PROPOSED FOUR-STOREY MIXED-USE BUILDING DEVELOPMENT SITE

PART OF LOTS 203 AND 204

R-PLAN 14

360 BOOTH STREET

CITY OF OTTAWA

SERVICEABILITY REPORT

REPORT R-818-43A

T.L. MAK ENGINEERING CONSULTANTS LTD.

AUGUST 2018

FILE REFERENCE NUMBER 818-43

Introduction

The developer of this property is proposing to redevelop two existing residential lots described as Part of Lots 203 and 204 R-Plan 14 by constructing a four-storey mixed-use building consisting of ground-level commercial use and 18 one(1)-bedroom apartments on levels 2 to 4.

The municipal address of this property is referenced as 360 Booth Street. The site is located on the west side of Booth Street, south of Poplar Street, and north of Willow Street.

The area of this property is ±0.07 hectares. In addition to the four-storey mixed-use building, the other development features will comprise one level of underground parking, an interlock paver access to the front entrance of the building, an elevator in the building, bicycle parking racks at the front of the building, landscaped areas throughout the site, etc., to meet the City of Ottawa's site plan requirements.

This report will provide the City of Ottawa with our serviceability brief to address the proposed servicing scheme for this site.

Existing Site Conditions and Servicing

This property is occupied by two(2) residential buildings, both of which are two(2)-storey brick- and metal-sided dwellings, with a shed located at the rear of the property. An asphalt driveway and parking area are found on both of these lots.

The front or east half of the site is mostly hard impermeable surfaces that are covered with roof areas, asphalt laneway walkway, and parking. The remainder of the lot is generally grass or landscape areas.

The topography of the land is found to be generally sloping from rear to front or west to east.

As for the availability of underground services, there are existing municipal services along Booth Street in front of this property consisting of a 300mm diameter combined sewer and a 400mm diameter water-main.

Proposed Residential Apartment Building Site

One vehicle entrance that is to be located at the northeast corner of the property is proposed to provide vehicle access along the north property limit to direct vehicular traffic to and from the underground parking area that is located in level P1.

A. Water Supply

   Based on previous discussions with the owner and his architect, a sprinkler system will be installed in the building. The building is proposed to be serviced via a 100mm

diameter PVC CL-150 DR-18 water-service pipe that is sized to minimize head losses to the building from the City of Ottawa main.

The following boundary conditions for 360 Booth Street, which is to be connected to the 400mm diameter water-main along Booth Street were provided by the City of Ottawa on June 28, 2018. The ground elevation at this location is approximately 67.3m.

- Minimum HGL=107.5m
- Maximum HGL=115.0m
- MaxDay (0.27L/s) + Fire flow (183L/s)=108.0m

The City of Ottawa has indicated that for the calculated Fire Underwriter Survey (FUS) fire flow of 183L/s (as detailed in Appendix A), the resulting hydraulic grade-line is 108.0m. This corresponds to a residual pressure of 399kPa (58psi) at this location and is well above the minimum residual pressure requirement of 140kPa (20psi). Please refer to the Supporting Hydraulic Calculations in Appendix A for further details about the determination of the resultant pressures.

During peak hour flow conditions, the resulting minimum hydraulic grade-line of 107.5m corresponds to a peak hour pressure of 394kPa (57psi). This value is above the minimum pressure objective of 276kPa (40psi).

With respect to the maximum pressure check during average-day demands, the resulting maximum hydraulic grade-line of 115.0m corresponds to a pressure of 468kPa (68psi). This value is less than the maximum pressure objective of 552kPa (80psi).

In conclusion, based on the boundary condition provided, the 400mm diameter water-main on Booth Street provides adequate fire-flow capacity as per the Fire Underwriters Survey and provides anticipated demand flows within the pressure objectives during peak demand and basic demand conditions as per the City of Ottawa's Drinking Water Design Guidelines.

B. Sanitary Flow

The peak sanitary flow for the 18 units, which comprise one(1)-bedroom apartment and approximately 400m^2 of commercial space, is estimated at Q=0.47L/s with an infiltration rate of 0.02L/s. This flow will enter the existing 300mm diameter combined sewer on Booth Street via the proposed 150mm diameter PVC sanitary service lateral from the four(4)-storey mixed-use building.

The existing peak sanitary flow of the site for two(2) detached dwelling units is Q=0.13L/s with an infiltration rate of 0.02L/s. The net increase in flow from this proposed development is 0.34L/s.

At the front property line, a waste-water sampling and inspection chamber is proposed as per City of Ottawa detail S18.1.

C. Storm Flow

The storm-water outlet for the proposed development property will be the existing 300mm diameter combined sewer located on Booth Street. Storm-water attenuation on site will be accomplished by means of rooftop storage with controlled roof drains that regulate flow off site.

Four(4) roof drains are proposed for this mixed-use building, to restrict flow at a rate of 0.63L/s each or 4×0.63L/s=2.52L/s into the Booth Street combined sewer. The calculated net allowable controlled release rate from this site is 3.11L/s.

The building foundation weeping-tile drainage system shall have its own separate pipe for gravity flow where weeping-tile water is pumped up from the basement sump pit and is outletted via a 150mm diameter storm pipe to the existing 300mm diameter combined sewer. The storm-water outlet for the rooftop water will be a separately designated proposed 125mm diameter PVC pipe that will wye into the proposed 150mm diameter storm lateral from the building, and that will outlet to the existing 300mm diameter combined sewer.

Based on the residential site plan from the owner's architect, the average post-development runoff coefficient is estimated at C=0.87 and A=0.07 hectares.

An estimation of the pre-development flow condition was carried out using the criteria accepted by the City of Ottawa.

The pre-development flow rate into a combined sewer for this residential area is the two(2)-year storm event where C_{allow}=0.4 runoff value and t_c=10 minutes, which is typically used by the City of Ottawa. The C_{pre} value that is estimated for this site is 0.53.

Therefore, based on this calculation, on-site retention is required for this proposed development site, because the post-development C value of 0.87 is greater than the C_{allow}=0.4.

The storage volume for the five(5)-year and up to the 100-year event will be stored by means of flat rooftops at the fourth floor and on the rooftop of the underground garage that is located at the rear of the building.

To control the five(5)-year storm-water release rate off site to a net allowable rate of 3.11L/s, a site storage volume of approximately 10.62m^3 minimum is required during the five(5)-year event. For this site, four(4) flat rooftop storage areas will be used for storm-water management attenuation.

During the five-year storm event for the flat rooftop storage, the ponding depth of the rooftop at Roof Areas 1, 3, and 4 is estimated at 110mm at the drain and 0mm at the roof perimeter. At Roof Area 2, the ponding depth at the drain is 120mm and 0mm at the roof perimeter. The rooftop storage available at Roof Area 1 is 3.51m^3, the rooftop storage available at Roof Area 2 is 5.05m^3, the rooftop storage available at Roof Area 3 is 1.51m^3, and the rooftop storage available at Roof Area 4 is 1.61m^3, for a total of 11.68m^3, which is greater than the required volume of 10.62m^3.

To control the 100-year storm-water release rate off site to a net allowable controlled flow rate of 3.11L/s, a site storage volume of approximately 25.66m^3 minimum is required during the 100-year event.

During the 100-year storm event for the flat rooftop storage, the ponding depth of the rooftop at Roof Areas 1, 3, and 4 is estimated at 150mm at the drain and 0mm at the roof perimeter. At Roof Area 2, the ponding depth at the drain is 160mm and 10mm at the roof perimeter. The rooftop storage available at Roof Area 1 is 9.19m^3, the rooftop storage available at Roof Area 2 is 12.05m^3, the rooftop storage available at Roof Area 3 is 3.92m^3, and the rooftop storage available at Roof Area 4 is 4.17m^3, for a total of 29.33m^3, which is greater than the required volume of 25.66m^3.

Therefore, by means of flat building rooftop storage and grading the site to the proposed grades as shown on the Proposed Site Grading and Servicing Plan, and the Proposed Rooftop Storm-water Management Plan, Dwg. 818-43 G-1 and 818-43 SWM-1 respectively, the desirable five(5)-year storm and 100-year storm event detention volumes of 11.68m^3 and 29.33m^3 respectively will be available on site.

The controlled release rate from the rooftops is 2.52L/s [from four(4) controlled roof drains], which is less than the calculated net allowable controlled flow rate of 3.11L/s. Therefore, the

proposed SWM attenuation design by means of rooftop storage is sufficient to meet the City of Ottawa's drainage criteria as detailed in this report.

The building weeping tile drainage will outlet via a proposed 150mm diameter PVC storm lateral. The roof drains will be outletted via a proposed 125mm PVC storm lateral, where it wyes into the 150mm diameter storm lateral that outlets into the existing Booth Street 300mm diameter combined sewer.

Erosion and Sediment Control

The contractor shall implement Best Management Practices to provide for protection of the receiving storm sewer during construction activities. These practices are required to ensure no sediment and/or associated pollutants are released to the receiving watercourse. These practices include installation of a silt fence barrier (as per OPSD 219.110 and associated specifications) along Booth Street and all other areas that sheet drain off site. Maintenance hole sediment barriers are to be AMOCO 4555 non-woven geotextile or approved equivalent.

Refer to Appendix C for the summary of the Development Servicing Study Checklist that is applicable to this development.

PREPARED BY T.L. MAK ENGINEERING CONSULTANTS LTD.

TONY L. MAK, P.ENG

PROPOSED FOUR(4)-STOREY MIXED-USE BUILDING DEVELOPMENT SITE

PART OF LOTS 203 AND 204

R-PLAN 14

360 BOOTH STREET

CITY OF OTTAWA

APPENDIX A

CITY OF OTTAWA

WATER DATA BOUNDARY CONDITIONS

FUS AND SUPPORTING HYDRAULIC CALCULATIONS

From: Buchanan, Richard
To: "TL Mak ";
Subject: 360 Booth Street Water Boundary Request
Date: Thursday, June 28, 2018 10:01:59 AM
Attachments: 360 Booth June 2018.pdf

Good Morning Tony,

The following are boundary conditions, HGL, for hydraulic analysis at 360 Booth (zone 1W) assumed to be connected to the 406mm on Booth (see attached PDF for location).

Minimum HGL = 107.5m

Maximum HGL = 115.0m

MaxDay + FireFlow (183 L/s) = 108.0m

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

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

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: TL Mak <tlmakecl@bellnet.ca>
Sent: Jun 26, 2018 12:50 PM
To: "Buchanan, Richard" <Richard.Buchanan@ottawa.ca>
Subject: 360 Booth Street Water Boundary Request

Hi Richard,

The existing building located at 360 Booth Street is a 2-storey building with a basement. It is proposed to construct a mixed purpose 4 storey building with 18 single bedroom residential units on the second through fourth floor and commercial units on the first floor. The building is proposed to be serviced from the 400mm diameter watermain along Booth Street. The total gross area of the proposed building, excluding the underground parking, is approximately 1,809 m^2.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines where the residential consumption rate of 350 L/cap/d is used to estimate average day demands (AVDY) of the residential units. Maximum day (MXDY) demands were calculated by multiplying AVDY by a factor of 2.5. Peak hourly (PKHR) demands were calculated by multiplying MXDY by a factor of 2.2. Persons per unit (PPU) for each unit were estimated based on the City of Ottawa's Water Design Guidelines. **Table 1** shows the estimated domestic demands of the proposed building.

Similarly, the consumption demand for the commercial units were estimated using 2.5 L/m^2/d (value for shopping centers) for AVDY demands. MXDY demands were calculated by multiplying AVDY by a factor of 1.5, and the PKHR demands were obtained by multiplying MXDY by a factor of 1.8.

Table 1 - Estimated Domestic Demand

Floor	Unit Type	Number of Units	PPU or Total Sq m.	Consumption	BSDY		MXDY		PKHR	
				L/cap/d or L/m^2/d	L/d	L/s	L/d	L/s	L/d	L/s
Ground Floor	Rental	2	396.5 m^2	2.5	991	0.011	1,487	0.02	2,676	0.03
1	1 Bedroom	6	1.4	350	2,940	0.034	7,350	0.09	16,170	0.19

2	1 Bedroom	6	1.4	350	2,940	0.034	7,350	0.09	16,170	0.19
3	1 Bedroom	6	1.4	350	2,940	0.034	7,350	0.09	16,170	0.19
	Total	20			***9,811***	***0.114***	***23,537***	***0.27***	***51,186***	***0.59***

The fire flow required was determined following the Fire Underwriter Survey (FUS) method and is provided in the attached spreadsheet. For the FUS calculations, the building is assumed to be ordinary construction with concrete floors and 1-hour fire rated walls. It is understood that the building will have a sprinkler system that conforms to NFPA13. The resulting FUS fire flow requirement is determined to be 11,000 L/min (183 L/s) for a duration of 2.25 hours.

In summary:
AVDY = 9,811 L/d (0.114 L/s)
MXDY = 23,537 L/d (0.27 L/s)
PKHR = 51,186 L/d (0.59 L/s)
Fire Flow = 11,000 L/min (183 L/s)

The City is requested to provide boundary conditions for the Average Day, Maximum Day, Peak Hour and Fire Flow conditions indicated above.

Thank you for your prompt attention to this matter. Please forward us the boundary conditions as soon as possible.

Tony Mak
T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON K1C 6Z7
Tel: 613 837-5516 | Fax: 613 837-5277
E-mail: tlmakecl@bellnet.ca

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Boundary Condition for 360 Booth
Legend
Pipe Ownership
Private
Public
152mm
203mm
POPLAR ST
406mm
BOOTH ST
102mm
305mm
WILLOW ST
203mm
LEBRETON ST N
N
340
342
344
346
9
13
15
17
18
21
22
349
353
100
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120
124
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390
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84
90

From: TL Mak
To: "Buchanan, Richard";
Subject: RE: 360 Booth Street Water Boundary Request
Date: Wednesday, June 27, 2018 11:43:00 AM

Thanks Richard.

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From: Buchanan, Richard [mailto:Richard.Buchanan@ottawa.ca]
Sent: Wednesday, June 27, 2018 8:28 AM
To: 'TL Mak '
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Sent in the request. Should receive something by tomorrow.

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From: TL Mak
To: Richard Buchanan;
Subject: 360 Booth Street Water Boundary Request
Date: Tuesday, June 26, 2018 12:48:00 PM
Attachments: STANTEC_FUS_FIREFLOW_CALCULATOR_360Booth.pdf

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Stantec

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084
Project Name: 360 Booth
Date: June 22, 2018
Data inputted by: Alexandre Mineault-Guitard, M.A Sc., EIT
Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 1
Building Type/Description/Name: Residential

Notes: The existing residential building is proposed to be converted to a 18 apartments 4-storey residential building, with rentable area on the ground floor.

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	Choose Frame Used for Construction of Unit	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary construction	1	m	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	**Floor Space Area**						
		Type of Housing	Single Family	1	Other (Comm, Ind, Apt etc.)	18	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, Apt etc.)	18				
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement if 50% below grade):			4	4	Storeys	
3	Enter Ground Floor Area of One Unit	Average Floor Area (A) based total floor area of all floors (non-fire resistive construction):			452	1,809	Area in Square Meters (m^2)	
					Square Metres (m2)			
4	Obtain Required Fire Flow without Reductions	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						9,000
5	Apply Factors Affecting Burning	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0 25	Limited combustible	-0.15	N/A	7,650
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0 25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	-2,295
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is not standard or N/A	0	N/A	0
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	0
			Sprinkler not fully supervised or N/A	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	0 to 3 0m	0 25	0.75	m	5,738
			East Side	20.1 to 30.1m	0.1			
			South Side	0 to 3 0m	0 25			
			West Side	10.1 to 20 0m	0.15			
6	Obtain Required Fire Flow, Duration & Volume	*Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:*						11,000
		Total Required Fire Flow (above) in L/s:						183
		Required Duration of Fire Flow (hrs)						2.25
		Required Volume of Fire Flow (m^3)						1,485

Supporting Hydraulic Calculations

Stantec Project #: 163401084
Project Name: 360 Booth Street
Date: June 28, 2018
Data inputted by: Alexandre Mineault-Guitard, M.A.Sc., EIT
Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Boundary Conditions provided by the City

Scenario 1: Peak Hour (Min HGL): 107.5 m; and
Scenario 2: Average Day (Max HGL): 115 m;
Scenario 3: Maximum Day Hour and Fire Flow: 108 m.

Sample Calculations

HGL (m) = hp + hz *(1)*

where: hp = Pressure Head (m); and hz = Elevation Head (m), estimated from topography.

For Scenario 1, we have:

HGL(m) = 107.5 and hz (m) = 67.3.

Rearranging Equation 1, we can calculate the Pressure Head (hp) as follow:

hp (m) = HGL - hz

∴ hp = 107.5 - 67.3 m = 40.2 m.

To convert from Pressure Head (m) to a pressure value (kPa), the following equation can be used:

P (kPa) = (ρ * g * hp) / 1000 *(2)*

where: ρ = density of water = 1000 kg/m^3; and g = gravitational acceleration = 9.81 m/s^2.

Using Equation 2, we can calculate the Pressure Head (hp) as follow:

P (kPa) = (1000 * 9.81 * 40.2) / 1000

∴ P = 394 kPa.

Considering that 1 kPa = 0.145 psi, the pressure under Scenario 1 is equal to:

P = 57 psi.

Applying the same procedures, the pressures under Scenario 2 and Scenario 3 are calculated as follows:
Scenario 2: P = 68 psi; and Scenario 3: P = 58 psi.

To summarize:

Scenario 1: Minimum Pressure under Peak Hour Demand: 394 kPa (57 psi)
Scenario 2: Maximum Pressure under Average Day Demand: 468 kPa (68 psi)
Scenario 3: Minimum Pressure under Maximum Day + Fire Flow Demand: 399 kPa (58 psi)

PROPOSED FOUR(4)-STOREY MIXED-USE BUILDING DEVELOPMENT SITE

PART OF LOTS 203 AND 204

R-PLAN 14

360 BOOTH STREET

CITY OF OTTAWA

APPENDIX B

CITY OF OTTAWA

SANITARY SEWER DESIGN SHEET

SANITARY SEWER DESIGN SHEET

q = average daily per capita flow (350 L/cap. d)
I = unit of peak extraneous flow (0.28 L/ha. s)
M = peaking factor 4 (MAX.)
Q (p) = peak population flow (L/s)
Q (i) = peak extraneous flow (L/s)
Q (d) = peak design flow

RESIDENTIAL
DENSITY:
1 BED = 1.4 ppu

COMMERCIAL
P.F. = 1.5
AVG. FLOW = 50000 L/ha/D

$M = 1 + \frac{14}{4 + \sqrt{P}}$ where P population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

Q(i) = IA (L/s) where A = area in hectares

Q(d) = Q(p) + Q(i) (L/s)

LOCATION			INDIVIDUAL		CUMULATIVE		Peaking factor M	Pop. flow Q(p) (L/s)	Peak extraneous flow Q(i) (L/s)	Peak design flow Q(d) (L/s)	PROPOSED SEWER						
STREET	FROM	TO	Pop.	Area A (hectares)	Pop.	Area A (hectares)					Length (m)	Pipe size (mm)	Type of pipe	Grade %	Capacity (L/s) n =	Full flow velocity (m/s)	Actual velocity at Q(d)
					RESIDENTIAL												
360 BOOTH STREET	SITE	EX. 300Ø COMBINED SEWER	25.2	0.07	25.2	0.07	4	0.41	0.02								
					COMMERCIAL												
					A = 0.04 ha (400 SQ.M.)												
					Qc = 0.0235 L/S X		1.5	0.04									
										0.47							

LICENSED PROFESSIONAL ENGINEER
08/28/18
TONY M. MAK
PROVINCE OF ONTARIO

PROPOSED DEVELOPMENT (FILE# 818-43)

DESIGN	TLM
CHECKED	TLM
DATE	AUGUST 2018

PROJECT 360 BOOTH STREET
PROPOSED FOUR STOREY
MIXED USE BUILDING SITE

SHEET No. 1 of 1

PROPOSED FOUR(4)-STOREY MIXED-USE BUILDING DEVELOPMENT SITE

PART OF LOTS 203 AND 204

R-PLAN 14

360 BOOTH STREET

CITY OF OTTAWA

APPENDIX C

DEVELOPMENT SERVICING STUDY CHECKLIST SUMMARY

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

☐ Executive Summary (for larger reports only).

☒ Date and revision number of the report.

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

☒ Plan showing the site and location of all existing services.

☐ 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.

☐ Summary of Pre-consultation Meetings with City and other approval agencies.

☐ 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.

☒ Statement of objectives and servicing criteria.

☒ Identification of existing and proposed infrastructure available in the immediate area.

☐ 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).

☐ 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.

☐ 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.

☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☐ Confirm consistency with Master Servicing Study, if available

☒ Availability of public infrastructure to service proposed development

☒ Identification of system constraints

☒ Identify boundary conditions

☒ Confirmation of adequate domestic supply and pressure

☒ 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.

☒ 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.

☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☐ Address reliability requirements such as appropriate location of shut-off valves

☒ Check on the necessity of a pressure zone boundary modification.

☒ 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

☒ 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.

☐ 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.

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☒ 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).

☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.

☐ 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.

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

☐ 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)

☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.

☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.

☐ 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).

☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

☐ Analysis of available capacity in existing public infrastructure.

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

☒ 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.

☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

☐ Set-back from private sewage disposal systems.

☐ Watercourse and hazard lands setbacks.

☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

- [x] Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- [ ] Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- [x] 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.
- [ ] Any proposed diversion of drainage catchment areas from one outlet to another.
- [x] Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- [ ] 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.
- [ ] Identification of potential impacts to receiving watercourses
- [ ] Identification of municipal drains and related approval requirements.
- [x] Descriptions of how the conveyance and storage capacity will be achieved for the development.
- [x] 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
- [ ] Inclusion of hydraulic analysis including hydraulic grade line elevations.
- [x] Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- [ ] 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.
- [ ] Identification of fill constraints related to floodplain and geotechnical investigation.

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:

☐ 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.

☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

☐ Changes to Municipal Drains.

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☒ Clearly stated 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.

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario