

**Servicing Report – 159 Forward
Avenue**



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CAHDCO

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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 CAHDCO to prepare a servicing study in support of Site Plan Control submission of the proposed development located at 159 Forward Avenue. The site is situated northeast of Lyndale Avenue and Forward Avenue intersection within the City of Ottawa. The proposed development would replace an existing three-storey apartment complex with a new three-storey apartment building comprised of 31 total residential units. The site location is shown as **Figure 1** below. The 0.16ha site is presently zoned R4 (Residential Fourth Density 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 159 Forward Avenue development include:

- Geotechnical Desktop Review –Proposed Residential Development- 159 Forward Avenue, Paterson Group Consulting Engineers., April 24, 2020.
- City of Ottawa Design Guidelines – Water Distribution, Infrastructure Services Department, City of Ottawa, First Edition, July 2010
- City of Ottawa Sewer Design Guidelines, 2nd Ed., City of Ottawa, October 2012
- Technical Bulletin ISTB-2018-01 Revision to Ottawa Design Guidelines – Sewer, City of Ottawa, March 2018
- Technical Bulletin ISTB-2018-02 Revision to Ottawa Design Guidelines – Water Distribution, City of Ottawa, March 2018

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 northeast side of the Forward Avenue and Lyndale Avenue intersection. The site will be serviced via a 50mm building service connection to the existing 200mm dia. watermain within the Forward Avenue ROW at the western boundary of the site. The property is located within the City's Pressure Zone 1W. Average ground elevations of the site are approximately 62.5m. Under normal operating conditions, hydraulic gradelines vary from approximately 107.5m to 114.8m as confirmed through boundary conditions as provided by the City of Ottawa (see **Appendix A.1**)

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 1.4 pers./one bedroom and bachelor apartment units, 2.1 pers./two-bedroom units and 3.1 pers./three-bedroom units. See **Appendix A.2** for detailed domestic water demand estimates.

The average day demand (AVDY) for the entire site was determined to be 0.25 L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY for residential areas, which sums to 0.63 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY for residential areas totaling 1.39 L/s.

The Ontario Building Code (OBC) was used to determine the fire flow required for the proposed site given that the proposed development only involves a water service connection. The building was considered to be of combustible construction, and as a residential apartment, the building falls under occupancy class C. Based on calculations per the OBC guidelines (see **Appendix A.3**), the minimum required fire flows for this development are 150 L/s (9,000 L/min). As a conservative assumption, the calculations do not consider the proposed vertical firewall between the building.

3.3 PROPOSED SERVICING

Domestic water supply pressures are required to range within the guidelines of 50-80 psi specified in the City of Ottawa Design Guidelines for Water Distribution. Maximum day demands rates must generate a residual pressure above the required minimum 140 kPa (20 psi).

Based on boundary conditions provided by the City of Ottawa and an approximate elevation of

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62.3m, adequate domestic water supply is available for the subject site with pressures ranging from 45.2m (64.3psi) to 54.7m (77.8psi). This pressure range is within the guidelines of 50-80 psi specified in the City of Ottawa Design Guidelines for Water Distribution.

The boundary conditions provided for the proposed development under maximum day demands demonstrate that a maximum flowrate of 150 L/s is available in order to have a residual pressure above the required minimum 20 psi. This demonstrates that sufficient fire flow is available for the proposed development.

The closest hydrant is located 9m to the west of the subject property and is within 90m of the proposed building as per City of Ottawa Water Distribution Design Guidelines.

3.4 SUMMARY OF FINDINGS

The proposed development is serviced by the City of Ottawa's water distribution system. The available water supply is sufficient to meet both domestic and fire protection requirements.

4.0 WASTEWATER SERVICING

4.1 BACKGROUND

The site will be serviced via an existing 250 mm diameter sanitary sewer situated within the Forward Avenue ROW at the eastern boundary of the site (see **Drawing SSP-1**). It is proposed to connect a 150mm diameter sanitary service lateral directly 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 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 – 280L/cap/day
- Peak Factor – 4.0 (Harmon's)
- Extraneous Flow Allowance – 0.33 l/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m
- Population density for single-bedroom and bachelor apartments – 1.4 pers./apartment
- Population density for two-bedroom apartments – 2.1 pers./apartment
- Population density for two-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. 0.86 L/s with allowance for infiltration) to the existing 250 mm diameter sanitary 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 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 (City of Ottawa).

Storm Sewer & Inlet Controls

- Size storm sewers to convey 5-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 5-year storm event pre-development rates with a maximum pre-development C coefficient of 0.5(City of Ottawa).
- Proposed site to discharge the existing 375mm diameter storm sewer within the Forward 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 0.30m (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 5-year event discharge under pre-development conditions, to a maximum runoff coefficient C of 0.5. 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. 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)
All Events	23.17

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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 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 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 setting at 50% open. Storage volume and controlled release rate are summarized in **Table 2**:

Table 2: Roof Control Area (BLDG)

Design Storm	Depth (mm)	Discharge (L/s)	Volume Stored (m ³)
5-Year	112.23	3.07	13.90
100-Year	148.85	3.76	31.38

Drainage from the roof will directly discharge to the existing 375mm storm sewer on Forward Avenue.

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 two catch basins with the most downstream catch basin complete with an IPEX Tempest HF 83mm Orifice ICD 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, a superpipe has been provided between two catch basins to provide storage volume in the amount of approximately 4.43m³. Storage volume and controlled release rate for the superpipe are summarized in **Table 3**.

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Table 3: Controlled Tributary Area (CB1)

Design Storm	Design Head (m)	Discharge (L/s)	Static Ponding Depth (m)	Orifice Type	V _{required} (m ³)	V _{available} (m ³)
5-Year	0.26	7.50	0.00	IPEX Tempest HF 83mm Orifice	1.34	4.43
100-Year	0.86	13.55	0.00		4.38	4.43

5.3.2.3 Uncontrolled Areas

Due to grading restrictions, one subcatchment area has been designed without a storage component. The catchment area discharges off-site uncontrolled to the adjacent Forward 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 4: Uncontrolled Non-Tributary Area (UNC-1)

Design Storm	Discharge (L/s)
5-Year	2.78
100-Year	5.96

5.3.3 Results

Table 5 demonstrates the proposed stormwater management plan and demonstrates adherence to target peak outflow rates for the site.

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

	5-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled – Surface	2.78	5.96
Controlled – Subsurface	7.50	13.55
Controlled – Roof	3.07	3.76
Total	13.35	23.27
Target	23.17	23.17

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 0.16ha in area. The topography across the site is relatively flat, and currently drains from west to east, with overland flow generally being directed to the adjacent Forward 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 is graded to provide an emergency overland flow route to Forward Avenue for storm flows exceeding those generated by the 100-year design storm.

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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 within subsurface plant and adjacent overhead utility lines within the Forward Avenue ROW. 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, Conservation and Parks (MECP) staff concerning Environmental Compliance Approvals (ECAs, formerly Certificates of Approval (CofA)) under the Ontario Water Resources Act is not expected to be a requirement for the development. The Rideau Valley Conservation Authority will 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.

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

10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical review was prepared by Paterson Group on April 24, 2020. The report summarizes the geotechnical design parameters and construction recommendations prior to completion of full geotechnical investigation. For details which are not summarized below, please see the original Paterson Group report.

Subsurface soil conditions were based on existing subsurface information in the vicinity and aerial mapping from previous geotechnical investigations. The soil stratigraphy is expected to consist of asphalt pavement structure, playground park fill, silty sand and/or native glacial till deposit. Bedrock is anticipated to occur approximately 3.1m below ground surface. Groundwater elevations are anticipated to occur below bedrock surface between 2.0m and 3.0m below ground surface. A proposed grade raise of less than 1m is acceptable given the soil conditions.

Table 6: Recommended 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.

Table 7: Recommended Pavement Structure – Heavy Duty Access Lanes

Thickness (mm)	Material Description
40	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
400	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 WATER SERVICING

Based on the supplied boundary conditions from the City 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.

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 to the existing 250 mm diameter sanitary sewer within the Forward 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. Rooftop storage and controlled roof release, and subsurface storage via a large diameter storage pipe has been proposed to limit peak storm sewer inflows to downstream storm sewers to predevelopment levels as determined by City of Ottawa staff. The storm flows from the site will be controlled to less than the 5-year storm event. 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 Review prepared by Paterson Group. 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 and subsurface plant within the Forward 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.

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11.6 APPROVALS/PERMITS

An MECP Environmental Compliance Approval is not expected to be required for the subject site. 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.