoriak



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

180 METCALFE STREET

SITE PLAN

SCALE 1 : 400 (0, 4, 8, 12, 16)

DATE AUG 2018 | JOB 118103 | FIGURE FIG 3

M:\2018\118103\CAD\Design\Figures\Report Figures.dwg, PR, Aug 16, 2018 - 11:59am, mhrehoriak

SHT8X11.DWG - 216mmx279mm

The City of Ottawa design criteria for Water Distribution systems were used to calculate the theoretical water demand for the proposed twenty-seven storey residence building. The water demand has been calculated for the residence based on a population of 506 people and a summary of the flows is provided in **Table 6.1**.

Table 6.1 Water Demand Summary

	Proposed Development
Water Demand Rate	Residential - 350 L/person/day Commercial Retail – 2.5L/m² floor space
Units/Area	31 - Bach, 121 - 1 Bed, 81 – 1 Bed + Den, 70 - 2 Bed, 500m² Retail Floor Space
Density	1.4 ppu – Bach/1 Bed, 1.8 ppu – 1 Bed + Den, 2.1 ppu - 2 Bed,
Peaking Factors	Residential - MD=2.5 x avg day, PH=2.2 x max day Commercial - MD=1.8 x avg day, PH=1.5 x max day
Average Day Demand (L/s)	2.06
Maximum Daily Demand (L/s)	5.14
Peak Hour Demand (L/s)	11.29
FUS Fire Flow Requirement (L/s)	133.0
Max Day+Fire Flow (L/s)	138.14

The required fire demand was calculated using the Fire Underwriters Survey (FUS) Guidelines. The proposed building is to be sprinklered with the Siamese connection located by the front entrance of the building. Existing hydrants within the Nepean and Metcalfe Street Right-of-Ways will provide fire protection for the proposed development. The required fire demand was calculated to be 2,114 USGPM (or 8,000 L/min). Refer to **Appendix A** for a copy of the water calculations.

This water demand info was submitted to the City and boundary conditions provided from the City's water model. The boundary conditions are provided in **Table 6.2**.

Table 6.2 Water Boundary Conditions

Criteria	**Head (m)**
Connection Metcalfe or Nepean Street	
Minimum HGL	107.0
Maximum HGL	115.1
Max Day + Fire Flow HGL	107.5m

These boundary conditions were used to analyze the performance of the proposed watermain for three theoretical conditions: 1) High Pressure check under Average Day conditions 2) Peak Hour demand 3) Maximum Day + Fire Flow demand. The following **Table 6.3** summarizes the results from the hydraulic water analysis.

Table 6.3 Water Analysis Results Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	2.06	80psi (Max)	62.2
Max Day + Fire Flow	138.14	20psi (Min)	51.4
Peak Hour	11.29	40psi (Min)	50.7

Based on the proceeding analysis it can be concluded that the watermain, as designed, will provide adequate flow and pressures for the fire flow + maximum day demand and peak hour demand. Refer to **Appendix A** for detailed hydraulic calculations and City of Ottawa boundary conditions.

6.0 SANITARY SERVICING

There are existing 225mm and 300mm diameter sanitary sewers in Nepean street and an existing 375mm dimeter sanitary sewer in Metcalfe street. The proposed development will be serviced by a 200mm dia. sanitary service with a connection to the existing 225mm diameter sanitary sewer in Nepean Street. The existing 225mm sanitary sewer flows west on Nepean Street where it connects into the existing 675mm sanitary trunk sewer on O'Connor Street. Refer to the General Plan of Services (118103-GP) for sanitary servicing information.

Flows for the proposed development have been calculated based on a total population of 506 people. The sanitary flows were calculated based on an average domestic demand of 280 L/day. The total peak flow calculated for the apartment building is 5.21 L/s. Sanitary flow calculations are included in **Appendix B** for reference. Flows from the underground parking garage will be pumped to the sanitary sewer.

A downstream analysis was completed for the existing sanitary sewer on Nepean Street to confirm the downstream capacity. The downstream analysis included the total drainage area for the existing 225mm diameter sanitary sewer on Nepean Street up to the 675mm diameter trunk sewer on O'Connor Street. The results from the analysis indicate there is adequate capacity in the existing sanitary sewer to service the proposed development. Refer to the drainage area plan and design sheet in **Appendix B** for details.

7.0 STORM SERVICING

There is an existing 375mm diameter storm sewer in Nepean and Metcalfe Street which are the storm sewer outlets for the subject site. The proposed development will be serviced by a 250mm dia. storm service with a connection to the existing 375mm diameter storm sewer in Nepean Street. The existing 375mm diameter storm sewer flows to the west on Nepean Street where it becomes a 450mm diameter sewer prior to connection into the existing 1050mm diameter trunk sewer on O'Connor Street.

Stormwater from the site will be collected by roof drains and conveyed to an underground stormwater storage tank prior to outletting to existing storm sewer in Nepean Street. Foundation and under slab drainage consisting of a 150mm diameter perforated PVC pipe collection system will be pumped to the proposed storm service (refer to Mechanical drawings for details). Refer to the General Plan of Services (118103-GP) for detailed information on the existing and proposed storm servicing.

8.0 STORMWATER MANAGEMENT

8.1 Stormwater Management Criteria

The following Stormwater Management criteria was provided by the City of Ottawa:

- Control post-development flow from the site to the 1:5 year predevelopment level for all storm events up to and including 1:100 year storm.
- Pre-development flow to be calculated using a runoff coefficient of 0.5.
- Time of Concentration of 10 minutes.

8.2 Existing Site Drainage

As indicated previously the site is currently developed with a 6 storey building and surface parking lot. In the existing site condition the stormwater is collected in minimal storm sewer infrastructure in the parking area with the majority of the site sheet draining to Nepean Street. Refer to Figure A5 Pre-Development Drainage Area Plan in **Appendix C**.

8.3 Quantity Control

As previously mentioned stormwater from the proposed development for storms up to and including the 100-year storm event will be controlled to the 5-year level based on a run-off coefficient of 0.5 and a time of concentration of 10 minutes. The allowable release to the existing Nepean Street storm sewer was calculated to be 26.5 L/s.

The site has been divided into two different drainage areas as follows:

Area A-1

- The small area fronting the building will sheet drain uncontrolled directly to Nepean and Metcalfe Street.

Area A-2

- Flows from the building roof and rear area on the south and west side of the building will be conveyed to the existing storm sewer in Nepean Street. These flows will be captured by roof drains and area deck drains and will be conveyed to a stormwater storage tank under the ramp to the underground parking garage. Flows from the storage tank to the existing sewer in Nepean will be controlled by an inlet control device. Storage will be provided for storms up to and including the 100-year event within the storage tank.

Table 8.1 below summarizes the flow, storage required and storage provided for each of the site drainage areas.

Table 8.1 Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	Orifice Size & Type	5 Year Storm Event			100 Year Storm Event		
				Flow (L/s)	Req Vol (cu.m)	Max. Vol. Prov (cu.m.)	Flow (L/s)	Req Vol (cu.m)	Max. Vol. Prov (cu.m.)
A-1	0.017	0.53	N/A	2.6	N/A	N/A	4.0	N/A	N/A
A-2	0.166	0.87	101mm Plate	14.6	17.8	40.4	22.3	39.1	40.4
Total Release Rate from the Site				**17.2**			**26.4**		
Allowable Site Release Rate				**26.5**			**26.5**		

Refer to **Appendix C** for Rational and Modified Method calculations and Figure A6 Post Development Drainage Area Plan.

8.4 Quality Control

Quality control of stormwater for the site development will not be required as the majority of the site area consists of rooftop and landscaped area, which is considered to be clean for the purposes of water quality measures. Refer to Appendix C for E-mail correspondence from the RVCA accepting the quality control approach.

8.5 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater from the rear of the site be directed to the Nepean and Metcalfe Street right-of-way's as per existing conditions. Stormwater from the front of the building will sheet drain directly to the Nepean and Metcalfe Street right-of-way's as per existing conditions. The major overland system is shown on the Grading Plan.

9.0 EROSION AND SEDIMENT CONTROL

9.1 Temporary Measures

Temporary erosion and sediment control measures will be implemented during construction. Silt fence, mud mats and filter socks in catchbasins will be used as erosion and sediment control measures.

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granular that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Grading Plans (118103-GR) for additional information.

10.0 CONCLUSIONS AND RECOMMENDATIONS

- Water servicing for the proposed development will be serviced by two connections. A 200mm service will connect to the existing 400mm diameter watermain in Metcalfe Street and a 200mm service will connect to the existing 300mm dimeter watermain in Nepean

Street. The existing watermain infrastructure can provide adequate domestic flows and pressure for fire protection.

- The proposed building will be serviced by a 200mm diameter sanitary service which will connect to the existing 225mm diameter sanitary sewer on Nepean Street. The proposed building service will include an internal test port in the P1 level of the parking garage. The existing sanitary sewer has adequate excess capacity to service the development.
- Quantity control of stormwater will be provided through a stormwater storage tank to attenuate flows to the existing storm sewer in Nepean Street to the 5-year level for storms up to and including the 100-year event. The allowable release rate is 26.5 L/s and the post-development stormwater release rates are 17.2 L/s and 26.4 L/s for the 5 and 100 year events respectively.
- Quality control of stromwater will not be required as the majority of the site area will consist of rooftop and landscaped areas, which is considered clean for the puropose of water quality measures.
- An overland flow route is provided;
- Erosion and sediment control measures will be implemented prior to and during construction.

NOVATECH

Prepared by:

Matthew Hrehoriak, P.Eng.
Project Engineer

Reviewed by:

Cara Ruddle, P. Eng.
Senior Project Manager

APPENDIX A
Water Servicing Information

Matthew Hrehoriak

From: Cara Ruddle
Sent: Friday, July 20, 2018 3:18 PM
To: Matthew Hrehoriak
Subject: FW: 180 Metcalfe - bldg info
Attachments: PARKING SECTION.PDF

Cara Ruddle, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 220 | Cell: 613.261.7719 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Patrick Rossiter <PRossiter@rlaarchitecture.ca>
Sent: Thursday, July 19, 2018 3:49 PM
To: Cara Ruddle <c.ruddle@novatech-eng.com>
Cc: Jolly Shan <jshan@rlaarchitecture.ca>
Subject: RE: 180 Metcalfe - bldg info

Hi Cara,

Please see the attached section regarding cistern locations and the responses below:

Water Demands:

- Number of Units (each type bachelor, 1 bed, 2 beds, etc)
  BACHELOR 31
  1 BED 121
  1 BED + DEN 81
  2 BED 70
  303 TOTAL
- Commercial Retail Use and Floor Area
  RETAIL USE UNKNOWN AT THIS TIME
  RETAIL @ 5277 SQ.FT.
- Amenity type and floor area
  AMENITY (INTERIOR) 7TH FLOOR @ 2262 SQ.FT.
  1ST FLOOR @ 931 SQ.FT.
  ROOF TERRACE 2960 SQ.FT.

Fire Flow Calculation:

- Type of building Construction (Ordinary, Non- Combustible, Fire Resistive if so how many hours)
  NON-COMBUSTIBLE
- If fire resistive are the openings fully protected (minimum 1hr rating)
  2HR AT FLOOR OPENINGS
- Floor Area (Total Podium Floor Area / Number of Podium Storeys, Total Tower Floor Area / Number of Tower Storeys)
  PODIUM – 6 STOREYS @ 88,155 SQ.FT. GROSS TOTAL
  TOWER – 21 STOREYS @ 180,155 SQ.FT. GROSS TOTAL
- Will the building have a fully supervised sprinkler system?

YES

If you need any further info please let me know.

Regards,

Patrick

From: Jolly Shan
Sent: Thursday, July 19, 2018 1:19 PM
To: Patrick Rossiter <PRossiter@rlaarchitecture.ca>
Subject: FW: 180 Metcalfe - bldg info

From: Cara Ruddle <c.ruddle@novatech-eng.com>
Sent: July-19-18 1:13 PM
To: Robert Verch <rverch@rlaarchitecture.ca>
Cc: Jolly Shan <jshan@rlaarchitecture.ca>; Matthew Hrehoriak <m.hrehoriak@novatech-eng.com>
Subject: 180 Metcalfe - bldg info

Rob:
As discussed yesterday, we require information about the building to complete the water/fire demand calculations to obtain boundary conditions for the existing watermain infrastructure. Below is a list of information we require. Please provide this information as soon as possible so that we can submit it to the City for boundary conditions.

Water Demands:

- Number of Units (each type bachelor, 1 bed, 2 beds, etc)
- Commercial Retail Use and Floor Area
- Amenity type and floor area

Fire Flow Calculation:

- Type of building Construction (Ordinary, Non- Combustible, Fire Resistive if so how many hours)
- If fire resistive are the openings fully protected (minimum 1hr rating)
- Floor Area (Total Podium Floor Area / Number of Podium Storeys, Total Tower Floor Area / Number of Tower Storeys)
- Will the building have a fully supervised sprinkler system?

Thanks.

Cara Ruddle, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 220 | Cell: 613.261.7719 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

NOVATECH
Engineers, Planners & Landscape Architects

180 METCALFE ST
HYDRAULIC ANALYSIS

JOB NO. 118103
DATE PREPARED: JULY 2018

Table 1
Water Demand

	Unit Type					Residential Demand (L/s)				Commercial Demand (L/s)			Total Demand (L/s)		
	Bachelor	1 Bed Apartment	1 Bed + Den Apartment	2 Bed Apartment	Total	Avg Day	Max. Daily	Peak Hour	Floor Area (m^2)	Avg Day	Max. Daily	Peak Hour	Avg Day	Max. Daily	Peak Hour
Unit Count	31	121	81	70	303	2.05	5.11	11.25	500.0	0.014	0.026	0.039	2.06	5.14	11.29
Unit Population	43	169	146	147	505								**2.06**	**5.14**	**11.29**

Design Parameters:

- Bachelor Apartment = 1.4 persons/unit
- 1 Bed Apartment = 1.4 persons/unit
- 1 Bed + Den Apartment = 1.8 persons/unit
- 2 Bed Apartment = 2.1 persons/unit

Section 4.0 Ottawa Sewer Design Guidelines

- Average Domestic Flow	350	L/person/day
- Retail Area Flow	2500	L/(1000m^2/day)

Peaking Factors: Table 3-3 Moe Guideline for Drinking Water systems (pop < 500)

Max. Daily Demand:

- Residential	2.5	x Avg Day
- Commercial	1.8	x Avg Day

Peak Hourly Demand:

- Residential	2.2	xMax Day
- Commercial	1.5	xMax Day

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

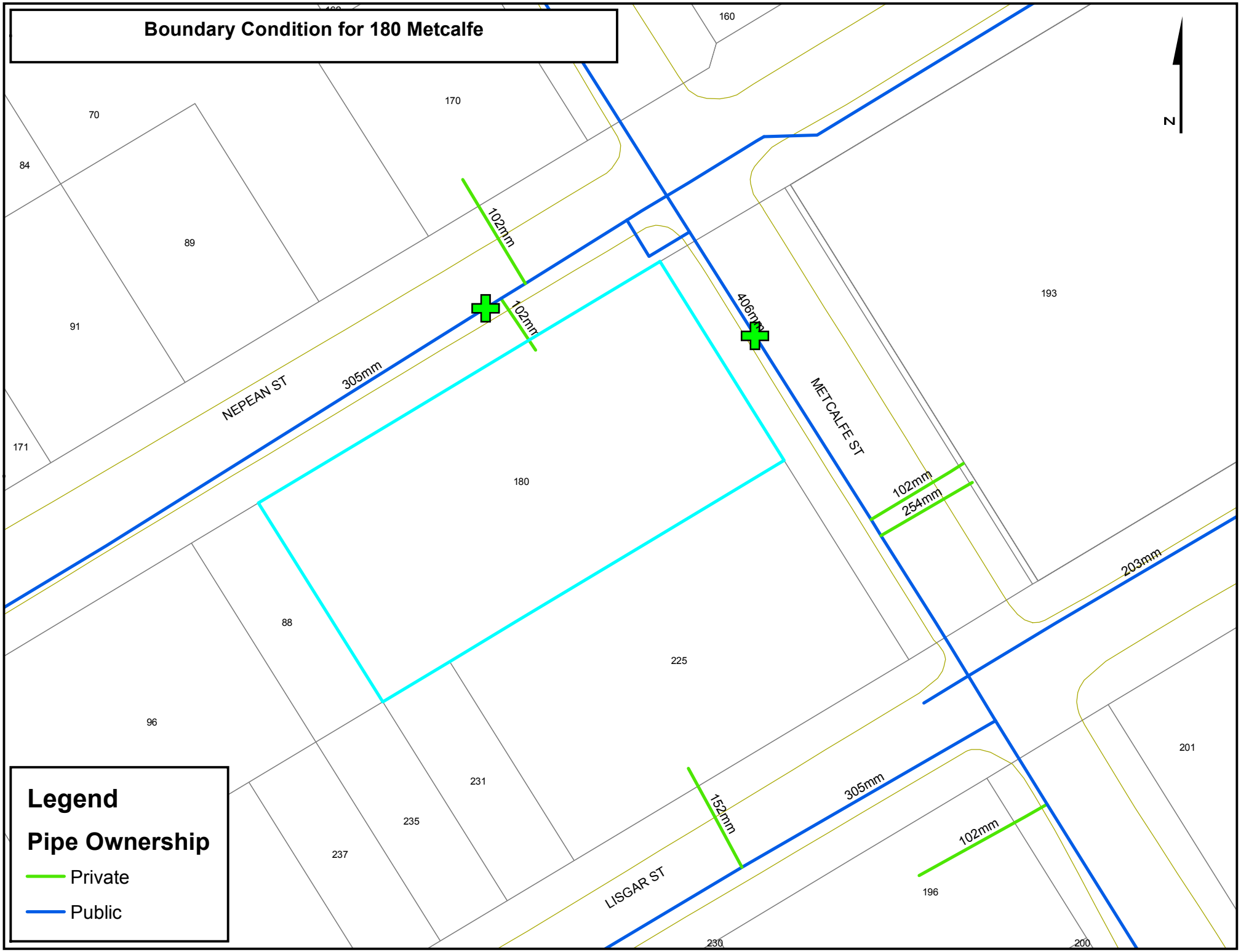
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 118103
Project Name: 180 Metcalfe
Date: July 23/18
Input By: Matt Hrehoriak
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: 27 Storey Building with 6 Storey Podium
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Fire resistive construction (2 to 3 hrs)		0.7		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	1365			
		Total Floors/Storeys (Podium)	6			
		Tower Footprint (m^2)	797			
		Total Floors/Storeys (Tower)	21			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,048**	
	F	**Base fire flow without reductions**				**8,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**4,760**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**70%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**8,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**133**
				or	USGPM	2,114
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	960


Boundary Condition for 180 Metcalfe
N
160
170
70
84
89
91
171
180
193
225
88
96
231
235
237
201
196
230
200
NEPEAN ST
METCALFE ST
LISGAR ST
305mm
102mm
102mm
406mm
102mm
254mm
203mm
152mm
305mm
102mm
Legend
Pipe Ownership
Private
Public

Matthew Hrehoriak

From: Wessel, Shawn <shawn.wessel@ottawa.ca>
Sent: Thursday, July 26, 2018 12:15 PM
To: Matthew Hrehoriak
Cc: Lindsey Seely; Cara Ruddle
Subject: RE: 180 Metcalfe - swm criteria
Attachments: 180 Metcalfe July 2018.pdf

Good afternoon Mr. Hrehoriak and Ms. Ruddle.

Please find below boundary information for 180 Metcalfe from IAD:

The following are boundary conditions, HGL, for hydraulic analysis at 180 Metcalfe (zone 1W) assumed to be connected to the 305mm on Nepean and 406mm on Metcalfe (see attached PDF for location).

Minimum HGL = 107.0m

Maximum HGL = 115.1m

Max Day + Fire Flow (133 L/s) = 107.5m

HGL is the same at both connections

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.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji
Project Manager - Infrastructure Approvals
Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique

180 METCALFE STREET
HYDRAULIC ANALYSIS

CALCULATED WATER DEMNADS:

PROPOSED DEVELOPMENT (27 STOREY BUILDING)

AVERAGE DAY =	2.06	L/s
MAXIMUM DAY =	5.14	L/s
PEAK HOUR =	11.29	L/s
MAX DAY + FIRE =	138.14	L/s

CITY OF OTTAWA BOUNDARY CONDITIONS:

BOUNDAY CONDITIONS BASED ON (ZONE 1W) CONNECTION TO 305mm DIA. WATERMAIN ON NEPEAN STREET AND THE 406mm DIA. WATERMAIN ON METCALFE STREET

MINIMUM HGL =	107	m
MAXIMUM HGL =	115.1	m
MAX DAY + FIRE =	107.5	m

WATERMAIN ANALYSIS:

180 METCALFE WATERMAIN CONNECTIONS

FINSIHED FLOOR GROUND ELEVATION = 71.35 m

HIGH PRESSURE TEST = MAX HGL - AVG GROUND ELEV x 1.42197 PSI/m < 80 PSI

HIGH PRESSURE = 62.2 PSI

LOW PRESSURE TEST = MIN HGL - AVG GROUND ELEV x 1.42197 PSI/m > 40 PSI

LOW PRESSURE = 50.7 PSI

MAX DAY + FIRE TEST = MAX DAY + FIRE - AVG GROUND ELEV x 1.42197 PSI/m > 20 PSI

LOW PRESSURE = 51.4 PSI

APPENDIX B
Sanitary Servicing Information

PROJECT #: 118103
PROJECT NAME: 180 METCALFE STREET
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: JULY 2018

180 METCALFE STREET SANITARY FLOWS

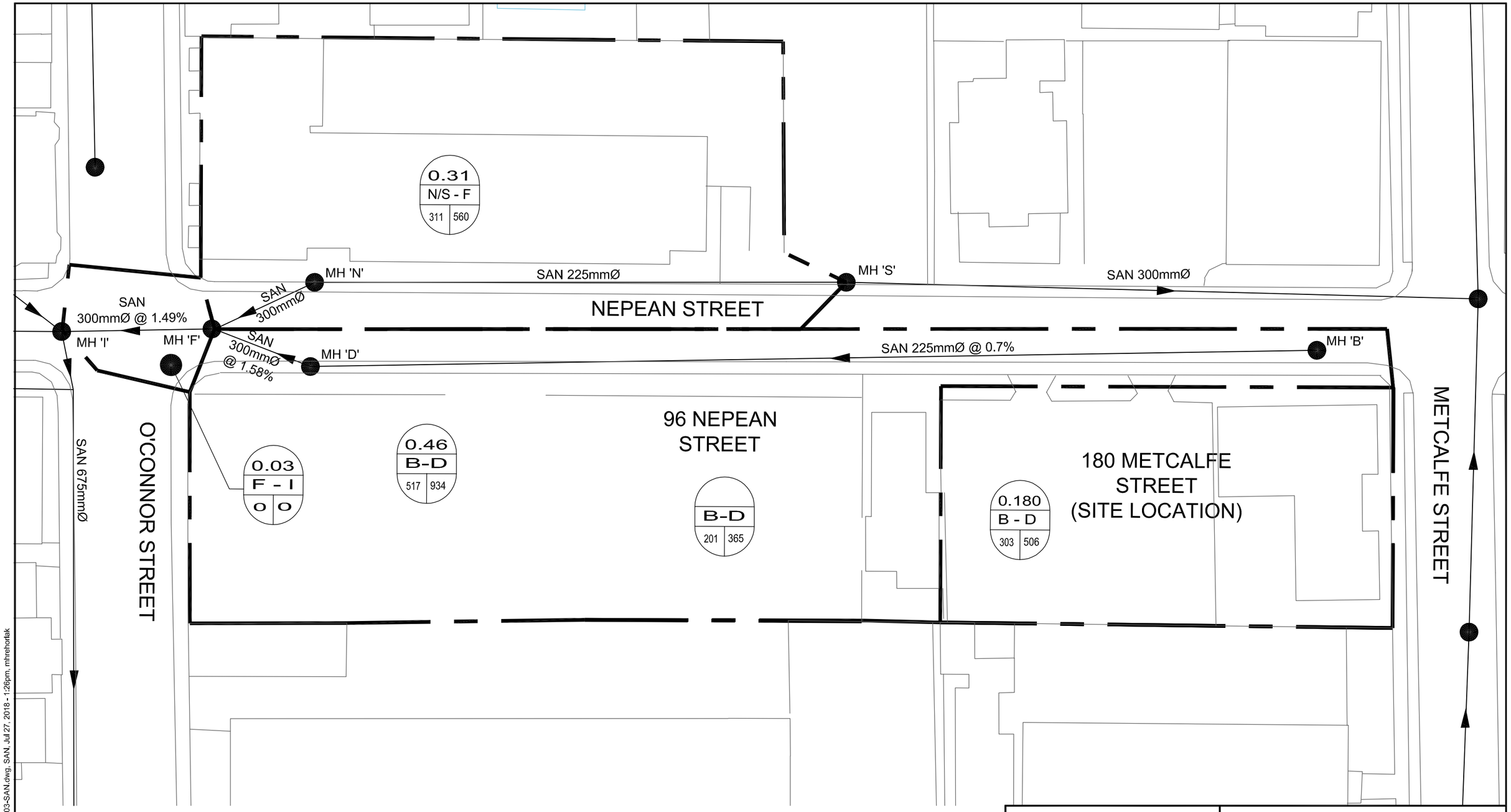
LOCATION			RESIDENTIAL									COMMERCIAL		INFILTRATION				PIPE					
			Apartment Units					TOTAL															
AREA	FROM	TO	Bachelor Units	1 Bed Units	1 Bed + Den Units	2 Bed Units	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Retail Floor Area (m^2)	Commercial Peak Flow (L/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
	BLDG	**EX**	31	121	81	70	506	506	506	3.2	5.21	500.00	0.014	0.18	0.18	0.06	5.28	200	2.00	N/a	46.3	1.48	11.4%

Design Parameters:

- Bachelor Apartment = 1.4 persons/unit
- 1 Bed Apartment = 1.4 persons/unit
- 1 Bed + Den Apartment = 1.8 persons/unit
- 2 Bed Apartment = 2.1 persons/unit

Section 4.0 Ottawa Sewer Design Guidelines

- Average Domestic Flow	280	L/person/day
- Retail Area Flow	2500	L/(1000m^2/day)
- Extraneous Flows	0.33	l/s/ha
Residential Peaking Factor	Harmon Equation	
Commercial Peaking Factor	1	



LEGEND

- 0.317 / 139-137 / 4 | 10.8 — DRAINAGE AREA (hectares); MANHOLE TO MANHOLE; UNIT COUNT AND POPULATION
- MH 100 — EXISTING SANITARY SEWER AND MANHOLE
- SANITARY DRAINAGE AREA
- DIRECTION OF FLOW

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

N.T.S.

180 METCALFE STREET

SANITARY DRAINAGE PLAN

1 : 250 (0 2 4 6 8 10)

AUG 2018	118103	FIG A4

M:\2018\118103\CAD\Design\Figures\SAN\118103-SAN.dwg, SAN, Jul 27, 2018 - 1:26pm, mhrehorlak

SHT11X17.DWG - 279mmX432mm

PROJECT #: 118103
PROJECT NAME: 180 METCALFE STREET
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: JULY 2018

180 METCALFE STREET SANITARY FLOWS

LOCATION			RESIDENTIAL									COMMERCIAL		INFILTRATION			Total Flow (l/s)	PIPE					
			Apartment Units					TOTAL															
AREA	FROM	TO	Bachelor Units	1 Bed Units	1 Bed + Den Units	2 Bed Units	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Retail Floor Area (m^2)	Commercial Peak Flow (L/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
	BLDG	**MH B**	31	121	81	70	506	506	506	3.2	5.21	500.00	0.014	0.18	0.18	0.06	5.28	200	2.00	N/a	46.3	1.48	11.4%
	MH B	**MH D**					934	934	1440	3.0	13.78			0.46	0.64	0.21	14.01	225	0.71	144.6	37.8	0.95	37.1%
	MH D	**MH F**					0	0	1440	3.0	13.78			0.00	0.64	0.21	14.01	300	1.58	6.5	121.4	1.72	11.5%
	MH N/S	**MH F**					560	560	560	3.2	5.73			0.31	0.31	0.10	5.83	N/A					
	MH F	**MH I**					0	0	2000	2.9	18.59			0.03	0.98	0.32	18.93	300	1.49	19.3	117.9	1.67	16.1%

Design Parameters:

- Bachelor Apartment = 1.4 persons/unit
- 1 Bed Apartment = 1.4 persons/unit
- 1 Bed + Den Apartment = 1.8 persons/unit
- 2 Bed Apartment = 2.1 persons/unit

Section 4.0 Ottawa Sewer Design Guidelines

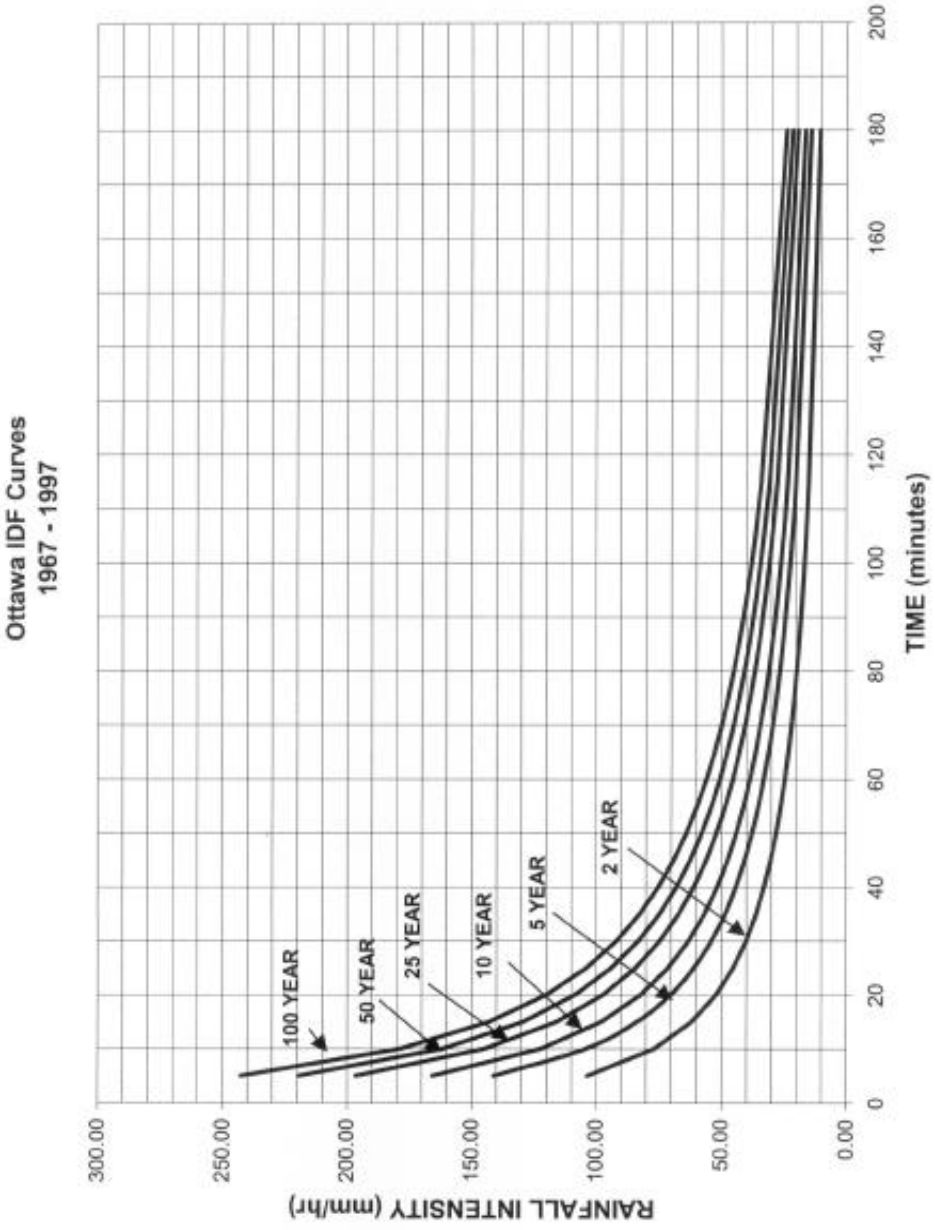
- Average Domestic Flow	280	L/person/day
- Retail Area Flow	2500	L/(1000m^2/day)
- Extraneous Flows	0.33	l/s/ha
Residential Peaking Factor	Harmon Equation	
Commercial Peaking Factor	1	

Notes:

1. Site population based on proposed site plan
2. Other area populations based on maximim permitted under current zoning (except 96 Nepean population from site plan)
3. Length and slopes are approximate and taken from City of Ottawa mapping

APPENDIX C
Stormwater Management Calculations

APPENDIX 5-A OTTAWA INTENSITY DURATION FREQUENCY (IDF) CURVE



RATIONAL METHOD

The Rational Method was used to determine both the allowable runoff as well as the post-development runoff for the proposed site. The equation is as follows:

$Q=2.78\ CIA$

Where:
Q is the runoff in L/s
C is the weighted runoff coefficient*
I is the rainfall intensity in mm/hr**
A is the area in hectares

*The weighted runoff coefficient is determined for each of the catchment areas as follows:

$$C = \frac{(A_p \times C_p) + (A_{imp} \times C_{imp})}{A_{tot}}$$

Where:
A_p is the pervious area in hectares
C_p is the pervious area runoff coefficient (C_{perv}=0.20)
A_{imp} is the impervious area in hectares
C_{imp} is the impervious area runoff coefficient (C_{imp}=0.90)
A_{tot} is the catchment area ($A_{perv} + A_{imp}$) in hectares

** The rainfall intensity is taken from the City of Ottawa IDF Curves using a time of concentration (tc) of 10 minutes resulting in a rainfall intensity of 104.2mm/hr and 178.6mm/hr for the 1:5 year and 1:100 year design events respectively.

Note: The post-development C values are to be increased by 25% for the 1:100 year event (max. C_{imp}=1.0).

NEPEAN STREET

METCALFE STREET

200mm GAS (ABAND)

75mm GAS (ABAND)

EX. CONCRETE SIDEWALK

EXCB T/G=70.88

EXCB T/G=70.87

EX STMMH T/G=70.93 INV. SW=68.81 INV. NE=68.87

56.1m-375mm STM @ 0.59%

EX STMMH T/G=71.05 INV. SW=69.20

EXCB T/G=70.92

EXCB T/G=70.83

CONCRETE SIDEWALK

Ø50mm Gas

EXCB T/G=71.14

Ø150mm Gas

EXCB T/G=71.09

117.4m-375mm STM @ 0.55%

Concrete Sidewalk

NO. 88 NEPEAN STREET
3 STOREY BRICK
APARTMENT BUILDING

NO. 180 METCALFE STREET
6 STOREY BRICK & STONE BUILDING
EX FINISHED FLOOR 72.40

0.183
PRE
0.5

EXCB T/G=71.31

EDGE OF ASPHALT

EDGE OF ASPHALT

CONCRETE SIDEWALK

EXCB T/G=71.14

EXCB T/G=71.21

EX STMMH T/G=71.27 INV. N=68.21

OHW

LEGEND

PROPERTY LINE

EXISTING STORM SEWER

PRE DEVELOPMENT DRAINAGE AREA

0.183
PRE
0.5

DRAINAGE AREA ha

DRAINAGE AREA IDENTIFIER

RUNOFF COEFFICIENT

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

180 METCALFE STREET

PRE DEVELOPMENT DRAINAGE AREA PLAN

SCALE 1 : 250 (0 2 4 6 8 10)

DATE AUG 2018 | JOB 118103 | FIGURE FIG A5

M:\2018\118103\CADD\Design\118103-SWM.dwg, FIG A5, Aug 01, 2018 - 1:53pm, mhrehoriak

SHT11X17 DWG - 279mmX432mm

NEPEAN STREET

EX. CONCRETE SIDEWALK

EXCB T/G=70.88

EXCB T/G=70.87

EX STMMH T/G=70.93 INV. SW=68.81 INV. NE=68.87

TEE CONNECT TO EXISTING 375mmØ STORM SEWER PER CITY OF OTTAWA DETAIL S11. INVERT ELEVATION OF EXISTING SEWER IS APPROXIMATELY 69.02±; SPRING LINE ELEVATION = 69.20
PROPOSED SERVICE INVERT = 69.20

56.1m-375mm STM @ 0.59%

EX STMMH T/G=71.05 INV. SW=69.20

10.2m - 250mmØ STM @ 1.0%

EXCB T/G=70.92

EXCB T/G=70.83

DC

CONCRETE SIDEWALK

STM CAP INV. = 69.30

TANK ACCESS T/G=71.50

STORMWATER STORAGE TANK

EXCB T/G=71.14

EXCB T/G=71.09

0.023
A-1
0.63

0.160
A-2
0.88

NO. 88 NEPEAN STREET
3 STOREY BRICK
APARTMENT BUILDING

NO. 180 METCALFE STREET
6 STOREY BRICK & STONE BUILDING
EX FINISHED FLOOR 72.40

EXCB T/G=71.31

OHW

AD 1 T/G=71.90

AD 2 T/G=71.80

AD 3 T/G=71.75

EDGE OF ASPHALT

EDGE OF ASPHALT

ASPHALT

CONCRETE SIDEWALK

DC

EXCB T/G=71.21

EX STMMH T/G=71.27 INV. N=68.21

EXCB T/G=71.14

117.4m-375mm STM @ 0.55%

METCALFE STREET

OHW

Concrete Sidewalk

LEGEND

- PROPERTY LINE
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- POST DEVELOPMENT DRAINAGE AREA

0.145
A-1
0.85

DRAINAGE AREA ha
DRAINAGE AREA IDENTIFIER
RUNOFF COEFFICIENT

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

180 METCALFE STREET

POST DEVELOPMENT DRAINAGE AREA PLAN

SCALE 1 : 250 (0 2 4 6 8 10)

DATE DEC 2018 | JOB 118103 | FIGURE FIG A6

M:\2018\118103\CAD\Design\118103-SWM.dwg, FIG A6, Oct 26, 2018 - 10:16am, mhrehorlak

Matthew Hrehoriak

From: Cara Ruddle
Sent: Wednesday, July 25, 2018 10:55 AM
To: Matthew Hrehoriak; Lindsey Seely
Subject: FW: 180 Metcalfe - swm criteria

Cara Ruddle, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 220 | Cell: 613.261.7719 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Wessel, Shawn <shawn.wessel@ottawa.ca>
Sent: Wednesday, July 25, 2018 10:10 AM
To: Cara Ruddle <c.ruddle@novatech-eng.com>
Subject: RE: 180 Metcalfe - swm criteria

Good morning and thank you for your inquiry and email Ms. Ruddle.

I can confirm that a C= 0.5 and a Tc= 10 minutes will be satisfactory for your SWM criteria for 180 Metcalfe due to separated sewers and location of site in vicinity of the Copper Storm Collector.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji
Project Manager - Infrastructure Approvals
Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1
(613) 580 2424 Ext. | Poste 33017
shawn.wessel@ottawa.ca

Please consider the environment before printing this email

From: Cara Ruddle <c.ruddle@novatech-eng.com>
Sent: Tuesday, July 24, 2018 4:18 PM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>
Subject: 180 Metcalfe - swm criteria

Shawn:
I did not see any swm criteria provided in the notes from the pre-consultation meeting with the City as emailed from Kimberley Baldwin on July 17, 2018. My notes from the meeting indicate a runoff coefficient of 0.4 and a time of concentration of 10 minutes. Can you please confirm that this swm criteria is correct for the storm sewers on both Nepean Street and Metcalfe Street.

Thanks.

Cara Ruddle, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 220 | Cell: 613.261.7719 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

Matthew Hrehoriak

To: Cara Ruddle
Subject: RE: 180 Metcalfe - Site Plan - Revised RVCA Comments

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Thursday, December 06, 2018 2:14 PM
To: 'kimberley.baldwin@ottawa.ca' <kimberley.baldwin@ottawa.ca>
Cc: Cara Ruddle <c.ruddle@novatech-eng.com>
Subject: 180 Metcalfe - Site Plan - Revised RVCA Comments

Hi Kimberley,

Following discussions with the Novatech, the RVCA is satisfied that Water Quality controls are not required as the majority of stormwater through rooftop collection and landscaped areas are considered clean for the purposes of water quality measures. The RVCA is requesting that the Site Servicing Report includes discussion that this is the approach used for water quality.

Thank you,

Eric Lalande, MCIP, RPP
Planner | x1137

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

This message may contain information that is privileged or confidential and is intended to be for the use of the individual(s) or entity n
may contain confidential or personal information which may be subject to the provisions of the Municipal *Freedom of Information &* I
you are not the intended recipient of this e-mail, any use, review, revision, retransmission, distribution, dissemination, copying, printin
taking of any action in reliance upon this e-mail, is strictly prohibited. If you have received this e-mail in error, please contact the send
and any copy of the e-mail and any printout thereof, immediately. Your cooperation is appreciated.

PROJECT #: 118103
PROJECT NAME: 180 METCALFE
LOCATION: 180 METCALFE ST

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: AUGUST 2018

TABLE 1A: Allowable Runoff Coefficient "C"

Area	"C"
Total	0.50
0.183	

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{5\ Year}$ (L/s)
Tillbury Ave	0.183	0.50	10	**26.5**

Time of Concentration	Tc=	10	min
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 118103
PROJECT NAME: 180 METCALFE
LOCATION: 180 METCALFE ST

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: AUGUST 2018

TABLE 2A: Post-Development Runoff Coefficient "C" - A-1

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.008	0.90	0.53	0.60
0.017	Soft	0.009	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development A-1 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Metcalfe / Nepean St	0.017	0.53	10	**2.6**	**5.1**

Time of Concentration	Tc=	10	min
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

Equations:
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 118103
PROJECT NAME: 180 METCALFE
LOCATION: 180 METCALFE ST

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: AUGUST 2018

TABLE 3A: Post-Development Runoff Coefficient "C" - A-2

			5 Year Event		100 Year Event	
Area	0.4	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.016	0.90	0.87	1.00	0.97
0.166	Roof	0.144	0.90		1.00	
	Soft	0.006	0.20		0.25	

TABLE 3B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-2

0.169 =Area (ha)
0.87 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	58.02	14.6	43.42	13.03
	10	104.19	42.82	14.6	28.22	16.93
	15	**83.56**	**34.34**	**14.6**	**19.74**	**17.76**
	20	70.25	28.87	14.6	14.27	17.12
	25	60.90	25.03	14.6	10.43	15.64

TABLE 3C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-2

0.166 =Area (ha)
0.97 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	10	178.56	80.17	21.3	58.87	35.32
	15	142.89	64.16	21.3	42.86	38.57
	20	**119.95**	**53.85**	**21.3**	**32.55**	**39.06**
	25	103.85	46.62	21.3	25.32	37.99
	30	91.87	41.25	21.3	19.95	35.90

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 3D: Structure information - A-2

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
STORAGE TANK	N/A	36.70	71.00	N/A	69.22

TABLE 3E: Storage Provided - A-2

Area A-1: Storage Table			
Elevation (m)	System Depth (m)	TANK Volume (m^3)	Underground Volume (m^3)*
69.220	0.00	0.00	0.00
69.320	0.10	3.67	3.67
69.420	0.20	7.34	7.34
69.520	0.30	11.01	11.01
69.620	0.40	14.68	14.68
69.720	0.50	18.35	18.35
69.820	0.60	22.02	22.02
69.920	0.70	25.69	25.69
70.020	0.80	29.36	29.36
70.120	0.90	33.03	33.03
70.220	1.00	36.70	36.70
70.320	1.10	40.37	40.37

TABLE 3F: Orfice Sizing information Area - A-2 Structure - TANK CB

Control Device							
Plug Type ICD			101 mm				
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Required Volume (m^3)**	**Area (m^2)**	**Dia. (mm)**
1:5 Year	14.6	0.44	69.71	250.00	17.76	0.008	101.0
1:100 Year	21.3	0.94	70.28	250.00	39.06	0.008	101.0

*NOTE: Design head taken from the center of the outlet pipe

Orifice Control Sizing
Q = 0.62 x A x ((2gh)^ 0.5)
Where:

Q = release rate in m^3/s
A = orifice area (sqm)
g = acceleration due to gravity, 9.81 m/s^2
h = head of water above the pipe invert (m)


Stage Storage Curve Area A-2
70.30
70.20
70.10
70.00
69.90
69.80
69.70
69.60
69.50
69.40
69.30
69.20
Elevation (m)
0
5
10
15
20
25
30
35
40
Storage (m³)

Table 8: Post-Development Stormwater Mangement Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	Oulet Location	Orifice	5 Year Storm Event				100 Year Storm Event			
					Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
A-1	0.017	0.53	Nepean St	N/A	2.6	N/A	N/A	N/A	5.1	N/A	N/A	N/A
A-2	0.166	0.87	Nepean St	101mm Plate	14.6	0.44	17.76	40.37	21.3	0.94	39.06	40.37
Total					**17.2**				**26.4**			
Allowable					**26.5**				**26.5**			

PROJECT #: 118103
PROJECT NAME: 180 METCALFE STREET
LOCATION: CITY OF OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: AUGUST 1, 2018

Storm Sewer Design Sheet

LOCATION		AREA (Ha)			FLOW					PROPOSED SEWER							
FROM	TO	TOTAL AREA	R= 0.2	R= 0.9	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	* PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
TANK	EX SEWER	0.166	0.006	0.160	0.40	0.40	10.00	104.19	42.06	250.0	1.00	10.0	59.53	1.21	0.14	17.47	0.71

***Note: Storm sewer design sheet flows are peak uncontrolled flows. Flows will be attenuated with ICD's**

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 5 YEAR Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.76 m/sec.
3) 5 Year intensity = $998.071 / (time + 6.053)^{0.814}$
10 Year intensity = $1174.184 / (time + 6.014)^{0.816}$
100 Year intensity = $1735.688 / (time + 6.014)^{0.820}$

APPENDIX D
Development Servicing Study Checklist

180 METCALFE STREET, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	Addressed (Y/N/NA)	Comments
Executive Summary (for larger reports only).	N/A	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Refer to Report Figures
Plan showing the site and location of all existing services.	Y	Refer to Grading and Servicing Plans
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.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	
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.	N/A	
Statement of objectives and servicing criteria.	Y	Report Sections: 5.0 Water Servicing , 6.0 Sanitary Servicing, 7.0 Storm Servicing
Identification of existing and proposed infrastructure available in the immediate area.	Y	
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).	N/A	
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 neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Refer to Grading Plan and Figure's A5 and A6 - Pre and Post Development Drainage Area Plan.

180 METCALFE STREET, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	**Addressed (Y/N/NA)**	**Comments**
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.	Y	Report Section 4.0 Site Constraints
All preliminary and formal site plan submissions should have the following information:		
Metric scale	Y	
North arrow (including construction	Y	
Key plan	Y	
Name and contact information of applicant and property owner	Y	
Property limits including bearings and dimensions	Y	
Existing and proposed structures and parking areas	Y	
Easements, road widening and rights-of-	Y	
Adjacent street names	Y	

4.2 Water	**Addressed (Y/N/NA)**	**Comments**
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Report Sections: 5.0 Water Servicing , 6.0 Sanitary Servicing, 7.0 Storm Servicing
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to Appendix 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.	Y	Refer to Appendix A
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.	Y	Refer to Appendix 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.	Y	Refer to Appendix 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.	Y	Report Section 5.0 Water Servicing
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.	Y	Report Section 5.0 Water Servicing
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.	Y	Report Section 5.0 Water Servicing
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

4.3 Wastewater	Addressed (Y/N/NA)	**Comments**
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	Y	Report Section 6.0 Sanitary Servicing
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.	Y	Report Section 6.0 Sanitary Servicing
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)	y	Refer to Appendix B
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.	Y	Report Section 6.0 Sanitary Servicing
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 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report Sections 7.0 Storm Servicing and 8.0 Stormwater Management
Analysis of the available capacity in existing public infrastructure.	N/A	The allowable flow requirments was provided by the City of Ottawa.
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	Figure A5 Pre Development Drainage Area Plan Figure A6 Post Development Drainage Area Plan
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.	Y	Report Section 8.0 Stormwater Management
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	Report Section 8.0 Stormwater Management
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	Report Section 8.0 Stormwater Management
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 calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	Refer to Appendix C
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A	
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.	Y	Refer to Appendix C
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM	N/A	
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.	N/A	

4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Identification of potential impacts to receiving watercourses.	N/A	
Identification of municipal drains and related approval requirements.	N/A	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	Report Section 8.0 Stormwater Management
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	Refer to Figure A6 Post Development Drainage Area Plan
Inclusion of hydraulic analysis including HGL elevations.	N/A	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report Section 9.0 Erosion and Sediment Control
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 constrains related to floodplain and geotechnical investigation.	N/A	

4.5 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Comments**
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.	Y	Report Section 8.5 Quality Control
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	**Addressed (Y/N/NA)**	**Comments**
Clearly stated conclusions and recommendations.	Y	Report Section 10.0 Conclusions and Recommendations
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.	N/A	T.B.D.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

APPENDIX E
Drawings