

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

Project # 160401351



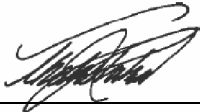
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TC United Group

Prepared by:
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May 7, 2018

Sign-off Sheet

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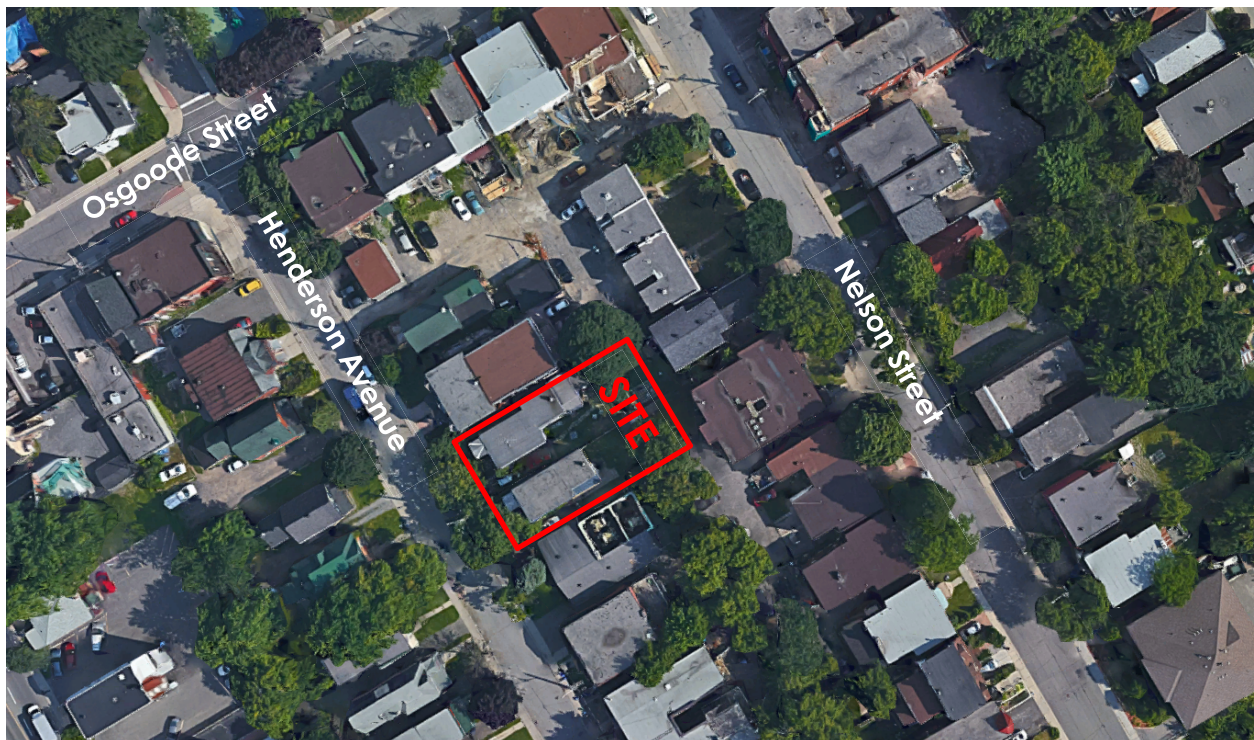
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Introduction
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1.0 INTRODUCTION

Stantec Consulting Ltd. has been commissioned by TC United Group to prepare a servicing study in support of Site Plan Control submission of the proposed development located at 135 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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Background
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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

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 0.48 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY, totaling 1.06L/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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Water Supply Servicing
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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 via proposed on-line manhole 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 MOE'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. 0.64 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).

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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 Modified Rational Method was employed to assess the rate and volume of runoff generated during post-development conditions. 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	5.38	4.74

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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.

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 have been calculated based on the Accutrol weir settings at 1/4 open or less. Storage volume and controlled release rate are summarized in **Table 2**:

Table 2: 100 Year Summary of Roof Controls

Area ID	Area (m ²)	Depth (mm)	Discharge (L/s)	Volume Stored (m ³)
Roof 1	246	132	1.8	6.5
Roof 2	78	127	0.6	1.6

5.3.2.2 Subsurface Storage

The post-development conditions will assume the roof and rear amenity space of the apartment buildings be discharge to the rainwater tank complete with a IPEX Tempest LMF 40 Inlet Control Device(ICD) sized to reduce peak outflow from the proposed site (tank details are included in **Appendix C** as an example only, alternative products may be specified for use that meet the design criteria). The precast concrete water holding tank has a maximum capacity of 16.5 m³ and has been calculated to have a maximum head of 1.20m. The rainwater tank will release by gravity to the proposed 675mm diameter storm sewer to the southwest along Henderson Avenue. A backflow preventer will be installed to prevent sewer discharge from entering the tank in the event of surcharge of the receiving sewer. Should the tank discharge ICD become blocked, flows will spill from the tank grate overland to the southwest of the property.

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It is proposed to maintain a separate building connection to the storm sewer for building foundation drains/weeping tile to ensure operation of the rainwater tank does not impact perimeter drainage of the building foundation. The modified rational method was employed to determine the peak volume stored in the rainwater tank. 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 40 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 1.47 L/s allowable tank release rate, and that sufficient tank storage is available to meet the resulting volume of detained stormwater.

Table 3 summarizes the estimated storm release rates and storage volumes during the 2 and 100 events.

Table 3: 2 and 100 Year Peak Surface Volume and Controlled Discharge Summary

Control Structure	ICD Size	2-Year Event			100-Year Event		
		Discharge (L/s)	Vrequired (m3)	Vavailable (m3)	Discharge (L/s)	Vrequired (m3)	Vavailable (m3)
Tank	LMF 40	1.48	3.48	16.50	1.48	12.23	16.50

The design head used to determine restricted flow rates through the proposed ICD was measured at 150 mm from the bottom of the storage tank up to the top and the tank was assumed to be full. 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.

5.3.3 Results

Table 4 demonstrates that the proposed stormwater management plan provides adequate attenuation storage to meet the very restrictive target peak outflow rates for the site.

Table 4: Summary of Total 2 and 100 Year Event Release Rates

	2-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled	1.41	3.27
Controlled –Surface	1.48	1.48
Total	2.62	4.75
Target	4.74	4.74

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
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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 (MOECC) 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 MOE 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.

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Geotechnical Investigation and Environmental Assessment
May 7, 2018

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 5: 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
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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. 0.64 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 rainwater tank 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
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11.6 APPROVALS/PERMITS

An MOECC 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.