

**Servicing Report – 144 Renfrew
Avenue**

Project # 160401237



Prepared for:
TC United Group

Prepared by:
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Sign-off Sheet

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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 144 Renfrew Avenue. The site is situated southeast of the intersection of Bronson Avenue and Renfrew Avenue within the City of Ottawa. The proposed development would replace an existing two-storey detached multi-unit building with a three-storey apartment unit comprising 13 total residential units and commercial space. The site location is shown as **Figure 1** below. The 0.04ha (0.10acre) site is presently zoned TM (Traditional Mainstreet Zone), which 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 144 Renfrew Avenue development include:

- Geotechnical Investigation – 144 Renfrew Avenue - Proposed Low-Rise Residential Building, Paterson Group Consulting Engineers, November 3, 2017.
- City of Ottawa Sewer Design Guidelines, City of Ottawa, October 2012.
- City of Ottawa Design Guidelines – Water Distribution, City of Ottawa, July 2010.
- Renfrew Avenue and Imperial Avenue Road, Sewer and Watermain Reconstruction (Contract ISD15-5062, Drawing 17002-12), Stantec Consulting Ltd., January 2017.

3.0 WATER SUPPLY SERVICING

3.1 BACKGROUND

The proposed development comprises one three-storey residential apartment building, complete with associated infrastructure and access areas. The site is located on the south side of Renfrew Avenue immediately west of the intersection with Bronson Avenue. The site will be serviced via a 50mm building service connection to an existing 200mm diameter watermain to be installed as part of reconstruction works (City of Ottawa project number ISD15-5062) within the Renfrew Avenue ROW at the northern boundary of the site. The property is located within the City's Pressure Zone 1W. Average ground elevations of the site are approximately 72.1m. Under normal operating conditions, hydraulic gradelines vary from approximately 106.7m to 117.5m as confirmed through boundary conditions as provided by the City of Ottawa and based on reconstructed watermain from Bronson to Lyon (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) and the Ottawa Design Guidelines – Water Distribution (2010). A daily rate of 350 L/cap/day has been applied for the population of the proposed site. Population densities have been assumed as 3.1 pers./three bedroom apartment unit, 2.1 pers./two bedroom apartment unit and 1.4 pers./one bedroom apartment units. See **Appendix A.1** for detailed domestic water demand estimates. Additionally, commercial and office domestic demands have been estimated at 50,000L/ha/day of floor area.

The average day demand (AVDY) for the entire site was determined to be 0.11 L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY for residential areas and 1.5 times the AVDY for commercial areas, which sums to 0.28 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY for residential areas and 1.8 times the MXDY for commercial areas, totaling 0.61 L/s.

Wood frame 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 minimum required fire flows for this development are 200 L/s (12,000L/min).

3.3 PROPOSED SERVICING

Per the boundary conditions provided by the City of Ottawa and based on an approximate elevation on-site of 72.1m, adequate flows are available for the subject site with pressures ranging

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from 34.6m (49.2psi) to 45.4m (64.6psi). This pressure range is within the guidelines of 40-80 psi based on Ottawa's Design Guidelines for Water Distribution.

Using boundary conditions for the proposed development under maximum day demands and a fire flow requirement of 12,000L/min per the FUS methodology, it can be confirmed that the system will maintain a residual pressure of approximately 47.5 psi; which is in excess of the required 140 kPa (20 psi). The above demonstrates that the existing watermain within Renfrew Avenue can provide adequate fire and domestic flows in excess of flow requirements for the subject site. An existing hydrant is located on the opposite side of Renfrew Avenue, immediately 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 375mm diameter combined sewer situated within the Renfrew Avenue ROW at the northern boundary of the site, and is to be installed as part of reconstruction works (City of Ottawa project number ISD15-5062) within the Renfrew Avenue region (see **Drawing SP-1**). It is proposed to make one 150mm diameter service lateral connection via monitoring manhole to the existing service stub drop-off for 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 Residential – 4.0 (Harmon's)
- Peak Factor Commercial – 1.5 (Harmon's)
- Extraneous Flow Allowance – 0.28 l/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m
- Population density for single-bedroom apartments – 1.4 pers./apartment
- Population density for two-bedroom apartments – 2.1 pers./apartment
- Population density for three-bedroom apartments – 3.1 pers./apartment

4.3 PROPOSED SERVICING

The proposed site will be serviced by gravity sewers which will direct the wastewater flows (approx. 0.45 L/s with allowance for infiltration) to the existing 375mm diameter combined sewer. 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 sewer main 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 the Rideau River Subwatershed, 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 small site size and land usage of the development, as well as connection to a managed combined sewer (City of Ottawa).

Storm Sewer & Inlet Controls

- Size on-site 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 with a maximum pre-development C coefficient of 0.4 (City of Ottawa).
- Peak discharge rates during wet weather events to be further reduced by peak calculated sanitary discharge from the site (City of Ottawa)
- Proposed site to discharge the existing 375mm diameter combined sewer within the Renfrew Avenue ROW at the 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.2**, 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 runoff coefficient C of 0.4, and reduced further by the estimated peak sanitary discharge from the site. Based on historical photographs for the region, the site was previously occupied by a sizeable 2 ½ storey dwelling with substantial paved areas and driveway prior to 2014. As such, the predevelopment release rate for the area has been determined using the maximum runoff coefficient of 0.4. 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. C coefficient values have been increased by 25% for the post-development 100-year storm event based on MTO Drainage Manual recommendations. 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
All Events	3.50	3.05

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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 in combination with in pipe storage and sewers equipped with inlet control devices (ICDs) be used to reduce site peak outflow to target rates.

5.3.2.1 Rooftop Storage

It is proposed to retain stormwater on portions of 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 for subcatchment BLDG 1 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. Both controlled and uncontrolled roof drains will be directed to the downstream storage pipe. Storage volume and controlled release rate are summarized in **Table 2**, and uncontrolled release rates are summarized in **Table 3** :

Table 2: Control Roof Release Area (BLDG 1)

Design Storm	Depth (mm)	Discharge (L/s)	Volume Stored (m³)
2-Year	82	1.3	1.2
100-Year	139	1.3	5.5

Table 3: Uncontrolled Roof Release Area (BLDG 2)

Design Storm	Discharge (L/s)
2-Year	0.5
100-Year	1.0

5.3.2.2 Subsurface Storage

Per the modified rational method calculations included as part of **Appendix C.2**, the remainder of the site is to be directed towards a catch basin ‘T’, catch basin lead, 900mm diameter storage pipe and storm catchbasin manhole complete with an IPEX Tempest LMF model 50 ICD sized to meet the target peak discharge rate for the during the 100-year event. In order to control peak discharge from the subject site to within target levels, storage has been provided

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within the manhole, catch basin structure and 900mm diameter storage pipe in the amount of approximately 5.8m³. Storage volume and controlled release rate are summarized in **Table 3**:

Table 4: Controlled Tributary Area (CB500)

Design Storm	Design Head (m)	Discharge (L/s)	Static Ponding Depth (m)	V _{required} (m ³)	V _{available} (m ³)
2-Year	0.37	1.4	0.00	2.06	5.83
100-Year	0.86	2.1	0.00	5.74	5.83

5.3.2.3 Uncontrolled Areas

Due to grading restrictions, one subcatchment has been designed without a storage component. This catchment area discharges off-site uncontrolled to the adjacent Bronson Avenue. Peak discharges from uncontrolled areas have been considered in the overall SWM plan, and have been balanced through overcontrolling proposed site discharge rates to meet target levels.

Table 5: Uncontrolled Non-Tributary Area (UNC-1)

Design Storm	Discharge (L/s)
2-Year	0.3
100-Year	0.9

5.3.3 Results

Table 6 demonstrates the proposed stormwater management plan and demonstrates adherence to target peak outflow rates for the site.

Table 6: Summary of Total 2 and 100 Year Event Release Rates

	2-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled – Surface	0.3	0.9
Controlled – Subsurface (includes Roof drainage)	1.4	2.1
Controlled – Roof*	1.3	1.3
Uncontrolled – Roof*	0.5	1.0
Total	1.7	3.0
Target	3.0	3.0

*Roof drains directed to subsurface storage pipe.

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 0.04ha in area. The topography across the site is relatively flat, and currently drains from south to north, with overland flow generally being directed to the adjacent Renfrew Avenue and Bronson Avenue ROW. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, adhere to any geotechnical restrictions (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 Renfrew Avenue and Bronson Avenue depicted in **Drawing GP-1**.

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 within subsurface plant within the adjacent Renfrew and Bronson Avenue ROWs, and adjacent overhead utility lines south of the subject 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

Pre-consultation with Ontario Ministry of Environment (MOECC) staff concerning Environmental Compliance Approvals (ECAs, formerly Certificates of Approval (CofA)) under the Ontario Water Resources Act is forthcoming. It is expected that an ECA will be required for approval of stormwater management works to connect to the existing combined sewer on Renfrew Avenue. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for the site development.

Requirement for a MOE Permit to Take Water (PTTW) is unlikely for the site due to the limited size of excavations and low expected groundwater flow rate through the existing overburden as noted in the geotechnical report. The geotechnical consultant shall confirm at the time of application that a PTTW is not required.

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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 EC-DS-1** for the proposed location of silt fences and other erosion control structures.

10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical Investigation Report was prepared by Paterson Group on November 3, 2016. 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 Paterson report.

Subsurface soil conditions within the subject area were determined from 2 test pits distributed across the site. The investigation concluded that the site consisted of topsoil with rootlets underlain by brown silty sand, gravel, cobbles and trace debris across the site ranging from 1.7-1.8m below the ground surface. Bedrock is anticipated to lie within 1 and 3 m below surface elevation. Groundwater elevations are anticipated to occur between 2 and 3m below ground surface.

The required pavement structure of the proposed hard surfaced areas is outlined in **Table 6** and **Table 7**.

Table 7: Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
300	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.

11.0 CONCLUSIONS

11.1 EROSION CONTROL

The contractor shall implement best management practices, to provide for protection of the area drainage system and the receiving watercourse during construction activities.

11.2 WATER SERVICING

Based on the supplied boundary conditions for existing watermains 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.

11.3 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. 0.45 L/s) to the existing 375mm dia. combined sewer within the Renfrew Avenue ROW at the northern boundary of the property. The proposed drainage outlet has sufficient capacity to receive sanitary discharge from the site based.

11.4 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. Rooftop storage, controlled roof release, and subsurface storage via large diameter storage pipe has been proposed to limit peak storm sewer inflows to downstream combined sewers to 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.

11.5 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 Paterson Group Consulting Engineers. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

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11.6 UTILITIES

Utility infrastructure exists within overhead lines and subsurface plant within the Renfrew and Bronson Avenue ROWs, and at the southern 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.

11.7 APPROVALS/PERMITS

An MOECC Environmental Compliance Approval is expected to be required for the subject site as the on-site sewers and stormwater management system will connect and directly discharge to an existing combined sewer. 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.