

**Servicing Report – 105 - 109  
Henderson Avenue**

Project # 160401351



Prepared for:  
TC United Group

Prepared by:  
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## Table of Contents

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1.1</b>
<b>2.0</b>	<b>BACKGROUND .....</b>	<b>2.2</b>
<b>3.0</b>	<b>WATER SUPPLY SERVICING.....</b>	<b>3.3</b>
3.1	BACKGROUND.....	3.3
3.2	WATER DEMANDS .....	3.3
3.3	PROPOSED SERVICING .....	3.3
3.4	SUMMARY OF FINDINGS .....	3.4
<b>4.0</b>	<b>WASTEWATER SERVICING .....</b>	<b>4.5</b>
4.1	BACKGROUND.....	4.5
4.2	DESIGN CRITERIA .....	4.5
4.3	PROPOSED SERVICING .....	4.5
<b>5.0</b>	<b>STORMWATER MANAGEMENT .....</b>	<b>5.1</b>
5.1	OBJECTIVES .....	5.1
5.2	SWM CRITERIA AND CONSTRAINTS .....	5.1
5.3	STORMWATER MANAGEMENT .....	5.2
5.3.1	Allowable Release Rate .....	5.2
5.3.2	Storage Requirements .....	5.3
5.3.3	Results .....	5.5
<b>6.0</b>	<b>GRADING AND DRAINAGE.....</b>	<b>6.6</b>
<b>7.0</b>	<b>UTILITIES.....</b>	<b>7.1</b>
<b>8.0</b>	<b>APPROVALS .....</b>	<b>8.1</b>
<b>9.0</b>	<b>EROSION CONTROL DURING CONSTRUCTION .....</b>	<b>9.1</b>
<b>10.0</b>	<b>GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT .....</b>	<b>10.1</b>
<b>11.0</b>	<b>CONCLUSIONS.....</b>	<b>11.2</b>
11.1	WATER SERVICING .....	11.2
11.2	SANITARY SERVICING .....	11.2
11.3	STORMWATER SERVICING .....	11.2
11.4	GRADING .....	11.2
11.5	UTILITIES .....	11.2
11.6	APPROVALS/PERMITS .....	11.3

## LIST OF TABLES

Table 1: Target Release Rates.....	5.2
Table 2: 100 Year Summary of Roof Controls.....	5.3
Table 3: Peak Uncontrolled 2-Year and 100-Year Release Rates .....	5.3
Table 4: 100 Year Storage Requirement and Release Rate Based on PCSWMM .....	5.5
Table 5: Summary of Total 100 Year Event Release Rates .....	5.5
Table 6: Pavement Structure – Residential Driveway.....	10.1

## LIST OF FIGURES

Figure 1: Location Plan .....	1.1
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## LIST OF APPENDICES

<b>APPENDIX A</b>	<b>WATER SUPPLY SERVICING .....</b>	<b>A.1</b>
A.1	Domestic Water Demand Estimate .....	A.1
A.2	Fire Flow Requirements Per FUS .....	A.2
A.3	Boundary Conditions .....	A.3
<b>APPENDIX B</b>	<b>WASTEWATER SERVICING .....</b>	<b>B.4</b>
B.1	Sanitary Sewer Design Sheet .....	B.4
<b>APPENDIX C</b>	<b>STORMWATER MANAGEMENT .....</b>	<b>C.5</b>
C.1	Storm Sewer Design Sheet .....	C.5
C.2	Rational Method Calculations .....	C.6
C.3	PCSWMM Model .....	C.7
C.4	HDPE Pipe Details .....	C.8
<b>APPENDIX D</b>	<b>GEOTECHNICAL INVESTIGATION .....</b>	<b>D.9</b>
<b>APPENDIX E</b>	<b>DRAWINGS .....</b>	<b>E.10</b>

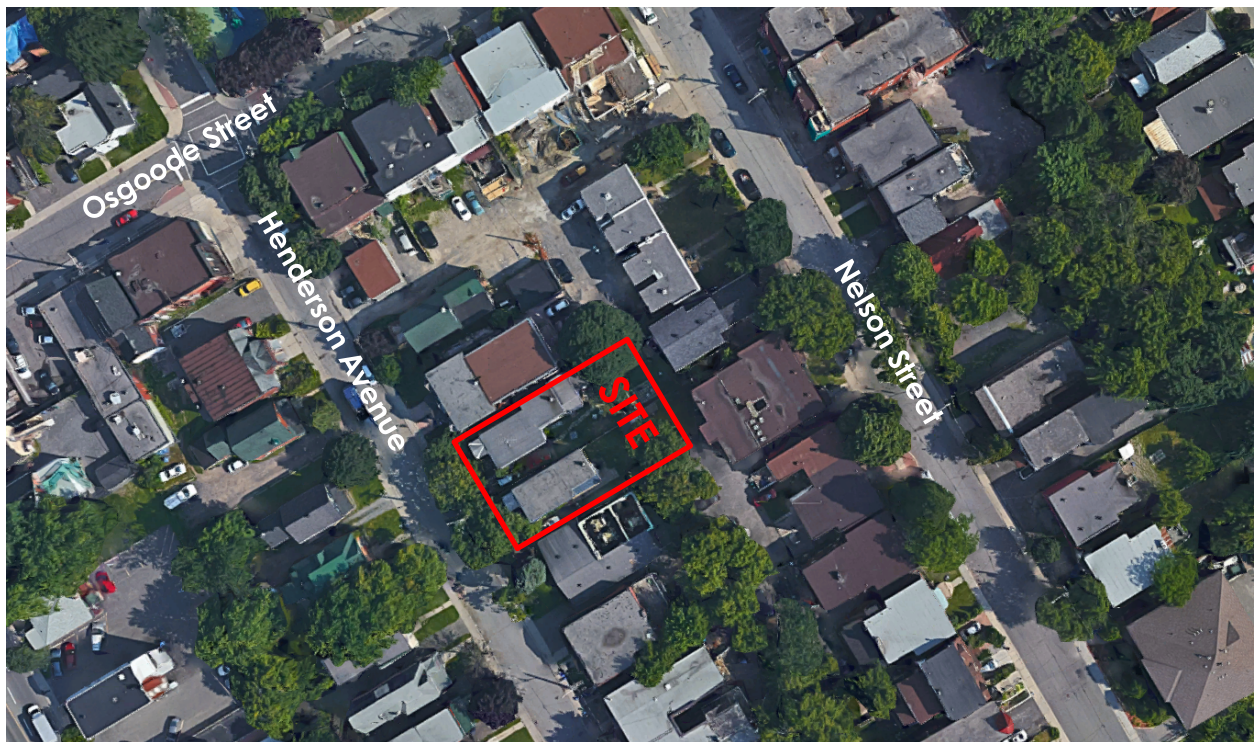
## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Introduction  
February 11, 2020

### 1.0 INTRODUCTION

Stantec Consulting Ltd. has been commissioned by TC United Group to prepare a servicing study in support of Site Plan Control submission for the proposed development located at 105-109 Henderson Avenue. The site is situated on the east side of Henderson Avenue, south of Osgoode Street within the City of Ottawa. The proposed infill development would relocate a portion of the existing heritage 2 storey dwellings with the addition of three-storey apartment units, comprising 20 total residential units. The location of the proposed development is shown in **Figure 1**. The 0.07ha (0.17 acre) site is presently zoned R4S [480] and permits the proposed development plan. The intent of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the guidelines outlined per consultation with City of Ottawa staff.

**Figure 1: Location Plan**



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## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Background  
February 11, 2020

### 2.0 BACKGROUND

Documents referenced in preparation of the design for the 105-109 Henderson Avenue development include:

- Geotechnical Investigation – 105-109 Henderson Avenue, McIntosh Perry, March 2018.
- City of Ottawa Sewer Design Guidelines, City of Ottawa, October 2012.
- City of Ottawa Design Guidelines – Water Distribution, City of Ottawa, July 2010.
- City of Ottawa Technical Bulletin ISBT-2018-01 Revision to Ottawa Sewer Design Guidelines, March 2018
- City of Ottawa Technical Bulletin ISDTB-2014-01, Revision to Ottawa Design Guidelines Water February 2014
- City of Ottawa Technical Bulletin PIEDTB -2016-01, September 6, 2016

### 3.0 WATER SUPPLY SERVICING

#### 3.1 BACKGROUND

The proposed development comprises one three storey residential apartment building attached to two existing two storey dwellings, complete with associated infrastructure, and an amenity area. The site is located on the east side of Henderson Avenue, south of Osgoode Street. The site will be serviced via a 50mm building service connection to the existing 200mm dia. watermain within the Henderson Avenue ROW at the western boundary of the site. The property is located within the City's Pressure Zone 1W. Ground elevations of the site are approximately 69.7m. Under normal operating conditions, hydraulic gradelines vary from approximately 106.5m to 115.5m as confirmed through boundary conditions as provided by the City of Ottawa (see **Appendix A.3**).

#### 3.2 WATER DEMANDS

Water demands for the development were estimated using the Ministry of Environment's Design Guidelines for Drinking Water Systems (2008). A daily rate of 350 L/cap/day has been applied for the population of the proposed site. Population densities have been assumed as 1.4 pers./bachelor units, 2.1 pers./two-bedroom units, and 3.1 pers./three-bedroom units. See **Appendix A.1** for detailed domestic water demand estimates.

The average day demand (AVDY) for the entire site was determined to be 0.19 L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY (residential property), which equals 0.49 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY, totaling 1.07L/s.

Ordinary construction was considered in the assessment for fire flow requirements according to the FUS Guidelines. The FUS Guidelines indicate that low hazard occupancies include apartments, dwellings, dormitories, hotels, and schools, and as such, a low hazard occupancy / limited combustible building contents credit was applied. Based on calculations per the FUS Guidelines (**Appendix A.2**), the maximum required fire flows for this development are 150 L/s (9,000L/min).

#### 3.3 PROPOSED SERVICING

Per the boundary conditions provided by the City of Ottawa and based on an approximate elevation on-site of 69.7m, adequate flows are available for the subject site with pressures ranging from 36.8m (52.3 psi) to 45.8m (65.1 psi). The values are within the normal operating pressure range as defined by the City of Ottawa design guidelines for water distribution (50-80psi).

Using boundary conditions for the proposed development under maximum day demands and the calculated fire flow requirement of 9,000/min(or 14,000) per the FUS methodology, it can be confirmed that the system will maintain a residual pressure of approximately the required 140 kPa (20 psi). The above demonstrates that the existing watermain within Henderson Street can provide

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## **SERVICING REPORT – 105 - 109 HENDERSON AVENUE**

Water Supply Servicing  
February 11, 2020

adequate fire and domestic flows in excess of flow requirements for the subject site. Existing hydrants are located approximately 76m south and 68m north of the subject site.

### **3.4 SUMMARY OF FINDINGS**

The proposed development is located in an area of the City's water distribution system that has sufficient capacity to provide both the required domestic and emergency fire flows. Based on boundary conditions as provided by City of Ottawa staff, fire flows are available for this development based on FUS guidelines and as per the City of Ottawa water distribution guidelines.



## 4.0 WASTEWATER SERVICING

### 4.1 BACKGROUND

The site will be serviced via an existing 250mm diameter sanitary sewer situated within the Henderson Avenue ROW (see **Drawing SSP-1**). It is proposed to make one 135mm diameter service lateral connection to the existing sewer to service the proposed site.

### 4.2 DESIGN CRITERIA

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP's Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewers:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- Minimum size – 200mm dia. for residential areas
- Average Wastewater Generation – 350L/cap/day
- Peak Factor – 4.0 (Harmon's)
- Extraneous Flow Allowance – 0.28 l/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m
- Average Apartment Population Density – 1.4 pers./one bedroom unit
- Average Apartment Population Density – 2.1 pers./two bedroom unit
- Average Apartment Population Density – 3.1 pers./three bedroom unit

### 4.3 PROPOSED SERVICING

The proposed site will be serviced by gravity sewers which will direct the wastewater flows (approx. 0.65 L/s with allowance for infiltration) to the existing 250mm diameter sanitary sewer. The proposed drainage pattern is detailed on **Drawing SSP-1**. A sanitary sewer design sheet for the proposed service lateral is included in **Appendix B.1**. Full port backwater valves are to be installed on all sanitary services within the site to prevent any surcharge from the downstream sanitary sewer from impacting the proposed property.

## **5.0 STORMWATER MANAGEMENT**

### **5.1 OBJECTIVES**

The objective of this stormwater management plan is to determine the measures necessary to control the quantity/quality of stormwater released from the proposed development to criteria established during the pre-consultation/zoning process, and to provide sufficient detail for approval and construction.

### **5.2 SWM CRITERIA AND CONSTRAINTS**

Criteria were established by combining current design practices outlined by the City of Ottawa Design Guidelines (2012), and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

#### **General**

- Use of the dual drainage principle (City of Ottawa).
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff. (City of Ottawa)
- Assess impact of 100 year event outlined in the City of Ottawa Sewer Design Guidelines on major & minor drainage system (City of Ottawa)
- The proposed site is not subject to quality control criteria due to the predominantly developed neighborhood and distance from the storm sewer outfall (City of Ottawa).

#### **Storm Sewer & Inlet Controls**

- Size storm sewers to convey at minimum the 2 year storm event under free-flow conditions using City of Ottawa I-D-F parameters (City of Ottawa).
- Site discharge rates for each storm event to be restricted to 2-year storm event pre-development rates.
- Proposed site to discharge the proposed 675mm diameter storm sewer within the Henderson Avenue ROW at the western boundary of the subject site (City of Ottawa).
- 100-year Storm HGL to be a minimum of 0.30 m below building foundation footing (City of Ottawa).

## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Stormwater Management  
February 11, 2020

### Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30m above the 100-year water level (City of Ottawa)
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35m (City of Ottawa)
- Provide adequate emergency overflow conveyance off-site (City of Ottawa)

## 5.3 STORMWATER MANAGEMENT

The intent of the stormwater management plan presented herein is to mitigate any negative impact that the proposed site will have on the existing combined sewer infrastructure, while providing adequate capacity to service the subjected site. The site was subdivided into subcatchments (subareas) tributary to stormwater controls as defined by the location of inlet control devices. A summary of subareas and runoff coefficients is provided in **Appendix C**, and **Drawing SD-1** indicates the stormwater management subcatchments.

### 5.3.1 Allowable Release Rate

Based on consultation with City of Ottawa staff, the peak post-development discharge from the subject site is to be limited to that of the 2-year event discharge under pre-development conditions, to a maximum discharge coefficient  $C$  of 0.4, and reduced further by estimated peak sanitary discharge from the site. The predevelopment release rate for the area has been determined using the rational method based on the criteria above. A time of concentration for the predevelopment area (10 minutes) was assigned based on the relatively small site and its proximity to the existing drainage outlet for the site. Peak flow rates have been calculated using the rational method as follows:

$$Q = 2.78 CiA$$

Where:  $Q$  = peak flow rate, L/s

$A$  = drainage area, ha

$I$  = rainfall intensity, mm/hr (per Ottawa IDF curves)

$C$  = site runoff coefficient

The target release rate for the site is summarized in **Table 1** below:

**Table 1: Target Release Rates**

Design Storm	Target Flow Rate (L/s)	Less Peak Sanitary Discharge of 0.64L/s (L/s)
All Events	5.62	4.97

## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Stormwater Management  
February 11, 2020

### 5.3.2 Storage Requirements

The site requires quantity control measures to meet the restrictive stormwater release criteria. It is proposed that rooftop storage via restricted roof release and inlet-control devices in combination with sub-surface storage be used to reduce site peak outflow to target rates. The Modified Rational Method(MRM) was employed to assess the rate of runoff generated on the roofs and uncontrolled areas during post-development conditions. The sub-surface storage volume required to fully capture the 100-year storm event was designed base on PCSWMM modeling.

#### 5.3.2.1 Rooftop Storage

It is proposed to retain stormwater on the building rooftops by installing restricted flow roof drains. The following calculations assume the roof will be equipped with standard Watts Model R1100 Accuflow Roof Drains.

Watts Drainage "Accutrol" roof drain weir data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Accutrol" weir has been used as an example only, and that other products may be specified for use, provided that the total roof drain release rate is restricted to match the maximum rate of release indicated in **Table 2**, and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater. Proposed drain release rates vary between two roof tops and have been calculated based on the Accutrol weirs set to the minimum allowable opening. Storage volume and controlled release rate are summarized in **Table 2**:

**Table 2: 100 Year Summary of Roof Controls**

Area ID	Area (m <sup>2</sup> )	Depth (mm)	Discharge (L/s)	Volume Stored (m <sup>3</sup> )
Roof 1	246	139	1.3	8.3
Roof 2	78	131	0.6	2.2

#### 5.3.2.2 Uncontrolled Catchments

Due to grading constraints, some subcatchments were designed without a storage component and flow offsite uncontrolled. **Table 3** summarizes the peak uncontrolled 2 and 100-year catchment release rates for the two subcatchments.

**Table 3: Peak Uncontrolled 2-Year and 100-Year Release Rates**

Area ID	Area (ha)	2-year Q release (L/s)	100-year Q release (L/s)
UNC-1	0.007	1.26	2.92

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## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Stormwater Management  
February 11, 2020

UNC-2	0.002	0.07	0.17
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### 5.3.2.3 Subsurface Storage

The stormwater management design for the site directs runoff collected in roof drains and on site catchbasins to an underground storage system consisting of three 900mm diameter HDPE pipes. Outflow from the storage system will be controlled by an IPEX Tempest LMF 45 Inlet Control Device (ICD) located in CB 1 immediately downstream of the storage system. The three 900mm diameter HDPE pipes, 300mm diameter PVC pipe, and two catch basins have the capacity to store 14.8 m<sup>3</sup> of runoff. The system will release by gravity to the proposed 675mm diameter storm sewer to the southwest along Henderson Avenue.

It is proposed to maintain a separate building connection to the Henderson storm sewer for building foundation drains/weeping tile to ensure operation of the rainwater tank does not impact perimeter drainage of the building foundation.

Although the Modified Rational Method is an acceptable method for determining underground storage requirements for a site of this size, the City of Ottawa has asked that a dynamic model be produced to determine the storage requirements based on a different set of parameters and design methodology. As such, a PCSWMM model was employed to determine the peak volume required to be stored in the underground storage system. The ICD was sized based on the available target release rate from the site during the 100-year storm event. It should be noted that the IPEX Tempest LMF 45 ICD has been used as an example only, and that alternative products may be specified for use, provided that the discharge rate is restricted to match the 1.9 L/s allowable sub-surface release rate, and that sufficient storage is available to meet the resulting volume of detained stormwater.

Downstream water levels were considered to be at the receiving sewer obvert immediately downstream of the proposed tank. Refer to calculations included as part of **Appendix C** for details.

Modeling parameters and results are included in **Appendix C.3. Table 4** provides a summary of the results from the PCSWMM model. The model results differ from those produced by the Modified Rational Method which is to be expected given that each tool employs different design methods (static vs dynamic) based on differing input parameters, design storms and hydrology.

## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Stormwater Management  
February 11, 2020

**Table 4: 100 Year Storage Requirement and Release Rate Based on PCSWMM**

Areas Tributary to Proposed Storage Tank with Controlled Release Rate	100 Year Required Subsurface Volume (m <sup>3</sup> )	100 Year Available Subsurface Volume (m <sup>3</sup> )	100 Year Release Rate (L/s)
TANK	14.0	14.8	1.9

### 5.3.3 Results

**Table 5** demonstrates that the proposed stormwater management plan provides adequate attenuation storage to meet the very restrictive target peak outflow rates for the site.

**Table 5: Summary of Total 100 Year Event Release Rates**

	100-Year Peak Discharge (L/s)
Uncontrolled	3.09
Controlled –Surface	1.90
<b>Total</b>	<b>4.99</b>
<b>Target</b>	<b>4.97</b>

## **6.0 GRADING AND DRAINAGE**

The proposed development site measures approximately 0.07 ha in area. The topography across the site is sloped, and currently drains both to the east and west of the site with overland flow roughly split between the Henderson Street ROW and rear yards to the northeast. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements (see **Section 10.0**) for the site and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes for flows deriving from storm events in excess of the maximum design event to existing Henderson Avenue based on existing drainage patterns as depicted in **Drawing GP-1**.

Utilities  
February 11, 2020

## **7.0 UTILITIES**

As the subject site lies within a mature developed residential community, Hydro, Bell, Gas and Cable servicing for the proposed development should be readily available. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities, along with determination of any off-site works required for redevelopment, will be finalized after design circulation.

## **8.0 APPROVALS**

Environmental Compliance Approvals (ECAs, formerly Certificates of Approval (CofA)) with Ontario Ministry of Environment, Conservation and Parks (MECP) under the Ontario Water Resources Act is forthcoming. It is expected that a direct submission ECA will be required for approval of the proposed building service connections and stormwater management system, as the sewers within the right-of-way are upstream of an existing combined sewer along Somerset Street East. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site development.

Requirement for a MECP Permit to Take Water (PTTW) for sewer construction dewatering and building footing excavation will be confirmed by the geotechnical consultant.



## **9.0 EROSION CONTROL DURING CONSTRUCTION**

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at proper time to avoid flooding.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

9. Verification that water is not flowing under silt barriers.
10. Clean and change silt traps at catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, straw bales and other erosion control structures.

## SERVICING REPORT – 105 - 109 HENDERSON AVENUE

Geotechnical Investigation and Environmental Assessment  
February 11, 2020

# 10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical Investigation Report was prepared by McIntosh Perry on March 2018. The report summarizes the existing soil conditions within the subject area and construction recommendations. For details which are not summarized below, please see the original McIntosh Perry Report.

A subsurface investigation was conducted and concluded that the site consists of topsoil underlain by fill material and followed by silty clay. A moisture content was observed to increase at a depth of 35-4.0m in clay.

The required pavement structure for proposed hard surfaced areas are outlined in **Table 5** below:

**Table 6: Pavement Structure – Residential Driveway**

Thickness (mm)	Material Description
50	Surface - Superpave 12.5, Design Category C, PG 32-58
250	Base – OPSS Granular A

Conclusions  
February 11, 2020

## **11.0 CONCLUSIONS**

### **11.1 WATER SERVICING**

Based on the supplied boundary conditions for existing watermain and estimated domestic and fire flow demands for the subject site, it is anticipated that the proposed servicing in this development will provide sufficient capacity to sustain both the required domestic demands and emergency fire flow demands of the proposed site. Fire flows greater than those required per the FUS Guidelines are available for this development.

### **11.2 SANITARY SERVICING**

The proposed sanitary sewer network is sufficiently sized to provide gravity drainage of the site. The proposed site will be serviced by a gravity sewer service lateral which will direct wastewater flows (approx. 0.65 L/s) to the existing 250mm dia. sanitary sewer within the Henderson Avenue ROW at the western boundary of the property. The proposed drainage outlet has sufficient capacity to receive sanitary discharge from the site.

### **11.3 STORMWATER SERVICING**

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. An on-site sub-surface storage system and connected ICD has been proposed to limit peak storm sewer inflows to downstream storm sewers to predevelopment levels as determined by City of Ottawa staff. The downstream receiving sewer has sufficient capacity to receive runoff volumes from the site based on pre-consultation through City of Ottawa staff.

### **11.4 GRADING**

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects the recommendations in the Geotechnical Investigation Report prepared by McIntosh Perry. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

### **11.5 UTILITIES**

Utility infrastructure exists within overhead lines within the Henderson Avenue ROW at the western boundary of the proposed site. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation.

Conclusions  
February 11, 2020

## **11.6 APPROVALS/PERMITS**

An MECP Environmental Compliance Approval is expected to be required for the subject site given that the storm and sanitary sewer outlets for the site are upstream of an existing combined sewer along Somerset Street East. Requirements for a Permit to Take Water (PTTW) are not anticipated. Need for a PTTW for sewer construction dewatering and building footing excavation will be confirmed by the geotechnical consultant. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site development. No other approval requirements from other regulatory agencies are anticipated.