10 GARRISON STREET SERVICING AND STORMWATER MANAGEMENT REPORT

July 24, 2024

Prepared for:

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1 Introduction

Stantec Consulting Ltd. has been commissioned by Farzin Fararooni and Parya Peyman to prepare the following Servicing and Stormwater Management Report in support of Official Plan Amendment (OPA) and Zoning By-Law Amendment application for the proposed 3-storey residential development located at 10 Garrison Street in the City of Ottawa.

The 0.046 ha site is situated along the south side of Garrison Street, between Carleton Avenue and Western Avenue. The site is currently zoned R1MM and contains an existing one-and-half-storey residential building with a detached garage and trees. The site is bound by Garrison Street to the north, existing residential development to the east and south and an existing commercial development to the west as shown in **Figure 1.1** below.

Figure 1.1: Key Plan of Site

The proposed 0.046 ha site comprises of a three-storey low-rise residential building. AS Design Company Inc. has prepared a site plan dated June 3, 2024, which defines the proposed development (see **Appendix A.1**), while the unit type breakdown is listed in **Table 1.1** below.

Table 1.1: Unit Type Breakdown

Unit Type	Number
One-bedroom	6
Two-bedroom	4
Total	**10**

2 References

Documents referenced in preparing of this stormwater and servicing report for the 10 Garrison Street development include:

- *City of Ottawa Sewer Design Guidelines* (SDG), City of Ottawa, October 2012, including all subsequent technical bulletins
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010, including all subsequent technical bulletins
- *Design Guidelines for Drinking Water Systems*, Ministry of the Environment, Conservation, and Parks (MECP), 2008
- *Fire Protection Water Supply Guideline* for Part 3 in the Ontario Building Code, Office of the Fire Marshal (OFM), October 2020
- *Water Supply for Public Fire Protection*, Fire Underwriters Survey (FUS), 2020
- *Geotechnical Investigation – Proposed Low-Rise Apartment Building, 10 Garrison Street, Ottawa, ON, Paterson Group Inc, April 2024.*

3 Potable Water Servicing

3.1 Background

The proposed building is in Pressure Zone 1W of the City of Ottawa's Water Distribution System. The proposed development comprises of a 3-storey residential low-rise residential building consisting of 10 units. The proposed development will be serviced by a new single water service connection off Garrison Street.

3.2 Water Demands

3.2.1 POTABLE WATER DEMANDS

The City of Ottawa Water Distribution Guidelines (July 2010) and ISTB 2021-03 Technical Bulletin were used to determine water demands based on projected population densities for residential areas and associated peaking factors. The population was estimated using an occupancy of 1.4 persons per unit for one-bedroom apartments and 2.1 persons per unit for two-bedroom apartments. Based on the unit type breakdown in **Table 1.1**, the proposed building is estimated to have a total population of 17 persons.

A daily rate of 280 L/cap/day has been used to estimate average daily (AVDY) potable water demand for the residential units. Maximum day (MXDY) demands were determined by multiplying the AVDY demands by a factor of 2.5 for residential areas, while peak hourly (PKHR) demands were determined by multiplying the MXDY by a factor of 2.2 for residential areas. The estimated demand for the proposed residential building is summarized in **Table 3.1** below and detailed in **Appendix B.1**.

Table 3.1: Estimated Water Demands

Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
17	0.1	0.1	0.3

3.2.2 FIRE FLOW DEMANDS

Fire flow requirements were estimated using the Office of the Fire Marshal (OFM) fire protection water supply guidelines under the Ontario Building Code. The estimate is based on a combustible building without fire-resistance ratings. Required fire flows were determined to be 60.0 L/s (3,600 L/min). Detailed fire flow calculations per the Ontario Building Code are provided in **Appendix B.2**, while correspondence with the architect on the construction type are provided in **Appendix A.2**.

3.3 Level of Servicing

3.3.1 BOUNDARY CONDITIONS

The estimated domestic water and fire flow demands were used to define the level of servicing required for the proposed development from the municipal watermain and hydrants within the Garrison Street ROW. **Table 3.2** outlines the boundary conditions provided by the City of Ottawa on July 7th, 2024 (and attached in **Appendix B.3**).

Table 3.2: Boundary Conditions

	Connection at Garrison Street
Min. HGL (m)	108.3
Max. HGL (m)	115.0
Max. Day + Fire Flow (60 L/s) HGL (m)	103.8

3.3.2 ALLOWABLE DOMESTIC PRESSURES

The desired normal operating pressure range in occupied areas as per the City of Ottawa 2010 Water Distribution Design Guidelines is 345 kPa to 552 kPa (50 psi to 80 psi) under a condition of maximum daily flow and no less than 276 kPa (40 psi) under a condition of maximum hourly demand. Furthermore, the maximum pressure at any point in the water distribution should not exceed 689 kPa (100 psi) as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures greater than 552 kPa (80 psi) are anticipated in occupied areas.

The proposed finished floor elevation, 66.23 m, will serve as the ground floor elevation for the calculation of the residual pressures at ground level. As per the boundary conditions, the on-site pressures are expected to range from 412 kPa (59.8 psi) to 478 kPa (69.3 psi) under normal operating conditions, which are within the normal operating pressure range defined by the City of Ottawa as within 276 kPa (40 psi) to 552 kPa (80 psi). It is anticipated that booster pumps will not be required to service the building.

3.3.3 ALLOWABLE FIRE FLOW PRESSURES

The boundary conditions provided by the City of Ottawa indicate that the watermain within Cummings Avenue is expected to maintain a residual pressure of 37.6 m equivalent to 368 kPa (53.4 psi) under worst-case fire flow conditions. This demonstrates that the watermain and nearby hydrants can provide the required fire flows while maintaining a residual pressure of 20 psi.

3.3.4 FIRE HYDRANT COVERAGE

There is an existing hydrant in the proximity of the proposed development site, as shown in **Figure 3.1**. According to the NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02, a hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678

L/min. Hence, the required fire flow demands for the site can be achieved with HYD-01 alone. See **Appendix B.4** for fire hydrant coverage table calculations and NFPA Table 18.5.4.3.

Figure 3.1: Existing Fire Hydrant Coverage Map

3.4 Proposed Water Servicing

The development will be serviced via a single 50 mm building service connecting to the existing 150 mm diameter watermain on Garrison Street with a 50 mm isolation valve. The proposed water servicing is shown on **Drawing SSP-1**. Based on the City of Ottawa Water Design Guidelines and the provided boundary conditions, the existing 150 mm diameter watermain on Garrison Street can provide adequate fire and domestic flows for the subject site.

Confirmation of the service sizes to the building, and the water pressure within the building to meet building code requirements will be the responsibility of the mechanical engineering consultant at the building permit phase.

4 Wastewater Servicing

4.1 Background

The site will be serviced from the existing 250 mm diameter concrete sanitary sewer within Garrison Street. The existing dwelling has sanitary service lateral connections to the municipal sewer, which will be decommissioned and abandoned as shown in **Drawing EXRM-1**.

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 the estimated wastewater flow rates and to determine the size and location of the sanitary service lateral:

- 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 of sanitary sewer service = 135 mm
- Minimum grade of sanitary sewer service = 1.0 % (2.0 % preferred)
- Average wastewater generation = 280 L/person/day (per City Design Guidelines)
- Peak Factor = based on Harmon Equation; maximum of 4.0 (residential)
- Harmon correction factor = 0.8
- Infiltration allowance = 0.33 L/s/ha (per City Design Guidelines)
- Minimum cover for sewer service connections – 2.0 m
- Population density for one-bedroom and bachelor apartments – 1.4 persons/apartment
- Population density for one-bedroom with den and two-bedroom apartments – 2.1 persons/apartment

4.3 Wastewater Generation and Servicing Design

The estimated peak wastewater flow generated are based on the current site plan and unit breakdown as shown in **Table 1.1**. The anticipated wastewater peak flow generated from the proposed development is summarized in **Table 4.1** below.

Table 4.1: Estimated Peak Wastewater Flow

Peak Residential Wastewater Flow			Infiltration Flow (L/s)	Total Peak Flow (L/s)
Population	Peak Factor	Peak Flow (L/s)		
17	3.71	0.20	0.02	0.22

Sanitary sewage calculations are included in **Appendix C.1**. A full port backwater valve will be required for the proposed building in accordance with the Sewer Design Guidelines and will be coordinated with the building mechanical engineers at detailed design and building permit phases.

The anticipated peak wastewater flows for the proposed development were provided to the City of Ottawa staff on June 19th, 2024 (see **Appendix C.2**) to evaluate the adequacy of the receiving municipal sanitary sewer system in the vicinity of the site and downstream network. The City has confirmed that the 250 mm diameter sanitary sewers in Garrison Street has sufficient capacity for the proposed sanitary peak flows.

4.4 Proposed Sanitary Servicing

A 150 mm diameter sanitary building service, complete with full port backwater valve as per City standard S14.1, is recommended to service the proposed development. Final sizing of the lateral is to be confirmed by the mechanical consultant at detailed design and building permit phases. The proposed sanitary servicing is shown on **Drawing SSP-1**.

5 Stormwater Management and Servicing

5.1 Background

The existing storm servicing system along the boundaries of the site consists of catch basins (urban roadway section) along Garrison Street, with the drainage collected by the catch basins directed to the 375 mm diameter storm sewer within Garrison Street.

5.2 Stormwater Management (SWM) Criteria

The Stormwater Management (SWM) criteria were established by combining current design practices outlined by the City of Ottawa Sewer Design Guidelines (SDG) (October 2012), review of project pre-consultation notes with the City of Ottawa, 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 SDG)
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff (City of Ottawa SDG)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on the major and minor drainage systems (City of Ottawa SDG)

Storm Sewer & Inlet Controls

- Discharge for each storm event to be restricted at the roof only, so long it meets the 2-year pre-development discharge rate for the overall site with a maximum pre-development C coefficient of 0.5 (City of Ottawa pre-consultation and correspondence)
- The preferred stormwater system outlet for this site is the 375 mm diameter storm sewer within Garrison Street.
- T_c should be not less than 10 minutes (City of Ottawa SDG).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30 m above the 100-year water level (City of Ottawa SDG)
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35 m (City of Ottawa SDG)
- Provide adequate emergency overflow conveyance off-site with a minimum vertical clearance of 15 cm between the spill elevation and the ground elevation at the building envelope in the proximity of the flow route or ponding area (City of Ottawa SDG)

5.3 Existing Conditions

The 0.046 ha site area currently consists of a one and a half-storey residential building, a detached garage, grassed areas and trees. Based on the existing site surface conditions with the grassed areas dominating the existing site, the pre-development imperviousness of the proposed development area is calculated at 33 % (C = 0.43). Under existing conditions there are no controls in place to manage stormwater runoff and all runoff the from the site drains uncontrolled.

5.4 Stormwater Management Design

The Modified Rational Method is employed to assess the rate and volume of runoff anticipated during post-development rainfall runoff events. Based on the proposed Site Plan and preliminary Grading Plan, drainage area boundaries are defined, Runoff coefficient values are then assigned to each drainage area based on the anticipated finished surface condition (e.g. asphalt, concrete, gravel, grass, etc.). Runoff coefficients for each surface type are assigned based on City of Ottawa SDG and accepted practices. A summary of subareas and runoff coefficients is provided in **Table 5.1** below. Further details can be found in **Appendix D.1**, while **Drawing SD-1** illustrates the proposed sub-catchments.

Table 5.1: Summary of Subcatchment Areas

Catchment Areas	C	A (ha)	Catchment Type	Outlet
BLDG	0.90	0.022	Tributary	375 mm Storm Sewer (Garrison Street)
WEST	0.53	0.017	Non-Tributary	Garrison Street ROW
EAST	0.33	0.007	Non-Tributary	Garrison Street ROW
Total Site	**0.68**	**0.046**	-	-

5.4.1 ALLOWABLE RELEASE RATE

Based on pre-consultation with City of Ottawa staff, the design criterion for the peak post-development discharge from the subject site is to be limited to the discharge resulting from the 2-year pre-development event using a site runoff coefficient of C= 0.5 or the pre-development C, whichever is less. Based on the calculated C value of 0.43 for the existing site condition, a runoff coefficient of 0.43 is used to establish the allowable release rate.

Given the limitations of site grading based on the existing topography, and the existing uncontrolled runoff condition for the site, it is proposed that the post-development drainage pattern for the yards be allowed to continue to drain uncontrolled to the Garrison Street ROW. The resultant areas that can be restricted to meet the allowable release rate is limited to roof area at 0.022 ha.

The allowable release rate for the site is determined using the modified rational method based on the criteria above. A time of concentration of 10 minutes is used based on the small site size, its proximity to the existing drainage outlet, and recommendations provided during pre-consultation with the City.

The peak pre-development flow rates shown in **Table 5.2** have been calculated using the rational method as follows:

$$Q = 2.78\,(C)(I)(A)$$

Where:
$Q = peak\ flow\ rate, L/s$
$C = site\ runoff\ coefficient$
$I = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ IDF\ curves)$
$A = drainage\ area, ha$

Table 5.2: Peak Pre-Development Flow Rates

Design Storm	Pre-Development Flow Rate (L/s) for C=0.43, A=0.046 ha, t_c = 10 min
2-year	**4.3**

For the proposed development, the pre-development flow rate of 4.3 L/s is used as the overall site target to assess water quantity control measures to be applied.

5.4.1.1 Uncontrolled Areas

In discussions with City of Ottawa Staff, shown in **Appendix D.3,** the City has given the go-ahead to control only the roof portion of the development so long as the remainder of the uncontrolled site is directed towards the Garrison Street ROW, which will not be subjected to the allowable release rate.

Both uncontrolled subcatchments, WEST and EAST, effectively drain north, uncontrolled, ultimately to the Garrison Street ROW via surface flows. The peak uncontrolled discharges are summarized in **Table 5.3** below.

Table 5.3: Peak Post-Development Discharge Rates from the Uncontrolled Areas

Design Storm	WEST Discharge (L/s)	EAST Discharge (L/s)
2-year	1.9	0.4
100-Year	5.6	1.4

The proposed uncontrolled runoff condition from 0.024 ha of the site is considered an improvement over the existing condition during which the full site, at 0.046 ha, contributes uncontrolled runoff to the existing public drainage system.

5.4.2 QUANTITY CONTROL

Based on the change in overall imperviousness of the site, expressed by the calculated runoff coefficients, quantity control measures are needed to manage stormwater runoff. Considering the limitations of the site area, rooftop storage with restricted flow roof drains is proposed. A spreadsheet

approach using the MRM is used to determine the storage volume required for the rooftop and is provided in **Appendix D.1,** while the storm sewer design sheet is provided in **Appendix D.2**.

The total volume stored on the rooftop is tabulated in **Table 5.4** below. The proposed rooftop storage can attenuate peak flows from the roof for a release at a controlled flow rate of **1.2 L/s**.

Table 5.4: Roof Control Areas

Design Storm	Discharge (L/s)	Volume Stored (m^3)
2-Year (Roof)	0.9	2.4
100-Year (Roof)	1.2	8.2

5.4.3 QUALITY CONTROL

No water quality control criteria apply for the site.

5.5 Results

Through the MRM analysis, the controlled 2-year post-development release rate of 0.9 L/s meets the pre-development release rate of 4.3 L/s. In addition, the 100-year post-development storm event release rate will meet the design criteria established through correspondence with the City of Ottawa. The uncontrolled portions of the site with runoff draining to the adjacent ROWs are consistent with the existing drainage pattern.

Relative to the existing site condition with 100 % uncontrolled runoff, the proposed post-development flow control for 0.022 ha of the site is anticipated to reduce the total stormwater discharge from the site. The data summarized in **Table 5.5** indicates that the proposed SWM plan reduces the overall site storm runoff release rate around by 17 % compared to the pre-development C=0.43, 100-year design storm event.

Table 5.5: Comparison of Pre- and Post-Development Release Rates

Drainage areas	2-year Discharge (L/s)	100-Year Discharge (L/s)
Pre-Development Total (0.046 ha)	4.3	9.9
Post-Development		
Tributary (0.022 ha)	0.9	1.2
Non-Tributary (0.024 ha)	2.4	7.0
Post-Development Total (0.046 ha)	3.3	8.2
Difference (Post minus Pre)	**-1.0 (-23.3 %)**	**-1.7 (-17.2 %)**

5.6 Proposed Stormwater Servicing

Rooftop storage will be provided onsite and discharged from the proposed development at a controlled flow rate of **1.2 L/s** to the existing 375 mm diameter storm sewer via a 200 mm diameter storm service

lateral. The final sizing and layout of the infrastructure, including the method(s) of flow attenuation, shall be confirmed at detailed design. See **Drawings SSP-1** and **SD-1** for the proposed preliminary locations of the stormwater infrastructure.

The mechanical engineering consultant is responsible to confirm sizing of the services to the building, that the appropriate backwater valve requirements are satisfied, and that the roof and foundation drainage systems are adequate for accommodating the 100-year design storm conditions.

6 Site Grading

The proposed re-development site measures approximately 0.046 ha in area and consists of grassed areas with trees and a residential dwelling with a detached garage. The topography across the site generally slopes from the south to north boundary. A preliminary grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, as detailed in **Section 5**, adhere to any grade raise restrictions for the site, match existing grades at the property line, and provide for minimum cover requirements for storm and sanitary sewers where possible.

Based on review of the existing grading of adjacent properties, the site may receive some minor external drainage. The proposed development will require a section of retaining wall along the western limit to match property line grades.

7 Utilities

Overhead (OH) hydro-wires run through the site diagonally from the northern boundary and to a utility pole at the southwest corner of the site. All utilities within the work area will require relocation during construction. The existing utility poles within the public right of way are to be protected during construction.

As the site is surrounded by existing residential and commercial development, Hydro Ottawa, Bell, Rogers, and Enbridge servicing is readily available through existing infrastructure to service this site. The exact size, location, and routing of utilities will be finalized after design circulation. Existing overhead wires and utility plants may need to be temporarily moved/reconfigured to allow sufficient clearance for the movement of heavy machinery required for construction. The relocation of existing utilities will be coordinated with the individual utility providers upon design circulation.

8 Approvals

The proposed development lies on a private site under singular ownership; drains to an approved separated sewer outlet; and is not intended to service industrial land or land uses. Therefore, the site is exempt from the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process under O.Reg. 525/98.

For ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). It is possible that groundwater may be encountered during the foundation excavation on this site. A minimum of two to four weeks should be allotted for completion of the EASR registration and the preparation of the Water Taking and Discharge Plan by a Qualified Person as stipulated under O.Reg. 63/16. An MECP Permit to Take Water (PTTW), which is required for dewatering volumes exceeding 400,000L/day, is not anticipated for the site.

9 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the 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 geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing ECDS-1** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, sediment traps, and other erosion control measures.

10 Geotechnical Investigation

A geotechnical investigation for 10 Garrison Street was completed by Paterson on April 23, 2024. Field testing consisted of two hand augers excavated to a maximum depth of 1.3 m below the existing ground surface with one of the hand augers advancing three times to confirm the refusal depth. The information obtained from the field investigation will guide the site design and identify development constraints.

The subsurface profile at the test locations consists of topsoil underlain fill material and bedrock. The fill was noted to consist of brown silty sand with gravel, traces of topsoil, organics, clay and plastic debris. Bedrock was observed to consist of grey limestone with weathering and fracturing in the upper 3 to 5 m. No permissible grade raise restriction or tree planting setbacks were identified.

Groundwater observations were recorded in hand auger holes during the current geotechnical investigation. All test holes were noted dry at the time of the investigation. The long-term groundwater table is anticipated to occur below the bedrock surface, at depths lower than the anticipated founding depth, though seasonal variations in the water table should be expected.

The subject site is considered suitable for the proposed building, and it is recommended that it be founded on conventional shallow footings placed on a clean, surface-sounded bedrock bearing surface.

The recommended rigid pavement structure is provided as follows in **Table 10.1** below.

Table 10.1: Recommended Pavement Structure

Material	Thickness (mm)	
	Car Parking	Access Lanes
Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete	50	40
Binder – HL-8 or Superpave 19.0 Asphaltic Concrete	-	50
Base – OPSS Granular A Crushed Stone	150	150
Sub-Base – OPSS Granular B Type II	300	450

Refer to the full geotechnical report attached as part of the submission package for further details.

11 Conclusions

11.1 Water Servicing

Based on the supplied boundary conditions for existing watermains and calculated domestic and fire flow demands for the subject site, the adjacent watermain on Garrison Street has sufficient capacity to sustain the required domestic demands and fire flow demands for the site. The proposed development will be serviced by the existing 150 mm watermain on Garrison Street. Sizing of the water service laterals are to be confirmed by the mechanical engineering consultant.

11.2 Sanitary Servicing

The proposed sanitary sewer service will consist of a 150 mm diameter sanitary service lateral connected to the existing 250 mm diameter sanitary sewer on Garrison Street. Existing connections are to be abandoned and full port backwater valves installed on the proposed sanitary service within the site. The municipal sanitary sewers have the downstream capacity required to receive the projected peak wastewater flows from the proposed development. Sizing of the service lateral is to be confirmed by the mechanical consultant.

11.3 Stormwater Servicing and Management

The proposed storm service will consist of the roof and foundation drains directing stormwater to the existing 375 mm diameter storm sewer in Garrison Street via a 200 mm diameter storm service lateral. The City has agreed that discharge from only the rooftop be controlled with the remainder towards the Garrison Street ROW per existing conditions. The proposed rooftop storage will meet the design criteria established from the correspondence with the City. The final sizing of the infrastructure shall be confirmed at detailed design. Sizing of the storm sewer laterals, and the appropriate backwater valve requirements are to be confirmed by the mechanical engineering consultant.

11.4 Grading

Preliminary site grading is designed to provide an adequate emergency overland flow route and drainage to support the proposed storm sewer network and SWM systems. The site may receive a small amount of external drainage from neighbouring properties. The yards drain uncontrolled to the Garrison Street right-of-way as per existing conditions.

11.5 Erosion and Sediment Control During Construction

Erosion and sediment control measures and best management practices outlined in this report and included in the drawing set will be implemented during construction to reduce the impact on adjacent properties, the public ROW, and existing facilities.

11.6 Geotechnical Investigation

Based on the Geotechnical Investigation, the site is considered suitable for the proposed building, and it is recommended that it be founded on conventional shallow footings placed on a clean, surface-sounded bedrock. The long-term groundwater table is anticipated to occur below the bedrock surface, at depths lower than the anticipated founding depth, though seasonal variations in the water table should be expected.

11.7 Utilities

The site is situated within an established neighbourhood, hence existing utility infrastructure is readily available to service the proposed development.

11.8 Approvals

This site is exempt from the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process under O.Reg. 525/98. For the expected dewatering needs of 50,000 to 400,000 L/day, the proponent will need to register on the MECP's Environmental Activity and Sector Registry (EASR). A Permit to Take Water, for dewatering needs in excess of 400,000 L/day, is not anticipated for this site.

APPENDICES

Appendix A Background

A.1 Site Plan by AS Design Company

1385 WELLINGTON ST W.

1391 WELLINGTON ST W.

1395 WELLINGTON ST W.

1399 WELLINGTON ST W.

102 WESTERN AVE

100 WESTERN AVE

345 CARLETON AVE

10 GARRISON ST
LOW-RISE APARTMENT BLDG.
(10 UNITS)

CURRENT ZONING: RIMM
PROPOSED ZONING: R4-UC
LOT AREA: 4,997.44 SF
FOOTPRINT: 2,400 SF

BASEMENT FLOOR = 2,392 SF
FIRST FLOOR = 2,400 SF
SECOND FLOOR = 2,400 SF
THIRD FLOOR = 2,400 SF

TOTAL BUILDING AREA = 7,200 SF
(BASEMENT, PORCH AND BALCONIES N.I.C.)

GARBAGE ROOM
9'-3"X6'-0"
(55 SQ.FT)
(12.2 M3)

BICYCLE STORAGE

GARBAGE ROOM

AVG. GRADE
+65.11

R.Y. AREA = 1,500 SF
SOFT LANDSCAPED AREA = 776 SF
PERCENTAGE OF SOFT LANDSCAPED = 51.73%

F.Y. AREA = 503 SF
SOFT LANDSCAPED AREA = 204 SF
PERCENTAGE OF SOFT LANDSCAPED = 40%

LINE OF REAR YARD SETBACK (7.5M)

LINE OF EXISTING ONE STOREY HOUSE TO BE DEMOLISHED

LINE OF EXISTING DETACHED GARAGE TO BE DEMOLISHED

LINE OF BALCONY ABOVE

LINE OF CANOPY ABOVE

LINE OF FRONT YARD SETBACK (3.07M AVG)

LINE OF INTERIOR SIDE YARD SETBACK (1.5M)

WINDOW WELL

PORCH
8'-0"x6'-6"

RAMP

RETAINING WALL

PUBLIC WALKWAY

GARRISON ST

ZONING INFORMATION: R4-UC

LOT WIDTH:
- REQUIRED: 15M
- PROVIDED: 15.24M

LOT AREA:
- REQUIRED: 450M²
- PROVIDED: 464.6M²

BUILDING HEIGHT:
- REQUIRED: 11M
- PROVIDED: 11M

FRONT YARD SETBACK:
- REQUIRED: 3.07M (AVERAGE)
- PROVIDED: 3.07M (AVERAGE)

INTERIOR SIDE YARD SETBACK:
- REQUIRED: 1.5M
- PROVIDED:
- EAST: 1.5M
- WEST: 1.5M

REAR YARD SETBACK:
- REQUIRED: 7.5M
- PROVIDED: 9.15M

FRONT YARD SOFT LANDSCAPING:
- REQUIRED: 40% OF THE F.Y.
- PROVIDED: 40% OF THE F.Y.

REAR YARD SOFT LANDSCAPING:
- REQUIRED: 50% OF THE R.Y.
- PROVIDED: 51.73% OF THE R.Y.

PARKING SPACES:
- REQUIRED: 0
- PROVIDED: 0

BICYCLE PARKING SPACES:
- REQUIRED: 5 P.S.
- PROVIDED: 6 P.S.

PERCENTAGE OF 2 BEDROOM DWELLING UNITS:
- REQUIRED: 25%
- PROVIDED: 40% (4 UNITS)

FRONT FACADE FENESTRATION REQUIREMENTS:
- REQUIRED: 25%
- PROVIDED: 30%

SITE PLAN

SCALE : 3/32" = 1'-0"

METERS: 0 2 4 6 8
FEET: 0' 5' 10' 20'

A2 — DWG No:

DWG BY:	AS
CHECKED:	AS
DATE:	2023-06-05

PROJECT No. : 2023-01

4	FLR. PLANS REVIEW	2023	07-18
5	FLR. PLANS REVIEW	2023	08-29
6	FLR. PLANS REVIEW	2023	08-31
7	ELEV. REVIEW	2023	09-22
8	PRE-CONSULT.	2023	10-04
9	LANDSCAPE DESIGN	2024	04-11
10	PRE-CONSULT.	2024	06-03

PROJECT TITLE: 10 GARRISON ST

AS Design Company Inc.
The Passion of Design
A: 32 Hockett Street Ottawa, ON, K1V 0P7
T: (613) 700 0387
E: AMJD@ASdesigncompany.com

A.2 Confirmation of Building Construction Type

From: Kilborn, Kris
To: Amjd Shendi
Cc: Renon, Ava
Subject: RE: Pre-Consultation Follow-up - 10 Garrison - PC2023-0300
Date: Tuesday, June 18, 2024 1:17:31 PM
Attachments: image001.jpg

Thanks Amjd much appreciated.
Did you have any geotechnical work done on the site or geotechnical investigation.

We would capture this in our servicing report if so.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Lead

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.

Please note our reception is on the 3rd floor.

From: Amjd Shendi <amjd@asdesigncompany.com>
Sent: Tuesday, June 18, 2024 10:00 AM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Renon, Ava <Ava.Renon@stantec.com>
Subject: Re: Pre-Consultation Follow-up - 10 Garrison - PC2023-0300

Hi Kris,

The building is a part 9 building with combustible construction (Conventional wood framing construction). It has 6 one-bedroom apartments and 4 two-bedrooms apartments.

Regards,

On Tue, Jun 18, 2024 at 8:45 AM Kilborn, Kris <kris.kilborn@stantec.com> wrote:

Good morning Amjd

Are you able to provide me with the unit breakdowns (1,2,3 bedroom units) we are submitting some info to City and require to know.
Also, if you could confirm the classification / type of construction for the building. This is required for fire flow determination.

We are hoping to submit this to the City today and would appreciate if you could forward along the information as soon as possible.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Lead

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.

Please note our reception is on the 3rd floor.

Appendix B Water Demands

B.1 Domestic Water Demands

10 Garrison Street - Domestic Water Demand Estimates

Based on Site Plan from AS Design Company Inc. (2024-06-03)

Project 160401910 Designed by: AR

Date: 2024-06-18 Checked by: MW

Revision: 01

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:		
1 Bedroom	1.4	ppu
2 Bedroom	2.1	ppu
Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines and Technical Bulletin ISTB-2021-03:		
Residential	280	L/cap/day

Unit Type	Number of Residential Units	Population	Avg Day Demand		Max Day Demand [1]		Peak Hour Demand [1]	
			(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
1 Bedroom	6	8	1.6	0.03	4.1	0.07	9.0	0.15
2 Bedroom	4	8	1.6	0.03	4.1	0.07	9.0	0.15
Total Site :	**10**	**17**	**3.3**	**0.1**	**8.2**	**0.1**	**18.0**	**0.3**

Notes:

1 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 x average day demand rate
peak hour demand rate = 2.2 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

B.2 Fire Flow Demands (OBC)

Fire Flow Calculations as per Ontario Building Code 2006 (Appendix A)

Job#	160401910	Designed by:	AR
Date	18-Jun-24	Checked by:	MW
		Description:	3-storey residential

$Q = KVS_{tot}$

Q = Volume of water required (L)

V = Total building volume (m^3)

K = Water supply coefficient from Table 1

S_{tot} = Sotal of spatial coefficeint values from property line exposures on all sides as obtained from the formula

$S_{tot} = 1.0 + [S_{side1} + S_{side2} + S_{side3} + S_{side4}]$

1	Type of construction	Building Classification		Water Supply Coefficient
	combustible without Fire-Resistance Ratings	A-2, B-1, B-2, B-3, C, D		23

2	Area of one floor (m^2)	number of floors	height of ceiling (m)	Total Building Volume (m^3)
	222.97	3	2.8	1,853
	222.22	1	2.73	607

3	Side	Exposure Distance (m)	Spatial Coefficient	Total Spatial Coeffiecient
	North	3.07	0.5	2
	East	1.53	0.5	
	South	9.15	0.085	
	West	1.51	0.5	

4	Established Fire Safety Plan?	Reduction in Volume (%)		Total Volume Reduction
	no	0%		0%

5		**Total Volume 'Q' (L)**
		113,160
		Minimum Required Fire Flow (L/min)
		3,600

Notes:

1. Site Plan and Floor Plans provided by AS Design Company Inc. dated 2024-06-03.
2. Exposure distance based on the site plan provided.

B.3 Boundary Conditions

From: Fawzi, Mohammed
To: Renon, Ava
Cc: Wu, Michael; Kilborn, Kris
Subject: RE: 10 Garrison Street Boundary Conditions
Date: Wednesday, July 3, 2024 10:16:13 AM
Attachments: ~WRD2349.jpg
10 Garrison Street June 2024.pdf

Hi Ava,

The following are boundary conditions, HGL, for hydraulic analysis at 10 Garrison Street (zone 1W) assumed connected to the 152mm watermain on Garrison Street (see attached PDF for location).

Minimum HGL: 108.3 m

Maximum HGL: 115.0 m

Max Day + Fire Flow (OBC-60 L/s): 103.8m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager, Infrastructure - Gestionnaire de projet, Projets d'infrastructure
Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Renon, Ava <Ava.Renon@stantec.com>
Sent: Friday, June 28, 2024 1:27 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Wu, Michael <Michael.Wu@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 10 Garrison Street Boundary Conditions

Good afternoon Mohammed,

I just wanted to touch base with you regarding the boundary condition request for 10 Garrison Street and check in to see if there were any updates.
Thank you for your time looking into this for us.

Regards,

Ava Renon
Summer Student

ava.renon@stantec.com

Stantec
300-1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, June 19, 2024 2:47 PM
To: Renon, Ava <Ava.Renon@stantec.com>
Cc: Wu, Michael <Michael.Wu@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 10 Garrison Street Boundary Conditions

Hi Ava,

Thank you for your email, this is to confirm your request has been sent.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager, Infrastructure - Gestionnaire de projet, Projets d'infrastructure
Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Renon, Ava <Ava.Renon@stantec.com>
Sent: Wednesday, June 19, 2024 11:31 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Wu, Michael <Michael.Wu@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: 10 Garrison Street Boundary Conditions

Good morning,

We are requesting boundary conditions for the proposed development at 10 Garrison Street. The proposed development comprises of a three-story low-rise residential building and is projected to service a total population of 17 persons.

The boundary conditions requested are for the watermain on Garrison Street, and the water demand for the proposed development are as follows:

- Average Day Demand: 0.1 L/s (3.3 L/min)
- Maximum Day Demand: 0.1 L/s (8.2 L/min)
- Peak Hour Demand: 0.3 L/s (18.0 L/min)
- Fire Flow Demand: 60.0 L/s(3600 L/min)

Attached are the calculation sheets and site map for your reference.

We appreciate your time looking into this for us, and please feel free to reach out if you have any questions or comments.

Thanks,

Ava Renon

Stantec
300-1331 Clyde Avenue
Ottawa ON K2C 3G4

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B.4 Hydrant Coverage

Stantec	Project: **10 Garrison Street**	160401910
	TABLE 1: FIRE HYDRANT COVERAGE TABLE	
	Revision: 01	Prepared By: MW
	Revision Date: 2024-07-19	Checked By:

Description	Hydrants[1]			Total Available Fire Flow (L/min)	Total Required Fire Flow[2] (L/min)
	HYD-01				
10 Garrison Street					
Distance from building (m)	62.9			-	-
Maximum fire flow capacity[3] (L/min)	5,678			**5,678**	3,600

NFPA 1 Table 18.5.4.3	
Distance to Building (m)	Maximum Capacity (L/min)
≤ 76	**5,678**
> 76 and ≤ 152	**3,785**
> 152 and ≤ 305	**2,839**

Notes:

1. Hydrant locations as per GeoOttawa accessed on July 19, 2024. Refer to Figure 3-1 in report
2. See FUS Calculations, Appendix B.2 for fire flow requirements.
3. See NFPA 1 Table 18.5.4.3 for maxiumim fire flow capacity of hydrants by distance to building.

Appendix C Sanitary

C.1 Sanitary Calculation Sheet

SUBDIVISION:

10 Garrison Street

DATE: 2024-07-25
REVISION: 1
DESIGNED BY: AR
CHECKED BY: MW

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401910

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / 1 BEDROOM	1.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / 2 BEDROOM	2.1	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / 3 BEDROOM	3.1				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS 1 BEDROOM	2 BEDROOM	3 BEDROOM	POP.	CUMULATIVE AREA	POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
Proposed Site	BLDG	SAN1	0.046	6	4	0	17	0.05	17	3.71	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.046	0.046	0.015	0.22	10.5	150	PVC	SDR 35	1.00	15.3	**1.42%**	0.86

Notes
1. Unit breakdown provided by AS Design Company Inc. and dated June 3, 2024
2. Site to outlet to existing 250 mm dia. sanitary sewer on Garrison Street.
3. Entire site area considered as potential source of infiltration.

C.2 Correspondence with City on Sanitary Sewer Capacity

From: Fawzi, Mohammed
To: Renon, Ava
Cc: Wu, Michael; Kilborn, Kris
Subject: RE: 10 Garrison Street Sanitary Capacity
Date: Wednesday, June 19, 2024 2:52:26 PM

Hi Ava,

No concerns with respect to an additional 0.22L/s of sanitary peak flow.

Thanks Ava.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager, Infrastructure - Gestionnaire de projet, Projets d'infrastructure
Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Renon, Ava <Ava.Renon@stantec.com>
Sent: Wednesday, June 19, 2024 11:21 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Wu, Michael <Michael.Wu@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: 10 Garrison Street Sanitary Capacity

Good morning,

We would like to confirm if the downstream sanitary sewer has the capacity to take an additional 0.22 L/s of sanitary peak flow for the proposed development at 10 Garrison Street. The proposed development comprises of a three-storey low-rise residential building and is projected to service a total of 17 persons.

Attached is the sanitary calculation sheet and site map for your review, and please let us know if you have any questions or comments.

Thanks,

Ava Renon

Stantec
300-1331 Clyde Avenue
Ottawa ON K2C 3G4

'

'

Appendix D Stormwater Servicing

D.1 Modified Rational Method Sheet

Stormwater Management Calculations

File No: **160401910**
Project: **10 Garrison Street**
Date: **09-Jul-24**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Uncontrolled - Non-Tributary	EAST	Hard	0.001		0.9	0.001		
		Soft	0.006		0.2	0.001		
		Subtotal		0.007			0.002	0.330
Uncontrolled - Non-Tributary	WEST	Hard	0.008		0.9	0.007		
		Soft	0.009		0.2	0.002		
		Subtotal		0.017			0.009	0.530
Roof	BLDG	Hard	0.022		0.9	0.020		
		Soft	0.000		0.2	0.000		
		Subtotal		0.022			0.020	0.900
Total				**0.046**			**0.031**	
Overall Runoff Coefficient= C:								**0.68**

Total Roof Areas	**0.022 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.000 ha**
Total Tributary Area to Outlet	**0.022 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.024 ha**
Total Site	**0.046 ha**

Stormwater Management Calculations

Project #160401910, 10 Garrison Street
Modified Rational Method Calculations for Storage

2 yr Intensity $I = a/(t + b)^c$
City of Ottawa

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.0463
C: 0.43

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.81	**4.25**

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: EAST — Uncontrolled - Non-Tributary
Area (ha): 0.01
C: 0.33

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	0.49	0.49		
20	52.03	0.33	0.33		
30	40.04	0.26	0.26		
40	32.86	0.21	0.21		
50	28.04	0.18	0.18		
60	24.56	0.16	0.16		
70	21.91	0.14	0.14		
80	19.83	0.13	0.13		
90	18.14	0.12	0.12		
100	16.75	0.11	0.11		
110	15.57	0.10	0.10		
120	14.56	0.09	0.09		

Subdrainage Area: WEST — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 0.53

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	1.92	1.92		
20	52.03	1.30	1.30		
30	40.04	1.00	1.00		
40	32.86	0.82	0.82		
50	28.04	0.70	0.70		
60	24.56	0.62	0.62		
70	21.91	0.55	0.55		
80	19.83	0.50	0.50		
90	18.14	0.45	0.45		
100	16.75	0.42	0.42		
110	15.57	0.39	0.39		
120	14.56	0.36	0.36		

Subdrainage Area: BLDG — Roof
Area (ha): 0.02 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	4.29	0.88	3.40	2.04	90.1	0.00
20	52.03	2.90	0.92	1.98	**2.38**	95.7	0.00
30	40.04	2.23	0.92	1.32	2.37	95.5	0.00
40	32.86	1.83	0.90	0.93	2.23	93.3	0.00
50	28.04	1.56	0.88	0.68	2.04	90.2	0.00
60	24.56	1.37	0.86	0.51	1.83	86.7	0.00
70	21.91	1.22	0.84	0.38	1.61	83.1	0.00
80	19.83	1.11	0.82	0.29	1.39	79.5	0.00
90	18.14	1.01	0.79	0.22	1.17	76.0	0.00
100	16.75	0.93	0.77	0.17	1.01	71.5	0.00
110	15.57	0.87	0.74	0.13	0.86	67.0	0.00
120	14.56	0.81	0.71	0.10	0.73	62.7	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	95.71	0.10	0.92	2.38	8.92	0.00

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	0.022 ha			
Total 2yr Flow to Sewer	1 L/s	0	0 m^3	Ok
Non-Tributary Area	0.024 ha			
Total 2yr Flow Uncontrolled	2 L/s			
Total Area	0.046 ha			

Project #160401910, 10 Garrison Street
Modified Rational Method Calculations for Storage

100 yr Intensity $I = a/(t + b)$
City of Ottawa

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.0463
C: 0.43

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: EAST — Uncontrolled - Non-Tributary
Area (ha): 0.01
C: 0.41

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	1.43	1.43		
20	119.95	0.96	0.96		
30	91.87	0.74	0.74		
40	75.15	0.60	0.60		
50	63.95	0.51	0.51		
60	55.89	0.45	0.45		
70	49.79	0.40	0.40		
80	44.99	0.36	0.36		
90	41.11	0.33	0.33		
100	37.90	0.30	0.30		
110	35.20	0.28	0.28		
120	32.89	0.26	0.26		

Subdrainage Area: WEST — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 0.66

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	5.59	5.59		
20	119.95	3.76	3.76		
30	91.87	2.88	2.88		
40	75.15	2.35	2.35		
50	63.95	2.00	2.00		
60	55.89	1.75	1.75		
70	49.79	1.56	1.56		
80	44.99	1.41	1.41		
90	41.11	1.29	1.29		
100	37.90	1.19	1.19		
110	35.20	1.10	1.10		
120	32.89	1.03	1.03		

Subdrainage Area: BLDG — Roof
Area (ha): 0.02 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	11.07	1.14	9.93	5.96	130.3	0.00
20	119.95	7.44	1.20	6.23	7.48	140.4	0.00
30	91.87	5.70	1.23	4.47	8.05	144.2	0.00
40	75.15	4.66	1.23	3.43	**8.22**	145.4	0.00
50	63.95	3.96	1.23	2.73	8.20	145.2	0.00
60	55.89	3.47	1.23	2.24	8.06	144.3	0.00
70	49.79	3.09	1.22	1.87	7.85	142.9	0.00
80	44.99	2.79	1.21	1.58	7.60	141.2	0.00
90	41.11	2.55	1.19	1.35	7.31	139.3	0.00
100	37.90	2.35	1.18	1.17	7.01	137.3	0.00
110	35.20	2.18	1.17	1.01	6.69	135.2	0.00
120	32.89	2.04	1.15	0.88	6.37	133.0	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	145.36	0.15	1.23	8.22	8.92	0.00

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	0.022 ha			
Total 100yr Flow to Sewer	1 L/s	0	0 m^3	Ok
Non-Tributary Area	0.024 ha			
Total 100yr Flow Uncontrolled	7 L/s			
Total Area	0.046 ha			

Stormwater Management Calculations

Project #160401910, 10 Garrison Street
Modified Rational Method Calculations for Storage

Total 2yr Flow	4 L/s
Target	4 L/s

Project #160401910, 10 Garrison Street
Modified Rational Method Calculations for Storage

Total 100yr Flow	8 L/s
Target	4 L/s

D.2 Storm Sewer Design Sheet

Stantec

10 Garrison Street

DATE: 2024-07-23
REVISION: 1
DESIGNED BY: MW
CHECKED BY:

FILE NUMBER: **160401910**

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS = B

LOCATION			DRAINAGE AREA																						PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
BLDG	BLDG	100	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	1.2	1.2	1.2	11.6	200	200	CIRCULAR	PVC	-	1.00	33.3	**3.60%**	1.05	0.41	0.47

D.3 Correspondence with City on Quantity Control

Wu, Michael

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: July 16, 2024 14:04
To: Wu, Michael
Cc: Kilborn, Kris; Moroz, Peter
Subject: RE: 10 Garrison Street SWM

Hi Michael,

This is to confirm we can proceed with controlling the roof to the 2-year and allow the remainder of the site to drain uncontrolled.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager, Infrastructure - Gestionnaire de projet, Projets d'infrastructure
Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: Thursday, July 11, 2024 2:50 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: 10 Garrison Street SWM

Good afternoon, Mohammed:

Hope this email finds you well.

We are working on the stormwater analysis for the proposed site at 10 Garrison Street and based on the pre-consultation, the 100-year post-development stormwater discharge is to be restricted to the 2-year pre-development, which has been calculated to be around 4.3 L/s, on account of the perviousness of the existing site (C=0.43) and small area (0.047 ha).

While there is rooftop storage proposed, the post-development stormwater discharge can only be controlled to 1.2 L/s at most. The remainder, comprising of the yards, will drain uncontrolled towards the Garrison Street ROW, but unless the yards are fully pervious (C=0.2), the site will

miss the target discharge during the 100-year event by 4-5 L/s, and given the small site area, storage options are limited.

There has been precedence established from similar site projects I've worked on in the past, where the City permitted **only** the roof area be controlled while the remainder of the site drains uncontrolled towards the adjacent ROWs per existing conditions. In fact, 211 Armstrong Street is one such project and it has nearly identical features as 10 Garrison Street as follows:

- Pre-development C=0.43
- Restricting to 2-year pre-development discharge = 4.3 L/s
- Site area of 0.047 ha
- Building area of 0.02 ha

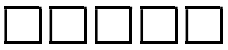
Attached are the stormwater calculations for your reference. Please let us know if we can control **only** the rooftop discharge with the remainder of the site draining uncontrolled towards the Garrison Street ROW per existing conditions.

Thanks,

Michael Wu EIT
Civil Engineering Intern, Community Development

Direct: 1 (613) 738-6033
Michael.Wu@stantec.com

Stantec
300-1331 Clyde Avenue
Ottawa ON K2C 3G4



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Appendix E Background Studies

PATERSON GROUP

Consulting Engineers
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
Tel: (613) 226-7381

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Temporary Shoring Design
Retaining Wall Design
Noise and Vibration Studies

patersongroup.ca

April 23, 2024
File: PG7051-LET.01

Mr. Farzin Fararooni
10 Garrison Street
Ottawa, Ontario
K1Y 2T8

Attention: **Mr. Farzin Fararooni**

Subject: **Geotechnical Investigation**
Proposed Low-Rise Apartment Building
10 Garrison Street – Ottawa, Ontario

Dear Sir,

Further to your request and authorization, Paterson Group (Paterson) completed a geotechnical investigation for the proposed low-rise apartment building to be located at the aforementioned site. This report presents our findings and recommendations from a geotechnical perspective for the proposed project.

Based on the available drawings, it is understood that the proposed low-rise apartment building will consist of a three-storey building with one basement level. Associated walkways, landscaped areas are also anticipated as part of the development. The development is anticipated to be municipally serviced.

Paterson completed a geotechnical investigation to determine the subsoil and groundwater conditions at this site by means of test holes and provide geotechnical recommendations pertaining to design of the proposed development including construction considerations which may affect the design at the subject site.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

3.0 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is expected that the proposed building will be founded on conventional shallow footings placed on a clean, surface-sounded bedrock bearing surface.

Due to the shallow overburden thickness and anticipated founding level, bedrock removal will be required for the proposed building excavation. Bedrock removal may also be required for installation of site services, depending on the depth of the proposed utilities.

The above and other considerations are discussed in the following sections.

Due to the absence of a silty clay deposit within the subject site, the proposed development will not be subjected to a permissible grade raise restriction or tree planting setbacks.

Site Grading and Preparation

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

Existing foundation walls and other construction debris should be completely removed from the proposed building perimeter. Under paved areas, existing construction remnants, such as foundation walls should be excavated to a minimum of 1 m below final grade.

Due to the depth of bedrock and the anticipated founding level for the proposed building, all existing overburden material and construction debris should be excavated from within the proposed building footprint.

Bedrock Removal

Bedrock removal can be accomplished by hoe ramming where the bedrock is weathered and/or where only small quantities of the bedrock need to be removed. Sound bedrock may be removed by line drilling in conjunction with controlled blasting and/or hoe ramming.

Prior to considering blasting operations, the blasting effects on the existing services, buildings and other structures should be addressed.

Table 1 - 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, bedrock, or OPSS Granular B Type I or II material placed over fill, in-situ soil or bedrock.	

Table 2 - Recommended Pavement Structure – Access Lanes & Heavy Truck Parking Areas	
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
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, bedrock, or OPSS Granular B Type I or II material placed over fill, in-situ soil or bedrock.	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD using suitable vibratory equipment.

6.0 Recommendations

It is recommended that the following be carried out by Paterson once details of the proposed building have been prepared:

- ❑ Review detailed grading and servicing plans from a geotechnical perspective.
- ❑ Review of detailed plans pertaining to excavation, foundation drainage and waterproofing details, including for sump pit(s), if applicable.

It is a requirement for the foundation design data provided herein to be applicable that a material testing and observation program be performed by the geotechnical consultant. The following aspects of the program should be performed by Paterson:

- ❑ Review and inspection of the installation of the foundation drainage systems.
- ❑ Review of the bedrock surface at the time of excavation.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Observation of driving and re-striking of all pile foundations.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

All excess soils must be handled as per ***Ontario Regulation 406/19: On-Site and Excess Soil Management.***

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

7.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

A soil investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we request that we be notified immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Mr. Farzin Fararooni, or his agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

We trust that this information satisfies your requirements.

Paterson Group Inc.

Owen R. Canton, B.Eng.

Faisal I. Abou-Seido, P.Eng.

Attachments:

- ❑ Soil Profile and Test Data Sheets
- ❑ Symbols and Terms
- ❑ Analytical Testing Results
- ❑ Figure 1 – Key Plan
- ❑ Drawing PG7051-1 – Test Hole Location Plan

Report Distribution:

- ❑ Mr. Farzin Fararooni (e-mail copy)
- ❑ Paterson Group