HIEU GIANG VIETNAMESE BUDDHIST TEMPLE SITE

PROPOSED BUILDING ADDITION AND SITE EXPANSION

3310 LEITRIM ROAD

PART OF LOT 16 CONCESSION 5 (RIDEAU FRONT)

CITY OF OTTAWA

SERVICEABILITY REPORT

REPORT R-816-47A REVISION 1

OCTOBER 2018

T.L. MAK ENGINEERING CONSULTANTS LTD.

APRIL 2018

FILE REFERENCE NUMBER 816-47A

Introduction

Representatives of the Hieu Giang Vietnamese Buddhist Temple are proposing to renovate the existing vacant one(1)-storey building at 3310 Leitrim Road, and to convert it into a place of worship. In addition to the proposed building renovations and site works, the proponent is also proposing to decommission the existing private septic system on site and to extend a 250mm diameter sanitary sewer east approximately 132.0m along Leitrim Road to service the site.

The land under consideration is a vacant residential property that is located on the south side of Leitrim Road and approximately 300.0m east of Bank Street. The lot area totals ±4052.9 square metres. The current site development proposal is primarily located at the north half of the property.

Other development features proposed for this site are a new congregation hall for prayer service, which will be added to the south side of the existing building. Twenty-three(23) new parking spaces and an asphalt access road are proposed to accommodate on-site vehicular traffic.

Existing Site Conditions and Servicing

The property is currently vacant. Approximately 10% of the site is hard-surfaced, and approximately 90% of the site is grass- or vegetation-covered. The terrain of the property is relatively flat with approximately 25% of the site gently sloping to the front (north) and the other 75% of the land sloping gently to the rear (south).

As for the availability of underground municipal services, there is an existing 200mm diameter water-main along Leitrim Road.

There are two(2) existing storm-water drainage outlets for this site. At the front of the lot, the City roadway ditch drains approximately ±1134.5 square metres of the property. At the rear or south of the property is a shallow ditch, which drains approximately ±2918.4 square metres of the lot. A private on-site sewage disposal system (septic tank and bed) is currently servicing the existing one(1)-storey building.

Proposed Site Servicing

The Hieu Giang Vietnamese Buddhist Temple is proposing to remove the existing in-ground septic system and to outlet sewage to the municipal sanitary system.

The existing 300mm diameter Leitrim Road sanitary sewer ends approximately ±155m east of the intersection of Bank Street and Leitrim Road, which is approximately ±132m from the site.

The proponent is proposing to extend the existing sewer system upstream to their site with a new ±132m long 250mm diameter sanitary sewer @0.5%, including two(2) sanitary manholes. Refer to Appendix B for the sanitary sewer design, and the plan and profile drawing (Dwg. 816-47 P-1) for details.

It is proposed that the existing building be serviced by a new 125mm diameter PVC sanitary lateral sloped at 1% minimum that will outlet to the new 250mm diameter sanitary sewer that is proposed to be extended upstream to service this property.

In addition, it is proposed that a new 25mm diameter water service (copper type “K”) be connected to the existing 200mm diameter Leitrim Road water-main to service the Hieu Giang Vietnamese Buddhist Temple.

Underground storm sewers are currently unavailable along this portion of Leitrim Road. The site surface water at the front portion of the lot is outletted to the existing Leitrim Road ditch. Therefore, the weeping-tile water of the existing building will continue to be sump-pumped from the basement sump pits and to be discharged onto the surface of the lot to outlet building weeping-tile water.

The owner’s Architects inform us that the proponent is proposing to enlarge the two(2) existing sump pits and associated pumps in the basement, as part of the building renovation works.

Proposed Institutional Building Addition and Site Expansion

One vehicle entrance, which is currently located at the front of the property approximately in the middle of the lot, will remain to service this site, with a new asphalt access road directing vehicular traffic to the south. Twenty-three(23) new parking spaces are proposed along the east and southeast of the buildings.

A. Water Supply

Based on previous discussions with the owner’s representative and Architects, the building will not be installed with a sprinkler system. The building is proposed to be serviced via a 25mm diameter water-service pipe copper type “K” that is sized to minimize head losses to the building from the city main.

Based on the City’s current boundary conditions provided from an email dated April 10, 2018 for hydraulic analysis (refer to Appendix A), in which the converted institutional building and congregation hall complex is being serviced from a 200mm diameter water-main, the ground elevation at this location is approximately 105.1m and the calculated boundary conditions (HGL) are as follows:

- Minimum HGL=156.2m
- Maximum HGL=158.0m
- MaxDay (0.02L/s) + fire flow (100L/s)=137.4m

The City has indicated that for the calculated Fire Underwriter Survey (FUS) fire flow of 100L/s (see Appendix A), the resulting hydraulic grade-line is 137.4m. This corresponds to a residual pressure of 317kPa (46psi) at this location and is above the minimum residual pressure requirement of 140kPa (20psi).

During peak hour flow conditions, the resulting minimum hydraulic grade-line of 156.2m corresponds to a peak hour pressure of 501kPa (73psi). 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 158.0m corresponds to a pressure of 519kPa (75psi). This value is below the maximum pressure objective of 552kPa (80psi).

In conclusion, based on the boundary condition provided, the 200mm diameter water-main along Leitrim Road provides adequate fire flow capacity as per the Fire Underwriters Survey and provides anticipated demand flows within recommended pressure ranges per the City of Ottawa's Drinking Water Design Guidelines.

B. Sanitary Flow

Peak sanitary flow for this proposed development site is estimated at Q=0.46L/s with an infiltration rate of 0.11L/s. This flow will enter the proposed 250mm diameter Leitrim Road sanitary sewer via the renovated institutional building's 125mm diameter PVC sanitary service lateral sloped at 1% minimum.

The peak sanitary flow estimated for this existing lot which houses a single family residential dwelling unit is Q = 0.17 L/s with an infiltration rate of 0.11 L/s. Therefore, the estimated net increase in peak flow from this proposed development site is 0.29 L/s.

C. Storm Flow

Two(2) drainage ditches serve to outlet this proposed re-development institutional site. At the front of the lot is the Leitrim Road roadway ditch, and at the rear of the property is a shallow ditch that directs flow to the east. The storm-water management for this site is assessed and developed to mitigate the impact to the two(2) identified existing storm-water outlets.

Based on the proposed grades and drainage design as shown on Dwg. 816-47 G-1, the **front portion** of the lot (±848.21m^2) will be directed to outlet into the Leitrim Road ditch. The post-development C is 0.49, and A×C=0.042. The pre-development front portions of the lot out-letting to the Leitrim Road ditch is approximately A=1134.5m^2, and C_{pre}=0.43. Therefore, A×C=0.049. Thus, by grading the site as proposed, the post-development flow up to the 100-year event is estimated to be less than the pre-development flow. Therefore, no SWM is required for site development at the front portion of the lot, which outlets to the Leitrim Road ditch.

Regarding the rear storm-water outlet ditch, the pre-development site area contribution to it is approximately ±2918.4 square metres and C=0.25 for light vegetative areas. The A×C value is 0.073. For post-development, and based on the proposed grades and drainage design as shown on Dwg. 816-47 G-1, the **rear portion** of the lot of approximately ±3204.69 square metres is designed to outlet to the rear lot ditch where C_{avg}=0.41. The A×C value under post-development conditions is 0.132, which is greater than 0.073. Therefore, on-site SWM is required to attenuate the off-site flow from the rear portion of the lot to a net allowable rate of 14.13L/second for storm events up the 100-year event.

A dry SWM pond is proposed to attenuate flow to meet City of Ottawa drainage criteria. An estimated pond storage volume of 42.08m^3 minimum is required for the 100-year event. At an assumed 100-year HWL elevation of 105.44m, the available storage volume is 45.04m^3, which is controlled by a proposed concrete outlet structure at the downstream end of the pond that incorporates a V-notch weir. Refer to Dwg. 816-47 G-1 and the storm drainage report (R816-47) for details.

For the five(5)-year event, at an assumed five(5)-year HWL elevation of 105.37m, the available storage volume is 25.58m^3, which is greater than the minimum required storage volume of 25.14m^3.

Therefore, by grading the site, and by constructing the dry pond and concrete control outlet structure as detailed on the Proposed Grading, Servicing, and Storm-water Management Plan Dwg. 816-47 G-1, the City of Ottawa's drainage criteria of post-development flow equal to or less than pre-development conditions can be met at this site for storms up and including the 100-year event.

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 the perimeter of the site and all other areas that sheet drain off site. Maintenance hole sediment barriers are to be AMOCO 4555 non-woven geotextile or approved equivalent.

PREPARED BY T.L. MAK ENGINEERING CONSULTANTS LTD.

TONY L. MAK, P.ENG

HIEU GIANG VIETNAMESE BUDDHIST TEMPLE SITE

PROPOSED SANITARY SEWER EXTENSION

3310 LEITRIM ROAD

PART OF LOT 16 CONCESSION 5 (RIDEAU FRONT)

CITY OF OTTAWA

APPENDIX A

CITY OF OTTAWA

WATER BOUNDARY CONDITIONS

AND

FUS FIRE FLOW CALCULATIONS

From: Baird, Natasha
To: "TL Mak ";
Subject: RE: 3310 Leitrim Road
Date: Tuesday, April 10, 2018 3:11:06 PM
Attachments: 3310 Leitrim Road.pdf

Hi Tony,

Please find boundary conditions attached.

Thanks,

Natasha

From: TL Mak <tlmakecl@bellnet.ca>
Sent: Friday, March 23, 2018 2:11 PM
To: Baird, Natasha <Natasha.Baird@ottawa.ca>
Subject: 3310 Leitrim Road

Hi Natasha,

The existing residential building located at 3310 Leitrim Road is a 1-storey building with a basement. The existing building will be retrofitted and will be used as a temple (*Hieu Giang Vietnamese Buddhist Temple*). A new congregation hall will also be added to the building. The building is proposed to be serviced from the 203 mm diameter watermain along Leitrim Road.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines. The consumption demand for the temple was estimated as 2.5 L/m2/d (value for shopping centers). For this building, the 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 shows the estimated domestic demands of the proposed building.

Table 1 - Estimated Domestic Demand

Floor	Unit Type	Number of Units	Area (m^2)	BSDY		MXDY		PKHR	
				L/d	L/s	L/d	L/s	L/d	L/s
1	Institutional	1	490.5	1,226	0.014	1,839	0.02	3,331	0.04
	Total	1		***1,226***	***0.014***	***1,839***	***0.02***	***3,331***	***0.04***

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 wood frame construction. It is understood that the building will not have a sprinkler system. The resulting total required fire flow is 6,000 L/min (100 L/s) for a duration of 2.00 hours.

In summary:
AVDY = 1,226 L/d (0.014 L/s)
MXDY = 1,839 L/d (0.02 L/s)
PKHR = 3,331 L/d (0.04 L/s)
Fire Flow = 6,000 L/min (100 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 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 Conditions 3310 Leitrim Road.

Information Provided

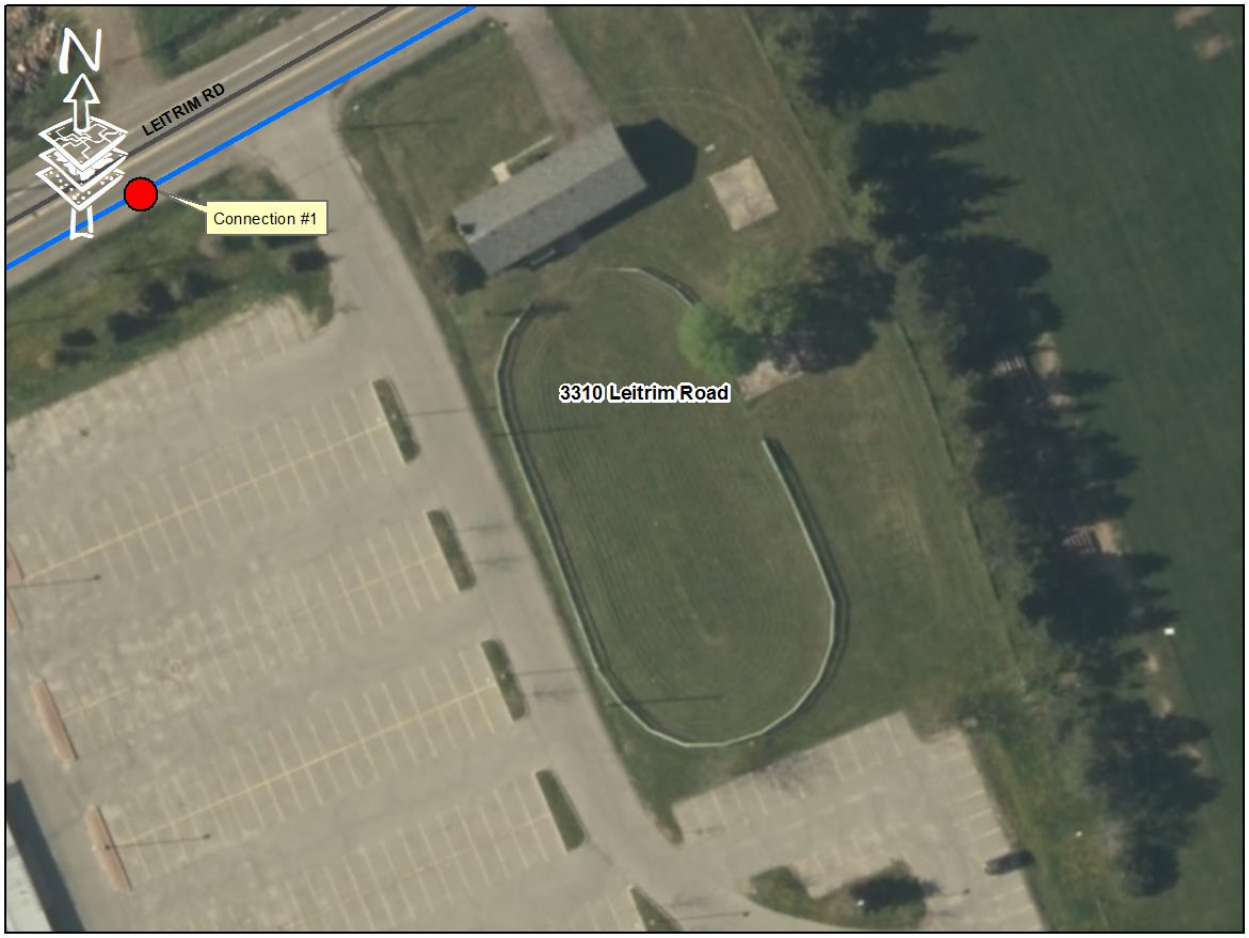
Date provided: 10 April 2018

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	0.84	0.01
Maximum Daily Demand	1.2	0.02
Peak Hour	2.4	0.04
Fire Flow Demand	6000	100.0

# of connections 1

Location



Results

Connection 1 - Leitrim Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	158.0	80.8
Peak Hour	156.2	78.3
Max Day plus Fire (6,000 l/min)	137.4	45.9

[1] Ground Elevation = 105.12 m

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Stantec

FUS Fire Flow Calculation

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

Stantec Project #: 163401084
Project Name: 3110 Leitrim Road
Date: March 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: Institutional (Buddhist Temple)

Notes: The existing residential building is proposed to be converted to a buddhist temple.

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	Wood Frame	1.5	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.)	1	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, Apt etc.)	1				
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement if 50% below grade):			1	1	Storeys	
3	Enter Ground Floor Area of One Unit	Average Floor Area (A) based total floor area of all floors (non-fire resistive construction):			490	490	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						7,000
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	5,950
			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	None	0	N/A	0
			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	45.1m or greater	0	0	m	0
			East Side	45.1m or greater	0			
			South Side	45.1m or greater	0			
			West Side	45.1m or greater	0			
6	Obtain Required Fire Flow, Duration & Volume	*Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:*						6,000
		Total Required Fire Flow (above) in L/s:						100
		Required Duration of Fire Flow (hrs)						2.00
		Required Volume of Fire Flow (m^3)						720

HIEU GIANG VIETNAMESE BUDDHIST TEMPLE SITE

PROPOSED SANITARY SEWER EXTENSION

3310 LEITRIM ROAD

PART OF LOT 16 CONCESSION 5 (RIDEAU FRONT)

CITY OF OTTAWA

APPENDIX B

SANITARY SEWER DESIGN SHEET

PAGE 1 OF 1

SANITARY SEWER DESIGN SHEET

q = average daily per capita flow (___L/cap. d)
I = unit of peak extraneous flow (0.28 L/ha. s)
M = peaking factor = 1.5
Q (p) = peak population flow (L/s)
Q (I) = peak extraneous flow (L/s)
Q (d) = peak design flow

INSTITUTIONAL AVG. FLOW

50,000 L/Gross ha./day

$M = 1 + \frac{14}{4 + \sqrt{P}}$ 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	INSTIT. flow Q(p) (L/s)	Peak extraneous flow Q(I) (L/s)	Peak design flow Q(d) (L/s)	PROPOSED SEWER						
STREET	FROM	TO	INSTIT.	Area A (hectares)	INSTIT.	Area A (hectares)					Length (m)	Pipe size (mm)	Type of pipe	Grade %	Capacity (L/s) n = 0.013	Full flow velocity (m/s)	Actual velocity at Q(d)
LEITRIM ROAD	SAN MH #2A	SAN MH #1A		1.54		1.54	1.5	1.34	0.43	1.77	62.0	250	PVC	0.5	43.4	0.86	
	SAN MH #1A	EX. SAN MH #101		1.0		2.54	1.5	2.21	0.71	2.92	70.0	250	PVC	0.5	43.4	0.86	
	EX. SAN MH #101	EX. SAN MH 102		2.19		4.73	1.5	4.11	1.32	5.43	126.7	300	PVC	0.426	65.4	0.90	

LICENSED PROFESSIONAL ENGINEER
06/05/17
TONY L-M. MAK
PROVINCE OF ONTARIO

DESIGN	TLM
CHECKED	TLM
DATE	JUNE 2017

(REF. FILE # 816-47)

PROJECT: HIEN GIANG VIETNAMESE BUDDHIST TEMPLE – 3310 LEITRIM ROAD
PROP. ± 132.0m – 250Ø SAN SWR EXTENSIONS

SHEET No. 1 of 1 (REV. #1)

Oct. 24/17

HIEU GIANG VIETNAMESE BUDDHIST TEMPLE SITE

PROPOSED SANITARY SEWER EXTENSION

3310 LEITRIM ROAD

PART OF LOT 16 CONCESSION 5 (RIDEAU FRONT)

CITY OF OTTAWA

APPENDIX C

DEVOPMENT 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.

- ☒ 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.
- ☒ 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.
- ☒ 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.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 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.
- ☒ 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