320 McRae Avenue

Site Servicing & Stormwater Management Report

SITE PLAN SUBMISSION

GWL Realty Advisors

RVA 194453

March 20, 2020

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1.0 INTRODUCTION

R.V. Anderson Associates Limited has been retained by GWL Realty Advisors to provide the site servicing design and stormwater management for the proposed residential and commercial complex at 320 McRae Avenue and 1976 Scott Street. This report will outline the proposed stormwater management measures and site services that will be implemented with the site to be in compliance with the City of Ottawa requirements.

1.1 Site Description

The site is located at 320 McRae Avenue in the City of Ottawa. It is currently occupied by a one-storey commercial building facing McRae Avenue and two single family homes on Tweedsmuir Avenue as shown in Figure 1.

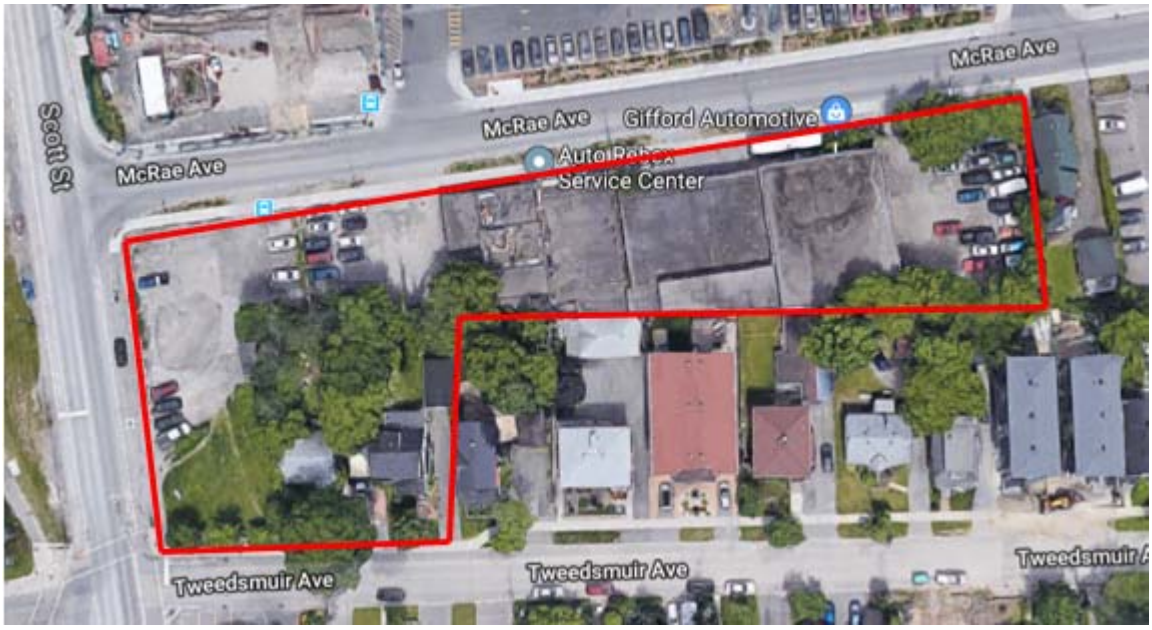


Figure 1: Project Location

The proposed development of the site includes a mixed-use building with underground parking and a park as shown in Figure 2. Refer to the architectural plans for the building layout.

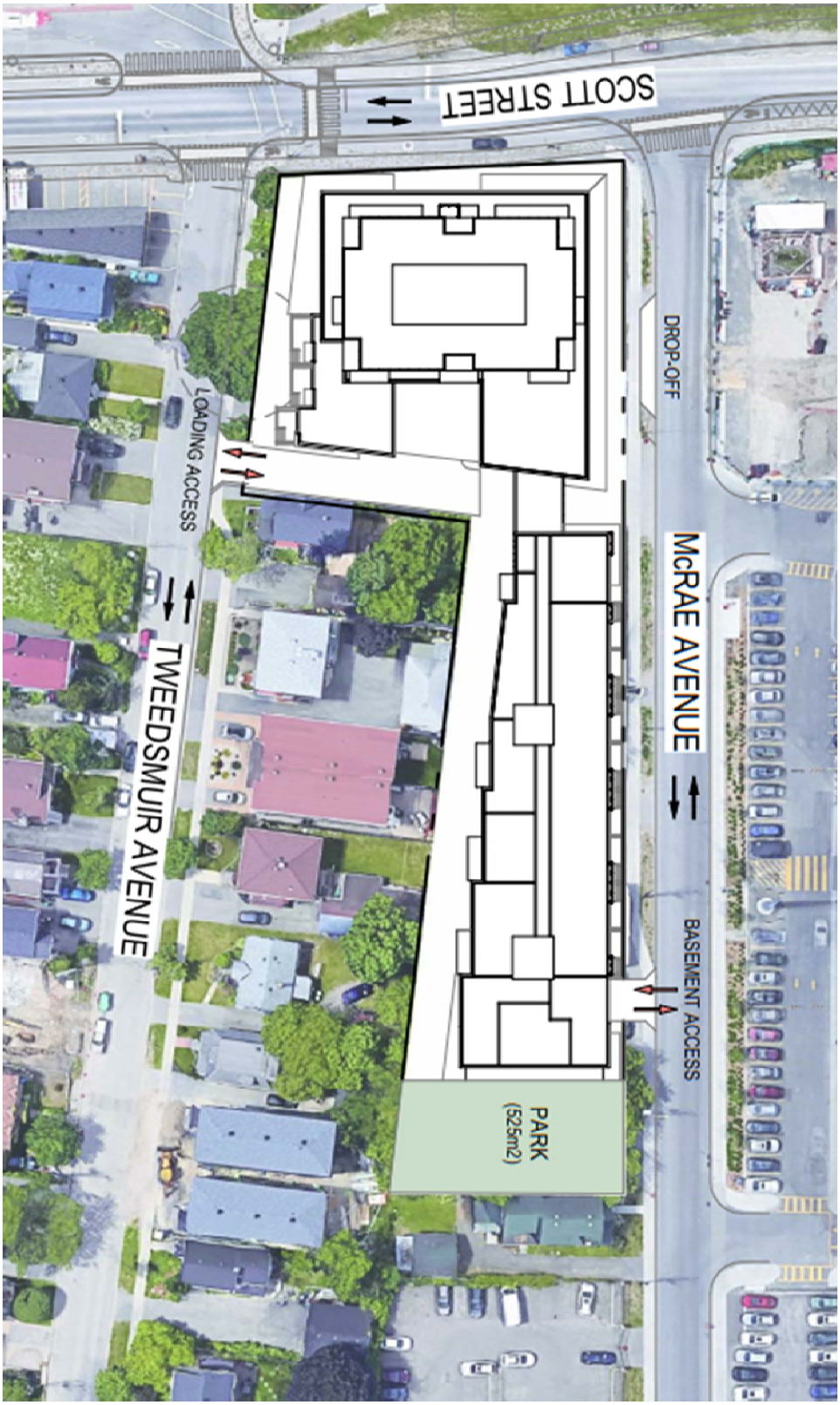


Figure 2: Proposed Development

2.0 STORMWATER MANAGEMENT

2.1 Design Criteria

The following design criteria are proposed as a result of correspondence with the City of Ottawa. The correspondence can be found in Appendix B:

Peak Flow - Control post-development flows from a 100-yr storm to a 5-year storm with a runoff coefficient (C) of 0.5.

Calculated Method - Modified Rational Method using spreadsheet.

Storage Method - Underground storage.

Proposed Drainage - The proposed site storm lateral will discharge to the existing storm sewer on Tweedsmuir Avenue.

Coefficients of Runoff -

	5 Year	**100 Year**
Roof:	C=0.95	C=1.00
Hard Landscape:	C=0.90	C=1.00
Grass:	C=0.20	C=0.25

Rainfall Intensities - City of Ottawa IDF rainfall curve for 100-year storms to generate the intensity formula as follows (See Appendix B for IDF curves):

$$i_{5yr} = \frac{998.071}{(T + 6.053)^{0.814}} \quad \text{– equation (2)}$$

$$i_{100yr} = \frac{1735.688}{(T + 6.014)^{0.820}} \quad \text{– equation (3)}$$

where:
i – Rainfall intensity (mm/hr)
T – Time (min)

2.2 Proposed Approach

To accommodate the volumes calculated below, storage will be provided in a storage tank with the building.

For the purposes of this report, we have used a modified rational method approach. This method was selected considering the relatively small size of individual drainage areas for the site.

This approach involves using the City of Ottawa IDF charts and equations described above to determine the storage required. For each five-minute interval, an associated flow is calculated using the rational method:

$$Q = \frac{CIA}{3600}$$

where:

Q = Flow (L/s)
C = Runoff Coefficient
I = Rainfall Intensity (mm/hr)
A = Area (m^2)

The flow contributing to storage on-site is the post-development flow minus the allowable discharge rate. The quantity of storage required is calculated by multiplying the flow contributing to storage by the five-minute time interval. The accumulated storage is summed for each five-minute time interval to determine the peak storage required.

2.2.1 Water Quality Requirements

The proposed site development does not include surface parking and the majority of stormwater falling on the site is rooftop and landscaped areas. Roofs and landscaped areas are generally deemed as clean for the purpose of protecting surface water quality and aquatic habitat. The Rideau Valley Conservation Authority (RVCA) has confirmed that stormwater runoff from the site does not require additional quality control measures save and except best management practices. Refer to the attached correspondence with RVCA included in Appendix B.

2.3 Design Calculations

2.3.1 Proposed Site

Drawing C-01 (Appendix A) shows the proposed building and site layout. The total area of the site is 5263 m^2. The proposed site development consists of a mixed-use residential/commercial building with a site area of 4743 m^2 and a park with an area of 520 m^2. The building site and the park will be serviced separately as the park is intended to be developed by the City at a later date. Stormwater management for the park is not considered in this report as it will be designed by others at a later date, however temporary grading is provided to ensure a positive drainage to the street until the park is designed / developed.

2.3.2 Adjacent Site Drainage

In addition to the proposed site, a portion of the adjacent properties on Tweedsmuir Avenue currently drain across the subject site. To maintain the drainage for these properties, a roof drain has been provided at the low point within property #315 Tweedsmuir. The flow from the adjacent properties will be conveyed to the interior storage tank. The allowable discharge will be increased by the 5 year discharge for the contributing area under the existing runoff coefficient for the area. Additional storage in the tank will be allotted for the flow from this area from a storm with a return period between 5 and 100 years.

2.3.3 Site Characteristics

The proposed building site consists of roof and hard landscape areas, with the corresponding City of Ottawa standard runoff coefficients shown in Table 1. The adjacent site runoff characteristics are shown on Table 2.

Table 1: Surface Drainage Areas

Surface Type	Surface Area (m^2)	Runoff Coefficient (5-year)	Runoff Coefficient (100-year)
Hard Landscape	1456	0.90	1.00
Roof	2951	0.95	1.00
Soft Landscape	336	0.20	0.25
Total Surface Area (m^2)	**4743**	**0.88**	**0.95**

Table 2: Adjacent Site Surface Drainage Areas

Surface Type	Surface Area (m^2)	Runoff Coefficient (5-year)	Runoff Coefficient (100-year)
Hard Landscape	106	0.90	1.00
Roof	106	0.95	1.00
Soft Landscape	267	0.20	0.25
Total Surface Area (m^2)	**479**	**0.52**	**0.58**

2.3.4 Allowable Discharge

The allowable peak discharge rate for the building site is equal to the 5-year peak development flow controlled at a time of concentration of 20 minutes and a maximum

runoff coefficient of 0.5. Based on this time of concentration, the 5-year rainfall intensity can be calculated as follows:

$$i_{5yr} = \frac{998.071}{(T + 6.053)^{0.814}}$$

$$i_{5yr} = 70.25 \text{ mm/hr}$$

The allowable runoff for the site can then be calculated as follows:

$$Q_{ALLSITE} = \frac{0.5 \text{ x } 70.25\text{mm/hr x } 4743\text{m}^2}{3600}$$

$$Q_{ALLSITE} = 46.3\text{L/s}$$

In addition, the 5 year flow from the adjacent site is added to this amount and is calculated as follows.

$$Q_{ADJ} = \frac{0.52 \text{ x } 70.25\text{mm/hr x } 479\text{m}^2}{3600}$$

$$Q_{ADJ} = 4.9\text{L/s}$$

Thus the total allowable flow is calculated as $Q_{ALLSITE}$ + Q_{ADJ} = 46.3L/s + 4.9L/s = 51.2L/s

This is the total allowable flow from the site, given the requirements of the site.

2.3.5 Storage Requirements

As outlined above, in order to control the total flow from the site to the allowable flow rate of 51.2 L/s, underground storage will be used.

The total surface area of the building site and adjacent properties described above is 4743m^2 + 479m^2, consisting of grassed area/soft landscaping area (336m^2 + 106m^2), hard landscaping/paved surface area (1456m^2 + 267m^2), and roof area (2951m^2 + 106m^2).

Of this surface area, the section between the building and the back of the sidewalk around the building will generally sheet drain freely onto the surrounding streets. This area is 1003m^2, consisting of soft surface (107 m^2) and the remainder hard surface (896 m^2). Flow from this area is as follows:

$$C_{free-100year} = \frac{[1.0(896) + 0.25(107) + 1.0(0)]}{1003} = 0.92$$

$$Q_{free} = \frac{0.92 \text{ x } 120.0 mm/hr \text{ x } 1003 m^2}{3600}$$

$$Q_{free} = 30.8 \text{ L/s}$$

The allowable stormwater flow for the remaining controlled surface and roof areas can be calculated by subtracting the proposed free flowing surface from the overall allowable flow.

$$Q_{storage} = Q_{ALL} - Q_{free}$$

$$Q_{storage} = 51.2 L/s - 30.8 \, L/s$$

$$Q_{storage} = 20.4 L/s$$

The remaining surface area, including the adjacent properties is 4219m^2 consisting of grassed area 335m^2, hard landscaping 827m^2 and roof 3057m^2, from which runoff will be contained in a storage tank within the parking garage.

The overall weighted runoff coefficients for this remaining controlled surface area are calculated using standard City of Ottawa runoff coefficients as:

$$C_{surface-100year} = \frac{[1.0(3057) + 0.25(335) + 1.0(827)]}{4219} = 0.94$$

$$C_{surface-5year} = \frac{[0.95(3057) + 0.20(335) + 0.9(827)]}{4219} = 0.88$$

See Table 3 below for the summary of required storage of surface runoff. Refer to Appendix B for the design calculations. Since the tank will be drained by gravity, the discharge will vary as the tank fills. To account for this, the tank will be sized with the discharge rate of 50% of the allowable discharge. Thus the average tank discharge rate discharge from the tank will be 10.2 L/s.

Table 3: Surface & Roof Discharge and Storage Summary

Area (m^2)	Weighted Runoff Coefficient 5-year	Weighted Runoff Coefficient 100-year	Allowable Discharge (L/s)	Average Discharge (L/s)	5-Year Storage Required (m^3)	100-Year Storage Required (m^3)
4219	0.88	0.94	20.4	10.2	85.90	189.48

2.3.6 Storage Tank Details

The tank must be sized to contain the full 100-year storage volume detailed in Table 3 above. Note that RVA has calculated the required storage volume only. The storage tank design, including inlet control device, outlet piping, spillover piping, and tank access within the building, is to be designed by others once the tank dimensions are finalized. Note that all tank features including piping and the access hatch shall be designed to withstand any surcharging that may be required to convey the flow to the spillover piping should the 100-year storage volume be exceeded. The storage tank will be located at the P1 level parking garage, in the approximate location shown on Drawing C-01. Refer to mechanical and structural drawings for design and details.

Discharge from the storage tank to the storm lateral must be restricted to the allowable discharge rate by an inlet control device. In the event that the 100-year storm is exceeded, an overflow must be provided to flow overland through the controlled surface area. Piping, and the overflow system within the building, is to be designed by others. Mechanical storm piping must be designed to convey the 100-year flows to the tank.

Refer to Appendix B for the storm design sheets.

2.3.7 Proposed Storm Sewer Lateral

The site will be serviced with one (1) connection to the City storm sewer network. The proposed sewer lateral connection is a 300mm storm lateral connecting to the 1200 mm diameter storm sewer on Tweedsmuir Avenue.

The location of the service connection is shown on Drawing C-01 in Appendix A.

2.3.8 Foundation Drainage

The foundation drainage design will be prepared by others. Refer to geotechnical for foundation drainage parameters.

3.0 SITE SERVICING

This section of the report provides a summary of the water supply and sanitary servicing to the site. The layout of site servicing including water, sanitary and storm services is shown in Appendix A.

3.1 Design Criteria

Based on the size and use of the proposed building, the water demand was calculated using the City of Ottawa Design Guidelines for Water Distribution (July 2010). The wastewater demand was calculated using on the City of Ottawa Sewer Design Guidelines (October 2012) and accompanying technical bulletins.

3.2 Water Service

The water demand for the proposed development area is calculated using the City of Ottawa Design Guidelines for Water Distribution (July 2010). The existing and proposed development consists of residential and commercial areas allocated as per the following table:

Table 4: Site Statistics

Type	Units/Area	Persons Per Unit	Population
EXISTING SITE			
Single Family	2 Units	3.4	6.8
Commercial	0.12 ha	-	-
PROPOSED SITE			
Townhouse	11 Units	2.7	29.7
Bachelor	61 Units	1.4	85.4
1 Bedroom	163 Units	1.4	228.2
2 Bedroom	78 Units	2.1	163.8
3 Bedroom	5 Units	3.1	15.5
Commercial	0.09 ha	-	-
Total Proposed	**0.09ha (commercial)**	**-**	**522.6**

For residential development, an average water consumption rate of 350 L/c/day is used. The maximum daily flow is calculated as:

$$\text{Residential Max Daily Flow (W)} = 2.5 \text{ x Average Daily Flow}$$

The maximum hourly flow is calculated as:

$$\text{Residential Max Hourly Flow (W)} = 2.2 \text{ x Max Daily Flow}$$

For commercial development, an average water consumption rate of 25000 L/gross ha/d, as per Section 4.2.8 of the design guidelines. The maximum daily flow for commercial areas is calculated as:

$$\text{Commercial Max Daily Flow (W)} = 1.5 \text{ x Average Daily Flow}$$

The maximum hourly flow for commercial areas is calculated as:

$$\text{Commercial Max Hourly Flow (W)} = 1.8 \text{ x Max Daily Flow}$$

Water flows for the proposed building calculated using the method above are summarized in Table 5.

Table 5: Water Flows

Type	Population or Area	Average Daily Flow (L/s)	Maximum Daily Flow (L/s)	Maximum Hourly Flow (L/s)
EXISTING SITE				
Residential	7 persons	0.03	0.07	0.15
Commercial	0.12 ha	0.03	0.05	0.09
	Total	0.06	0.12	0.24
PROPOSED SITE				
Residential	523 persons	2.12	5.29	11.64
Commercial	0.09 ha	0.03	0.04	0.07
	Total	2.14	5.33	11.71

Since the basic water demand is greater than 50 m^3/day (0.6 L/s), the proposed site will be serviced with two (2) connections from city watermains to avoid the creation of a vulnerable service area.

3.2.1 Proposed Water Service Connections

The site is located in Zone 1W of the City of Ottawa's water distribution system.

The proposed water service connections are:

- 150 mm water service entering at the northeast corner of the building (on the north side) and connected to the 203mm diameter watermain on McRae Avenue to the north of the existing valve.
- 150mm water service entering at the northeast corner of the building (on the east side) and connected to the 203mm diameter watermain on McRae Avenue to the south of the existing valve.

The locations of the service connections are shown on Drawing C-01 in Appendix A.

3.2.2 Fire Flow

The fire flow required for each building was calculated using the Fire Underwriters Survey Method (1999), as follows:

$$F = 220C\sqrt{A}$$

where:

F = the required fire flow in litres per minute.
C = coefficient related to the type of construction
A = floor area in square metres

The building was considered to be of ISO Construction class 5 (modified fire resistive), which correspondences to a construction type coefficient (C) of 0.6.

Per the FUS method for fire-resistive construction type, the floor area was calculated as the two largest adjoining floors (levels 2 & 3) plus 50 percent of the floors immediately above them up to eight floors (levels 4 to 11).

The maximum fire flow required for the building as calculated per the method above is 9,000 L/min (150 L/s). Refer to the calculations included in Appendix C for more detail.

The following boundary conditions were provided by the City of Ottawa:

- Minimum HGL = 108.5m
- Maximum HGL = 115.5m
- MaxDay + FireFlow (150 L/s) = 103.0m (McRae Ave connection)

There are four hydrants adjacent to the site: two on McRae Avenue, one on Scott Street, and one on Tweedsmuir Avenue, as indicated on Drawing C-01. Hydrant testing in the

area is recommended to confirm the available flow and pressure to confirm the fire protection supply.

3.3 Sanitary Service

Based on the City of Ottawa Sewer Design Guidelines (October 2012) and accompanying technical bulletins, an average wastewater rate of 280 L/c/day is used for residential buildings. The maximum daily flow rate is calculated as follows:

$$\text{Residential Max Daily Flow (Sanitary)} = \text{Residential Average Daily Flow (Sanitary)} * \text{Peak Factor}$$

where: $$\text{Peak Factor} = 1 + \left(\frac{14}{4+\left(\frac{\text{Population}}{1000}\right)^{0.5}}\right) * \text{K}$$

In addition, according to the design guidelines an average wastewater rate of 28,000 L/gross ha/d is used for the commercial areas. According to the guidelines, since the commercial area on site less than 20% of the total area, the maximum daily flow is:

$$\text{Commercial Max Daily Flow (Sanitary)} = 1.0 \text{ x Average Daily Flow(Sanitary)}$$

Additionally, extraneous flows can be calculated as follows:

$$Q_{\text{extraneous}} = 0.33\text{L/s} * Area$$

Table 6 below presents the wastewater flows for the proposed building calculated using the method above. Sanitary flows are provided for information only. Capacity of the sewer system has not been verified.

Table 6: Wastewater Flows

Type	Units / Area	Average Daily Flow (L/s)	Maximum Daily Flow (L/s)
Residential	318 units	1.69	5.71
Commercial	0.09 ha	0.03	0.03
Extraneous	2.086 ha	0.69	0.69
Total		**2.41**	**6.43**

3.3.1 Proposed Sanitary Sewer Lateral

The proposed development area will be serviced with one (1) connection to the City sewer network. The proposed sewer lateral connection is a 250mm sanitary lateral connecting to the 250 mm diameter sanitary sewer on McRae Avenue. A new manhole will be installed to connect to the main sewer. The location of the service connection is shown on Drawing C-01 in Appendix A.

3.3.2 Existing Conditions

There are 2 single family homes and 1170 m^2 of commercial space (automotive service centers) on the current site. The wastewater flows for the existing site are presented below in Table 7.

Table 7: Existing Site Wastewater Flows

Type	Units / Area	Average Daily Flow (L/s)	Maximum Daily Flow (L/s)
Residential	2 units	0.02	0.08
Commercial	0.117 ha	0.04	0.04
Extraneous	2.086 ha	0.69	0.69
Total		**0.75**	**0.81**

The existing buildings on the site will be demolished as part of the proposed development. The existing service connections will be removed from the site during construction and capped at the property line.

3.4 City Park Land

The area to the south of the site has been set aside as a future City owned park. It is our understanding that this area will be developed by others in the future. As such, the grading shown is temporary and servicing will be done in the future if required.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures (in accordance with the requirements of OPSS 805 – November 2018 for temporary measures) consisting of both permanent and temporary measures shall be implemented prior to the commencement of construction activities to ensure that sediment is contained within the site. Permanent erosion control measures shall ensure that potential long-term and localized erosion problems are dealt with prior to their occurrence.

4.1 Temporary Sediment Control Measures

Filter fabric shall be installed under the frame of all proposed and existing catchbasins and storm manholes immediately adjacent to any disturbed areas prior to construction to prevent sediment from entering into the sewer system. The filter fabric shall remain in-place for the duration of construction activities and shall not be removed until such time as the landscaping has been established and upon authorization by the Engineer. Light duty sediment fencing shall also be placed around the perimeter of the site for the duration of the construction.

Refer to Drawing C-02 for specific erosion and sediment control measures to be installed and monitored during construction.

5.0 CONCLUSION

The design of the stormwater management system serves to control the 100-year peak post-development flows to that of the 5-year peak flow at a runoff coefficient 0.5 as recommended by the City of Ottawa. On-site storage is proposed below the surface within storage tanks at basement level during the 5-year and 100-year storm events, designed by others. Discharge from the storage tanks into City's sewer system will be via gravity with an inlet control device. It will be the owners' responsibility to maintain the stormwater storage tank, and inlet control device in good working condition.

Given that the runoff coefficient for the site is being lowered to 0.5 which is lower than the runoff coefficient under existing conditions, the existing storm sewers on McRae Avenue and Scott Street are assumed to have adequate capacity to accommodate stormwater flow from the proposed buildings.

Fire flow requirements were calculated; however, capacity in the system must be confirmed with the City, based on boundary flow conditions.

We trust this Site Servicing and Stormwater Management report complies with the City of Ottawa requirements and we look forward to receiving your approval.

R.V. ANDERSON ASSOCIATES LIMITED

Prepared by:
Nathaniel Rodgers, P.Eng.

Reviewed by:
Trevor Kealey, P.Eng.

APPENDIX A

Drawings

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS BY NEUF ARCHITECTES SENCRL. REFER TO ARCHITECTURAL PLANS FOR DIMENSIONS.
2. ALL WATERMAINS TO BE INSULATED IF LESS THAN 2.4 METERS COVER AS PER CITY OF OTTAWA STANDARD DETAIL W22. AT ANY PROXIMITY OF SEWER MANHOLES, INSULATE WATERMAIN AS PER CITY DETAIL W23.
3. SEWERS ARE TO MAINTAIN 500mm BARRELL TO BARRELL CLEARANCE ABOVE AND 250mm BARRELL TO BARRELL CLEARANCE BELOW WATERMAINS AT ALL CROSSINGS (AS PER CITY DWGS W25 AND W25,2). IF 22° BENDS ARE USED ON THE WATER MAIN, THEY MUST BE ONE METER AWAY FROM THE SEWER.
4. THRUST BLOCKS TO BE AS PER CITY OF OTTAWA STANDARD DRAWINGS W25.3 AND W25.4. RESTRAINING AND RETAINING RINGS TO BE INSTALLED IN ACCORDANCE WITH CITY STANDARD DETAILS W25.5 AND W25.6.
5. TEMPORARY SUPPORT OF EXISTING UNDERGROUND UTILITIES IN ACCORDANCE WITH CITY STANDARD DETAIL W28.
6. WATERMAIN TRENCH AND BEDDING TO BE INSTALLED AS PER CITY DETAIL W17.
7. TAPPING VALVE SYSTEM CONNECTION TO CITY WATERMAIN BY CITY FORCES; EXCAVATION, BACKFILLING AND REINSTATEMENT BY CONTRACTOR.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G AND OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. THE OWNER AND CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.
9. UTILITY INFORMATION WAS VERIFIED IN THE FIELD WHERE POSSIBLE. INDIVIDUAL COMPANIES SHOULD BE CONTACTED BY THE CONTRACTOR PRIOR TO COMMENCEMENT FOR CONFIRMATION OF EXISTENCE AND LOCATION OF UTILITIES.
10. WATER SERVICE, STORM SEWERS AND APPURTENANCE TO COMPLY WITH THE REQUIREMENTS OF THE LATEST REVISION OF THE ONTARIO PLUMBING CODE AND APPLICABLE CITY OF OTTAWA ENGINEERING STANDARDS.
11. ALL SANITARY SEWERS TO BE INSULATED IF LESS THAN 2.0 METERS COVER. ALL STORM SEWERS TO BE INSULATED IF LESS THAN 2.0 METERS COVER. INSULATE AS PER CITY OF OTTAWA STANDARD DETAIL W22. ALL BUILDING CONNECTIONS TO HAVE SUFFICIENT COVER OR INSULATION IS REQUIRED.
12. CONTRACTOR SHALL CONTACT THE CONSULTANT, R.V. ANDERSON PRIOR TO BACKFILLING OF THE WATER SERVICE CONNECTIONS FOR THE PROPOSED LINES AND TIE-INS TO EXISTING LINES FOR AS-BUILT LOCATION RECORDS AND INSPECTION.
13. ANY ASPHALT CUT SHALL BE SAW CUT ON BOTH SIDES OF THE TRENCH FOR THE ENTIRE LENGTH OF THE EXCAVATION FOR PIPE INSTALLATIONS. REINSTATEMENT OF THE ROADS SHALL MATCH EXISTING OR MEET CITY STANDARD R10.
14. ANY CONCRETE CUT SHALL BE REMOVED AT EXPANSION JOINTS. IF NO JOINTS EXIST, THE CONCRETE SHALL BE SAW CUT ON BOTH SIDES OF THE TRENCH FOR THE ENTIRE LENGTH OF THE EXCAVATION FOR PIPE INSTALLATIONS. REINSTATEMENT SHALL MATCH EXISTING OR MEET CITY REQUIREMENTS.
15. PIPE BEDDING SHALL BE GRANULAR "A" AS PER CITY DETAIL S6, AND SHALL BE COMPACTED TO 95% SPD AND APPROVED SELECT NATIVE BACK FILL COMPACTED TO 95% SPD.
16. DRAWINGS TO BE READ IN CONJUNCTION WITH CONTRACT SPECIFICATIONS,
17. GRANULAR LAYERS BENEATH NEW ASPHALT SURFACES ON PROPERTY SHALL BE PLACED AT A THICKNESS NOT EXCEEDING 300mm. THE GRANULAR 'A' AND GRANULAR 'B' TYPE II IS TO BE COMPACTED TO A MINIMUM OF 100% SPMDD USING SUITABLE VIBRATORY EQUIPMENT.
18. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S BONDED CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS NORMALLY REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS, BUT NOT LIMITED TO THE FOLLOWING: ROAD CUT PERMITS, SEWER PERMITS, APPROACH APPROVAL PERMITS, RELOCATION OF SERVICES, COMMITTEE OF ADJUSTMENT, ENCROACHMENT AGREEMENTS, WATER PERMIT, ETC
19. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. SPECIFICALLY, THE LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.01.16 AND 407.07.26. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
20. REFER TO LANDSCAPE DRAWINGS FOR DETAILS ON LANDSCAPING TREATMENTS AND PLANTINGS.
21. SEWERS TO BE CONSTRUCTED AS PER CITY OF OTTAWA SPECIFICATIONS - SPECIAL PROVISION F-4100, ALL SEWER STRUCTURES AS PER F-4070, ALL WATER MAINS AS PER F-4411 AND ALL ASSOCIATED SPECIFICATIONS. IRON ADJUSTMENTS PER F-4080.
22. EROSION AND SEDIMENT CONTROL MEASURES (IN ACCORDANCE WITH THE REQUIREMENTS OF OPSS 805 - NOVEMBER 2018 FOR TEMPORARY MEASURES) CONSISTING OF BOTH PERMANENT AND TEMPORARY MEASURES SHALL BE IMPLEMENTED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO ENSURE THAT SEDIMENT IS CONTAINED WITHIN THE SITE. PERMANENT EROSION CONTROL MEASURES SHALL ENSURE THAT POTENTIAL LONG-TERM AND LOCALIZED EROSION PROBLEMS ARE DEALT WITH PRIOR TO THEIR OCCURRENCE. FILTER FABRIC SHALL BE INSTALLED UNDER THE FRAME OF ALL PROPOSED AND EXISTING CATCHBASINS AND STORM MANHOLES IMMEDIATELY ADJACENT TO ANY DISTURBED AREAS PRIOR TO CONSTRUCTION TO PREVENT SEDIMENT FROM ENTERING INTO THE STORM SEWER SYSTEM. THE FILTER FABRIC SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION ACTIVITIES AND SHALL NOT BE REMOVED UNTIL SUCH TIME AS THE LANDSCAPING HAS BEEN ESTABLISHED AND UPON AUTHORIZATION BY THE ENGINEER. LIGHT DUTY SEDIMENT FENCING SHALL ALSO BE PLACED AROUND THE PERIMETER OF THE SITE FOR THE DURATION OF THE CONSTRUCTION.
23. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
24. CONNECTION OF THE WATER SERVICES TO THE CITY WATERMAIN BY CITY FORCES; EXCAVATION, BACKFILLING AND REINSTATEMENT BY CONTRACTOR.
25. REFER TO THE STORM WATER MANAGEMENT & SITE SERVICING REPORTS FROM RV ANDERSON DATED FEBRUARY 19, 2020 FOR FURTHER DETAILS.
26. REFER TO GEOTECHNICAL REPORT BY PINCHIN LTD. DATED FEBRUARY 19, 2020 FOR SOILS INFO.
27. SIDEWALK DEPRESSIONS PER CITY DETAIL SC6.
28. REFER TO MECHANICAL DRAWINGS FOR INTERNAL PLUMBING INCLUDING WATER METER, BACKFLOW PREVENTION, INTERNAL PIPING ETC.

STORM INVERT SCHEDULE

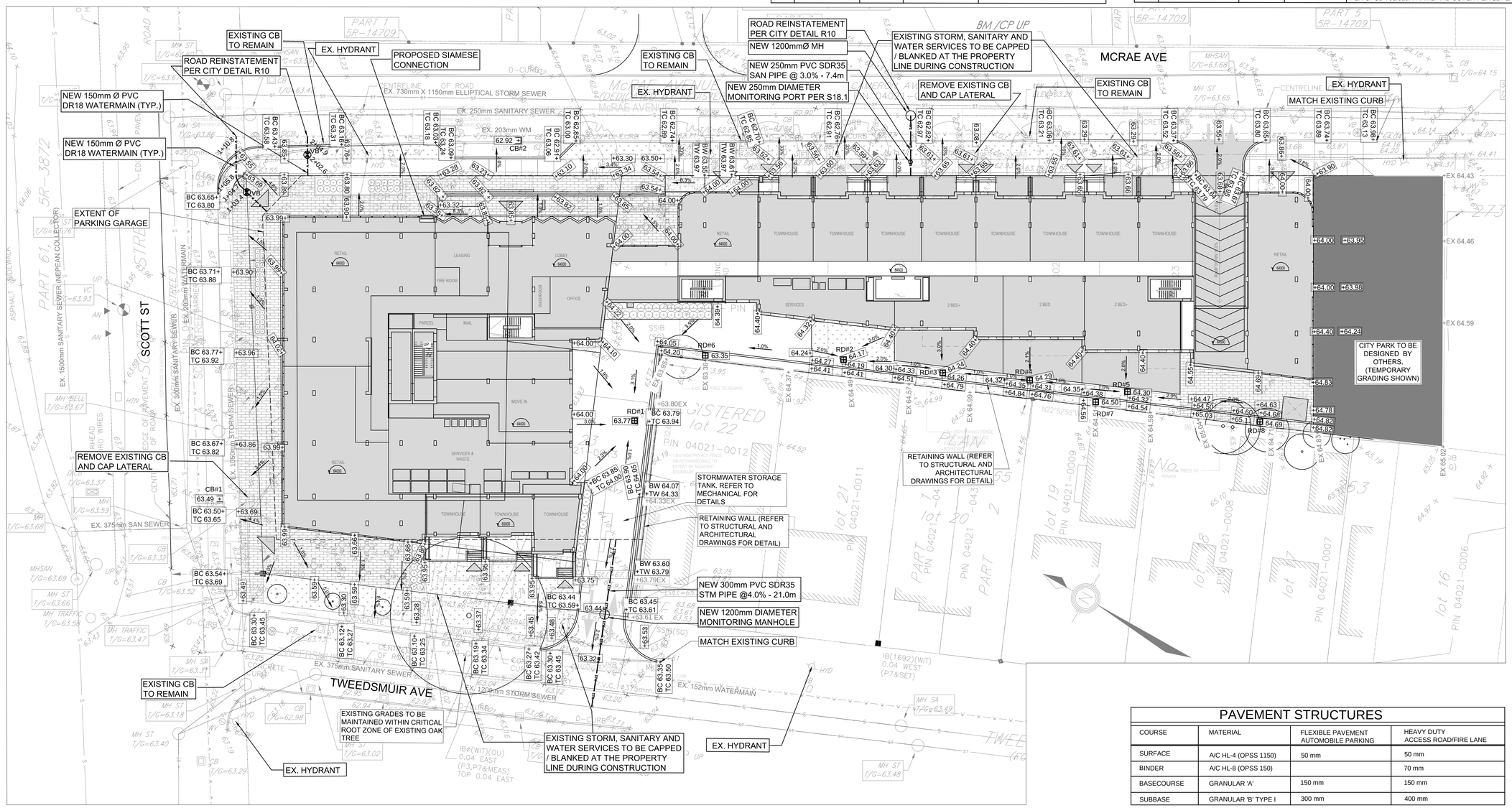
	STRUCTURE	GROUND	INVERT	COMMENTS
	RD#1	63.77	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#2	64.17	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#3	64.24	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#4	64.29	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#5	64.30	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#6	63.35	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#7	64.50	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	RD#8	64.69	SEE MECHANICAL	ROOF DRAIN: SEE MECHANICAL
	CB#1	63.49	62.24	NEW SURFACE STYLE CATCHBASIN PER CITY DETAIL S19.1.
	CB#2	62.92	EXISTING	REPLACE FRAME AND COVER WITH SURFACE STYLE PER CITY DETAIL S19.1.
	STORM CISTERN	IN BLDG	SEE MECHANICAL	DISCHARGE FROM CISTERN PUMPED TO STM LATERAL FOR OBSERVATION PORT DETAILS: SEE MECHANICAL
300mm PVC STORM SEWER	BUILDING/PARKING GARAGE CONNECTION	63.90	60.30	CONNECTION TO BUILDING SERVICES: SEE MECHANICAL
	MONITORING MANHOLE	63.44	59.92	NEW 1200mm DIAMETER MANHOLE PER OPSD 701.010. FRAME/COVER PER S24.1 & S25.
	WATERMAIN CROSSING	63.23	59.65	STM LATERAL CROSSES UNDER 150mm WATERMAIN. BOTTOM OF WM = 60.75m (CLEARANCE = 800mm)
	SANITARY CROSSING	63.16	59.56	STM LATERAL CROSSES OVER 375mm SANITARY SEWER. SEWER INVERT = 60.39m (CLEARANCE = 530mm)
	CONNECTION TO CITY SEWER	63.12	59.46	CONNECT TO 1200mm STORM SEWER AS PER CITY DWG S11. CITY SEWER INVERT 58.76m.

PRIVATE WATERMAIN TABLE

	STATION	DESCRIPTION	TOP OF PIPE ELEVATION	GROUND ELEVATION	COMMENTS
150mm PVC DR18 WATER SERVICE (NORTH SIDE)	1+00.0	BUILDING/PARKING GARAGE CONNECTION	SEE MECHANICAL	63.99	CONNECTION TO BUILDING SERVICES: SEE MECHANICAL
	1+03.4	VALVE & VALVE BOX	61.48	63.88	VALVE AND VALVE BOX PER W24
	1+04.7	22.5deg BEND	61.34	63.84	CONCRETE THRUST BLOCK PER W25.3
	1+05.8	22.5deg BEND	61.34	63.84	CONCRETE THRUST BLOCK PER W25.3
	1+10.8	CONNECTION TO 203mmØ WM.	61.01	63.70	CONNECT TO CITY WATERMAIN AS PER W33
150mm PVC DR18 WATER SERVICE (EAST SIDE)	2+00.0	BUILDING/PARKING GARAGE CONNECTION	SEE MECHANICAL	63.99	CONNECTION TO BUILDING SERVICES: SEE MECHANICAL
	2+02.6	VALVE & VALVE BOX	61.39	63.89	VALVE AND VALVE BOX PER W24
	2+04.9	CONNECTION TO 203mmØ WM.	60.57	63.43	CONNECT TO CITY WATERMAIN AS PER W33

SANITARY INVERT SCHEDULE

	STRUCTURE	GROUND	INVERT	COMMENTS
250mm PVC	BUILDING/PARKING GARAGE CONNECTION	63.66	61.35	CONNECTION TO BUILDING SERVICES: SEE MECHANICAL FOR MONITORING PORT IN PARKING GARAGE
	MONITORING PORT	63.65	61.32	NEW 250mm DIAMETER MANHOLE PER CITY DETAIL S18.1. STEEL COVER REQUIRED.
	WATERMAIN CROSSING	62.78	61.20	SAN LATERAL CROSSES OVER 203mm WATERMAIN. TOP OF WM = 60.40m (CLEARANCE = 800mm)
	CONNECTION TO MAIN SEWER	62.97	61.13	CONNECT TO 250mm SANITARY SEWER AT NEW 1200mm DIAMETER MANHOLE. SEWER INVERT 61.00. NEW MANHOLE PER OPSD 701.010. FRAME AND COVER PER S24 & S25.

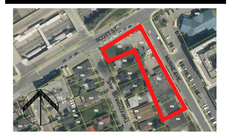


NOT FOR CONSTRUCTION - SUBJECT TO CHANGE PENDING OUTSTANDING APPROVALS

PAVEMENT STRUCTURES

COURSE	MATERIAL	FLEXIBLE PAVEMENT AUTOMOBILE PARKING	HEAVY DUTY ACCESS ROAD/FIRE LANE
SURFACE	A/C HL-4 (OPSS 1150)	50 mm	50 mm
BINDER	A/C HL-8 (OPSS 150)		70 mm
BASECOURSE	GRANULAR 'A'	150 mm	150 mm
SUBBASE	GRANULAR 'B' TYPE I	300 mm	400 mm

*NOTE: FOR DETAILED PAVEMENT STRUCTURE SPECIFICATIONS AND GUIDELINES, REFER TO THE GEOTECHNICAL INVESTIGATION, PROJECT FILE NO. 230236.004, DATED 28 NOVEMBER 2018, PREPARED BY PINCHIN LTD.



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CLIENT Client
GWL REALTY ADVISORS

OUVRAGE Project
320 MCRAE

EMPLACEMENT Location
320 MCRAE

NO PROJET No.
194453

NO	REVISION	DATE
1	QA SUBMISSION	02/24/2020
2	FOR COORDINATION	02/26/2020
3	SITE PLAN SUBMISSION	03/20/2020

DESSINE PAR Drawn by **NR**
VÉRIFIÉ PAR Checked by **TMK**
DATE **03/20/20**
ÉCHELLE Scale **1:250**

TITRE DU DESSIN Drawing Title
SITE SERVICING, GRADING AND STORM WATER MANAGEMENT PLAN

RÉVISION Revision
NO. DESSIN Dwg Number **C01**

EROSION AND SEDIMENT CONTROL NOTES:

GENERAL

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM HIS CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN A MANNER THAT STRICTLY MEETS THE REQUIREMENTS OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT HIS OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVE FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT SEQUENTIAL MEASURES ARRANGED IN SUCH A MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCES, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR BERMS, OR OTHER RECOGNIZED TECHNOLOGIES AND METHODS AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF OPSS 805 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY. AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIMES WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT A MOMENT'S NOTICE.

BEFORE COMMENCING THE WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP), THE ESCP WILL CONSIST OF A WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD OR DEBRIS.

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTORS, IN THE WORKING AREA ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES AND THE SPECIFICATIONS DETAILED HEREIN.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO ANY SEWER OR WATERCOURSE AND AVOIDS DAMAGE TO THE CONTROL MEASURE. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BREACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

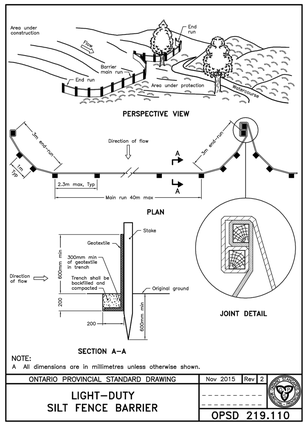
WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR AT ALL, THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

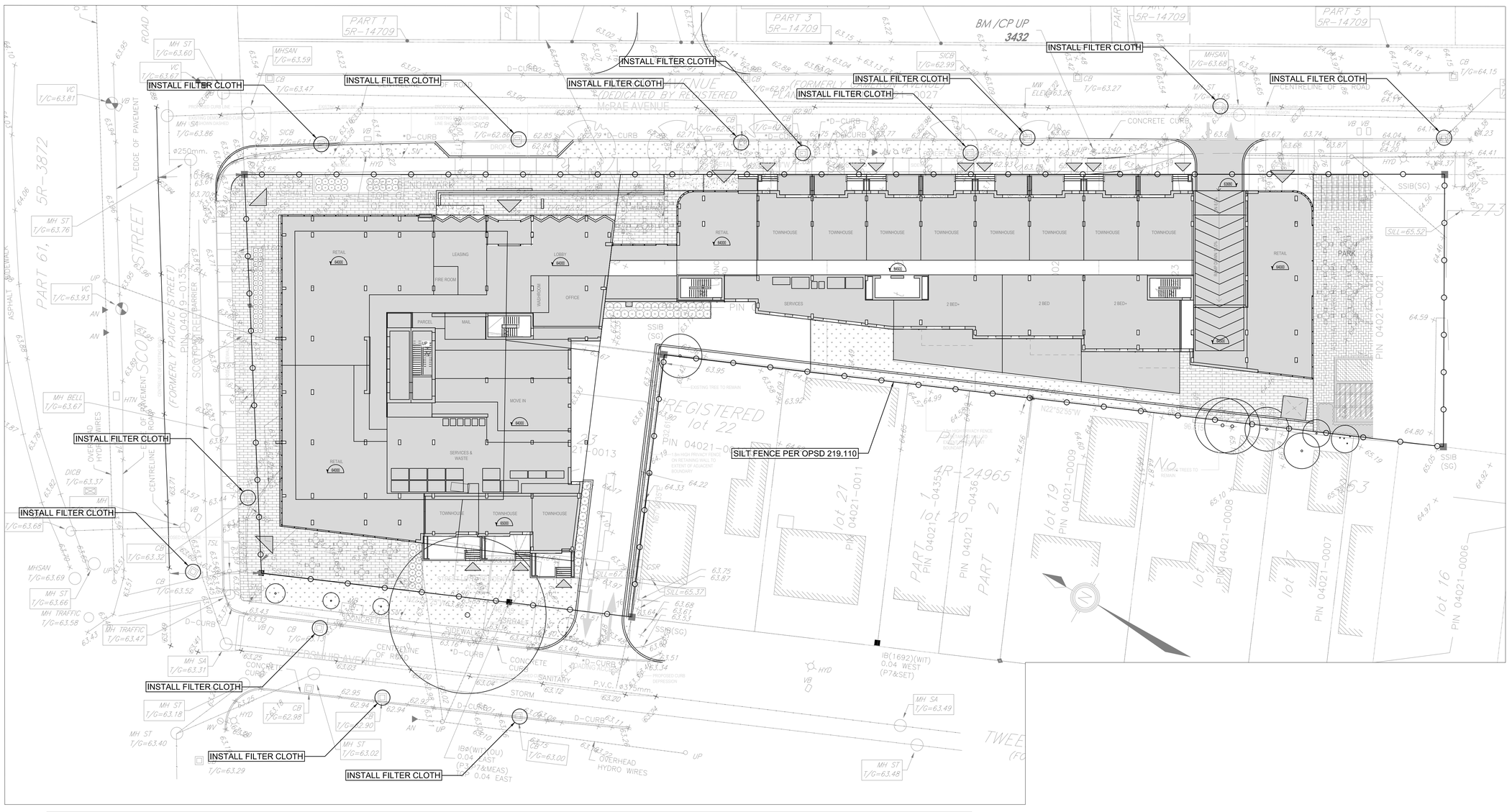
SITE SPECIFIC NOTES:

EROSION AND SEDIMENT CONTROL MEASURES (IN ACCORDANCE WITH THE REQUIREMENTS OF OPSS 805 - NOVEMBER 2018 FOR TEMPORARY MEASURES) CONSISTING OF BOTH PERMANENT AND TEMPORARY MEASURES SHALL BE IMPLEMENTED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO ENSURE THAT SEDIMENT IS CONTAINED WITHIN THE SITE., FILTER FABRIC SHALL BE INSTALLED UNDER THE FRAME OF ALL PROPOSED AND EXISTING CATCHBASINS AND STORM MANHOLES IMMEDIATELY ADJACENT TO ANY DISTURBED AREAS PRIOR TO CONSTRUCTION TO PREVENT SEDIMENT FROM ENTERING INTO THE STORM SEWER SYSTEM. THE FILTER FABRIC SHALL REMAIN IN-PLACE FOR THE DURATION OF CONSTRUCTION ACTIVITIES AND SHALL NOT BE REMOVED UNTIL SUCH TIME AS THE LANDSCAPING HAS BEEN ESTABLISHED AND UPON AUTHORIZATION BY THE ENGINEER. LIGHT DUTY SEDIMENT FENCINGPER OPSD 219.110 SHALL ALSO BE PLACED AROUND THE PERIMETER OF THE SITE FOR THE DURATION OF THE CONSTRUCTION.

THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

SEDIMENT AND EROSION CONTROL MEASUREMENTS MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.





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CLIENT Client
GWL REALTY ADVISORS

OUVRAGE Project
320 MCRAE

EMPLACEMENT Location
320 MCRAE

NO PROJET No.
194453

NO	REVISION	DATE
1	QA SUBMISSION	02/24/2020
2	FOR COORDINATION	02/26/2020
3	SITE PLAN SUBMISSION	03/20/2020

DESSINÉ PAR Drawn by
NR

VÉRIFIÉ PAR Checked by
TMK

DATE
2/18/20

ÉCHELLE Scale
1:250

TITRE DU DESSIN Drawing Title
SITE EROSION AND SEDIMENT CONTROL PLAN

RÉVISION Revision

NO. DESSIN Dwg Number
C02

APPENDIX B

Stormwater Design Calculations & Correspondence

320 McRae

CAPTURED FLOW
5 yr Storm Post-Development Flow

100 yr Average Discharge	10.20 L/s
(based on 20 minute time of concentration)	

Elapsed time (min)	Elapsed time (s)	Intensity (mm/hr)	Intensity (mm/s)	Acc Depth (mm)	C	Area (m^2)	Flow (l/s)	Discharge (l/s)	Storage flow (l/s)	Storage volume (m^3)	
0	0	0.00	0.0000	0.00	0.88	4219	0.00	0.00	0.00	0.00	
5	300	141.18	0.0392	11.76	0.88	4219	72.80	10.20	62.60	18.78	
10	600	104.19	0.0289	20.45	0.88	4219	107.46	10.20	97.26	58.35	
15	900	83.56	0.0232	27.41	0.88	4219	86.17	10.20	75.97	68.38	
20	1200	70.25	0.0195	33.26	0.88	4219	72.45	10.20	62.25	74.70	
25	1500	60.90	0.0169	38.34	0.88	4219	62.80	10.20	52.60	78.90	
30	1800	53.93	0.0150	42.83	0.88	4219	55.62	10.20	45.42	81.75	
35	2100	48.52	0.0135	46.88	0.88	4219	50.04	10.20	39.84	83.66	
40	2400	44.18	0.0123	50.56	0.88	4219	45.57	10.20	35.37	84.88	
45	2700	40.63	0.0113	53.94	0.88	4219	41.90	10.20	31.70	85.59	
50	3000	37.65	0.0105	57.08	0.88	4219	38.83	10.20	28.63	85.90	-peak storage
55	3300	35.12	0.0098	60.01	0.88	4219	36.22	10.20	26.02	85.88	
60	3600	32.94	0.0092	62.75	0.88	4219	33.97	10.20	23.77	85.59	
65	3900	31.04	0.0086	65.34	0.88	4219	32.02	10.20	21.82	85.08	
70	4200	29.37	0.0082	67.79	0.88	4219	30.29	10.20	20.09	84.38	
75	4500	27.89	0.0077	70.11	0.88	4219	28.76	10.20	18.56	83.53	
80	4800	26.56	0.0074	72.33	0.88	4219	27.39	10.20	17.19	82.53	
85	5100	25.37	0.0070	74.44	0.88	4219	26.16	10.20	15.96	81.41	
90	5400	24.29	0.0067	76.46	0.88	4219	25.05	10.20	14.85	80.18	
95	5700	23.31	0.0065	78.41	0.88	4219	24.04	10.20	13.84	78.86	
100	6000	22.41	0.0062	80.27	0.88	4219	23.11	10.20	12.91	77.45	
105	6300	21.58	0.0060	82.07	0.88	4219	22.26	10.20	12.06	75.97	
110	6600	20.82	0.0058	83.81	0.88	4219	21.47	10.20	11.27	74.41	
115	6900	20.12	0.0056	85.48	0.88	4219	20.75	10.20	10.55	72.79	
120	7200	19.47	0.0054	87.11	0.88	4219	20.08	10.20	9.88	71.12	
125	7500	18.86	0.0052	88.68	0.88	4219	19.45	10.20	9.25	69.38	
130	7800	18.29	0.0051	90.20	0.88	4219	18.87	10.20	8.67	67.61	
135	8100	17.76	0.0049	91.68	0.88	4219	18.32	10.20	8.12	65.78	
140	8400	17.27	0.0048	93.12	0.88	4219	17.81	10.20	7.61	63.92	
145	8700	16.80	0.0047	94.52	0.88	4219	17.33	10.20	7.13	62.01	
150	9000	16.36	0.0045	95.89	0.88	4219	16.87	10.20	6.67	60.07	
155	9300	15.95	0.0044	97.22	0.88	4219	16.45	10.20	6.25	58.09	
160	9600	15.56	0.0043	98.51	0.88	4219	16.04	10.20	5.84	56.09	
165	9900	15.18	0.0042	99.78	0.88	4219	15.66	10.20	5.46	54.05	
170	10200	14.83	0.0041	101.01	0.88	4219	15.30	10.20	5.10	51.99	
175	10500	14.50	0.0040	102.22	0.88	4219	14.95	10.20	4.75	49.90	
180	10800	14.18	0.0039	103.40	0.88	4219	14.62	10.20	4.42	47.78	

Flow Calculations:
For 5m (300s) interval
t/600*A*C*I
(300)/600*1076*0.95*0.0392=20.04

320 McRae

CAPTURED FLOW
100 yr Storm Post-Development Flow

100 yr Average Discharge	**10.20 L/s**
(based on 20 minute time of concentration)	

Elapsed time (min)	Elapsed time (s)	Intensity (mm/hr)	Intensity (mm/s)	Acc Depth (mm)	C	Area (m^2)	Flow (l/s)	Discharge (l/s)	Storage flow (l/s)	Storage volume (m^3)	
0	0	0.00	0.0000	0.00	0.94	4219	0.00	0.00	0.00	0.00	
5	300	242.70	0.0674	20.23	0.94	4219	133.68	10.20	123.48	37.05	
10	600	178.56	0.0496	35.11	0.94	4219	196.71	10.20	186.51	111.90	
15	900	142.89	0.0397	47.01	0.94	4219	157.42	10.20	147.22	132.49	
20	1200	119.95	0.0333	57.01	0.94	4219	132.14	10.20	121.94	146.33	
25	1500	103.85	0.0288	65.66	0.94	4219	114.40	10.20	104.20	156.30	
30	1800	91.87	0.0255	73.32	0.94	4219	101.20	10.20	91.00	163.81	
35	2100	82.58	0.0229	80.20	0.94	4219	90.97	10.20	80.77	169.62	
40	2400	75.15	0.0209	86.46	0.94	4219	82.78	10.20	72.58	174.20	
45	2700	69.05	0.0192	92.22	0.94	4219	76.07	10.20	65.87	177.84	
50	3000	63.95	0.0178	97.55	0.94	4219	70.45	10.20	60.25	180.76	
55	3300	59.62	0.0166	102.51	0.94	4219	65.68	10.20	55.48	183.09	
60	3600	55.89	0.0155	107.17	0.94	4219	61.58	10.20	51.38	184.95	
65	3900	52.65	0.0146	111.56	0.94	4219	58.00	10.20	47.80	186.41	
70	4200	49.79	0.0138	115.71	0.94	4219	54.85	10.20	44.65	187.53	
75	4500	47.26	0.0131	119.65	0.94	4219	52.06	10.20	41.86	188.36	
80	4800	44.99	0.0125	123.40	0.94	4219	49.56	10.20	39.36	188.94	
85	5100	42.95	0.0119	126.98	0.94	4219	47.32	10.20	37.12	189.31	
90	5400	41.11	0.0114	130.40	0.94	4219	45.29	10.20	35.09	189.48	
95	5700	39.43	0.0110	133.69	0.94	4219	43.44	10.20	33.24	189.48	-peak storage
100	6000	37.90	0.0105	136.85	0.94	4219	41.76	10.20	31.56	189.33	
105	6300	36.50	0.0101	139.89	0.94	4219	40.21	10.20	30.01	189.04	
110	6600	35.20	0.0098	142.82	0.94	4219	38.78	10.20	28.58	188.63	
115	6900	34.01	0.0094	145.65	0.94	4219	37.46	10.20	27.26	188.10	
120	7200	32.89	0.0091	148.40	0.94	4219	36.24	10.20	26.04	187.47	
125	7500	31.86	0.0089	151.05	0.94	4219	35.10	10.20	24.90	186.75	
130	7800	30.90	0.0086	153.63	0.94	4219	34.04	10.20	23.84	185.94	
135	8100	30.00	0.0083	156.13	0.94	4219	33.05	10.20	22.85	185.05	
140	8400	29.15	0.0081	158.56	0.94	4219	32.11	10.20	21.91	184.08	
145	8700	28.36	0.0079	160.92	0.94	4219	31.24	10.20	21.04	183.05	
150	9000	27.61	0.0077	163.22	0.94	4219	30.42	10.20	20.22	181.95	
155	9300	26.91	0.0075	165.46	0.94	4219	29.64	10.20	19.44	180.79	
160	9600	26.24	0.0073	167.65	0.94	4219	28.91	10.20	18.71	179.58	
165	9900	25.61	0.0071	169.78	0.94	4219	28.21	10.20	18.01	178.31	
170	10200	25.01	0.0069	171.87	0.94	4219	27.55	10.20	17.35	176.99	
175	10500	24.44	0.0068	173.90	0.94	4219	26.93	10.20	16.73	175.63	
180	10800	23.90	0.0066	175.90	0.94	4219	26.33	10.20	16.13	174.22	
185	11100	23.39	0.0065	177.84	0.94	4219	25.77	10.20	15.57	172.77	
190	11400	22.90	0.0064	179.75	0.94	4219	25.22	10.20	15.02	171.28	
195	11700	22.43	0.0062	181.62	0.94	4219	24.71	10.20	14.51	169.76	
200	12000	21.98	0.0061	183.45	0.94	4219	24.22	10.20	14.02	168.20	
205	12300	21.55	0.0060	185.25	0.94	4219	23.74	10.20	13.54	166.60	
210	12600	21.14	0.0059	187.01	0.94	4219	23.29	10.20	13.09	164.98	
215	12900	20.75	0.0058	188.74	0.94	4219	22.86	10.20	12.66	163.32	
220	13200	20.37	0.0057	190.44	0.94	4219	22.44	10.20	12.24	161.63	
225	13500	20.01	0.0056	192.11	0.94	4219	22.05	10.20	11.85	159.92	
230	13800	19.66	0.0055	193.75	0.94	4219	21.66	10.20	11.46	158.17	

Flow Calculations:
For 5m (300s) interval
t/600*A*C*I
(300)/600*1076*1*0.0674=36.27

Nathaniel Rodgers

From: Wu, John <John.Wu@ottawa.ca>
Sent: Monday, December 16, 2019 2:36 PM
To: Elizabeth Rodgers
Subject: RE: 320 McRae - Pre-Consultation - SWM Criteria & Site Servicing Constraints

Follow Up Flag: Follow up
Flag Status: Flagged

C 0.5 5year's to restrict up to 100 years' storm, Tc 20 minutes

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: December 16, 2019 2:26 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Jaime Posen <posen@fotenn.com>
Subject: 320 McRae - Pre-Consultation - SWM Criteria & Site Servicing Constraints

Hi John,

Further to the pre-consultation meeting for the 320 McRae development (which took place on May 9, 2019), it is my understanding that you are the engineering department contact from the pre-application consultation.
I'm looking for information on servicing and stormwater management constraints for the site.

RVA will be preparing the Site Servicing and Stormwater Management design. Can you please provide the stormwater management criteria for the site and any servicing restrictions?

Thanks,
Beth Rodgers (Hamley), P.Eng.
Project Engineer

R.V. Anderson Associates Limited
1750 Courtwood Crescent, Suite 220
Ottawa, ON K2C 2B5
T 613 226 1284 x 3226
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Note that my email address has recently changed to ERodgers@rvanderson.com
Please update your records accordingly.

Elizabeth Rodgers

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: January 28, 2020 8:53 AM
To: Elizabeth Rodgers
Cc: Nathaniel Rodgers
Subject: RE: 320 McRae - WQ Control Requirements

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate before Replying or Clicking on any links

Good Morning Beth,

Based on the site plan provided there are no surface parking spaces and the development will be primarily rooftop area receiving rainwater. Roofs and landscaped areas, for the purpose of protecting surface water quality and aquatic habitat, are deemed as clean. The RVCA therefore accepts that the stormwater runoff from the site does not require any additional quality control measures save and except best management practices.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: Friday, January 24, 2020 2:16 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: RE: 320 McRae - WQ Control Requirements

Hi Jamie,

Please find attached the draft site plan for 320 McRae. There are no proposed surface parking spaces within the site; however, there is an access laneway (for garbage trucks, moving trucks, etc) within the site. There is also a ramp to the underground parking garage.

Let me know if you need more info or would like to discuss.

Thanks,

Beth Rodgers (Hamley), P.Eng.
Associate, Project Engineer

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From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: January 22, 2020 2:09 PM
To: Elizabeth Rodgers <erodgers@rvanderson.com>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: RE: 320 McRae - WQ Control Requirements

Good Afternoon Beth,

Can you provide me with a site plan? I need to know hoe many surface parking spaces are being provided. Thanks.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: Tuesday, January 21, 2020 10:08 AM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: 320 McRae - WQ Control Requirements

Hi Jamie,

We're working on redevelopment of another site in Ottawa, at 320 McRae Ave. The sanitary and storm sewers in this area are separated; therefore, we will have separate laterals for stormwater and sanitary discharge from the site. Can you please provide stormwater quality control requirements for this site?

If you need more information on the project, please let me know.

Thanks,
Beth Rodgers (Hamley), P.Eng.
Associate, Project Engineer

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APPENDIX C

Site Servicing Calculations & Correspondence

W/WW Demand Calculations **320 McRae Avenue**

Table 4.1 Per Unit Populations	
Unit Type	Persons Per Unit
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Avg Apt.	1.8

WATER

Demand Type	Average Day Dema	P.F. (Max Day Demand)	P.F. (Max Hour Demand)	Units
Residential	350	2.5	2.2	L/c/d
Shopping Center	25000	1.5	1.8	L/gross ha/d

WASTEWATER

Demand Type	Average Day Dema	P.F. (Max. Daily Demand)	Units
Residential	280	See Table Below	L/c/d
Shopping Center	28000	1	L/gross ha/d

Type	Units/ Area (ha)	Population	Peak Factor (P.F.)
Bachelor	61	85.4	
1 Bedroom	87	121.8	
1 Bedroom+	76	106.4	
2 Bedroom	47	98.7	
2 Bedroom+	31	65.1	
3 Bedroom	5	15.5	
Townhouse	11	29.7	
Total Proposed	318	522.6	3.37
Ex Single Family Hom	2	6.8	3.74

Water Wastewater Demand Calculations **320 McRae**

NEW DEVELOPMENT - 320 McRae Ave

			WATER						WASTEWATER			
Type	Units/ Area (ha)	Population	Avg. Daily Flow (L/d)	Avg. Daily Flow(L/s)	Max Daily Flow (L/d)	Max Daily Flow (L/s)	Max Hourly Flow (L/d)	Max Hourly Flow (L/s)	Avg. Daily Flow (L/d)	Avg. Daily Flow(L/s)	Max Daily Flow (L/d)	Max Daily Flow (L/s)
Bachelor	61	85.4	29890	0.35	74725	0.86	164395	1.90	23912	0.28	0.00	0.00
1 Bedroom	87	121.8	42630	0.49	106575	1.23	234465	2.71	34104	0.39	0.00	0.00
1 Bedroom+	76	106.4	37240	0.43	93100	1.08	204820	2.37	29792	0.34	0.00	0.00
2 Bedroom	47	98.7	34545	0.40	86362.5	1.00	189997.5	2.20	27636	0.32	0.00	0.00
2 Bedroom+	31	65.1	22785	0.26	56962.5	0.66	125317.5	1.45	18228	0.21	0.00	0.00
3 Bedroom	5	15.5	5425	0.06	13562.5	0.16	29837.5	0.35	4340	0.05	0.00	0.00
Townhouse	11	29.7	10395	0.12	25987.5	0.30	57172.5	0.66	8316	0.10	0.00	0.00
Commercial	0.0882		2205	0.03	3307.5	0.04	5953.5	0.07	2469.6	0.03	2469.60	0.03
Total Residential		522.6	182910	2.12	457275	5.29	1006005	11.64	146328	1.69	493332.9881	5.71
Total		522.6	185115	2.14	460582.5	5.33	1011958.5	11.71	148797.6	1.72	495802.59	5.74

EXISTING - entire site

			WATER						WASTEWATER			
Type	Units/ Area (ha)	Population	Avg. Daily Flow (L/d)	Avg. Daily Flow(L/s)	Max Daily Flow (L/d)	Max Daily Flow (L/s)	Max Hourly Flow (L/d)	Max Hourly Flow (L/s)	Avg. Daily Flow (L/d)	Avg. Daily Flow(L/s)	Max Daily Flow (L/d)	Max Daily Flow (L/s)
Single family home	2	6.8	2380	0.03	5950	0.07	13090	0.15	1904	0.02	7127.51	0.08
Commercial	0.117		2925	0.03	4387.5	0.05	7897.5	0.09	3276	0.04	3276.00	0.04
Total		6.8	5305	0.06	10337.5	0.12	20987.5	0.24	5180	0.06	10403.51	0.12

Fire Flow Analysis - FUS Method
320 McRae Avenue

320 McRAE AVENUE FIRE DEMAND CALCULATIONS

			TOTAL
A	Coefficient for type of construction:		0.6
B	Total Floor Area (excl. basement)	m^2	8,039
C	Height in Stories		26
D	Fire Flow Required	L/min	12,000
E	15% Reduction for Occupancy Charge	L/min	-1,800
	Fire Flow Required	L/min	10,200
F	50% Reduction for Automatic Sprinklers	L/min	-5,100
G	Charge for Building Separation		
	North: Nearest Building	120	5%
	West: Nearest Building	5	20%
	South: Nearest Building	31	5%
	East: Nearest Building	33	5%
	Charge for Building Separation	L/min	3,570
H	Fire Flow Required	L/min	9,000
	Fire Flow Required	L/s	150

Elizabeth Rodgers

From: Wu, John <John.Wu@ottawa.ca>
Sent: February 12, 2020 3:07 PM
To: Elizabeth Rodgers
Subject: RE: 320 McRae- Water Boundary Conditions

Follow Up Flag: Follow up
Flag Status: Flagged

The following are boundary conditions, HGL, for hydraulic analysis at 320 McRae (zone 1W) assumed to be connected to the 203mm on Scott and/or 203mm on McRae (see attached PDF for location).

Minimum HGL = 108.5m

Maximum HGL = 115.5m

MaxDay + FireFlow (150 L/s) = 106.0m, Scott connection

MaxDay + FireFlow (150 L/s) = 103.0m, McRae connection

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.

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: February 11, 2020 5:37 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Hi John,

I believe the building will fall under the ISO Construction class 5 (modified fire resistive), so a coefficient of 0.6 would apply for the building. I've redone the FUS calculations accordingly (attached).

Based on updated calculations using the FUS method, the amount of fire flow required is 150 L/s.

Can you please provide updated results from the distribution model using this fire flow?

Thanks,
Beth

From: Wu, John <John.Wu@ottawa.ca>
Sent: February 6, 2020 2:01 PM
To: Elizabeth Rodgers <erodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Please refer to Guidelines and Technical bulletin ISDTB-2014-02 concerning basic day demands greater than 0.5 L/s.

The following are boundary conditions, HGL, for hydraulic analysis at 320 McRae (zone 1W) assumed to be connected to the 203mm on Scott and/or 203mm on McRae (see attached PDF for location).

Minimum HGL = 108.5m

Maximum HGL = 115.5m

MaxDay + FireFlow (317 L/s) = 92.0m, Scott connection

MaxDay + FireFlow (317 L/s) = 83.0m, McRae connection

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.

Please note, even the fire flow is available for 317, you need more than two fire hydrant to get that amount of fire flow.

John

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: February 4, 2020 10:13 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Hi John,

According to the structural engineer, the building is not considered fire-resistive construction. Therefore, I've used the non-combustible coefficient of 0.8 and total floor area as per FUS method.
Amount of fire flow required: 317 L/s.

Please review and provide boundary conditions.

Beth Rodgers (Hamley), P.Eng.
Associate, Project Engineer

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From: Wu, John <John.Wu@ottawa.ca>
Sent: January 28, 2020 10:49 AM
To: Elizabeth Rodgers <erodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Go read the area in FUS 1999, use 0.6 for the construction method. Do not use the whole area of the building.
The occupancy can be 15%.

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: January 28, 2020 10:45 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Hi John,
Please find attached for the FUS calculation sheet for 320 McRae, for your review.

Thanks,
Beth Rodgers (Hamley), P.Eng.
Associate, Project Engineer

R.V. Anderson Associates Limited
1750 Courtwood Crescent, Suite 220
Ottawa, ON K2C 2B5
T 613 226 1284 x 3226
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Please update your records accordingly.

From: Wu, John <John.Wu@ottawa.ca>
Sent: January 28, 2020 10:37 AM
To: Elizabeth Rodgers <erodgers@rvanderson.com>
Subject: RE: 320 McRae- Water Boundary Conditions

Your fire flow it too large, please send us the FUS calculation sheet for review.

From: Elizabeth Rodgers <erodgers@rvanderson.com>
Sent: January 27, 2020 4:48 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nathaniel Rodgers <nrodgers@rvanderson.com>
Subject: 320 McRae- Water Boundary Conditions

Hi John,

For the private development project located at 320 McRae Ave, I would like to request water boundary conditions. If you are not the appropriate contact, please forward this to the appropriate person
.
Can you please provide water boundary conditions for this area, based on the information below?

1. Type of development – Residential condo building with commercial/retail space on the main floor.
2. Location of service – See attached figures of location. Water service to be from either McRae Ave or Scott Street (between McRae and Tweedsmuir).
3. Amount of fire flow required: 367 L/s (calculated per FUS method)
4. Average daily demand: 2.16 L/s

5. Maximum daily demand: 5.38 L/s.
6. Maximum hourly daily demand: 11.83 L/s

Attachment 1 – Draft Site Plan
Attachment 2 – General Location Plan

Please let me know if you need more information.

Thanks,
Beth Rodgers (Hamley), P.Eng.
Associate, Project Engineer

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1750 Courtwood Crescent, Suite 220
Ottawa, ON K2C 2B5
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