



Stormwater Management and Servicing Report

Proposed Multi-Unit Commercial Development
5254 Bank Street
Ottawa, Ontario

Prepared for:

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1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Unpoised Architecture Inc. to complete a Stormwater Management Analysis and Servicing Brief for a proposed multi-unit commercial building development located at 5254 Bank Street in Ottawa, Ontario. The legal description of the property is Part of Lot 28, Concession 4 (Rideau Front), PIN 04327-0082, City of Ottawa.



Figure 1: Aerial View of Proposed Development

The site at 5254 Bank Street has approximately 23 metres of frontage along Bank Street and a depth of approximately 76 metres. The overall lot area is approximately **0.172 ha**.

Currently there is a 1-storey residential building and garage located at the front (East) of the property, and two barns located at the rear (West) of the property. An asphalt driveway provides access to the site from Bank Street. The asphalt driveway provides access to the residential dwelling and garage, which transitions to a gravel driveway providing access to the rear yard barns. The balance of the site is grassed area.

The development proposed consists of a multi-unit commercial development, consisting of multiple bays equipped with overhead doors for vehicular access. A driveway, branching off Bank Street, will provide vehicular access to all the bay doors. A parking lot will be proposed directly North of the driveway. The balance of the site will be grassed area and landscaping elements.



Due to the steep slope down on site from East to West, the West portion of the site will be built up with retaining wall.

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater considerations, LRL Associates Ltd. Should be advised to review the report recommendations.

2 EXISTING SITE AND DRAINAGE DESCRIPTION

The subject site measures 0.172ha and consists of a 1-storey residential building and garage located at the front (East) of the property, and two barns located at the rear (West) of the property. An asphalt driveway, providing entrance from Bank Street, provides access to the site.

The residential unit was serviced by municipal water. As no sanitary sewer is present along Bank Street adjacent to the property, the dwelling relied on a septic system for sanitary requirements.

As per the topographical survey provided by Farley, Smith and Denis Surveying LTD (dated April 24th, 2019), the site slopes down considerable from East to West, with a minor slope down from North to South. Elevations of the existing site range from 115.29m in the northeast corner and 113.64m at the southeast corner, down to 110.55m in the northwest corner and 109.81m at the southwest corner of the site.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-way:

Bank Street

- 406 mm diameter PVC watermain

3 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

Stormwater management

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity objectives will be achieved.

Water services

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow with the City of Ottawa.



- Describe the proposed water distribution network and connection to the existing system.

Sanitary services

- Calculate peak flow rates from the development.
- Describe the proposed sanitary system.

4 WATER SUPPLY AND FIRE PROTECTION

4.1 Existing Water Supply Services and Fire Hydrant Coverage

The subject property lies within the City of Ottawa 4C water distribution network pressure zone. Refer to **Appendix B** for the water network pressure zone map.

The subject property is located within proximity of an existing 406 mm dia. PVC watermain within Bank Street.

There are currently six (6) existing fire hydrants within close proximity to the property:

- 1) West side of Bank Street, approximately 6m North of North P/L
- 2) West side of Bank Street, approximately 93m North of North P/L
- 3) West side of Bank Street, approximately 215m North of North P/L
- 4) West side of Bank Street, approximately 87m South of South P/L
- 5) West side of Bank Street, approximately 202m South of South P/L
- 6) West side of Bank Street, approximately 303m South of South P/L

Refer to **Appendix B** for the location of fire hydrants.

4.2 Water Supply Servicing Design

The subject property is proposed to be serviced via 19mm diameter Type K copper service lateral connected to the 406mm diameter PVC watermain located within Bank Street.

Refer to Site Servicing Plan C401 in **Appendix E** for servicing layout.

Table 1 summarizes the City of Ottawa Design Guidelines design parameters utilized in the preparation of the water demand estimate.

Table 1: City of Ottawa Design Guidelines Design Parameters

Design Parameter	Value
Industrial – Light Demand	35,000 L/(gross ha)/d
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Desired operating pressure range during normal operating conditions	345 kPa (50 psi) and 552 kPa (80 psi)
During maximum hourly demand conditions pressure must not drop below	276 kPa (40 psi)
During normal operating conditions pressure shall not exceed	552 kPa (80 psi)
During maximum day and fire flow operating conditions pressure must not drop below	140 kPa (20 psi)

**Table updated to reflect technical Bulletin ISDTB-2018-02*



The interior layout and architectural floor plans have been reviewed, and it was determined that the building will include:

- 3 commercial / industrial units (auto service, auto body shop)

The required water supply requirements for the industrial units in proposed building have been calculated using the following formula:

Where: $Q = (q \times A \times M)$
 q = average water consumption (L/grossha/day)
 A = gross area (ha)
 M = Peak factor

For industrial water demands, the following factors were used in calculations as per Table 4.2 in the Ottawa Design Guidelines – Water Distribution:

- Maximum Daily Demand Commercial Factor = **1.5**
- Peak Hour Demand Commercial Factor = **1.8**

For a site with an approximate area of **0.172** ha, the industrial anticipated demands were calculated as follows:

- Average daily domestic water demand is **0.069** L/s,
- Maximum daily demand is **0.103** L/s, and
- Maximum hourly is **0.186** L/s.

Refer to **Appendix B** for water demand calculations.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in **Appendix B**. Table 3 below summarizes boundary conditions for the proposed development.

Table 2: Summary of Anticipated Demands and Boundary Conditions

Design Parameter	Anticipated Demand (L/s)	Boundary Conditions @ Bank Street Head (m) / Pressure (psi)
Average Daily Demand	0.069	165.2 / 74.3
Max Day + Fire Flow (per FUS)	0.103 + 100.0	155.2 / 60.1
Peak Hour	0.186	159.9 / 66.8
* Assumed Ground elevation at connection point = 112.93 m.		
Water demand calculation per City of Ottawa Water Design guidelines. See Appendix B for details.		

As shown above, pressures from boundary conditions exceed the minimum required threshold in all scenarios.



The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect, see **Appendix A** for collaborating correspondence:

- Type of construction – Ordinary Construction
- Occupancy type – Combustible
- Sprinkler Protection – No sprinkler system

The estimated fire flow demand was estimated to be **6,000 L/min**, see **Appendix B** for details.

There are six (6) existing fire hydrants in close proximity to the proposed buildings that are available to provide the required fire flow demands of 6,000 L/min. Refer to **Appendix B** for fire hydrant locations.

Table 4 below summarizes the contributing hydrants within close proximity (equal to or less than 305m) to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 3: Fire Protection Summary Table

Building	Fire Flow Demand (L/min)	Fire Hydrants(s) within 76m	Fire Hydrant(s) within 152m	Fire Hydrant(s) within 305m
Proposed Commercial Building	6000	1	2	3

As the fire hydrants listed above all pull from the same watermain, a drop in pressure is expected when pulling from multiple hydrants. The total available fire flow from contributing hydrants will need to be established by the City of Ottawa through a multi-hydrant analysis.

5 SANITARY SERVICE

5.1 Existing Sanitary Sewer Services

There is no sanitary sewer located within Bank Street. The sanitary outflows produced by the current site are treated by a septic system, and release via leaching bed.

The existing septic system will need to be removed. Removal of the existing system will require approval by the OSSO.

5.2 Sanitary Sewer Servicing Design

The proposed development will be serviced via a septic treatment system and leaching bed, to be buried at the rear (west) of the property.

The parameters to be used to calculate the anticipated sanitary flows are:

- A commercial/industrial lot space / gross area of 0.172ha



- A light industrial flow of 35,000 L/ha/day
- An industrial peaking factor of 7.0
- a total infiltration rate of 0.33 L/s/ha

Based on these parameters the total anticipated wet sanitary flow was estimated to be **0.54 L/s**. Refer to LRL drawing C401 in **Appendix E** for the proposed sanitary servicing.

Refer to **Appendix C** for the site sanitary sewer design sheet.

The septic system design is to be performed by an accredited septic designer.

6 STORMWATER MANAGEMENT

6.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the City of Ottawa stormwater management system. As such, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

In pre-development conditions, stormwater from a small portion of the front (East) of the property will flow uncontrolled overland to the Bank Street roadside ditch. The balance of the site's stormwater flows uncontrolled overland to the West & South property lines.

Refer to **Appendix E** for pre-development watershed information.

6.2 Design Criteria

The stormwater management criteria for this development are based on the pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City standards), as well as the Ministry of the Environment's Stormwater Planning and Design Manual, 2003 (SWMPD Manual).

6.2.1 Water Quality

The proposed development lot is subject to review by the City of Ottawa. It was determined that site stormwater management quality criteria for the site will follow the City's requirements; 80% TSS removal (based on MOE fine PSD).

Stormwater quality requirements have been met by incorporating a treatment unit within the stormwater network, the Stormceptor EFO4 stormwater treatment unit (or approved equivalent). Supporting calculations for TSS removal can be found in **Appendix D**.

In due course, an agreement for ongoing maintenance between the owner and the servicing company will be required to be witnessed by the City.

Correspondence (pre-application consultation meeting minutes) with municipal input is included in **Appendix A**.



Quality treatment unit details have been included within **Appendix D**.

6.2.2 Water Quantity

Based on pre-consultation discussions with the City of Ottawa and South Nation Conservation Authority, correspondence included in **Appendix A**, the following stormwater management requirements were identified for the subject site:

- Meet an allowable release rate based on the existing Rational Method Coefficient of no more than 0.50, employing the City of Ottawa IDF parameters for a 2-year storm with a calculated time of concentration equal to or greater than 10 minutes.
- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site.

The allowable release rate for the subject site was calculated to be **18.36 L/s**.

Refer to **Appendix D** for calculations.

6.3 Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site to quantify the detention storage required for quantity control of the development.

Refer to **Appendix D** for storage calculations.

6.4 Proposed Stormwater Quantity Controls

The extent of the stormwater management quantity control calculations will focus on the proposed development and the proposed changes to the site. The proposed changes to the site are as follows;

- 3 unit building development
- Paved driveway, sidewalk/curbs and parking lot
- Grassed area and planters
- Retaining wall bordering South property line

The balance of the site unaffected by these works will remain as they were in existing condition.

The existing site is delineated by catchment EWS-01 (0.172 ha), consisting of buildings, both asphalt and gravel paving, and grassed area (total runoff coefficient of 0.58).

Refer to **Appendix E** Civil Plan C701 for greater detail.

The proposed stormwater management quantity control for this development will be accomplished by restricting flow leaving site via a flow control at the outlet of the stormwater management network; a Hydrovex VHV-100 Flow Control Device (or approved equivalent). Storage required as a result of quantity control measures will be accomplished by minor surface ponding, but mostly via underground storage chambers. Stormwater will be captured by one of the proposed catch basins within the driveway, controlled/stored, conveyed to the treatment unit and ultimately pumped up to the Bank Street roadside ditch.



The proposed site storm sewer and stormwater management system are shown on drawing C401 and detailed calculations, including the design sheet, can be found in **Appendix D**.

The proposed site development has been analyzed and post development watersheds have been allocated.

- Watershed WS-01 (0.083 ha), consisting of the east and central portions of the driveway and parking lot, as well as 2 bay rooftops, will be captured by CBMH02
- Watershed WS-02 (0.047 ha), consisting of mostly the asphalt driveway cul-de-sac, 1 bay rooftop and surrounding grass area, will be captured by catch basin CB01.
- Watershed WS-03 (0.070 ha), consisting of the west grassed portion of the site and property line buffers, will flow overland off site uncontrolled, as it did in pre-development conditions

Table 4 below summarizes post-development drainage areas. Detailed calculations can be seen in **Appendix D**.

Table 4: Post Development Drainage Areas

Drainage Area Name	Area (ha)	Weighted Runoff Coefficient (C)	100 Year Weighted Runoff Coefficient (25% increase)
WS-01 (controlled)	0.083	0.71	0.89
WS-02 (controlled)	0.047	0.72	0.90
WS-03 (uncontrolled)	0.070	0.20	0.25

Table 5 below summarizes the release rates and storage volumes required to meet the allowable release rate of 18.36 L/s for 100-year flow.

Table 5: Stormwater Release Rate & Storage Volume Summary (100 Year)

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m ³)	Total Available Storage (m ³)
WS-01, WS-02 (controlled via ICD)	0.130	9.50*	47.58**	50.53
WS-03 (uncontrolled)	0.070	8.69	0.00	0.00
TOTAL	0.172	18.19	47.58	50.53

*proposed controlled release rate using flow control unit

**as stormwater storage is occurring underground, the controlled release rate was halved to 7.25 L/s for storage volume calculations



The 100-year maximum ponding depths can be found on drawing “C601 – Stormwater Management Plan” of **Appendix E**.

7 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction. Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS 577.

Refer to drawing C101 in **Appendix E** for erosion and sediment control details.

8 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 5254 Bank Street presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

Water Service

- The maximum required fire flow was calculated at **6,000 L/min** using the FUS method.
- There are six (6) existing fire hydrants within close proximity to the proposed development. As the hydrants follow the same watermain, the city will need to provide a multi-hydrant analysis to confirm adequate fire flow can be provided.
- The new proposed building will be serviced by one (1) new connection: a new 19 mm diameter water service to be connected to the existing 406 mm diameter watermain within Bank Street.
- Boundary conditions received from the City of Ottawa indicate that sufficient pressure is available to service the proposed site.

Sanitary Service

- The anticipated sanitary flow from the proposed development is **0.54 L/s**.
- The proposed development will be serviced by a septic treatment train and leaching bed (design by others).

Stormwater Management

- Stormwater quality controls require a minimum 80% TSS removal, which will be achieved by the proposed stormwater treatment unit.
- The storm water release rates from the proposed development will meet calculated allowable release rate of **18.36 L/s**.



- Stormwater quantity control objectives will be met through overland ponding and underground storage structures, and control will be provided via the flow control unit proposed.

9 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document. If you have any questions or comments, please contact the undersigned.

Prepared by:
LRL Associates Ltd.



Mohan Basnet, P. Eng.
Civil Engineer

A handwritten signature in black ink, appearing to read 'Kyle Herold', with a long horizontal line extending to the right.

Kyle Herold
Civil Designer



APPENDIX A
Pre-consultation / Correspondance



APPENDIX B
Water Supply Calculations



APPENDIX C

Wastewater Collection Calculations



APPENDIX D

Stormwater Management Calculations



APPENDIX E

Civil Engineering Drawings



DRAWINGS/FIGURES

**Proposed Site Plan
Legal Survey**

