D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

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

SITE SERVICING STUDY & STORMWATER MANAGEMENT REPORT

1353 COKER STREET
OTTAWA, ONTARIO

REPORT NO. 20127

MARCH 7, 2022
REVISED: JUNE 3, 2022

CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

This report describes the servicing and stormwater management requirements for a proposed 1-storey, 310 sq.m. warehouse located at 1353 Coker Street in Ottawa, Ontario. The property is currently occupied by an existing 1-storey building. Refer to Pre-Application Consultation meeting notes in Appendix B.

This report forms part of the servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-4, prepared by D.B. Gray Engineering Inc.

2.0 WATER SERVICE

2.1 WATER SUPPLY FOR FIREFIGHTING

As per OBC A-3.2.5.7. Table 2, the required water supply flow rate for firefighting for the proposed 1-storey 310 sq.m. building is 1,800 L/min. (i.e. a 1-storey building not exceeding 600 sq.m.) which calculated to be a 54,000 L volume for 30-minute water supply. As per City of Ottawa Technical Bulletin ISTB-2021-03 the requirements for levels of fire protection on private property in rural areas is based on the Fire Underwriters Survey (FUS) method. Using the FUS method the required fire flow was calculated to be 5,000 L/min calculated to be a 525,000 L volume for 1.75 hour water supply (as required by Fus). Refer to calculations in Appendix A. In the City of Ottawa buildings less than 600 sq.m. typically do not require an onsite water supply.

2.2 DOMESTIC WATER SUPPLY

The existing drilled well to the west of the existing building will provide the domestic water supply via an underground connection to the plumbing of the existing building. As per the Hydrogeological and Terrain Study, prepared by Paterson Group Inc.: *"The total volume of water pumped during the 8 hour pumping event was approximately 9,120 L. This is approximately three times the maximum total daily design volume of water required to support the development as part of the site plan application (approximately 3,600 L/day)."*

3.0 SANITARY SERVICE

The existing on-site septic system will be decommissioned and a new on-site septic system is proposed to service the existing and proposed buildings (refer to design by Paterson Group Inc.). As per the Hydrogeological and Terrain Study, prepared by Paterson Group Inc.: *"Paterson has completed a replacement sewage system design for the proposed development. A septic flow value of 1,900 L/day was used for the existing building and a septic flow value of 1,700 L/day was calculated for the proposed building addition. This results in a total daily design sewage flow (TDDSF) of 3,600 L/day."*

4.0 STORMWATER MANAGEMENT

4.1 QUALITY CONTROL

James Holland with South Nation Conservation (SNC) has stated:
"There Is a water course on site needs quality protection … need update stormwater - from old site plan - 80% TSS post to pre quantity."

The water course SNC referred to above is not on site; it is on the adjacent property (same owner). Currently the runoff from 730 sq.m. of granular surface drains towards the water course. This will be reduced by approximately 25% to 550 sq.m. which inherently will reduce the sediment draining to the watercourse. No other water quality measures are proposed.

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to drawing C-2 and notes 2.1 to 2.5 on drawing C-3. In summary: A silt fence is to be installed, and any material deposited on the public road is to be removed.

4.2 QUANTITY CONTROL

The stormwater quantity control criterion is to control the post-development 100-year peak flow rates to the pre-development 100-year peak flow rates and the post-development 5-year peak flow rates to the pre-development 5-year peak flow rates. The pre-development topography of the property is such that 36% of the property currently drains north towards the watercourse and 64% of the property currently drains south towards the roadside ditch. Using the Rational Method with a time of concentration of 10 minutes, the pre-development 100-year flow rates were calculated to be 41.76 L/s draining north and 64.96 L/s draining south, and the pre-development 5-year flow rates were calculated to be 20.06 L/s draining north and 33.52 L/s draining south. The overall pre-development flow rates draining off site were calculated to be 106.72 L/s during the 100-year event and 53.58 L/s during the 5-year event. The Rational Method was used calculate the post-development flow rates and the Modified Rational Method was used to calculate the required storage volumes. Refer to calculations in Appendix A.

Drainage Area I (Uncontrolled Flow Rate North – 625 sq.m)
The area to the north of the property will continue to drain uncontrolled north towards the watercourse (albeit reduced in area by 35%). The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event
Maximum Flow Rate	26.50 L/s	12.50 L/s

Drainage Area II (Uncontrolled Flow Rate South – 1,752 sq.m)
The area to the south of the property will continue to drain uncontrolled south towards the roadside ditch. The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event
Maximum Flow Rate	63.48 L/s	32.58 L/s

Drainage Area III (Roof South – 310 sq.m)
The two roof drains are to be flow control type roof drains which will restrict the flow of stormwater and cause it to pond on the roof. Each roof drain is to be installed with one parabolic slotted weir and releasing 0.01242 L/s/mm (5 USgpm/in). The roof drains are to be Watts with an Accutrol Weir RD-100-A1 or approved equal. The opening at the top of the flow control weir is to be a minimum 50 mm in diameter. A minimum of 3 scuppers each a minimum 300 mm wide are to be installed 150 mm above the roof drains. Refer to architectural for exact locations and details. The roof is to be designed to carry the load of water having a 50 mm depth at the scuppers or 200 mm depth at the roof drains (refer to structural).

	100-Year Event	5-Year Event
Maximum Release Rate	2.85 L/s	2.02 L/s
Maximum Depth at Roof Drain	115 mm	81 mm
Maximum Volume Stored	9.15 cu.m	4.11 cu.m

Entire Site:

	100-Year Event	5-Year Event
Pre-Development Flow Rate North	41.76 L/s	20.06 L/s
Pre-Development Flow Rate South	64.96 L/s	33.52 L/s
Overall Pre-Development Flow Rate	106.72 L/s	53.58 L/s
Post-Development Flow Rate North	26.50 L/s	12.50 L/s
Post-Development Flow Rate South	66.33 L/s	34.60 L/s
Overall Post-Development Flow Rate	92.83 L/s	47.10 L/s

The post-development topography of the property will be such that only about 23% of the property drains north towards the watercourse and about 77% of the property drains south towards the roadside ditch. The maximum post-development flow rate draining north during the 100-year event was calculated to be 26.50 L/s, which is 37% less than the pre-development flow rate. The maximum post-development flow rate draining north during the 5-year event was calculated to be 12.50 L/s, which is 38% less than the pre-development flow rate. The maximum post-development flow rate draining south during the 100-year event was calculated to be 66.33 L/s, which is about equal to the pre-development flow rate. The maximum post-development flow rate draining south during the 5-year event was calculated to be 34.60 L/s, which about equal to the pre-development flow rate. The overall maximum post-development flow rate draining off site during the 100-year event was calculated to be 92.83 L/s, which is 13% less than the pre-development flow rate. The overall maximum post-development flow rate draining off site during the 5-year event was calculated to be 47.10 L/s, which is 12% less than the pre-development flow rate. The post-development reduction in flow rates is expected to have a positive impact on the watercourse at the north end of the property and an acceptable impact on the roadside ditch at the south end of the property.

4.3 STORMWATER

The roof drains will drain to grade. The foundation drains will drain to a storm sump and be pumped to grade.

The Ministry Of Environment, Conservation and Parks (MECP) is expected to consider the property "industrial lands", therefore, an Environmental Compliance Approval (ECA) is expected to be required for the proposed stormwater management facility. A response to a Pre-Submission Consultation Request is required, from the Ottawa office of MECP, to confirm.

5.0 CONCLUSIONS

1. As per OBC method the required water supply flow rate for firefighting for the proposed building is 1,800 L/min, which calculated to be a 54,000 L volume for 30-minute water supply. Using the FUS mehod the required fire flow was calculated to be 5,000 L/min and the required water supply was calculated to be 525,000 L. Since the building is less than 600 sq.m. it is expected that an onsite water supply will not be required.

2. The existing drilled well to the west of the existing building will provide the domestic water supply via an underground connection to the plumbing of the existing building.

3. An on-site septic system is proposed to service the development.

4. The runoff from granular surfaces draining towards the water course will be reduced by approximately 25%, which inherently will reduce the sediment draining to the watercourse. No other water quality measures are proposed.

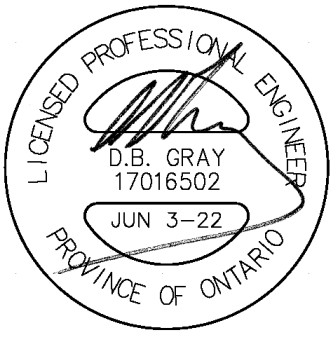
5. An Erosion & Sediment Control Plan has been developed to be implemented during construction.

6. The maximum post-development flow rates during the 100-year event will be 13% less than the pre-development flow rates during the 100-year event.

7. The maximum post-development flow rates during the 5-year event will be 12% less than the pre-development flow rates during the 5-year event.

8. The post-development reduction in stormwater flow rates is expected to have a positive impact on the watercourse at the north end of the property and an acceptable impact on the roadside ditch at the south end of the property.

9. It is expected that an Environmental Compliance Approval (ECA) from the Ministry of the Environment, Conservation and Parks (MECP) will be required.



NOT VALID UNLESS
SIGNED & DATED

APPENDIX A

WATER SERVICING

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

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

May 30, 2022

1353 Coker Street

1-Storey Warehouse

Ottawa, Ontario

FIRE FLOW CALCULATIONS

FUS Method

F = Required fire flow in litres per minutes
= $220CA^{0.5}$

C = Coefficient related to the type of construction
= 0.8 Noncombustible Construction

A = Total floor area in square meters (excluding basements at least 50% below grade)
= 310 sq.m

F = 3,099 L/min
= 3,000 L/min (rounded to nearest 1,000 L/min)

15% Charge for Combustible Occupancy

= 3,450 L/min

Charge	Side	Separation	Construction	Length	Storeys	Length • Height
8%	North	20.1 to 30	Wood Frame	17	1	17
17%	East	3.1 to 10	Noncombustible	8	2	16
22%	South	0 to 3	Noncombustible	13	1	13
0%	West					

47% Total Exposure Charge

= 1,622 L/min Exposure Increase

= 5,072 L/min
= 5,000 L/min (rounded to nearest 1000 L/min)

Required duration of fire flow in hours
= 1.75 h as per Required Duration of Fire Flow table on page 16

Required water supply in litres
= 525,000 L

APPENDIX B

STORMWATER MANAGEMENT

SUMMARY TABLES

ONE HUNDRED YEAR EVENT

Drainage Area	Pre-Development Flow Rate			Post Development Flow Rate			Maximum Volume Required & Stored (cu.m)
	North (L/s)	South (L/s)	Total (L/s)	North (L/s)	South (L/s)	Total (L/s)	
AREA I (Uncontrolled Flow Rate North)	-	-	-	26.50	-	-	-
AREA II (Uncontrolled Flow Rate South)	-	-	-	-	63.48	-	-
AREA III (Roof South)	-	-	-	-	2.85	-	9.15
TOTAL	41.76	64.96	106.72	26.50	66.33	92.83	9.15

FIVE YEAR EVENT

Drainage Area	Pre-Development Flow Rate			Post Development Flow Rate			Maximum Volume Required & Stored (cu.m)
	North (L/s)	South (L/s)	Total (L/s)	North (L/s)	South (L/s)	Total (L/s)	
AREA I (Uncontrolled Flow Rate North)	-	-	-	12.50	-	-	-
AREA II (Uncontrolled Flow Rate South)	-	-	-	-	32.58	-	-
AREA III (Roof South)	-	-	-	-	2.02	-	4.11
TOTAL	20.06	33.52	53.58	12.50	34.60	47.10	4.11

March 7, 2022

1353 Coker Street

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS

Modified Rational Method

ONE HUNDRED YEAR EVENT

PRE-DEVELOPMENT FLOW RATE NORTH

			C
Roof Area:	120	sq.m	1.00
Asphalt/Concrete Area:	75	sq.m	1.00
Gravel Area:	730	sq.m	0.875
Landscaped Area:	30	sq.m	0.25
Total Catchment Area:	955	sq.m	0.88

Bransby Williams Formula

$$Tc = \frac{0.057 \bullet L}{Sw^{0.2} \bullet A^{0.1}} \text{ min}$$

Sheet Flow Distance (L):	50	m
Slope of Land (Sw):	1	%
Area (A):	0.0955	ha
Time of Concentration (Sheet Flow):	4	min
Area (A):	955	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.88	
Flow Rate (2.78AiC):	41.76	L/s

PRE-DEVELOPMENT FLOW RATE SOUTH

			C
Roof Area:	505	sq.m	1.00
Asphalt/Concrete Area:	600	sq.m	1.00
Gravel Area:	75	sq.m	0.875
Landscaped Area:	552	sq.m	0.25
Total Catchment Area:	1,732	sq.m	0.76

Bransby Williams Formula

$$Tc = \frac{0.057 \bullet L}{Sw^{0.2} \bullet A^{0.1}} \text{ min}$$

Sheet Flow Distance (L):	35	m
Slope of Land (Sw):	0.5	%
Area (A):	0.1732	ha
Time of Concentration (Sheet Flow):	3	min
Area (A):	1,732	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.76	
Flow Rate (2.78AiC):	64.96	L/s

DRAINAGE AREA I (Uncontrolled Flow Rate North)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	45	sq.m	1.00
Gravel Area:	550	sq.m	0.875
Landscaped Area:	30	sq.m	0.25
Total Catchment Area:	625	sq.m	0.85
Area (A):	625	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.85		
Flow Rate (2.78AiC):	26.50	L/s	

DRAINAGE AREA II (Uncontrolled Flow Rate South)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	387	sq.m	1.00
Asphalt/Concrete Area:	630	sq.m	1.00
Gravel Area:	125	sq.m	0.875
Landscaped Area:	610	sq.m	0.25
Total Catchment Area:	1,752	sq.m	0.73
Area (A):	1,752	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.73		
Flow Rate (2.78AiC):	63.48	L/s	

DRAINAGE AREA III (Roof South)

(ONE HUNDRED YEAR EVENT)

			C
Total Catchment Area:	310	sq.m	1.00

No. of Roof Drains: 2
Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 115 mm

Maximum Release Rate: 2.85 L/s Pond Area: 188 sq.m

Maximum Volume Stored: 9.15 cu.m

Maximum Volume Required: 9.15 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
5	243	20.92	2.85	18.06	5.42
10	179	15.39	2.85	12.54	7.52
15	143	12.31	2.85	9.46	8.52
20	120	10.34	2.85	7.49	8.98
25	104	8.95	2.85	6.10	9.15
30	92	7.92	2.85	5.07	9.12
35	83	7.12	2.85	4.26	8.96
40	75	6.48	2.85	3.62	8.70
45	69	5.95	2.85	3.10	8.37
50	64	5.51	2.85	2.66	7.98
55	60	5.14	2.85	2.29	7.55
60	56	4.82	2.85	1.97	7.07
65	53	4.54	2.85	1.69	6.57
70	50	4.29	2.85	1.44	6.04
75	47	4.07	2.85	1.22	5.49
80	45	3.88	2.85	1.03	4.92
85	43	3.70	2.85	0.85	4.33
90	41	3.54	2.85	0.69	3.73
95	39	3.40	2.85	0.55	3.12
100	38	3.27	2.85	0.41	2.49
105	36	3.15	2.85	0.29	1.85
110	35	3.03	2.85	0.18	1.20
115	34	2.93	2.85	0.08	0.54
120	33	2.83	2.83	0.00	0.00

FIVE YEAR EVENT

PRE-DEVELOPMENT FLOW RATE NORTH

			C
Roof Area:	120	sq.m	0.90
Asphalt/Concrete Area:	75	sq.m	0.90
Gravel Area:	730	sq.m	0.70
Landscaped Area:	30	sq.m	0.20
Total Catchment Area:	955	sq.m	0.73
Area (A):	955	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.73		
Flow Rate (2.78AiC):	20.06	L/s	

PRE-DEVELOPMENT FLOW RATE SOUTH

			C
Roof Area:	505	sq.m	0.90
Asphalt/Concrete Area:	600	sq.m	0.90
Gravel Area:	75	sq.m	0.70
Landscaped Area:	552	sq.m	0.20
Total Catchment Area:	1,732	sq.m	0.67
Area (A):	1,732	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.67		
Flow Rate (2.78AiC):	33.52	L/s	

DRAINAGE AREA I (Uncontrolled Flow Rate North)

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	45	sq.m	0.90
Gravel Area:	550	sq.m	0.70
Landscaped Area:	30	sq.m	0.20
Total Catchment Area:	625	sq.m	0.69
Area (A):	625	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.69		
Flow Rate (2.78AiC):	12.50	L/s	

DRAINAGE AREA II (Uncontrolled Flow Rate South)

(FIVE YEAR EVENT)

			C
Roof Area:	387	sq.m	0.90
Asphalt/Concrete Area:	630	sq.m	0.90
Gravel Area:	125	sq.m	0.70
Landscaped Area:	610	sq.m	0.20
Total Catchment Area:	1,752	sq.m	0.64
Area (A):	1,752	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.64		
Flow Rate (2.78AiC):	32.58	L/s	

DRAINAGE AREA III (Roof South)

(FIVE YEAR EVENT)

			C
Total Catchment Area:	310	sq.m	0.90

No. of Roof Drains: 2
Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 81 mm

Maximum Release Rate: 2.02 L/s Pond Area: 115 sq.m

Maximum Volume Stored: 4.11 cu.m

Maximum Volume Required: 4.11 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
5	141	10.95	2.02	8.93	2.68
10	104	8.08	2.02	6.06	3.64
15	84	6.48	2.02	4.46	4.01
20	70	5.45	2.02	3.43	4.11
25	61	4.72	2.02	2.70	4.05
30	54	4.18	2.02	2.16	3.89
35	49	3.76	2.02	1.74	3.66
40	44	3.43	2.02	1.41	3.37
45	41	3.15	2.02	1.13	3.05
50	38	2.92	2.02	0.90	2.70
55	35	2.72	2.02	0.70	2.32
60	33	2.56	2.02	0.53	1.92
65	31	2.41	2.02	0.39	1.51
70	29	2.28	2.02	0.26	1.08
75	28	2.16	2.02	0.14	0.64
80	27	2.06	2.02	0.04	0.19
85	25	1.97	1.97	0.00	0.00
90	24	1.88	1.88	0.00	0.00
95	23	1.81	1.81	0.00	0.00
100	22	1.74	1.74	0.00	0.00
105	22	1.67	1.67	0.00	0.00
110	21	1.62	1.62	0.00	0.00
115	20	1.56	1.56	0.00	0.00
120	19	1.51	1.51	0.00	0.00

APPENDIX C

PRE-CONSULTATION MEETING NOTES & CITY OF OTTAWA SERVICING STUDY CHECKLIST

Pre-Consult 1353 and 1359 Cooker Street

South Nation Conservation – James Holland

- There Is a water course on site
- needs quality protection
- permit previously issued for enclosing watercourse only a section 30 ft long with a 20 inch dia pipe.
- review/require DFO
- need update stormwater - from old site plan - 80% TSS post to pre quantity.
- Watercourses are likely low-flow, intermittent watercourses that likely are indirect fish habitat. Year-round use is unlikely due to flow and heavy vegetation.
- SNC recommends that DFO is consulted via a Request for Review when a project has the potential to cause a Harmful Alteration, Disruption, or Destruction (HADD) to fish and/or fish habitat. However, if a project can be completed following all of DFO's fish protection measures, a Request for Review is not needed. In this case, I think a piping/culverts of this watercourse can be done without a RFR provided all of the fish protection measures are followed.

Engineering (Reza Bakhit)

- need new Stormwater Managament – demonstrate post to pre
- comply with the Shields Creek Subwatershed Study
- site servicing report required
- erosion and sediment
- geotech
- hydrogeological assessment and terrain analysis report required to demonstrate private servicing (well and septic)
- ECA required from MECP

Other (C McWilliams)

- Fire services may require addition on site suppression
- landscape plan needed, so also incclde a tree conservation report.
- verify permitting for buildings on site – appears to be more than had been permitted between the 3 parcels
- demonstrate zoning compliance

Transportation (Mike Giampa)

- Submit a screening form. If a TIA is warranted proceed to scoping.

The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended.

- A Noise Impact Study is not required
- On site plan:

Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
Show existing and proposed access widths.

CITY OF OTTAWA SERVICING STUDY CHECKLIST

GENERAL

Executive Summary: **N/A**

Date and revision number of report: **Included**

Location map and plan showing municipal address, boundary and layout of proposed development: **Included**

Plan showing site and location of all existing services: **Included**

Development statistics, land use, density, adherence to zoning and Official Plan and reference to applicable watershed and subwatershed plans: **N/A**

Summary of Pre-Application Consultation meetings with City of Ottawa and other approval agencies: **Included**

Confirmation of conformance with higher level studies: **N/A**

Statement of objectives and servicing criteria: **Included**

Identification of existing and proposed infrastructure available in the immediate area: **Included**

Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development: **Included**

Concept level master grading plan to confirm existing and proposed grades in the proposed development: **Included**

Identification of potential impacts of proposed piped services on private services on adjacent lands: **N/A**

Proposed phasing of proposed development: **N/A**

Reference to geotechnical studies: **Included**

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

- Metric scale: **Included**
- North arrow: **Included**
- Key plan: **Included**
- Name and contact information of applicant and property owner: **N/A**
- Property limits: **Included**
- Existing and proposed structures and parking areas: **Included**
- Easements, road widenings and right-of-ways: **Included**
- Street names: **Included**

WATER SERVICING

Confirmation of conformance with Master Servicing Study: **N/A**

Availability of public infrastructure to service proposed development: **N/A**

Identification of system constraints: **N/A**

Identification of boundary conditions: **N/A**

Confirmation of adequate domestic supply: **N/A**

Confirmation of adequate fire flow: **TBD**

Check of high pressures: **N/A**

Definition of phasing constraints: **N/A**

Address reliability requirements: **N/A**

Check on 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 proposed development: **N/A**

Description of proposed water distribution network: **N/A**

Description of required off-site infrastructure to service proposed development: **N/A**

Confirmation that water demands are calculated based on the City of Ottawa Water Design Guidelines: **N/A**

Provision of a model schematic showing the boundary conditions locations, streets, parcels and building locations: **N/A**

SANITARY SERVICING

Summary of proposed design criteria: **Included**

Confirmation of conformance with Master Servicing Study: **N/A**

Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the City of Ottawa Sewer Design Guidelines: **N/A**

Description of existing sanitary sewer available for discharge of wastewater from proposed development: **N/A**

Verification of available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service proposed development: **N/A**

Calculations related to dry-weather and wet-weather flow rates: **N/A**

Description of proposed sewer network: **Included**

Discussion of previously identified environmental constraints and impact on servicing: **N/A**

Impacts of proposed development on existing pumping stations or requirements for new pumping station: **N/A**

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: **N/A**

Identification and implementation of emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: **N/A**

Special considerations (e.g. contamination, corrosive environment): **N/A**

STORMWATER MANAGEMENT & STORM SERVICING

Description of drainage outlets and downstream constraints: **Included**

Analysis of available capacity in existing public infrastructure: **N/A**

Plan showing subject lands, its surroundings, receiving watercourse, existing drainage pattern and proposed drainage pattern: **Included**

Water quantity control objective: **Included**

Water quality control objective: **Included**

Description of the stormwater management concept: **Included**

Setback from private sewage disposal systems: **N/A**

Watercourse and hazard lands setbacks: **N/A**

Record of pre-consultation with the Ministry of the Environment, Conservation and Parks and the Conservation Authority having jurisdiction on the affected watershed: **Included**

Confirmation of conformance with Master Servicing Study: **N/A**

Storage requirements and conveyance capacity for minor events (5-year return period) and major events (100-year return period): **Included**

Identification of watercourses within the proposed development and how watercourses will be protected or if necessary altered by the proposed development: **Included**
Calculation of pre-development and post-development peak flow rates: **Included**

Any proposed diversion of drainage catchment areas from one outlet to another: **N/A**

Proposed minor and major systems: **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**

Identification of potential impacts to receiving watercourses: **Included**

Identification of municipal drains: **N/A**

Description of how the conveyance and storage capacity will be achieved for the proposed development: **Included**

100-year flood levels and major flow routing: **Included**

Inclusion of hydraulic analysis including hydraulic grade line elevations: **N/A**

Description of erosion and sediment control during construction: **Included**

Obtain relevant floodplain information from Conservation Authority: **N/A**

Identification of fill constraints related to floodplain and geotechnical investigation: **N/A**

APPROVAL AND PERMIT REQUIREMENTS

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: **N/A**

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act: **N/A**

Changes to Municipal Drains: **N/A**

Other permits (e.g. National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation): **N/A**

CONCLUSIONS

Clearly stated conclusions and recommendations: **Included**

Comments received from review agencies: **N/A**

Signed and stamped by a professional Engineer registered in Ontario: **Included**